The Internationalization Process of Firms: from Exports to FDI*

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Abstract

We examine how uncertainty affects firms' internationalization choices. We begin by unveiling a new empirical regularity: using a unique dataset that allows us to study the dynamics of firms' exports and foreign direct investments (FDI) in individual destinations, we show that most firms serve a market via exports before investing there. To rationalize this pattern, we describe a model in which firms are uncertain about their profitability in a foreign market and may experiment via exports before engaging in FDI. In line with this idea, we show that the probability that a firm starts investing in a foreign country increases with its export experience in that country. In more uncertain destinations, firms delay FDI entry, experimenting longer with exports before establishing foreign affiliates.

JEL classifications: D21, F10, F13.

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1 Introduction

In recent decades, more and more companies have started to operate outside their domestic markets, exporting their goods to foreign customers and engaging in foreign direct investment (FDI). When deciding whether and how to serve foreign markets, firms face considerable uncertainty: they are often unaware of local regulations and legal requirements; they may also be uncertain about the size of foreign demand and the adequacy of their products to local tastes. In this paper, we examine how foreign market uncertainty affects firms' export and FDI choices.

A vast literature in international business has long emphasized that uncertainty about the "characteristics of the specific national market – its business climate, cultural patterns, structure of the market system, and, most importantly characteristics of the individual customer" can lead firms to follow a gradual internationalization process, serving a foreign market via exports before deciding whether to invest there (Johanson and Vahlne, 1977).

The first contribution of this paper is to unveil a new empirical regularity, which confirms the findings of case studies in the international business literature. Using a unique dataset that provides information on exports and FDI activities of all companies registered in Belgium over the 1998-2008 period, we find that a firm's FDI entry in a foreign market is almost always preceded by exports: in 85.90% of the cases, firms that start investing in a foreign market have already been serving it via exports. The reverse is not true: in 99.95% of the cases, firms that start exporting to a market do so without having previously invested there.

To explain these findings, we describe a simple dynamic model of export and FDI choices. In the spirit of Jovanovic (1982), firms are uncertain about their ability to earn profits in a foreign market and can only discover it by operating there. In this setting, firms may follow a gradual internationalization process, which involves trial and error. A firm may first test a foreign market via exports. After an initial trial period, it will stop exporting to that market, if it discovers that it cannot make enough profits to cover the trade costs. For intermediate levels of realized profitability, it will continue exporting without engaging in FDI. For higher levels of profitability, it will establish foreign affiliates.

The logic of our theoretical model applies to investments driven by firms' desire to serve foreign markets. These include horizontal FDI — the establishment of foreign production facilities to serve the local market — as well as distribution-oriented FDI — investments in distribution centers/sales offices. In the case of horizontal FDI, a firm

must decide whether to serve a market via exports or foreign affiliate sales, a decision that is driven by a tradeoff between proximity and concentration (e.g. Markusen, 1984; Brainard, 1997; Helpman *et al.*, 2004): a firm serving a market with exports bears trade costs, but saves the cost of establishing a foreign subsidiary; on the other hand, a firm serving a market with FDI bears the cost of setting up the subsidiary, but saves on trade costs. In the case of distribution FDI, exporting firms must decide whether to use a local agent to distribute their products (the mode characterized by lower fixed cost) or to set up their own distribution network (involving lower variable costs).[1] In both cases, uncertainty can lead firms to start serving a foreign market via exports before engaging in FDI. The intuition for this result is simple. In the face of uncertainty, a firm may start serving a foreign market via exports, which allows it to "test" the market on a small scale. If it discovers that it can earn large enough profits in the foreign market, it finds it worthwhile to pay the fixed costs of establishing its own production facility or distribution network to reduce its variable costs.[2]

In our model, a firm discovers its profitability in a foreign market as soon as it starts serving it; one trial period of exporting is thus enough to decide whether or not it is worth investing there. In a more general setup, a firm may experiment for several periods before discovering its profitability. If foreign investments are partially irreversible, uncertainty will increase the option value of waiting until more information about the profitability of the projects is revealed (e.g. Bernanke, 1983; Rodrik, 1991). In more uncertain destinations, we would thus expect firms to delay FDI entry, experimenting longer with exports, before establishing foreign affiliates.

In our empirical analysis, we study the decision of Belgian firms to start investing in new markets. We focus on the role of firms' export experience and foreign market uncertainty. We use several variables to capture the degree of uncertainty faced by Belgian firms in a foreign market. These include the average exit rate of Belgian new exporters, which captures the likelihood that firms engage in a process of trial and error; country risk ratings published by the PSR Group; country risk ratings constructed by the Belgian export credit agency; and gravity variables (distance, no common language), which capture the degree of cultural proximity between Belgium and the destination country.

In line with the key prediction of our model, we show that the probability that a

[1]Most FDI is horizontal in nature: foreign affiliates worldwide sell most of their products locally (e.g. Markusen and Maskus, 2003; Blonigen, 2005). For example, over the period 2005-2010, less than 19 percent of affiliate sales were sold outside of the country of production (UNCTAD, 2011).

[2]Our model does not apply instead to vertical FDI, which involves the fragmentation of the production process across different countries and is not meant to serve customers in the host country.

firm starts investing in a foreign country increases with its export experience in that country. The role of export experience depends crucially on the degree of foreign market uncertainty. In destinations in which they face more uncertainty, firms delay FDI entry, experimenting longer with exports before establishing foreign affiliates.

Our results show that firms' export and FDI decisions must be understood as part of a broader dynamic strategy to serve foreign markets in the face of uncertainty. They suggest that, even when exports and FDI represent alternative ways of serving a foreign market – and are thus substitutes from a static perspective – they may be complements over time – since the knowledge acquired through export experience can eventually lead firms to invest abroad.

Our analysis has implications for the effects of trade and FDI liberalization. Governments often try to attract FDI to bring much-needed capital, new technologies, marketing techniques, and management skills, while also making efforts to reduce trade barriers. Contrary to the standard literature on the proximity-concentration tradeoff, our paper suggests that these two policy objectives are not necessarily at odds with each other: trade liberalization may actually foster FDI, by lowering the costs of export experimentation. The converse is also true: FDI liberalization may lead to export entry, by increasing the option value of export experimentation.

Our paper builds on a vast literature that studies firms' internationalization choices. Much of this literature examines firms' decision on whether to serve a foreign market, and whether to do so through export or horizontal FDI. In standard models of the proximity-concentration tradeoff, firms serve a foreign market through export *or* FDI (e.g. Markusen, 1984; Brainard, 1997; Helpman *et al.*, 2004): a firm serving a market with exports bears trade costs, but saves the cost of establishing a foreign subsidiary; on the other hand, a firm serving a market with FDI bears the cost of setting up the subsidiary, but saves on trade costs. Recent studies emphasize the importance of productivity differences in explaining firms' export and FDI choices. Helpman *et al.* (2004) introduce firm heterogeneity à la Melitz (2003) into a simple model of the proximity-concentration tradeoff and show that the higher fixed cost of FDI gives rise to selection effects: the most productive firms engage in FDI, less productive ones export, and the least productive serve only their home market.[3] Our paper focuses on the

[3]Ramondo *et al.* (2013) introduce uncertainty (country-specific productivity shocks) in a static model of the proximity-concentration tradeoff with heterogeneous firms. They do not examine firms' dynamics and experimentation, focusing instead on the relationship between cross-country differences in output fluctuations and cross-country patterns of exports and affiliate sales. Oldenski (2012) focuses instead on interaction effects between task content and country characteristics in firms' decision between exports and horizontal FDI.

dynamics of firms' internationalization choices, highlighting the importance of market uncertainty and experimentation. We show that, when firms are uncertain about their profitability in foreign markets, they may start by testing these markets via exports – the mode characterized by lower fixed costs – before engaging in FDI.[4]

Within the literature on the proximity-concentration tradeoff, the closest paper to ours is Rob and Vettas (2003), which examines the impact of foreign market uncertainty on firms' internationalization choices. They describe an infinite horizon model, in which a multinational firm can serve a foreign market via exports, horizontal FDI, or a combination of the two. The firm faces demand uncertainty: in each period, foreign demand either continues to grow or stops growing forever. Our simple two-period model allows us to capture in a stylized way both demand and supply uncertainty. More importantly, while the analysis of Rob and Vettas (2003) is only theoretical in nature, we empirically examine the dynamics of firms' export and FDI choices in individual foreign markets.

