

# Developing Countries Exports Survival in the OECD: Does Experience Matter?\*

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## Abstract

This paper focuses on developing countries that export for the first time to the OECD and obtains several important results on export dynamic, linking exports experience and exports survival. Using product level data at the SITC 5 digit level for 114 developing countries on the 1962-2009 period, we show that prior exports experience obtained in non-OCDE markets increases survival in the OECD market. The effect of experience depreciates however rapidly with time: gaining experience for more than two years is worthless. Moreover, a break in export experience prior to entering the OECD reduces the benefit on survival. Geographic export dynamic reveals that experience is acquired in neighbor, easy to access markets before reaching more distant, richer partners and ultimately serving the OECD. Where the experience is acquired does not however matter for survival.

Keywords: duration of export, survival analysis, experience and learning, developing countries

JEL codes: C41, F10, F14, O50

\* We are grateful to Békés Gábor, Tibor Besedeš, Maria Bas, Olivier Cadot and Emanuel Ornelas for helpful discussions. We also thank seminar participants at ETSG 2011, ERWIT 2012, FREIT/LETC 2012 and PSE trade seminar 2012 for useful comments on the previous version of the paper entitled "Exports Dynamics: Raising Developing Countries Exports Survival through Experience", FERDI WP P35-A, may 2012. We are responsible for any remaining errors.  
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## 1. Introduction

Recent studies covering different countries and periods revealed the short duration of trade flows.<sup>1</sup> We focus on 114 developing countries exports to the OECD market over the 1962-2009 period at the SITC 5 digit level (around 1200 products) and observe similar patterns.<sup>2</sup> Exports at the product-country level are very short-lived: 56% do not survive on the OECD market the first year while 84% are dead after five years. The situation is even worse for low-income countries: 63% of exports do not survive their first year in OECD markets. Following Besedeš and Prusa (2011), we believe that what matters for trade deepening and export growth of developing countries is export survival not just foreign markets entry. Our aim is thus to identify factors that improve survival of developing countries exports in developed economies.

Export experience is a likely candidate. Case studies on developing countries' trade practices identify export experience in regional markets as a way to test products and export capability before reaching and building long term relationship with more demanding markets. For example, in a World Bank survey on African export survival (World bank, 2012), most respondents suggested an export strategy where experience matters: products are first tested on the domestic market, then exported to regional markets before reaching more distant markets. Similarly, Artopoulos et al. (2013) explore factors enabling firms in four Argentinian sectors to export successfully to developed countries. They find that prior export experience is essential to capture export knowledge and build new export business practices. For example, producers in the Yacht industry originally focused on MERCOSUR countries before serving developed markets.

Export experience acquired on foreign markets increase the probability of long term success in subsequent markets for two main reasons: learning by exporting and signaling. First, exporters learn about alternative ways to ship products, customs regulation in their own country, logistics, banking and international laws. They build knowledge on how to develop initial contacts, work with foreign distributors and adopt marketing export business practices. Overall, this trade experimentation reduces the uncertainty associated with exporting to new foreign market and increase the likelihood of surviving in the OECD exigent market. This is consistent with theoretical frameworks of Albornoz et al. (2012), Albornoz et al. (2013), Araujo et al. (2013) or Nguyen (2012) where, in situation of uncertainty about exporting (i.e., unknown export capability or foreign

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<sup>1</sup> e.g. Besedeš and Prusa (2006a, 2006b)'s seminal work as well as several subsequent papers such as Brenton et al. (2010) or Eaton et al. (2008).

<sup>2</sup> Developing countries encompass all non-high income countries according to the World Bank definition: i.e., all countries with income below \$12,196 per capita calculated according to the World Bank Atlas method using 2009 GNI per capita. Low-income countries have income per capita below \$995. The definition of OECD used in this paper includes all pre-1973 OECD countries plus Korea, i.e. Australia, Austria, Canada, Denmark, Finland, France, Italy, Japan, Germany, Belgium, Luxembourg, Spain, Greece, Ireland, Iceland, Korea, Netherland, Norway, New-Zealand, Portugal, Sweden, Switzerland, United Kingdom and United States.

demand), acquiring exports experience reduces exports failure on new foreign markets.<sup>3</sup> Second, having export experience infer signals to importers that the exporter can comply to foreign demand and be a reliable supplier. Such conjecture is in line with theoretical predictions of Rauch and Watson (2003) or Cadot, Carrère and Strauss-Kahn (2013) who model developed countries' search for developing country suppliers in situation of uncertainty about suppliers' reliability. In either case, having a prior export experience results in longer survival in the OECD market.

In this paper, we empirically explore the impact of developing countries export experience in non-OECD markets on export survival in the OECD market and provide evidence on the dynamic of exports and depreciation of experience. We first rely on the well-known Cox (1972) survival model at the product-country level for 114 developing countries over the 1962-2009 period (e.g. Besedeš and Prusa, 2006a 2006b, Brenton et al., 2010). We also propose alternative specifications in order to account for unobserved heterogeneity and potential selection bias: a discrete-time probit model with random effects (Hess and Persson, 2012) and linear model of probability with fixed effects (Araujo et al., 2013).

We find that experience matters - one year of experience prior to reaching the OECD market drastically decreases the export hazard rate. The impact of experience depreciates however rapidly with time: acquiring experience for two consecutive years prior to serving the OECD enhances survival; getting more years of experience is worthless. Moreover, a break in exports experience prior to entering the OECD market reduces the benefit on survival. Whereas exports experience acquired two or three years before entering the OECD still matter for survival, years of experience gained further in the past have no impact on export hazard rates. Export experience is first acquired in the closest non-OECD market. Through time, it occurs in more distant, richer, and less accessible markets. We find however that non-OECD partner's characteristics do not directly impact export duration on OECD market. What matters is to get experience on your product, not where it was acquired.

Of course, export experience and export toward the OECD of a given product may come from different firms.<sup>4</sup> What we are interested in is not so much how to make a firm exports to the OECD profitable but rather how to create a successful sustainable trade flow at the product-country level. Following the work of Hausmann and Rodrik (2003), several papers confirm the information spillovers across export pioneer and subsequent exporters and the related market failure.<sup>5</sup> In our context, the export pioneer bear the cost of acquiring experience in non-OECD markets but may

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<sup>3</sup> Eaton et al. (2012) as well as Freund and Pierola (2010) also provide theoretical ground for the analysis of the role of export experience on entry in new foreign market. These papers do not however consider how experience may be acquired in other markets than the final targeted destination market.

<sup>4</sup> This feature is not so frequent in developing countries where the number of firms per sector is low. For example, Cadot et al. (2013) focus on transaction data for four African countries between 2000 and 2010 and find an average number of firms per product of 1.89 to 3.76.

<sup>5</sup> Cadot et al. (2013) reports important synergies and information spillovers between firms. Freund and Pierola (2010) report anecdotal evidence about Peruvian export of paprika, which confirms the information spillovers across local producers.

not benefit directly from the positive externalities related to having an export experience. From a policy perspective, our findings give some support to subsidizing early exports to non-OECD markets in order to reduce the information asymmetry, capture the externalities from export experience and offset the market failure.<sup>6</sup>

Relying on product-country level data is also relevant in our case because accounting for dynamic experience and survival requires a very large time span. We need to observe exports for several years prior to entering the OECD market as well as many years of exports to the OECD for survival. We are not aware of firm level databases that would provide enough years of data for such an analysis. Finally, the role of experience on survival might differ greatly across countries (e.g., important Diaspora, long term export subventions, etc.).<sup>7</sup> By using product-country level data, we provide a global view of the role of export experience on survival controlling for country specific characteristics. Our work thus complements firm level studies on similar topics and enhances the existing product level literature on export survival in a development perspective.