Our paper is also closely related to the increasingly vast literature on firms' export dynamics (Eaton *et al.*, 2008; Aeberhardt *et al.*, 2014; Albornoz *et al.*, 2012). These studies show that new exporters begin by exporting small amounts and are likely to drop out of foreign markets shortly after entry; conditional on surviving, their exports grow rapidly and account for a substantial proportion of export growth.[5] Theoretical models seeking to account for firms' export dynamics emphasize learning about foreign markets and trade relationships (e.g. Rauch and Watson, 2003; Eaton *et al.*, 2010). Most related to our analysis is the paper by Albornoz *et al.* (2012). In their model, individual export profitability, while initially uncertain, is positively correlated over time and across destinations. This gives rise to a process of "sequential exporting", in which firms' export strategies are correlated across markets. We examine instead firms' export and FDI choices, showing that uncertainty in foreign market profitability can give rise to a gradual process of internalization within markets.

Finally, the idea that uncertainty affects investment decisions is central to real options theory. This theory suggests that, if investments are irreversible and market conditions are uncertain, firms may prefer to "wait and see", minimizing current investments but securing an option to invest at a later time (e.g. McDonald and Siegel, 1986; Dixit and Pindyck,1994, Guiso and Parigi, 1999). Our paper shows that, before investing in a

[4]Horstmann and Markusen (1996) develop a theoretical model of multinationals' decisions when foreign market conditions are uncertain. Rather than on the choice between exports and FDI, their analysis focuses on the choice between serving a foreign market via FDI or through a contractual arrangement with a local agent who has superior information about the market characteristics.

[5]See, for example, Eaton *et al.* (2008) for Columbian firms, Aeberhardt *et al.* (2014) for French firms, Lawless (2009) for Irish firms, Iacovone and Javorcik (2010) for Mexican firms, and Albornoz *et al.* (2012) for Argentinian firms.

foreign market, firms often serve a foreign market via exports; when market conditions are more uncertain, firms experiment longer with exports before engaging in FDI.

The remainder of the paper is organized as follows. Section 2 presents some stylized facts about the sequencing of firms' export and FDI entry in individual foreign markets. Section 3 outlines a simple model of firms' internationalization choices under uncertainty. Section 4 describes the data used in our empirical analysis. Section 5 presents our empirical methodology and results. Section 6 concludes.

2 The sequencing of export and FDI entries

In this section we document a novel empirical regularity concerning firms' export and FDI choices. We show that the overwhelming majority of firms serve a foreign market via exports before establishing affiliates in that market. Thus export entry almost always precedes FDI entry. The opposite is not true: essentially all firms that start exporting to a new market do not already have affiliates in that market.

We exploit a unique dataset from the National Bank of Belgium (NBB), which allows us to study the dynamics of firms' exports and FDI decisions in individual foreign markets. Data on export and FDI cover the whole population of companies registered in Belgium and can be linked to firm-level accounts through the value added tax number, a unique code identifying each firm. We restrict our attention to manufacturing firms (i.e. four-digit codes belonging to sectors between 15 and 37 of NACE revision 1) and impose a threshold in terms of employment (i.e. at least 5 employees).

Data on exports since 1993 come from the NBB Foreign Trade dataset, which allows us to identify the countries to which a firm exports in a given year. Trade data on individual transactions concerning exports or imports are collected separately at company level for intra-EU (Intrastat) and extra-EU (Extrastat) trade. The Extrastat dataset is based on customs declarations and covers virtually all trade transactions. The Intrastat dataset covers all firms whose annual trade flows (overall receipts or shipments) exceed a certain threshold.

Data on FDI come from the NBB annual Survey on Foreign Direct Investment. The survey, conducted since 1997, provides information on all Belgian firms that invest in foreign countries. FDI is defined as international investments through which a resident entity in one economy acquires an interest in a resident entity of another economy. The Survey on Foreign Direct Investment includes all companies holding at least 10 percent of the social capital of foreign firms. All firms are required to report their FDI stocks and flows in individual foreign countries. Using this dataset, we study Belgian firms'

decision to start investing in individual foreign markets.

As mentioned in the introduction, the logic of our theoretical model applies to horizontal and distribution-oriented FDI — which are driven by market access motives — but not to vertical FDI — which is driven by the desire to reduce production costs. Unfortunately, the NBB Survey on Foreign Direct Investment contains little information on the activities of Belgian foreign affiliates, making it hard to distinguish different types of FDI. In particular, it provides no information on the products manufactured by the affiliates, their industry code, and the destination of the foreign affiliate sales. However, the survey reports intra-firm trade between each foreign affiliate and the Belgian parent. In our empirical analysis, we will use this information to rule out potential vertical FDI entries. Recent studies find that vertical FDI, which is characterized by the movement of goods between parents and affiliates, is less important. For example, Ramondo *et al.* (2013) stress that "while it is true that intra-firm trade flows are large (particularly North-North flows) as a fraction of total trade, they are a small fraction of affiliate sales for the median multinational firm, irrespective of the destination country or the industry of operation."

To identify firms that start investing in a foreign country, we define the variable *FDI entry*$_{f,i,t}$, which is equal to 1 if firm f has positive FDI stocks in country i in year t, but had no FDI stock in that country in the previous year. Since the FDI data starts in 1997, we can define FDI entries as of 1998.

Identifying export entries is less straightforward, since firms often ship their goods at intervals. Some studies define new exporters as firms that export to a market in year t, but not in $t-1$ (e.g. Besedes and Prusa, 2006; Eaton *et al.*, 2008). Given the lumpiness of exports, if we applied this definition, we would classify as new entrants many firms that have already been exporting to a given market (55.72% of export entries would be re-entries). To avoid this problem, we use a more stringent definition of new exporters: the variable *Export entry*$_{f,i,t}$ is equal to 1 if firm f exports to foreign market i in year t, after at least 5 years of no exporting to that market. This is the most stringent definition we can apply without incurring left-censoring problems: given that the trade data start in 1993, for all export entries in the 1998-2008 period, we can observe exports in the previous five years.[6] This definition allows us to identify firms with no export experience in a foreign country — at least not in the previous five years — drastically reducing the number of re-entries (only 5.6% of export entries in our sample).

[6]See Berthou and Vicard (2015) for a similarly stringent definition of new exporters, based on the previous 7 years of a firm's exports.

Table 1: Export and FDI entries

Year	Export entries with no previous FDI	Export entries with previous FDI	Total export entries	FDI entries with no previous exports	FDI entries with previous exports	Total FDI entries
1998	7,127	3	7,130	8	81	89
1999	5,664	2	5,666	7	89	96
2000	5,739	1	5,740	17	159	176
2001	5,633	2	5,635	32	191	223
2002	5,032	0	5,032	7	100	107
2003	5,058	3	5,061	11	71	82
2004	5,778	3	5,781	18	81	99
2005	5,054	5	5,059	28	67	95
2006	4,394	4	4,398	15	70	85
2007	4,697	2	4,699	16	56	73
2008	4,535	2	4,537	10	64	74
Total	58,711 (99,95%)	27 (0.05%)	58,738 (100%)	169 (14.10%)	1,030 (85.90%)	1,199 (100%)

Notes: The table includes all export and FDI entries by Belgian manufacturing firms in all destinations around the world during the 1998-2008 period.

Table 1 provides statistics on all Belgian firms that started exporting to or investing in foreign markets during our sample period. In line with previous studies of firms' internationalization choices (e.g. Head and Ries, 2003; Helpman *et al.*, 2004), export entries are much more frequent than FDI entries (58,738 compared to 1,199).

The novel finding concerns the dynamics of firms' export and FDI choices in individual foreign markets. Table 1 shows that 99.95% of the firms that started exporting to a foreign market, did so without having previously invested there. By contrast, 85.90% of the firms that started investing in a foreign market had already been exporting to that destination.

3 Export and FDI choices under uncertainty

As mentioned above, a vast international business literature starting from Johanson, and Vahlne (1977) has put forward the idea that firms follow a gradual internationalization process: the need to acquire knowledge about local demand and supply conditions leads them to serve a foreign market via exports before engaging in FDI. In this section, we develop a simple dynamic model of firms' export and FDI choices to formalize this idea.

3.1 Setup

We examine firms' internationalization choices when they are uncertain about their profitability in foreign markets. Firms are identical ex-ante (i.e. before entering the foreign market), but heterogeneous ex-post (in terms of their realized profitability in the foreign market). In what follows, we describe a model in which a representative risk-neutral firm chooses whether to serve foreign market i, and whether to do so through exports or horizontal FDI. We show that uncertainty can lead the firm to serve the foreign market via exports, before investing in a foreign production facility. As discussed in Section 3.5, the same logic applies to investments in a foreign distribution network.

There are two main ingredients of our model. First, there is a cost asymmetry in the two modes of serving the foreign market: exporting involves a lower fixed cost, while FDI involves lower variable costs. Variable costs comprise two components: a known unit cost of production, which is normalized to zero, and an unknown unit cost of distributing the good in the foreign market, c_i. If the firm serves the foreign market via exports, it bears a unit trade cost τ_i (reflecting both transport costs and barriers to trade) and incurs a one-time fixed cost equal to F_i^E (e.g. capturing the costs of learning about customs procedures). If instead the firm engages in FDI, setting up a foreign production

subsidiary, it avoids paying the trade costs, but incurs a one-time fixed cost $F_i^I > F_i^E$. Both fixed costs are assumed to be irreversible.[7] For a proximity-concentration tradeoff to arise, the fixed cost of FDI must be larger than the fixed cost of exporting. In particular, we assume the following: $F^I \geq \frac{1}{2}(2\sqrt{F^E} + \tau)^2$.[8]

Second, firms are uncertain about their profitability in foreign markets. To model uncertainty, we follow the model by Albornoz *et al.* (2012), in which a firm discovers its profitably in a foreign market once it starts operating there. The firm faces a linear demand in the foreign market: $q_i(p_i) = a_i - p_i$, where q_i and p_i denote the output sold in the foreign market and the corresponding price, and a_i is an unknown parameter. Uncertainty in foreign profitability is captured by the random variable

$$\mu_i \equiv a_i - c_i, \tag{1}$$

with continuous cumulative distribution function $G(.)$ on the support $[\underline{\mu}_i, \overline{\mu}_i]$, mean $E\mu_i$, and variance σ^2. The value $\overline{\mu}_i$ is realized with the highest possible demand intercept and the lowest possible distributions cost; the value $\underline{\mu}_i$ is realized under the opposite extreme scenario. As discussed below, before serving the foreign market, the firm knows the distribution $G(.)$. However, it can only discover its own profitability in the foreign market if it operates there, either through exports or FDI.

To simplify notation, in what follows we drop the country subscript, with the understanding that country variables refer to foreign market i.

3.2 Timing and entry strategies

Without loss of generality, we assume that the firm does not discount the future. The timing of decisions is as follows:

> $t = 1$: the firm chooses between exporting to the foreign market, setting up a foreign subsidiary, or not entering the market at all. If the firm decides to enter

[7] We assume that the fixed cost of establishing a production facility in a foreign market is independent of whether the firm has previously exported to that market. This is the case if F^E includes costs that are specific to exporting (e.g. learning about customs procedures) and F^I captures only FDI costs (e.g. building a foreign production plant). Serving a foreign market may involve fixed costs that are common to both exports and FDI (e.g. designing a marketing strategy for the foreign market). In this case, the fixed costs of exports and FDI could be rewritten as $F^E = K + f^E$ and $F^I = K + f^I$, respectively, with $f^I > f^E$. Our results would continue to hold under this alternative formulation of the fixed costs.

[8] This is a sufficient condition to guarantee that, for some level of expected profitability, the firm will choose to "test" the foreign market via exports. It guarantees that, in the limit case in which the firm expects to make zero first-period profits from export entry, overall expected profits from export entry (Ω^E in equation 10) are larger than expected profits from FDI entry (Ω^I in equation 11).

via exports (FDI), it pays the per-destination fixed cost F^E (F^I) and chooses how much to sell in that period. At the end of this period, if the firm has sold a positive amount, it infers μ from its profit.

$t = 2$: if the firm has not entered the foreign market at $t = 1$, it decides whether or not to do so. If the firm has entered at $t = 1$, it decides whether to exit the foreign market, serve it under the same mode, or switch mode.

The setup is similar to Jovanovic (1982)'s model of firm dynamics, in which individuals are uncertain about their entrepreneurial ability and can only discover it through the process of starting a new firm. In our model, firms can only find out their profitability in a foreign market by actually serving it, via exports or foreign affiliate sales. Firms choose between three possible entry strategies:

a) Entry via exports at $t = 1$: in the first period, the firm pays the fixed cost F^E, exports to the foreign market and discovers its profitability; in the second period, it decides whether to continue serving the foreign market through exports, switch to FDI, or exit;

b) Entry via FDI at $t = 1$: in the first period, the firm pays the fixed cost F^I and serves the foreign market through its foreign subsidiary; in the second period, the firm decides whether to continue serving the foreign market through FDI, switch to exports, or exit;

c) No entry in the foreign market at $t = 1$.

In what follows, we solve for the firm's optimal decisions by backward induction.

3.3 Period $t = 2$

a) Entry via exports at $t = 1$

Consider first the case in which the firm has started serving the foreign market via exports in the first period, discovering its profitability μ. In the second period, the firm decides whether to continue exporting, open a foreign subsidiary, or exit the foreign market. If it continues to export, its second-period profits are given by

$$\pi^{EE}(\tau) = K_{\{\mu>\tau\}}\Big(\frac{\mu-\tau}{2}\Big)^2. \tag{2}$$

Alternatively, if the firm discovers that it is very profitable in serving the foreign market, it may find it worthwhile to pay the fixed cost of setting up a foreign subsidiary to avoid paying the variable trade costs of exporting. In this case, second-period profit are given by $\pi^{EI}(F^I) \equiv (\mu - q^{EI})q^{EI} - F^I$. Profit maximization yields the optimal quantity decision $\hat{q}^{EI} = \frac{\mu}{2}$. The profits obtained from establishing a production facility at $t = 2$ are thus equal to

$$\pi^{EI}(F^I) = \left(\frac{\mu^2}{4} - F^I\right), \tag{3}$$

which are positive if realized profitability is above the threshold $\mu^I \equiv 2\sqrt{F^I}$.