A recent but growing empirical literature investigates the role of export experience on exports size and on the probability of export failure in subsequent markets. Dutt et al. (2013) focuses on country level data and include a measure of export experience in gravity equation. They find that having previous countries export experience lead to sharp increase in bilateral trade. Using firm level data, Albornoz et al. (2013) and Araujo et al. (2013) confirm their theoretical findings on the role of prior export experience in raising the probability of survival upon entry. We contribute to this empirical literature by investigating the role of dynamic experience (which may last for several years) on long run survival at the product-country level.

Our work is also related to recent empirical papers on the dynamic of firms' entry in new foreign markets. These papers shed light on the role of prior export experience in fostering entry into subsequent markets (Eaton et al. 2008, Albornoz et al. 2012, Lawless 2011 and Ozler et al. 2009), but do not provide insights on the role of experience on export duration.<sup>8</sup> The literature on the determinants of export survival has not much to say on the topic. Experience, when included in the analysis, is viewed as a static phenomenon. It is measured by the number of product sold or the number of destinations reached by the exporter at the time it reaches a new export destination (Volpe and Carballo, 2008, Nitsch, 2009, Brenton et al., 2010 and Cadot et al. 2013). None of these studies investigates the dynamic of prior experience.

The remainder of the paper is organized as follows. Section 2 focuses on the empirical strategy. We present the baseline Cox (1972) survival model, discuss identification issues and propose alternative specifications. Section 3 describes data, definitions of export spells and basic export

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<sup>6</sup> Alternatively, government may reduce the asymmetric information and market failure associated with foreign exports through the financing of export promotion agencies (Lederman et al. 2010 and Volpe Carballo 2010).

<sup>7</sup> Rauch and Trindade (2002) show that the existence of Chinese Diaspora creates networks that facilitate bilateral trade.

<sup>8</sup> Early empirical studies demonstrate that past export experience increase the likelihood of being an exporter today (e.g., Roberts and Tybout 1997, Evenett and Venables 2002 and Bernard and Jensen 2004).

survival analysis. Section 4 examines the dynamic of experience. It explores the role of exports experience on exports survival focusing on the timing of experience and show consistent results across specifications. Section 5 investigates the geographic experience dynamic and asks whether characteristics of countries in which exporters acquire experience matter for survival. Section 6 concludes.

## 2. Empirical framework and identification strategy

We study the role of experience in export survival at the country-product level using 5 digit SITC data (backwards classification – revision 1) over the 1962-2009 period. We consider the exports of 114 developing countries toward the OECD market and analyze the experience gained on non-OECD markets prior to entering the OECD for the *first time*.<sup>9</sup> In order to insure that we are capturing new export spells for which prior non-OECD experience is easily identifiable, we focus on the sub-sample of first export spells to the OECD market (a spell is defined as a period of time with an uninterrupted product export from a given country to the OECD market). Our dependent variable thus captures survival duration of exports within the OECD at the product-country level.<sup>10</sup>

We deliberately explore the role of prior export experience on survival in the *aggregate* OECD market and argue it is relevant for several reasons. First, distinguishing OECD countries may result in missing years of successful developing countries' export (survival) within the OECD. Assume for example that country  $d$  is the first OECD market served for product  $i$  by developing country  $j$ , that exports to  $d$  last for 3 years (and stop in year 3) and that in the meantime exports of  $i$  from  $j$  spread to other OECD countries. By distinguishing OECD countries we would conclude that the export of  $i$  from  $j$  died after 3 years, while in fact the product is still exported toward other countries of the OECD (for which it was no more a first spell). Second, we do not intent to study the role of experience within an OECD country prior to surviving in other OECD markets, our focus is on successful (long-term) exports toward the OECD market and we thus believe that exploring export survival in the aggregate OECD market is appropriate.

In order to assess the impact of experience on the hazard rate, we first use the most popular semi-parametric continuous Cox (1972) survival model. This model presents several limitations, which we discuss below. It is however appropriate to account for the full duration of our data, study long run survival and as such it has been widely used in the survival literature (e.g., Besedeš and Prusa 2006a, 2006b, Fugazza and Molina 2011, Brenton et al. 2010, Nitsch 2009, Volpe and Carballo 2008 and Görg et al. 2012).

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<sup>9</sup> Developing countries and OECD countries are defined above. We dropped from the sample all countries that do not report any exports to the world for at least 10 consecutive years.

<sup>10</sup> Note that the dimension of our analysis precludes the use of product-country fixed effects.

In the Cox (1972) model, the hazard rate,  $h_{ij}(t+k)$ , for the export flow of product  $i$  from country  $j$  to the OECD in  $t+k$  (and exported for the first time to the OECD in  $t$ ) is assumed to be:

$$h_{ij}(t+k) = h_{0i}(t+k) \exp(\alpha \text{Exp}_{ij(t-1)} + \mathbf{X}_{ijt} \beta + \gamma_j + \gamma_t) \quad (1)$$

where  $\text{Exp}_{ij(t-1)}$  is a dummy variable taking a value of 1 if product  $i$  from country  $j$  is exported to a non-OECD country in  $t-1$  prior to entering the OECD in  $t$ . Note that in subsequent regressions, we also account for the number of consecutive years of prior experience, e.g.,  $\text{Exp}_{ij(t-2)/\text{Exp}_{ij(t-1)}=1}$  and for breaks in experience, e.g.,  $\text{Exp}_{ij(t-2)/\text{Exp}_{ij(t-1)}=0}$ .  $\mathbf{X}_{ijt}$  is a vector of covariates for the export flow and  $h_{0i}$  is the baseline hazard. Our Cox model is stratified in order to take into account unobserved heterogeneity at the product level: we do not force the baseline hazard to be proportional across products (Brenton et al. 2010). We also introduce year and exporting country fixed effects ( $\gamma_t$  and  $\gamma_j$  respectively).

The Cox estimator is convenient because of its semi-parametric properties, i.e. partial likelihood approach with no specific assumptions about the shape of the baseline hazard, it however presents two major drawbacks when applied to large trade data sets (Hess and Persson, 2012). First, it is difficult to properly control for unobserved heterogeneity and second, the model imposes the restrictive assumption of proportional hazards. We thus propose alternative methodologies, a discrete-time conditional probit (Hess and Persson, 2012) and a linear model of probability with fixed effects (Araujo et al., 2013) in order to deal with these two points – we will come back on these models below.

Our main concern when studying the link between prior experience and survival is a selection bias: product-country spells  $ij$  survive better on the OECD market not because prior experience revealed or enhanced the ability of country  $j$  to export product  $i$  but because country  $j$  is better at producing product  $i$  and could not access the OECD directly. In effect, for identification we need prior export experience on non-OECD countries to be a choice. If access to the OECD is constraint, some efficient exporters may have to stay away from this market. When they finally enter the OECD, they survive longer, not because they had experience but because they are better (which is why they exported to non-OECD markets in the first place). In contrast, if there are no constraints to serving the OECD market, prior export experience in non-OECD market reflect a willingness to test and potentially enhance the export ability, which is exactly what we want to capture. Access to the OECD market may be constrained by a lack of demand for product  $i$ , whether it results from consumer's preferences or prohibitive tariffs. A positive demand shock may then lead to a selection bias driven by an omitted variable: the country efficiency in producing a product  $i$ . We address this issue in several ways.