Comparing (3) with (2), we can derive the threshold of realized profitability above which the firm will switch from exports to FDI:

$$\mu^{EI} \equiv \frac{2F^I}{\tau} + \frac{\tau}{2}. \tag{4}$$

Figure 1: Strategies of the firm at $t = 2$, following export entry at $t = 1$

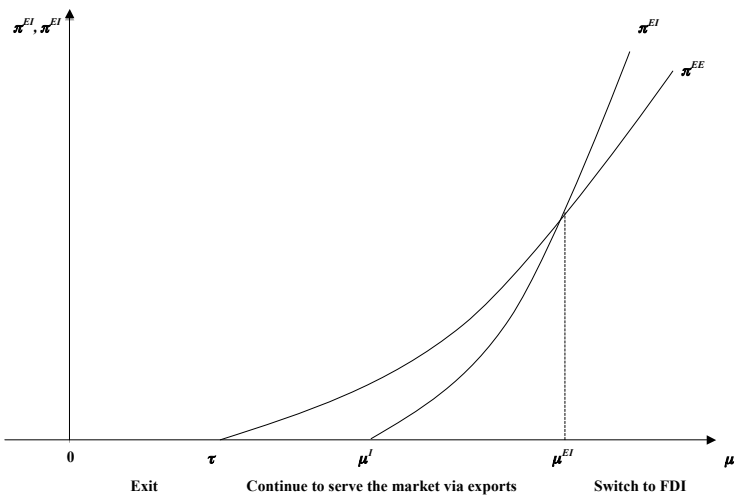


Figure 1 illustrates second-period export and FDI profits for a firm that has entered the foreign market via exports in the first period. Depending on its realized profitability, the firm decides whether to continue serving the foreign market, and whether to do so via exports or FDI: if μ is below the unit trade cost τ, exports and FDI profits are both negative, so the firm exits the foreign market; if $\tau < \mu < (=)\mu^{EI}$, export profits are positive and higher than (or equal to) FDI profits, so the firm continues to serve the

foreign market via exports; finally, if $\mu > \mu^{EI}$, the firm is willing to pay the fixed cost of setting up a foreign subsidiary to avoid the trade costs.

b) Entry via FDI at $t = 1$

Consider next the case in which the firm establishes a production facility in the foreign market at $t = 1$, paying the one-time fixed cost F^I. In this case, second-period FDI profits are equal to $\pi^{II} = \frac{\mu^2}{4}$, which are positive as long as $\mu > 0$. In this model, a firm entering the foreign market via FDI in the first period will never switch to exports in the second period: if realized profitability μ is negative, exports and FDI profits are both negative, so the firm will exit the market. If instead $\mu \geq 0$, the firm will continue serving the foreign market through foreign affiliate sales, which is always more profitable than switching to exports.

c) No entry at $t = 1$

Finally, if the firm has not entered in the first period, it has not discovered its profitability in the foreign market. In the second period, it does not enter and earns zero profits.

3.4 Period $t = 1$

Next, we evaluate the profits associated with different entry strategies from an ex ante perspective, i.e. when the firm is still uncertain about its foreign market profitability.

a) Entry via exports at $t = 1$

From an ex-ante perspective, second-period profits from export entry are equal to

$$V^E(\tau, F^I) = \int_{\tau}^{\mu^{EI}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \Big(\frac{\mu^2}{4} - F^I\Big) dG(\mu). \tag{5}$$

Equation (5) captures the option value of serving the foreign market in the second period, once the firm has discovered its profitability: the first term is the option value of continuing to export, while the second is the option value of switching to FDI. Overall expected profits from export entry can thus be written as

$$\omega^E(\tau, F^E, F^I, q^E) \equiv \int_{\underline{\mu}}^{\overline{\mu}} (\mu - \tau - q^E) q^E dG(\mu) - F^E + K_{\{q^E > 0\}} V^E. \tag{6}$$

The first two terms of (6) represent expected first-period profits from export entry. The last term captures expected second-period profits, as defined in equation (5).

Optimal first-period exports depend on expected profitability in the foreign market. Denote by $\mu^E \equiv 2\sqrt{F^E} + \tau$ the threshold of profitability for which the firm expects zero first-period profits from entering via exports. When $E\mu > \mu^E$ ($E\mu = \mu^E$), expected first-period export profits are positive (zero) and the firm will set export volumes equal to $\hat{q}^E = \frac{E\mu - \tau}{2}$. In scenarios in which $\tau < E\mu < \mu^E$, expected profits in the first period are negative, but the firm will still export a positive amount $\hat{q}^E = \frac{E\mu - \tau}{2}$, as long as overall expected profits from export entry are positive. Finally, consider scenarios in which $E\mu < \tau$. Again, expected first-period profits will be negative, but the firm may still be willing to test the foreign market, exporting an arbitrarily small amount $\epsilon > 0$, as long as $(E\mu - \tau - \epsilon)\epsilon - F^E + V^E > 0$. Expected profits from entering the foreign market at $t = 1$ via exports can thus be rewritten as

$$\begin{aligned} \Omega^E(\tau, F^I, F^E) \equiv & \int_{\tau}^{\overline{\mu}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) - F^E \\ & + K_{\{q^E>0\}} \Big\{ \int_{\tau}^{\mu^{EI}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \Big(\frac{\mu^2}{4} - F^I\Big) dG(\mu) \Big\}. \end{aligned} \tag{7}$$

We denote with $\tilde{\mu}^E$ the threshold of expected profitability above which $\Omega^E > 0$.

b) Entry via FDI at $t = 1$

From an ex-ante perspective, overall profits from FDI entry can be written as

$$\omega^I(F^I, q^I) \equiv \int_{\underline{\mu}}^{\overline{\mu}} (\mu - q^I) q^I dG(\mu) - F^I + K_{\{q^I>0\}} \int_0^{\overline{\mu}} (\mu - q^I) q^I dG(\mu). \tag{8}$$

The first two terms of (8) represent expected first-period profits FDI export entry. The last term captures expected second-period profits, which are positive as long as $\mu > 0$. Substituting optimal subsidiary sales, $\hat{q}^I = \frac{\mu}{2}$, we can rewrite the firm's expected profits from entering the foreign market via FDI as follows:

$$\Omega^I(F^I) \equiv \frac{1}{4} \int_{\underline{\mu}}^{\overline{\mu}} \mu^2 dG(\mu) - F^I + K_{\{q^I>0\}} \frac{1}{4} \int_0^{\overline{\mu}} \mu^2 dG(\mu). \tag{9}$$

We denote with $\tilde{\mu}^I$ the critical threshold of expected profitability above which $\Omega^I > 0$.

c) No entry at $t = 1$

The firm does not enter the foreign market, earning zero profits.

Entry decisions

From the analysis above, we can derive the firm's entry strategy. There are three possible cases to consider, depending on expected profitability before entry. First, if $E\mu < \tilde{\mu}^E$, expected profits from both export and FDI entry are negative, so the firm will decide not to serve the foreign market. Second, if $\tilde{\mu}^E < E\mu < \tilde{\mu}^I$, expected profits from export entry are positive and exceed expected profits from FDI entry, so the firm will start serving the foreign market via exports. Finally, if $E\mu > \tilde{\mu}^I$, expected profits from FDI entry are larger than expected profits from export entry, so the firms will start serving the foreign market by setting up a subsidiary. We can thus state the following:

Proposition 1 *The first-period entry decision depends on expected profitability in the foreign market: if $E\mu < \tilde{\mu}^E$, the firms does not enter; if $E\mu > \tilde{\mu}^I$, it enters directly via FDI; in the intermediate case in which $\tilde{\mu}^E \leq E\mu < \tilde{\mu}^I$, the firm enters via exports, switching to FDI in the second period if realized profitability exceeds μ^{EI}.*

When experimentation matters (i.e. when the firm would not enter the foreign market in the absence of uncertainty), the firm will enter via exports rather than FDI. To verify this, consider the limit case in which $E\mu = \mu^E$, in which the firm expects to make zero first-period profits from export entry. In this case, overall expected profits from export entry are equal to

$$\Omega^E = \int_{\tau}^{\mu^{EI}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \Big(\frac{\mu^2}{4} - F^I\Big) dG(\mu) > 0, \tag{10}$$

while expected profits from FDI entry are given by[9]

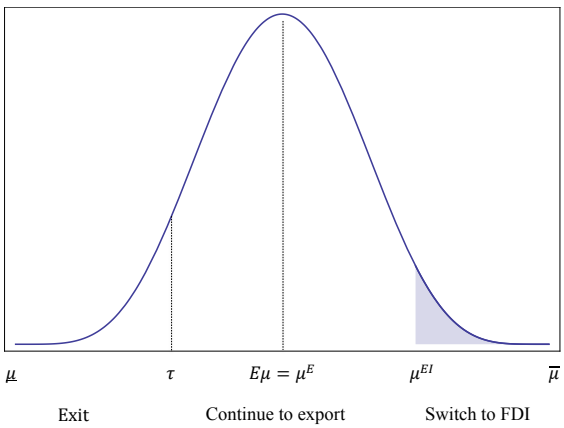
$$\Omega^I = \frac{1}{2}(2\sqrt{F^E} + \tau)^2 - F^I \leq 0. \tag{11}$$

In this scenario, uncertainty leads to a gradual internationalization process: the firm enters the foreign market via exports, even if it expects to make zero profits in the first period; in the second period, if its realized profitability is high enough, it starts investing in the foreign market.

[9]The fact that $\Omega^I \leq 0$ when $E\mu = \mu^E$ follows from the assumption that $F^I \geq \frac{1}{2}(2\sqrt{F^E} + \tau)^2$.

As an illustration, in Figure 2 we have drawn the probability density function of a beta-type distribution of the random variable μ, with mean equal to μ^E.[10] As discussed above, the case in which $E\mu = \mu^E$ is one in which the firm enters the foreign market via exports, even if it expects to make zero profits in the first period.[11] The shaded area captures the probability that the firm starts investing in the second period, which is equal to $1 - G(\mu^{EI})$. The area below τ captures instead the probability that a firm entering the foreign market in the first period exits in the following period, if it discovers that its profitability is below the unit trade costs.[12]

Figure 2: Probability of a switch from exports to FDI at $t = 2$



An important feature of our model is that exports and horizontal FDI are substitutes from a static perspective – since they represent alternative ways to serve a foreign market – but may be complements over time – since the market-specific knowledge acquired through exports experience can lead firms to set up foreign production plants.

Our analysis has important implications concerning the effects of trade liberalization. Governments often try to achieve two objectives: attract FDI to bring much-needed capital, new technologies, marketing techniques, and management skills; and liberalize their economies (unilaterally, or in the context of regional/multilateral trade negotiations). In

[10]The beta distribution is often used to model the behavior of random variables limited to intervals of finite length. It is parametrized by two positive shape parameters, denoted α and β. The probability density function in Figure 2 corresponds to a beta distribution with $\alpha = \beta = 6$, with support $[\underline{\mu}, \overline{\mu}]$.

[11]By definition, μ^E is above the minimum level of expected profitability that guarantees that the firm will engage in export experimentation (the threshold $\tilde{\mu}^E$ identified by equation 7, such that $\Omega^E = 0$). For values of expected profitability $\tilde{\mu}^E \leq E\mu < \mu^E$, the firm will expect to make negative profits from testing the foreign market via exports in the first period.

[12]Drawing a mean-preserving spread of the distribution in Figure 2, it is straightforward to verify that an increase in the variance of μ increases the probability that a firm entering the foreign market via exports at $t = 1$ will stop exporting to that market at $t = 2$ (the area below τ gets larger). This suggests that the exit rate of new exporters should be higher in more uncertain foreign markets.

static models of the proximity-concentration tradeoff, these two objectives are always in conflict with each other: reducing import barriers makes exporting a more attractive option, reducing the incentives for FDI. By contrast, our analysis suggests that, when firms are uncertain about foreign market conditions, a reduction in trade costs may foster FDI, by lowering the cost of export experimentation. To verify this, consider a scenario in which trade costs are initially such that $\tau > E\mu - 2\sqrt{F^E}$, implying that first-period expected profits from entering the foreign market via exports are negative. Also assume that the expected first-period export loss exceeds the option value of serving the foreign market in the second period, so the firm will choose not to serve the foreign market. Now consider a reduction in the trade costs to $\tau = E\mu - 2\sqrt{F^E}$. The firm now expects to make zero export profits at $t = 1$, but is willing to enter the foreign market to secure the possibility of positive profits at $t = 2$. With probability $1 - G(\mu^{EI})$, export experimentation will lead the firm to start investing in the foreign market.

The implications of FDI liberalization also differ from those of standard internationalization models. Consider a situation in which a government allows foreign firms to invest in its country, removing a pre-existing ban on FDI. In our model, this may lead some firms to start exporting. The intuition for this result is that the possibility of setting up foreign affiliates increases the option value of export entry.[13] By contrast, in standard internationalization models, FDI liberalization cannot trigger export entry.

3.5 Distribution-oriented FDI

Building on the literature on the proximity-concentration tradeoff, the model described above examines a firm's choice between two alternative ways of serving a foreign market: exports or horizontal FDI. In the face of uncertainty, a firm may start by serving a foreign market via exports, before engaging in FDI (Proposition 1).

The logic of our theoretical model can be extended to distribution-oriented FDI — investments in distribution centers/sales offices.[14] To see this, consider a representative domestic firm that must decide whether to export to a foreign market and how to distribute its exports to consumers in that market. The choice is between using a local agent (involving lower fixed costs) and setting up its own distribution network (involving

[13]When FDI is banned, the option value of export entry is equal to $\int_{\tau}^{\overline{\mu}} \left(\frac{\mu-\tau}{2}\right)^2 dG(\mu)$. Following FDI liberalization, an exporting firm can establish a production plant if it discovers that its profitability exceeds the threshold μ^{EI}, so the option value increases to $\int_{\tau}^{\mu^{EI}} \left(\frac{\mu-\tau}{2}\right)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \left(\frac{\mu^2}{4} - F^I\right) dG(\mu)$.

[14]Wholesale trade accounts for an important share of foreign affiliate sales. For example, using data for U.S. firms, Hanson *et al.* (2005) report that wholesale trade affiliates represent between 9.7% (transportation equipment) and 37% percent (industrial machinery) of total foreign affiliates' sales.

lower variable costs). We normalize unit production costs to zero and denote unit trade costs with τ. If the firm uses a local agent, unit distribution costs are equal to c. If instead it invests in its own distribution network, the unit distribution costs are reduced to $c-\phi$. Independently of the distribution mode, the firm incurs a sunk cost F^E to start exporting (e.g. cost of learning customs procedures). To establish its own distribution network, it incurs an additional sunk cost F^I.

Uncertainty is captured by the random variable μ, defined in equation (1). It can be shown that, in scenarios in which experimentation matters (i.e. when the firm would not enter the foreign market in the absence of uncertainty), the optimal strategy of the firm is to test the foreign market in the first period, using a local agent to distribute its exports; in second period, if realized profitability is below the unit trade costs τ, the firm exits the market; for intermediate levels of profitability, it will continue using the local agent to distribute its exports; if profitability exceeds the threshold $\mu^{EI'} = \frac{2F^I}{\phi} - \frac{\phi}{2} + \tau$, it will establish its own distribution network.[15]

As in our benchmark model, uncertainty can thus give rise to a gradual internationalization process, in which *a firm's export entry precedes its FDI entry*: during an initial trial period, the firm uses a local agent to distribute its exports in the foreign market; if it discovers that it can earn large enough profits in that market, it pays the fixed FDI cost to reduce its variable costs.[16]

4 Dataset and main variables

The statistics on export and FDI entries presented in Section 2 show that Belgian firms almost never establish affiliates in a foreign market without having first tested it via exports: in almost 90% of the cases, FDI entry is preceded by export entry. This finding is in line with the idea that firms follow a gradual internationalization process: in the face of uncertainty, they start by serving a foreign market via exports, to acquire information about local demand and supply conditions; if they discover that they can earn large enough profits in that market, they establish foreign (production or distribution) affiliates to reduce variable costs.