First, we control for Balassa's measures of revealed comparative advantage (RCA) at the country-product-time level.<sup>11</sup> The RCA controls for the selection bias that would occur if country  $j$  has a comparative advantage in product  $i$  in  $t$ , explaining both that it shows high survival within the OECD and was already exporting when the OECD was inaccessible. By including the RCA variable in the analysis, we thus capture the role of prior export experience on the hazard rate for a given level of country export efficiency.

Selection bias becomes an issue if entry in the OECD market is constraint. We thus complement the RCA as control by exploring whether an OECD demand shock for a given product (i.e., withdraw of the constraint caused by a change in consumers' preferences or a change in tariffs) occurred over the period. As shown in Section 4.2, the distribution of new exporting countries to the OECD at the product-time level reveals that important demand shocks are unlikely. Still, we test the robustness of our result by dropping from the sample such demand shocks.

Exports of heterogeneous goods are more likely to be subject to asymmetric information and may therefore particularly benefit from prior experience in non-OECD countries. Export experience should thus matter more for differentiated good than for homogeneous one, which have a referenced price and for which export are more standardized (Albornoz et al. 2012). In contrast, selection bias, if any, should apply to both types of goods. We implement this identification strategy by interacting our experience measures with the elasticity of substitution between varieties as estimated by Broda et al. (2006) for the US over 1994 – 2003 at the HS-3 digit and denoted by  $\sigma$ .

Finally, acknowledging that selection bias is essentially an omitted variable bias at the country-time level, we follow Araujo et al. (2013) and deal with this issue by properly controlling for exporter-time fixed effects. In order to do so, we consider two alternative models. The first one is a discrete-time hazard model proposed by Hess and Persson (2012) as a way to better handle the unobserved heterogeneity in Cox models. The discrete-time hazard rate,  $h_{ijk,t}$  is defined as the following conditional probit:

$$\begin{aligned} h_{ijk} &= P(T_{ij} < t + k + 1 | T_{ij} \geq t + k, Exp_{ij(t-1)}, X_{ijt}) \\ &= \Phi(\alpha Exp_{ij(t-1)} + X_{ijt} \beta + \gamma_k + \gamma_j + v_{ij}) \end{aligned} \quad (2)$$

where  $T_{ij}$  is a random variable that measure the survival rate of a particular spell  $ij$  and  $\Phi$  is the standard normal cumulative distribution function. In addition to duration (marking the current length of the spell),  $\gamma_k$ , and product,  $\gamma_i$ , fixed effects, we introduce a country-time random effects,  $v_{jt}$ .

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<sup>11</sup> We consider both a standard Balassa's RCA index and an alternative RCA index as defined by Proudman and Redding (2000). These measures are further described in Section 4.2.

Another interesting method to control for country-time heterogeneity, while relaxing the assumption of proportional hazards, is to estimate a linear probability model for every duration  $k$ . With such a specification, we obtain a set of estimated coefficients for each  $k$ , allowing for the evolution of these coefficients over time. More precisely, following Araujo et al. (2013), we define a dummy  $S_{ijt}^k$  that takes a value of 1 if country  $j$  which first exported product  $i$  to the OECD in  $t$  is still serving the OECD after  $k$  years. We may wonder whether, for example, prior export experience still matters after 10 years of survival. We estimate the following equation:

$$S_{ijt}^k = \text{constant} + \alpha \text{Exp}_{ij(t-1)} + \beta X_{ijt} + \gamma_i + \nu_{jt} + \varepsilon_{ijt} \quad (3)$$

with  $\gamma_i$  and  $\nu_{jt}$  being product and country-time fixed effects respectively. The other advantage of this specification relates to the use of linear probability which allows for two-way clustered standard errors at the country and product level.

### 3. Data and Variables

#### 3.1. Data and Definition

Our database includes 5 digit SITC level country-product data for the 1962-2009 period and covers 114 developing countries. We exclude from the database mineral fuel (SITC section 3) and arm products (SITC section 9) which specificities are likely to bias the results. We thus consider 1,268 products. Import data tend to be more reliable than export data, especially for non-OECD countries, we thus follow the common strategy of using mirror statistics (imports as declared by the OECD countries from all available exporters).

The period considered (47 years of trade data) is long enough for export survival analysis. Prior studies, with the exception of Hess and Persson (2011), do not go back that far in time. Following Besedeš and Prusa (2006a), a “new” export of country  $j$  to the OECD market corresponds to a product that was not exported in year  $t-1$  but is exported in  $t$ .<sup>12</sup> As a first step, we do not impose any minimum export value for new export. We will however test the robustness of our results to imposing a minimum of 1000 \$ as done in Besedeš and Prusa (2006a) or Brenton et al. (2010).

We do not consider an export as “new” if the first year of positive trade corresponds to the first years of reported data. We thus drop left-censored data, i.e., if the first year of exports at the country-product level coincides with the first year of reported trade data, the observation (i.e., the spell) is dropped from the analysis. By contrast, the sample still includes trade flows that are positive in the last years of our sample (2009) and for which we do not have any information on how much longer they will last. These right-censored data are not an issue as econometric techniques handle them easily.

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<sup>12</sup> Our results are robust to alternative – and more restrictive – definitions of new products (see Section 4.1).



The final sample includes 114 countries, and 62,031 first export spells to the OECD market.<sup>13</sup> The composition of the sample is further described in Table A1 in the Appendix. The Kaplan-Meier estimator can be used as a first step to non-parametrically characterize survival functions by providing the fraction of spells that survive at least  $k$  years. The spell duration (calculated as the number of consecutive years with non-zero data and reported in Table A2 in the Appendix), is of only one year for 74% of the sample, of 2 years for 12% of the sample with a maximum of 47 years for 0.2% of the export spells.

### 3.2. Basic Survival Analysis

About half (46.1%) of these 62,031 first spells acquired experience before serving the OECD markets. The experience in non-OECD market occurs in the few years preceding entry (one to five years).<sup>14</sup> For 42.2% of the spells with an experience, we observe exports to non-OECD countries in the year preceding entry into the OECD. Few spells present non-OECD experience for more than two consecutive years (7.2% of the export spells having experience are active in both  $t-1$  and  $t-2$ , 4.1% in  $t-1$ ,  $t-2$  and  $t-3$ , 2.7% in  $t-1$ ,  $t-2$ ,  $t-3$  and  $t-4$ ). Interruption in experience is quite significant with 22.3% of the spells having no experience in the year preceding entry while there is experience two or three years before serving the OECD markets.

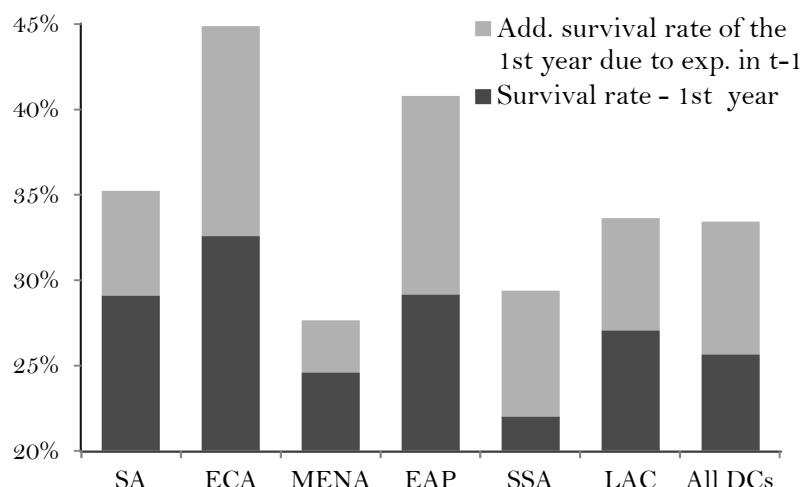
As a first piece of evidence, Figure 1 shows the survival rates, after one year, of developing countries' export to the OECD, with and without export experience in the year prior to entering the OECD. The figure reveals an important impact of non-OECD prior export experience on survival. Over all exporters, prior experience in  $t-1$  raises the survival rate of export flows in the OECD market after one year by 7.8 percentage point or around 30%.

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<sup>13</sup> Our data being left censored, we cannot guaranty that a spell starting in 1963 is the very first one to the OECD market. Importantly, only 10 % of the sub-sample of "first" spells occurs before 1972. The left censored nature of our data is thus unlikely to affect our result significantly. We further test for the robustness of our result to left-censoring by running our main estimation on the subsample of first spells occurring after 1980 or even 1990. Results are unchanged (see Section 4.1).

<sup>14</sup> We also accounted for left-censoring in pre-OECD experience. As for export to the OECD, if the first year of export to any market (where experience is acquired) coincided with the first year of reported trade data, the observation (i.e., the spell) was dropped from the analysis.

**Figure 1: Survival rates after the first year in OECD market with or without experience in t-1, 1962-2009**



**Note:** based on Kaplan-Meier survival function of developing countries' exports on OECD market (details are given in Table A1 in the Appendix). SA stands for South Asia, ECA for Europe and Central Asia, MENA for Middle East and North Africa, EAP for East Asia and Pacific, SSA for Sub-Saharan Africa, LAC for Latin America and Caribbean.

**Source:** Authors' computation from COMTRADE's database

In order to correctly apprehend the impact of experience on export survival one should however control for variables that may influence survival rates such as country and spells size as well as specific links with the OECD such as reciprocal and non-reciprocal preferential schemes. This is what we ought to do through the estimations of continuous-time (Cox) model, discrete-time random effect probit model and a linear duration probability model.

### 3.3. Variables

We investigate the time profile of a product exports before its first entry into the OECD market, allowing for dynamic experience in non-OECD countries. Such experience allows the exporter to learn about its ability to sale in foreign markets as well as about the quality and/or fit of its products. We thus need to construct a product-level measure of experience.

Three measures reflecting the time profile of experience are introduced into the analysis. The first one is a dummy variable at the product-country level which takes a value of 1 if there is a prior experience on non-OECD market before reaching the OECD. The second one accounts for the number of consecutive years of prior experience acquired before entry into the OECD market. This measure captures the impact on survival of export experience in t-1 but also potential additional impacts of already being an exporter in t-2, t-3, etc. Finally, the third variable specifies whether the experience in non-OECD markets occurred just before entry in OECD markets or whether it was an older interrupted experience. That is: does experience in say t-2, with no export experience in t-1, also matters? These latter sets of variables allow us to approximate a kind of "depreciation" rate in experience.

We run survival analysis including dynamic experience variables and, as controls, other common variables found in the survival literature (e.g., Besedeš and Prusa 2006b, Fugazza and Molina 2009 or Brenton et al. 2010). Such variables consistently and significantly impact the hazard rate. They include the initial export value, GDP, market access (i.e. preferential trade agreement index), the number of exporters of the same products to the OECD market and a dummy variable capturing whether the trade relationship consists on several spells. These variables are further described in Appendix 2. "Gravity-type" variables such as geographical distance and contiguity are controlled for by exporting country fixed effects. Finally, as in Nitsch (2009), Brenton et al. (2010), Volpe and Carballo (2008) or Cadot et al. (2011), we also include variables capturing static experiences (i.e., current market and product experience) as defined below.

For a new export of product  $i$  to the OECD by exporter  $j$  in  $t$ , "static" experience is defined as: (i) the "*current product experience*", i.e. the number of non-OECD countries to whom product  $i$  is exported from country  $j$  at time  $t$ ; (ii) the "*current market experience*", i.e. the numbers of products other than  $i$  already exported to the OECD in  $t$ . In contrast with the dynamic measures of experience defined above, contemporaneous measures do not refer to the life cycle of the product and may actually correspond to exporters' geographic risk diversification or exporter-specific market access.

## 4. The dynamic of experience matters for survival

### 4.1. Baseline results

As a first step, we rely on the stratified Cox model. Table 1 reports the marginal coefficients of the Cox estimates. Acquiring export experience before entering the OECD market clearly matters. As shown in col. (1) of Table 1, having at least one year of prior experience before entering the OECD market counts for survival (i.e., it decreases significantly the export hazard rate). Two consecutive years of experience is however enough to experiment export profitability at the product-country level (i.e. after two consecutive years of experience additional years does not decrease the hazard rate). These results can be seen in columns (2) where the coefficient on experience in  $t-1$  is negative and highly significant whereas the coefficient on  $t-2$  loses in size and significance and coefficient on  $t-3$  and further dates are no more significant. Thus, only the first two consecutive years of experience prior to entering the OECD market matters for export survival.

The estimation in column (3) explores the effect of breaks in export experience. Product-country spells with recent export experience are more likely to survive, i.e.: recent experience lowers the hazard rate more than experience that occurred further in the past. Having at least one year of export experience in  $t-2$  instead of  $t-1$  decreases the impact on that experience on the survival rate by 0.8 percentage point, i.e. by about 15%. Having at least one year of export experience in  $t-3$  instead of  $t-1$  decreases the impact on that experience on the survival rate by 39%. Having an experience older than 3 years does not enhance survival in the OECD market. The effect of experience thus decreases rapidly over time.