In our empirical analysis, we study how the experience acquired by a firm while exporting to a foreign market affects its decision to start investing in that market. In this

[15] After the firm has payed the entry export costs F^E and discovered its profitability μ, its profits are equal to $\Pi^E = (\mu - q^E - \tau)q^E$ if it continues using a local distributor, and to $\Pi^I = (\mu + \phi - q^I - \tau)q^I - F^I$ if it establishes its own distribution network. The threshold $\mu^{EI'}$ is such that $\Pi^E = \Pi^I$.

[16] The main difference between horizontal and distribution FDI is that, when a firm invests in a distribution network (a production facility), exports should increase (fall) following FDI entry.

section, we describe our measures of export experience and foreign market uncertainty. Definitions of all the variables can be found in the Appendix Table A-1. See Table A-2 for a list of the countries included in our analysis.

4.1 Export experience

To capture the experience acquired by a firm exporting to a foreign market, we define the variable *Export experience*$_{f,i,t}$, which measures the number of years during which firm f has been exporting to country i since its export entry. As discussed in Section 2, we define export entry based on firms' exports during the previous 5 years — the most stringent definition we can apply without incurring left-censoring problems. A firm is coded as having 1 year of experience in the year after it starts exporting to a foreign market. Experience accumulates in each subsequent year, unless the firms does not export for 5 consecutive years (export exit).

Our empirical analysis includes three types of firms, depending on export experience acquired upon FDI entry. Some firms are "new exporters", i.e. their export entry occurred during the 1998-2008 period. Other firms are "old exporters", they were already exporting to a given foreign market in the first year of the NBB Foreign Trade dataset (1993). Finally, "non-exporters" are firms that never exported to a foreign market during the 1998-2008 period.

We have created three bins of the export experience variable: *No experience*$_{f,i,t}$, *Experience14*$_{f,i,t}$ and *Experience5+*$_{f,i,t}$ depending on whether firm f has zero, 1-4 years, or 5+ years of export experience when it starts investing in a foreign market. Table 2 presents some descriptive statistics of FDI entries, by firms' export experience.[17]

Table 2: FDI entries by export experience

Years of experience	FDI entries	Percentage	Cumulative
0	73	8.26	8.26
1-4	156	17.65	25.91
at least 5	655	74.09	100.00
Total	884		

Notes: The table includes all FDI entries by Belgian manufacturing firms in all destinations around the world during the 1998-2008 period.

[17]Notice that the sample includes 884 of the 1,199 FDI entries included in Table 1. This is because, for some FDI entries, we cannot code the firm's export experience. Consider, for example, a firm with no exports in 1993, positive exports in 1994, and started investing in the foreign market in 1998. This firm may have 1-4 or 5+ years of export experience upon FDI entry.

4.2 Foreign market uncertainty

In our theoretical model, uncertainty is captured by the random variable μ. As in the model by Albornoz *et al.* (2012), this variable captures both demand and supply uncertainty. In line with this, in our empirical analysis, we include several country-level variables that are meant to capture the degree of uncertainty faced by Belgian firms in foreign markets.

Our first measure of uncertainty, *Exit rate*$_i$, is the average exit rate of Belgian new exporters in country i. Our theoretical model suggests that this variable can be used to proxy the extent of foreign market uncertainty: the more uncertain are demand and supply conditions in a foreign market (i.e. the larger is the variance of the random variable μ), the more likely are Belgian firms to engage in a process of trial and error, starting to export at t, but dropping out of the market at $t+1$ (see footnote 12).

As mentioned before, firm-level exports are often lumpy. As in the case of export entry, we thus define export exit based on a firm's exports during a 5-year period: an exit occurs when a firm does not export to a given foreign market for five consecutive years. The exit rate variable is constructed based on information on *all* Belgian firms that start exporting to country i during the period 1998-2003, so that we can observe their export flows (if any) in at least 5 years following entry. To avoid endogeneity concerns, we consider only destinations in which the exit rate is constructed based on at least 100 Belgian new exporters.

The average exit rate of new exporters captures the likelihood that firms engage in a process of trial and error. In principle, this can be affected not only by the degree of foreign market uncertainty (σ in our model), but also by the extent of the fixed costs of exporting (F^E in our model): when these costs are lower, exporting firms should be more likely to enter and exit. When comparing the average exit rate of Belgian new exporters across different countries, we find that it is significantly higher for destinations outside the European Union (0.34 on average) than for destinations within European Union (0.19 on average).[18] If cross-country differences in exit rates were driven by differences in the fixed costs of exporting — rather than differences in the degree of uncertainty — we would expect the variable *Exit rate*$_i$ to be significantly higher in EU destinations.[19]

[18]These statistics are based on the definition of the European Union that applied to the beginning of our sample period. Prior to the accession of ten candidate countries on 1 May 2004, the EU comprised the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

[19]The lowest exit rates are found in the Netherlands (0.11) and France (0.12), two countries with which Belgium has both a common language and a common border; the highest exit rates in our sample are in Mauritius (0.48) and Angola (0.46).

As a second uncertainty measure, we use the composite International Country Risk ratings published by the PSR Group. Their composite risk measure is constructed by aggregating the political risk rating (with a weight of 50%), the economic risk (with a weight of 25%) and the financial risk (with a weight of 25%). It varies between 19 and 48, with higher values indicating less uncertain market conditions in country i. The variable *ICR rate*$_i$ is the negative of the average composite rate of country i over our sample period.

We also use two country-risk ratings constructed by the Belgian export credit agency (Delcredere-Ducroire).[20] These capture "the risks of expropriation and breach of contract by the government, but also risks related to the (dys)functioning of the judiciary system and the risk of a possible negative change of attitude towards foreign investors" and the "[r]isk resulting from an event or decision by foreign authorities that prevents the transfer of the amount of the debt paid by the debtor" (e.g. related to investment loans, the payment of dividends and repatriation of capital). The variables *Expropriation risk*$_i$ and *Transfer risk*$_i$ are the average of these ratings over our sample period. They vary between 1 and 7, with higher values capturing more uncertain market conditions.

Finally, we include the variables *No common language*$_i$ and *Distance*$_i$. The first measures the negative of the probability that two people selected at random from two countries (Belgium and destination i) understand one another in some language (from Melitz and Toubal, 2014). The ability to communicate in the same language can decrease uncertainty by making it easier to communicate and gather information. The variable *Distance*$_i$ measures the distance between the capital of Belgium and the capital of country i. Previous studies suggest that geographic distance may be used as a proxy for unfamiliarity (Huang, 2007).

Summary statistics of the six country-level measures of uncertainty are reported in the top panel of Table 3. The bottom panel shows that these variables are highly correlated with each other. The highest correlation involves the variables *ICR rate*$_i$ and *Transfer risk*$_i$, while the lowest correlation is between *Distance*$_i$ and *Transfer risk*$_i$.

[20] This is Belgium's public credit insurer, covering companies against political and commercial risks relating to international commercial transactions (see http://www.delcredereducroire.be/en).

Table 3: Uncertainty measures, descriptive statistics and correlations

Variable	Obs.	Average	St. Dev.	Min	Max
Exit rate$_i$	69	0.30	0.08	0.11	0.48
ICR$_i$	68	-38.84	5.17	-48.00	-22.45
Expropriation risk$_i$	71	2.26	1.47	1.00	7.00
Transfer risk$_i$	72	2.95	1.85	1.00	7.00
No common language$_i$	70	- 0.30	0.26	-1.00	0.00
log Distance$_i$	72	7.99	1.14	5.24	9.85

	Exit rate$_i$	ICR$_i$	Expropriation risk$_i$	Transfer$_i$ risk	No common language$_i$	log Distance$_i$
Exit rate$_i$	1					
ICR$_i$	0.6205	1				
Expropriation risk$_i$	0.5677	0.7976	1			
Transfer risk$_i$	0.6952	0.9022	0.7603	1		
No common language$_i$	0.5665	0.5319	0.4826	0.5154	1	
log Distance$_i$	0.6037	0.3170	0.3649	0.2781	0.6040	1

Correlations based on the 65 countries for which all uncertainty measures are available.

5 Empirical methodology and results

In the simple two-period model described in Section 3, firms discover their profitability in a foreign market as soon as they start operating there. Thus, after just one period of exporting, a firm acquires all information about local demand and supply conditions and finds out its profitability μ. Based on this information, it can immediately decide whether or not it is worthwhile engaging in FDI. Though clearly very stylized, this two-period model captures the idea that exporting has an option value, i.e. it allows firms to "test" a foreign market and find out whether they are profitable enough to set up subsidiaries in that market. In a more general setup, it may take firms several periods to discover whether they are profitable enough to make FDI entry worthwhile.

5.1 Main results

In our empirical analysis, we use proportional hazard models to examine how the experience acquired by a firm while exporting to a given country affects its FDI entry decision in that country. These models explicitly take into account that FDI entry may not occur for some firms in some countries by the end of the sample period. By using this methodology to estimate the probability that firms starts investing in a foreign market, we can thus avoid right censoring problems.

In particular, we use a proportional hazard model to estimate $FDI\ entry_{f,i,t}$, the

probability that firm f starts investing in country i at time t:

$$\begin{aligned} \text{FDI entry}_{f,i,t} &= h_0(t)\exp(\beta_1 \text{ Export experience}14_{f,i,t} + \beta_2 \text{ Export experience}5+_{f,i,t} \\ &\quad +\beta_3 \; X_{f,t} + \eta_f + \phi_i), \end{aligned} \tag{12}$$

where $h_0(t)$ is the baseline hazard rate. The key variables of interest are the variables *Export experience*$14_{f,i,t}$ and *Export experience*$5+_{f,i,t}$, capturing firms' export experience in foreign markets (with the variable *No export experience*$_{f,i,t}$ being the omitted category).[21] $X_{f,t}$ is a matrix of time-varying firm controls, η_f and ϕ_i indicate, respectively, country and firm fixed effects. In our benchmark regressions, we estimate the coefficients using the partial likelihood method suggested by Cox (1975). This is a semi-parametric method that allows us to remain agnostic about the functional form of the baseline hazard rate $h_0(t)$.

The results are reported in Table 4. In column (1), the only controls are the experience variables and country fixed effects, while in column (2) we include other firm controls. To allow for possible learning spillovers across markets emphasized in previous studies of firms' export dynamics (e.g. Albornoz *et al.*, 2012; Morales *et al.*, 2011), we include the variables *Exports to region*$_{f,t-1,r}$ and *FDI in region*$_{f,t-1,r}$, which measure respectively the number of countries in region (continent) r to which firm f is exporting to and where it has foreign affiliates at $t-1$.[22] We also include three additional firm-level variables that may affect export and FDI choices: *Employment*$_{f,t}$, the number of full-time equivalent employees of a firm, *Productivity*$_{f,t}$, the firm's value added per employee, and *Foreign ownership*$_{f,t}$, a dummy equal to 1 if the Belgian firm is foreign-owned, i.e. at least 10 percent of its capital is directly or indirectly owned by foreign investors.

The results in columns (1)-(2) are based on all Belgian firms that have exported to at least one country during our sample period. Notice that the number of observations is drastically reduced in columns (3)-(4), in which we include firm fixed effects to account for the role of time-invariant firm characteristics. In these specifications, we exploit the variation within individual firms across different destination markets. This implies that all observations for which there is no within-firm variation in the dependent variable are dropped; only firms that started investing in at least one market are retained. These specifications are closest to the spirit of our theoretical model, in which we examine the dynamics of export and FDI choices of a representative firm. They also alleviate

[21] We do not include time-varying country variables (e.g. population and GDP), which are never significant in specifications with country fixed effects.

[22] In an earlier version of the paper, we also experimented with measures of within-industry learning spillovers (e.g. Hausmann and Rodrik, 2003; Segura-Cayuela and Vilarrubia, 2008; Fernandes and Tang, 2014). These variables were never significant when included in our regressions.

concerns about possible selection effects, since the impact of export experience on FDI entry is identified by exploiting within-firm variation across different destinations.

In all specifications of Table 4, the coefficients of *Export experience14*$_{f,i,t}$ and *Export experience5+*$_{f,i,t}$ are positive and statistically significant at 1%, suggesting that export experience increases the probability of FDI entry. If we compute the hazard ratio for these variables, we find that firms that have 1-4 years (5 or more years) of export experience are between 5 and 27 (6 and 42) times more likely to start investing in a foreign market than firms with no export experience. There is no systematic pattern in the difference between the estimated coefficients of the experience variables: they are statistically different from each other only in columns (1) and (2) (in opposite directions). This is not surprising, given that the role of export experience should depend on the degree of foreign uncertainty, as shown in Table 5 below.

Table 4: FDI entry and export experience

	(1)	(2)	(3)	(4)
Experience14$_{f,i,t}$	3.324***	2.521***	2.189***	1.880***
	(0.153)	(0.164)	(0.169)	(0.178)
Experience5+$_{f,i,t}$	3.768***	2.310***	2.292***	2.006***
	(0.142)	(0.162)	(0.184)	(0.191)
log Productivity$_{f,t}$		0.452***		0.196
		(0.073)		(0.121)
log Employment$_{f,t}$		0.493***		1.123***
		(0.027)		(0.199)
Foreign ownership$_{f,t}$		0.316***		1.080***
		(0.092)		(0.152)
FDI in region$_{f,t-1,r}$		0.072***		-0.204***
		(0.011)		(0.021)
Exports to region$_{f,t-1,r}$		0.024***		0.018**
		(0.004)		(0.008)
Country fixed effects	Yes	Yes	Yes	Yes
Firm fixed effects	No	No	Yes	Yes
Observations	5,374,283	4,397,068	283,081	247,319
FDI entries	884	861	884	861
Log likelihood	-9,826.1	-8,915.0	-7,643.1	-7,300.2

Notes: The dependent variable is *FDI entry*$_{f,i}(t)$, the probability that an exporter f starts investing in country i at time t. The table reports the estimated coefficients of Cox regression models, with robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

As for the other firm controls, the coefficients of *Productivity*$_{f,t}$, *Employment*$_{f,t}$ and *Foreign ownership*$_{f,t}$ are positive and significant, indicating that firms that are more productive, larger, and foreign owned are more likely to establish foreign affiliates (though

the effect of productivity is only significant when comparing across firms). The coefficient of the variable *Exports to region*$_{f,t-1,r}$ is also positive and significant, suggesting that the probability that a firm starts investing in a foreign country increases with its export experience in neighboring countries, possibly because profitability, while uncertain, is positively correlated across close markets (Albornoz *et al.*, 2012). The sign of the coefficient of the variable *FDI in region*$_{f,t-1,r}$ depends on the specification and the underlying identification strategy. It is positive and significant in column (2), where we compare across firms, but becomes negative and significant in column (4), where we compare a given firm across destinations. This is not surprising: when comparing the FDI entry decisions of different firms, the variable *FDI in region*$_{f,t-1,r}$ captures firms that are generally more likely to invest in foreign markets; when comparing the FDI entry decisions of the same firm (over time and in different destination markets), it captures the fact that, when a firm already has subsidiary in a given region, it is less likely to set up subsidiaries in the same region.