**Table 1: Dynamic Experience in non-OECD markets and Survival of first spells, 1962-2009.**

| <i>Impact on hazard rate / Cox model with product stratification</i> |                |          |    |          |    |          |    |
|--|----------------|----------|----|----------|----|----------|----|
|  |                | (1)      |    | (2)      |    | (3)      |    |
| Initial Value  | <i>ln</i>      | -0.053   | a/ | -0.053   | a/ | -0.053   | a/ |
| GDP  | <i>ln</i>      | 0.002    |    | 0.002    |    | 0.003    |    |
| Market Access  | <i>[0;1]</i>   | 0.007    |    | 0.007    |    | 0.008    |    |
|  | <i>unit=1</i>  |          |    |          |    |          |    |
| Competition  | <i>country</i> | -0.003   | a/ | -0.003   | a/ | -0.003   | a/ |
|  | <i>unit=1</i>  |          |    |          |    |          |    |
| Multiple Spell   | <i>spell</i>   | 0.350    | a/ | 0.349    | a/ | 0.350    | a/ |
|  | <i>unit=1</i>  |          |    |          |    |          |    |
| Current Market exp.  | <i>product</i> | -0.001   | a/ | -0.001   | a/ | -0.001   | a/ |
|  | <i>unit=1</i>  |          |    |          |    |          |    |
| Current Product exp.   | <i>country</i> | -0.051   | a/ | -0.046   | a/ | -0.045   | a/ |
| <b>Previous experience</b>   |                |          |    |          |    |          |    |
| Prev. Product Exp.   | <i>dummy</i>   | -0.032   | a/ |          |    |          |    |
| <b>Decomposition of the timing of previous experience</b>            |                |          |    |          |    |          |    |
| Exp t-1  | <i>dummy</i>   |          |    | -0.035   | a/ | -0.054   | a/ |
| Exp t-2 /Exp t-1=1   | <i>dummy</i>   |          |    | -0.025   | c/ |          |    |
| Exp t-3/Exp t-1=1<br>& Exp t-2=1                                     | <i>dummy</i>   |          |    | -0.012   |    |          |    |
| Exp t-4/Exp t-1=1 & Exp<br>t-2=1 & Exp t-3=1                         | <i>dummy</i>   |          |    | 0.034    |    |          |    |
| Exp t-2 /Exp t-1=0   | <i>dummy</i>   |          |    |          |    | -0.046   | a/ |
| Exp≥ t-3/Exp t-1=0<br>& Exp t-2=0                                    | <i>dummy</i>   |          |    |          |    | -0.033   | a/ |
| Exp≥ t-4/Exp t-1=0 &<br>Exp t-2=0 & Exp t-3=0                        | <i>dummy</i>   |          |    |          |    | -0.007   |    |
| Model  |                | Cox      |    | Cox      |    | Cox      |    |
| Year FE  |                | yes      |    | yes      |    | yes      |    |
| Exporter FE  |                | yes      |    | yes      |    | yes      |    |
| Product stratification   |                | yes      |    | yes      |    | yes      |    |
| Nber of Spells   |                | 62'031   |    | 62'031   |    | 62'031   |    |
| log likelihood   |                | -210'801 |    | -210'799 |    | -210'799 |    |

We report the marginal coefficients of the Cox estimates. a/ denotes estimates significant at 1%, b/ at 5% and c/ at 10%. Clustered (product) standard errors.

**Source:** Authors' computation from COMTRADE's database

This strong depreciation rate is in line with results obtained at the firm level by Ozler et al. (2009) on the probability of entry into a new market. They find that the likelihood of exporting to new markets in  $t$  for a plant that exported  $t-2$  is 79% lower than the likelihood for a plant that exported in  $t-1$  (see also Robert and Tybout 1997). Using a large and lengthy country-product level database, we find that the depreciation of experience not only matters for entry but also for survival.

Our control variables behave as expected. Higher values of initial exports reduce the hazard of exporting. This finding corroborates previous results on export duration. Market access (PTAs) and GDP variables are insignificant once exporter fixed effects are included.<sup>15</sup> Interestingly, the higher the number of competitors on the OECD market, the lower the export hazard rate. Cadot et al. (2013) find similar results at the firm level (i.e., the existence of other firms exporting the same product to the same destination increase survival in export markets) and interpret it as synergy effects. In our case, it more likely reflects high demand in OECD markets for products originating from developing countries. That is: for a given product, the market exists and is large. As for the multiple spells variable, estimates show the expected positive sign, suggesting that first spells in multiple-spells relationships are systematically shorter than in single-spell relationships.

Importantly, our results clearly suggest that static export experience is product, rather than market specific. Selling the product to an additional destination country reduces the hazard by approximately 5 percentage points *ceteris paribus* while introducing an additional product on the OECD market lowers the hazard by a much lower 0.1 percentage point. These results are in line with the findings obtained by Volpe and Carballo (2008) on Peruvian firm data and by Brenton et al. (2010) on country level data.

Finally, we explore whether these results are robust to alternative samples and definitions (Table A3 in the Appendix). First, we reduce the sample to spells with initial values above 1,000 US\$ (specification 1). In specifications (2) and (3), we ensure that our spells are in effect the first to the OECD (i.e., accounting for potential remaining left censoring issues), by restricting our sample to the post-1980 and post-1990 first spells. We test for alternative and more restrictive definitions of new products in specifications (4) and (5). Our results remain robust and stable under these alternative specifications.

In sum, our baseline analysis, regressing export hazard rates in the OECD on prior product-country level export experience in non-OECD countries, shows an important effect of one to two years of experience on export survival. Acquiring more consecutive years of experience is useless and breaks in exports prior to entering the OECD market diminish the benefit of experience. Our next task is to confirm our results through several tests accounting for selection bias in the estimation.

## 4.2. Identification and Robustness

As mentioned in Section 2, unobserved heterogeneity and potential selection bias may persist in our baseline analysis. This would occur if a product-country spells  $ij$  survive better on the OECD market because country  $j$  is efficient at producing product  $i$ , independently of prior acquired experience, and could not access the OECD directly. We therefore perform several robustness tests, in order to insure that our results are sound.

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<sup>15</sup> Interestingly, the market access variable enters with a positive coefficient. This suggests that having a higher PTA index and therefore a facilitated access to OECD markets would reduce survival. This feature is further studied in a previous version of the paper (see Carrère and Strauss-Kahn, 2012).

First, we control for the Balassa's revealed comparative advantage (RCA) index defined as:

$$RCA_{ijt}^{Balassa} = \frac{x_{ijt} / \sum_i x_{ijt}}{\sum_j x_{ijt} / \sum_j \sum_i x_{ijt}}$$

where  $x_{ijt}$  stands for country  $j$ ' export of product  $i$  in  $t$ . The RCA controls for the selection bias that would occur if country  $j$  has a comparative advantage in product  $i$ , explaining both that it shows high survival within the OECD and was exporting in non-OECD countries before serving the OECD market. The potential issue with this measure is its dependence on country size, as the denominator is a weighted average of the export shares. As an alternative, we follow Proudman and Redding (2000) and compute the denominator as an unweighted mean.<sup>16</sup> This alternative measure is equivalent to normalizing the Balassa's index by its cross-sectional mean, neutralizing the country size effect. Table 2 specifications (1) and (2) present the results and show that our baseline findings are robust to the inclusion of these controls.<sup>17</sup>

Selection bias becomes an issue if entry in the OECD market is constraint. Still controlling for RCA, we therefore verify that our findings are not systematically associated with a product demand shock from the OECD. The median number of new exporters of a given product to the OECD a same year (whatever the experience) is 2, reflecting that potential bias due to high movements in demand is unlikely. We do test however whether our results are robust to the exclusion of the biggest demand shocks: In specification (3) of Table 2, we drop from our sample spells that correspond to the top 10% biggest demand shocks (i.e. spells for which more than 5 exporters of a same product entering the OECD market the same year). Similarly, in specification (4), we drop the top 25% (corresponding to more than 3 exporters of a given product a same year). As shown in the Table 2, our results are unchanged.

Next, we interact our experience measures with  $\sigma$ , the HS-3 digit level Broda et al. (2006)'s elasticity of substitution for the US over the 1994 – 2003 period. As presented in Table 2 specification (5), the interaction between experience and the elasticity of substitution is positive and significant, implying that experience lower less the exporting hazard when  $\sigma$  is high, i.e. when goods are more substitutable. Note also that the introduction of the elasticity of substitution alone confirms one of the results found in survival analysis namely that differentiated goods survive the longest. This is probably due to the fact that exporters of homogenous goods face fiercer competition in

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<sup>16</sup>  $RCA_{ijt}^{Redding \text{ and } Proudman} = \frac{x_{ijt} / \sum_i x_{ijt}}{\frac{1}{N} \sum_i (x_{ijt} / \sum_i x_{ijt})}$  with  $j=[1 \dots N]$

<sup>17</sup> All specifications reported in Table 2 are systematically run on the 3 equations of Table 1, i.e. on both the "previous experience" dummy and on the time profile of experience. All results of Table 1 remain. In order to save space, we only report in Table 2 results for the previous experience dummy, results are available upon request.

international market (see Fugazza and Molina, 2011 or Besedeš and Prusa 2006a).<sup>18</sup> We thus showed that the interaction of HS3 level elasticity of substitution with HS3-product-country level experience identifies the asymmetric information problem exacerbated for heterogeneous goods that experience help resolve.

Specification (6) in Table 2 provides results of the conditional random effect probit model described in Section 2. In addition to products fixed effects, this specification includes country-year random effects which control for potential selection bias driven by omitted variables at the country-time level. The vector of control variables for this model, as well as for the linear probability model defined below, is the same as in the Cox model. The sign and significance of the experience coefficients on survival is confirmed by the probit analysis as well as all our results concerning the depreciation of experience.

Finally, specifications (7) to (10) report the results of the linear probability model (Araujo et al. 2013). We consider survival in the OECD  $k$  year upon entry ( $k = 1, 2, 5, 10$ ), controlling for country-time fixed effects. The likelihood that an exporter of product  $i$  to the OECD market still serves that market after  $k$  years increases with prior export experience acquired at the product-country level in non-OECD markets. The magnitude of the effect is not negligible. For example, using the unconditional probability of survival as reference, having a previous experience before entering the OECD market would increase the probability of survival after one year by almost 10% ( $1 \times 0.022 / 0.242$ , see specification 7). After 5 years, the impact of experience on survival is clearly less important: it increases the probability of surviving by 4.5%. Consistent with Araujo et al. (2013), we find that the effect of experience on survival diminishes with the time spent within the OECD market.<sup>19</sup>

Our analysis may also suffer from a potential omitted variable if country  $j$  export product  $i$  to the OECD market through foreign direct investment (FDI). This would however result in exports with high survival potential going directly to the OECD (i.e., without prior experience on non-OECD markets). Not controlling for product-country level FDI may thus, at most, underestimate our results on the role of prior experience on export survival.

We have confronted our baseline findings to a series of tests dealing with potential issues of unobserved heterogeneity and selection bias. We introduced RCA as control variables, accounted for constraint on OECD market access and demand shocks, proposed alternative methodologies with product-country fixed effects. Our results on the role of product-country export experience on export survival in the OECD market are strongly robust across these specifications.

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<sup>18</sup> The number of observations is drastically reduced when  $\sigma$  is introducing due to data availability and classification conversion (from HS-3 digit to SITC rev.1 - 5 digits). Importantly, coefficients on variables are very stable.

<sup>19</sup> As in Araujo et al. (2012), for some country variables (i.e., GDP and market access), we introduce growth between period  $t$  and  $t + k$  in addition to the level of these variables. Our results are unchanged.

**Table 2 – Dynamic Experience in non-OECD markets and Survival of first spells, 1962-2009**

| <i>marginal impact</i>   | Nber of spells | Prev. Product Exp. | RCA <sub>ijt</sub> |
|--|----------------|--------------------|--------------------|
| <b>Cox Model with product stratification, country and year fixed effects /</b>   |                |                    |                    |
| 1. RCA <sub>ijt</sub> as control - Balassa definition  | 62,031         | -0.030             | a/ -0.037 a/       |
| 2. RCA <sub>ijt</sub> as control - Redding and Proudman definition   | 62,031         | -0.031             | a/ -0.025 a/       |
| 3. Top-10% of OECD demand shocks dropped from the sample + RCA <sub>ijt</sub> as control - Balassa def.                        | 58,375         | -0.034             | a/ -0.040 a/       |
| 4. Top-25% OECD demand shocks dropped from the sample + RCA <sub>ijt</sub> as control - Balassa def.                           | 48,233         | -0.037             | a/ -0.041 a/       |
| 5. previous experience and degree in product substitutability with coefficient for $\sigma : 0.001$ and $\sigma. Exp : 0.0013$ | 36,668         | -0.056             | -0.064 a/          |
| <b>Discrete-time probit with country-year and product specific effects / marginal impact on the discrete-time hazard rate</b>  |                |                    |                    |
| 6. Conditional random effects probit   | 62031          | -0.052             | a/ -0.083 a/       |
| <b>Linear probability model with country-year and product fixed effects / marginal impact on the survival probability</b>      |                |                    |                    |
| 7. k=1 year / <i>Uncond. Prob. of surviving</i> =0.242   | 61,951         | 0.022              | a/ 0.029 a/        |
| 8. k=2 years / <i>Uncond. Prob. of surviving</i> =0.125  | 61,951         | 0.015              | a/ 0.017 a/        |
| 9. k=5 years / <i>Uncond. Prob. of surviving</i> =0.056  | 61,951         | 0.011              | a/ 0.008 a/        |
| 10. k=10 years / <i>Uncond. Prob. of surviving</i> =0.035  | 61,951         | 0.011              | a/ 0.004           |

We report the marginal coefficients of the Cox estimates. a/ denotes estimates significant at 1%, b/ at 5% and c/ at 10%. Clustered (product) standard errors for specifications (1)-(5), Two-way clustered (country product) standard errors for specifications (7)-(10).

Source: Authors' computation from COMTRADE's database



## 5. Acquiring experience.

We established in Section 4 that recent experience in non-OECD countries prior to serving the OECD market notably increases exports survival at the product-country level. In term of timing, exporting in the year preceding OECD entry is the experience that matters. We now focus on OECD pre-entry and ask the following questions: Where do exporters gain their experience and can we identify a geographic dynamic? Does survival depend on where the experience was acquired?

### 5.1. Geographic dynamic of experience

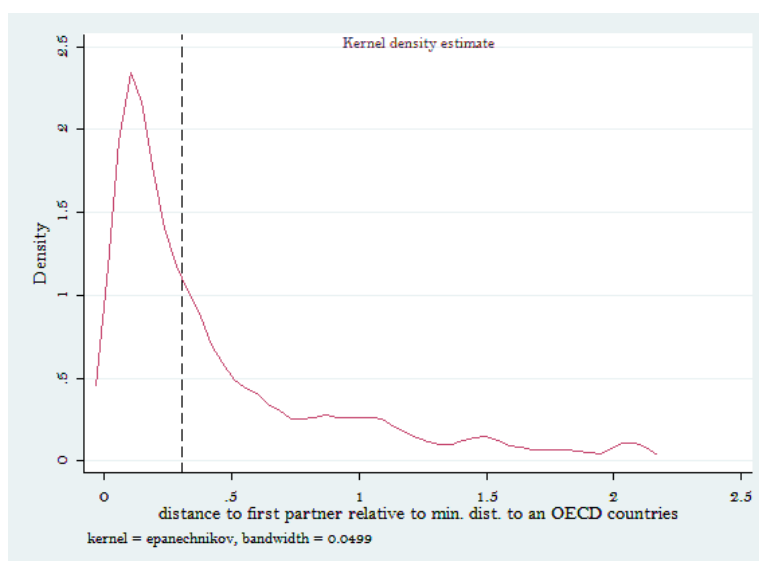
Knowing that accumulating experience is important for export survival in the OECD leads to the natural question of where the experience is acquired. The literature on foreign market entry provides several insights: Recent theoretical and empirical literature emphasize that countries are more likely to export (i.e., export expansion at the extensive margin) to markets that are larger, geographically closer and share a common language (e.g., Eaton and Kortum 2002 and Helpman et al. 2008). More specifically, several recent studies show that trying products on neighbor markets increase the likelihood of entry in subsequent, more distant markets. Evenett and Venables (2002) work at the country level and document a “geographic spread of exports” where exporting to a given country is more likely if the product is already sold in neighboring countries. In the same vein, Eaton et al. (2008) show that once a Colombian firm exports to both its neighbors and other Latin American destinations, it enjoys 24% chances to expand further to reach an OECD market. Closeness thus stands out, among other characteristics, as an essential determinant of entry, suggesting that developing countries may look for experience in the most accessible markets.

We now only consider the sub-sample of first spells having a prior experience and analyze the ratio of the distance between the exporter and its non-OECD partner to its minimum distance with the OECD.<sup>20</sup> Figure 2 represents the kernel distribution of this ratio, the dashed line being the median. An interesting pattern emerges. The Figure shows that 75% of the observations present a ratio significantly lower than 1 which suggests that non-OECD export partners where experience is acquired tend to be closer to the exporter than the OECD market. Exporters likely use their neighbors in order to test their export ability and get experience before reaching the more distant OECD market.

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<sup>20</sup> “Gravity-type” variables such as geographical distance (i.e. minimum distance between exporter and one OECD country), and contiguity (1 if such link exists between the exporter and at least one OECD country) are from the CEPII and are available at <http://www.cepii.fr/anglaisgraph/bdd/gravity.htm>.

**Figure 2: Kernel density of the distance between the exporter and its non-OECD partner relative to the minimum distance between the exporter and the OECD market.**



**Note:** the 10% observations with the highest ratio are not reported here.

**Source:** Authors' computation from COMTRADE's database

As an important piece of evidence on the geographic dynamic of experience, we study the evolution of exports at the product-country level that report five consecutive years of export experience before serving the OECD market. Commonly new non-OECD partners are added over these 5 years. We thus compare, in the year prior to entry into the OECD market (i.e.,  $t-1$ ), the characteristics of old and new non-OECD partners. Old partners refer to partners that were already present in  $t-5$  (on average 2 per exporter/product, with a maximum of 12), whereas new partners were added over the 5 years. These new partners represent 53% of the total number of non-OECD partners in  $t-1$ .

Table 3 clearly shows that old partners (i.e. countries on which the very first export experience is done) are more likely to share frontier and language with the exporter whereas new non-OECD partners are more distant to and have lower PTAs index with the exporter. New partners also have higher GDP. We thus confirm at the aggregate level several firms entry characteristics revealed by the literature. Our findings are in line with a story where exporters acquire experience in the most accessible markets in term of distance, size and PTAs before serving more distant and larger markets as well as markets outside PTAs.<sup>21</sup>

<sup>21</sup> Similarly, Molina (2010) shows a pattern of export dynamic where exports expand from within PTAs member countries to non-members countries.

**Table 3. Comparison of non-OECD partners between t-5 and t-1**  
(average over new partners vs. old ones in t-1)

| New                       | obs. | Contiguity | Same Language | Distance  | PTA       | GDPpc     |
|---------------------------|------|------------|---------------|-----------|-----------|-----------|
| Trad. Partners            | 5564 | 0.454      | 0.798         | 1336.7    | 0.515     | 3926.4    |
| New partners              | 6734 | 0.261      | 0.622         | 2663.9    | 0.436     | 4130.4    |
| <i>Test of mean diff.</i> |      | <i>a/</i>  | <i>a/</i>     | <i>a/</i> | <i>a/</i> | <i>b/</i> |
| Variation                 |      | -42.5%     | -22.0%        | 99.3%     | -15.2%    | 5.2%      |

a/ denotes estimates significant at 1%, b/ at 5% and c/ at 10%.

**Source:** Authors' computation from COMTRADE's database

## 5.2. Does survival depend on where the experience was acquired?

Developing countries get experience on their products' export capability in the closest, easiest to access non-OECD markets. The next question that comes to mind is whether survival depends on where the experience was acquired.

In order to approach this question, we explore whether several characteristics of non-OECD partners prior to exporting to the OECD have an impact on survival in the OECD market. We re-run the model reported in Table 1 col. (1) augmented by 6 variables, namely (i) whether the non-OECD partner belongs to the same region or/and (ii) to the same PTA or/and (iii) shares a common border or/and (iv) shares a common language with the exporter. We also introduce (v) the ratio of the geographical distance between the exporter and its partner relative to the minimum distance between the exporter and the OECD market and (vi) the ratio between the GDP of the partner relative to the one of the exporter. All these variables are interacted with the "experience in t-1" dummy. We look at these determinants jointly and alternatively. Their impacts are never significantly different from zero, i.e. non-OECD partner's characteristics on which experience was acquired do not directly impact the exporting hazard on OECD market.

Evenett and Venables (2002), Defever et al. (2011), Lawless (2011) and Morales et al. (2014) find that proximity between prior and targeted export partners in terms of both geography and level of development significantly boosts the probability of entry. Does it matters as well for survival? In order to capture such proximity, we introduce in the equation reported in table 1 col. (1), the 3 following variables: (i) the PTA index between the non-OECD partners on which experience was acquired and the OECD market; (ii) the geographical minimum distance between these partners and the OECD market and (vi) the GDP of the partners. We also introduce a dummy equal to one if at least one of the non-OECD partners is a high income country. Once again, none of these variables seems to have a direct impact on survival rate.

What matters is thus the established experience, wherever it was acquired. Testing your product and your ability to export on a non-OECD country represents important knowledge in order to survive in the OECD market. The specificity of the country in which the experience is acquired is however not relevant for survival.

## 6. Conclusion

Our findings evidence the importance of export experience for export survival. The level of developing countries' exports toward the world largest market, i.e., the OECD, is a key determinant of growth and development. In order to be successful in the long run (i.e., create a long term export relationship with the OECD), exporters may decide to first acquire export experience by serving easily accessible non-OECD markets (i.e., close in distance, with large market and within the same PTA). Such experience should occur just before reaching the OECD market to be effective. Being the export pioneer may result in a market failure if there are important information spillovers as the pioneer does not benefit from the positive externalities associated with export experience. Government in developing countries may thus be inclined to support early exports to non-OECD markets.

Alternatively, a country that benefit from important PTAs with the OECD may start a trial and error process within the OECD market in order to improve, in the long run, its export relationship. Some preliminary work on the topic actually shows that higher market access to the OECD is associated with multiple spells (i.e. large number of unsuccessful subsequent entries in the OECD market at the country-product level), resulting in the long-run in higher survival (Carrère and Strauss-Kahn, 2012). We ought to explore this pattern deeper in future research.

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## Appendix 1: Tables

**Table A1 – Descriptive Statistics on the first export spells to the OECD market (114 developing countries and 2168 products).**

|                           | Nber of countries | Nber of first spells to OECD | Average Nber of first spells per country | Survival rate - 1st year | Survival rate - 5th year | % having a previous exp. | % of previous exp. being in t-1 | Survival rate of the 1st year with an exp. in t-1 | Survival rate - 5th year with an exp. in t-1 |
|---------------------------|-------------------|------------------------------|--|--------------------------|--------------------------|--------------------------|---------------------------------|---|--|
| South Asia                | 7                 | 4,431                        | 633.0                                    | 29.1%                    | 9.2%                     | 44.1                     | 43.3                            | 35.2%   | 11.1%  |
| Europe & Central Asia     | 3                 | 1,685                        | 561.7                                    | 32.6%                    | 8.9%                     | 43.4                     | 33.2                            | 44.9%   | 15.0%  |
| Middle East & NorthAfrica | 12                | 5,939                        | 494.9                                    | 24.6%                    | 5.0%                     | 52.2                     | 42.1                            | 27.6%   | 5.6%   |
| East Asia & Pacific       | 19                | 8,508                        | 447.8                                    | 29.2%                    | 9.1%                     | 46.0                     | 45.9                            | 40.8%   | 15.3%  |
| Sub-Saharan Africa        | 43                | 21,762                       | 506.1                                    | 22.0%                    | 4.4%                     | 38.7                     | 32.6                            | 29.4%   | 6.2%   |
| Latin America & Caribbean | 30                | 19,706                       | 656.9                                    | 27.0%                    | 6.9%                     | 53.3                     | 49.0                            | 33.6%   | 10.3%  |
| Total                     | 114               | 62,031                       | 544.1                                    | 25.6%                    | 6.4%                     | 46.1                     | 42.2                            | 33.4%   | 9.9%   |

**Note:** columns 4, 5, 8 and 9 corresponds to estimated Kaplan-Meier survival rates.

**Source:** Authors' computation from COMTRADE's database

**Table A2. Estimated Kaplan-Meier Survival Rates.**

| year | All developing countries | Upper Middle Income | Lower Middle Income | Low Income |
|------|--------------------------|---------------------|---------------------|------------|
| 1    | 25.6%                    | 27.9%               | 25.5%               | 20.6%      |
| 2    | 13.6%                    | 15.1%               | 13.7%               | 9.5%       |
| 3    | 9.4%                     | 10.5%               | 9.6%                | 6.1%       |
| 5    | 6.4%                     | 7.1%                | 6.6%                | 3.8%       |
| 10   | 4.2%                     | 4.6%                | 4.4%                | 2.1%       |
| 20   | 3.0%                     | 3.3%                | 3.2%                | 1.2%       |

**Source:** Authors' computation from COMTRADE's database

Whatever the category, a very large fraction of trade spells fail after 1 or 2 years. For the Upper Middle Income only 28% of export spells survive one year, 15% survive 2 years, 4.6% survive 10 years. Hence, we confirm the already well-known result in recent empirical literature: the export spells are very short-lived.

**Table A3 – Dynamic Experience in non-OECD markets and Survival of first spells, 1962-2009**  
**Alternative Samples and Definitions.**

| <i>Impact on hazard rate / Cox model<br/>with product stratification</i>                                      | Nber of<br>spells | Prev.<br>Product<br>Exp. | Exp t-1                | Exp t-2<br>/ Exp t-1=1 | Exp≥ t-3<br>/ Exp t-1=1<br>& Exp t-2=1 | Exp≥ t-4<br>/ Exp t-1=1<br>& Exp t-2=1<br>& Exp t-3=1 | Exp t-2<br>/ Exp t-1=0 | Exp≥ t-3<br>/ Exp t-1=0<br>& Exp t-2=0 | Exp≥ t-4<br>/ Exp t-1=0<br>& Exp t-2=0<br>& Exp t-3=0 |
|---|-------------------|--------------------------|------------------------|------------------------|--|---|------------------------|--|---|
| 1. Alternative sample: only first spell>1000 US\$   | 49,377            | -0.038 a/                | -0.047 a/<br>-0.064 a/ | -0.023 c/              | -0.016                                 | 0.039   | -0.057 a/<br>-0.056 a/ | -0.029 a/<br>-0.029 a/                 | -0.022<br>-0.022                                      |
| 2. Alternative sample: only post-1980 first spells  | 34,855            | -0.019 a/                | -0.031 a/<br>-0.053    | -0.019 c/              | -0.053 c/                              | 0.064   | -0.048 a/              | -0.026 a/                              | -0.001  |
| 3. Alternative sample: only post-1990 first spells  | 21,775            | -0.027 a/                | -0.037 a/<br>-0.066    | -0.0298 c/             | -0.0275                                | 0.0485  | -0.058 a/              | -0.042 a/                              | -0.027  |
| 4. Alternative definitions of new products: "no export in t-1, positive exports in t and t+1"                 | 15,005            | -0.051 a/                | -0.030 b/<br>-0.066 a/ | -0.036 c/              | -0.043                                 | -0.047  | -0.071 b/<br>-0.064 c/ | -0.021 a/<br>-0.015                    | -0.045<br>-0.038                                      |
| 5. Alternative definitions of new products: "no export in t-2 and t-1, positive exports in t and t+1 and t+2" | 15,005            | -0.0315 c/               | -0.009<br>-0.085 a/    | -0.085 c/              | 0.031                                  | -0.118  | -0.071 b/<br>-0.126 c/ | -0.021 a/<br>-0.062                    | -0.045<br>-0.051                                      |

We report the marginal coefficients of the Cox estimates. a/ denotes estimates significant at 1%, b/ at 5% and c/ at 10%.

Clustered (product) standard errors.

**Source:** Authors' computation from COMTRADE's database



## Appendix 2. Description of control variables

The control variables include initial export value (Comtrade, in current dollars) and the exporting country GDP (WDI, in constant 2000US\$). Both are introduced in log and are expected to decrease the hazard rate.

We also introduce a variable capturing market access. This variable is constructed using the bilateral database available from the website of Jeffrey Bergstrand (May 2011 version) and includes both reciprocal and non-reciprocal trade agreements.<sup>22</sup> We compute a weighted average of the preferential trade agreements (PTA) dummy between the exporter and OECD countries, where the weights correspond to each OECD country's GDP. Relying on the shares of intra-regional trade as weights would better capture the intensity of the PTAs. However, given our dependent variable this would clearly introduce some endogeneity issues. Whereas preferential access to the OECD market (on average), is expected to increase entry, its effect on the hazard rate of exports is unknown as easier entry does not necessarily guaranty longer survival.

Two additional variables, common in the literature, are included in the analysis: The number of exporters of the same products to the OECD market (computed from Comtrade) and the number of multiple spells existing for a trade relationship. The former is expected to capture current competition on a specific product market and should increase the hazard rate. The latter refers to a dummy variable equal to 1 if the first spell is followed by other spell(s). It captures the fact that for trade relationships with multiple spells, the first spell is expected to be shorter. Multiple spells should thus lead to higher hazard rate.

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<sup>22</sup><http://www.nd.edu/~jbergstr/>

“Sur quoi la fondera-t-il l’économie du monde qu’il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l’ignore.”

**Pascal**



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