Real options theory suggests that, if investments are irreversible and market conditions are uncertain, firms may prefer to "wait and see", delaying investments until more information about the profitability of the projects is revealed (e.g. Bernanke, 1983; McDonald and Siegel, 1986; Rodrik, 1991; Dixit and Pindyck,1994). In more uncertain foreign markets, we would thus expect firms to experiment longer with exports, before engaging in FDI. To verify this hypothesis, we run a series of regressions in which we interact the variables *Export experience*$14_{f,i,t}$ and *Export experience*$5+_{f,i,t}$ with country-level measures of uncertainty:

$$\begin{aligned} \text{FDI entry}_{f,i,t} \;=\; & h_0(t)\exp(\gamma_1 \text{ Export experience}14_{f,i,t} + \gamma_2 \text{ Export experience}5+_{f,i,t} \\ & +\gamma_3 \text{ Export experience}14_{f,i,t} \times \text{Uncertainty}_i \\ & +\gamma_4 \text{ Export experience}5+_{f,i,t} \times \text{Uncertainty}_i + \gamma_5\, X_{f,t} + \eta_f + \phi_i), \end{aligned} \tag{13}$$

where *Uncertainty*$_i$ represents different measures of country-level uncertainty.[23]

The interactions terms in (13) allow us to verify whether the role of export experience depends on the degree of foreign market uncertainty. If firms delay FDI entry until they are certain about their profitability in a foreign market, we would expect export experimentation to last longer in more uncertain destinations, implying that the coefficient γ_4 should be systematically larger than the coefficient γ_3.

[23]The uncertainty measures are highly correlated with the country fixed effects estimated in the first specification of Table 4. Given that these measures vary only at the country level, they cannot be included together with country fixed effects (ϕ_i) in equation (13).

Table 5: FDI entry and export experience, the role of uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)
Experience14$_{f,i,t}$ × Exit rate$_i$	0.287	1.117				
	(2.246)	(2.530)				
Experience5+$_{f,i,t}$ × Exit rate$_i$	5.681***	5.244**				
	(2.062)	(2.433)				
Experience14$_{f,i,t}$ × ICR $_i$			0.043	0.061		
			(0.035)	(0.038)		
Experience5+$_{f,i,t}$ × ICR$_i$			0.114***	0.122***		
			(0.031)	(0.035)		
Experience14$_{f,i,t}$ × Expropriation risk$_i$					0.124	0.185
					(0.144)	(0.158)
Experience5+$_{f,i,t}$ × Expropriation risk$_i$					0.366***	0.371***
					(0.123)	(0.144)
Experience14$_{f,i,t}$	1.939***	1.443**	3.954***	4.386***	1.925***	1.546***
	(0.611)	(0.682)	(1.453)	(1.614)	(0.279)	(0.289)
Experience5+$_{f,i,t}$	0.693	0.544	6.994***	7.073***	1.674***	1.402***
	(0.590)	(0.675)	(1.293)	(1.473)	(0.275)	(0.284)
Firm controls	No	Yes	No	Yes	No	Yes
Firm and Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	268,779	234,983	265,920	232,432	278,361	243,248
FDI entries	881	858	879	856	883	860
Log likelihood	-7,598.0	-7,259.0	-7,565.9	-7,224.1	-7,624.1	-7,283.4
	(7)	(8)	(9)	(10)	(11)	(12)
Experience14$_{f,i,t}$ × Transfer risk$_i$	0.027	0.047				
	(0.103)	(0.109)				
Experience5+$_{f,i,t}$ × Transfer risk$_i$	0.276***	0.265***				
	(0.087)	(0.098)				
Experience14$_{f,i,t}$ × No common language$_i$			-0.429	-0.010		
			(0.515)	(0.544)		
Experience5+$_{f,i,t}$ × No common language$_i$			1.020**	1.273**		
			(0.465)	(0.494)		
Experience14$_{f,i,t}$ × log Distance$_i$					-0.062	-0.043
					(0.120)	(0.133)
Experience5+$_{f,i,t}$ × log Distance$_i$					0.187*	0.136
					(0.103)	(0.118)
Experience14$_{f,i,t}$	2.032***	1.703***	2.029***	1.921***	2.228***	1.959***
	(0.257)	(0.270)	(0.291)	(0.316)	(0.197)	(0.205)
Experience5+$_{f,i,t}$	1.676***	1.428***	2.817***	2.650***	2.263***	2.039***
	(0.260)	(0.273)	(0.255)	(0.288)	(0.217)	(0.224)
Firm controls	No	Yes	No	Yes	No	Yes
Firm and Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	283,081	247,319	274,986	240,074	279,706	244,145
FDI entries	884	861	849	826	850	827
Log likelihood	-7,635.0	-7,293.9	-7,267.1	-6,934.7	-7,285.1	-6,953.3

Notes: The dependent variable is $h_{f,i}(t)$, the probability that an exporter f starts investing in country i at time t. The table reports the estimated coefficients of Cox regression models, with robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

The results of these estimations can be found in Table 5. For each uncertainty mea-

sure, we report specifications with firm and country fixed effects. In some specifications, we also include the additional firm controls.[24] As expected, in all 12 specifications the estimated coefficient for γ_4 is larger than the coefficient γ_3. This confirms that, when faced with more uncertain market conditions, firms experiment longer with exports before engaging in FDI.

The results of Table 5 provide strong evidence that the impact of export experience on FDI entry decisions depends crucially on the extent of foreign market uncertainty. In all specifications, the interactions between the uncertainty measures and *Export experience14*$_{f,i,t}$ are statistically insignificant, while the corresponding interactions with *Export experience5+*$_{f,i,t}$ are positive and significant in all but one specification. These results suggest that, when faced with more uncertain conditions, firms delay investment decisions until they have acquired enough export experience.

Table 6: Effect of increased foreign market uncertainty on the probability of FDI entry

	(1)	(2)	(3)	(4)	(5)	(6)
Experience14$_{f,i,t}$ × Exit rate$_i$	0.021					
	(0.168)					
Experience5+$_{f,i,t}$ × Exit rate$_i$	0.517**					
	(0.229)					
Experience14$_{f,i,t}$ × ICR $_i$		0.258				
		(0.230)				
Experience5+$_{f,i,t}$ × ICR$_i$		0.829***				
		(0.300)				
Experience14$_{f,i,t}$ × Expropriation risk$_i$			0.203			
			(0.258)			
Experience5+$_{f,i,t}$ × Expropriation risk$_i$			0.724**			
			(0.317)			
Experience14$_{f,i,t}$ × Transfer risk$_i$				0.053		
				(0.204)		
Experience5+$_{f,i,t}$ × Transfer risk$_i$				0.679**		
				(0.276		
Experience14$_{f,i,t}$ × No common language$_i$					-0.105	
					(0.120)	
Experience5+$_{f,i,t}$ × No common language$_i$					0.310*	
					(0.161)	
Experience14$_{f,i,t}$ × log Distance$_i$						-0.067
						(0.125)
Experience5+$_{f,i,t}$ × log Distance$_i$						0.233
						(0.142)

Notes: The table reports the impact of a one standard deviation change in each regressor on the hazard rate of an exporter f to start investing in i at time t, based on the specifications in columns 1, 3, 5, 7, 9, and 11 in Table 5. Robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

[24]To save on space, we do not report the coefficients of the additional firm controls. Their sign and significance is the same as in Table 4.

In Table 6, we quantify the effect of uncertainty on the probability that firms start investing in a foreign market. In particular, we report the effect of a one standard deviation increase in each of the uncertainty measures on the hazard rate of FDI entry for firms with different export experience. Notice that the interaction terms between the uncertainty measures and the dummy *Export experience1*$4_{f,i,t}$ are always insignificant, indicating that higher uncertainty in a foreign market has no effect on the probability of FDI entry for firms with less than 5 years of export experience in that market. By contrast, the interaction terms between the uncertainty measures and the dummy *Export experience 5+*$_{f,i,t}$ are positive and significant in all but one specification (the interaction with distance in column 6 is marginally significant, with a p-value of 0.101). Thus, higher uncertainty delays investment decisions, increasing the probability of FDI entry only for firms that have acquired more export experience. The largest effect is found in column 2: for firms with at least 5 years of export experience, a one standard deviation increase in the ICR rate — equivalent to changing the destination country from Italy to India — increases the probability of FDI entry for more experienced firms by 83%.

In principle, alternative mechanisms unrelated to foreign market uncertainty and experimentation could explain why firms tend to establish affiliates in a market after acquiring export experience in that market. For example, switches from exports to FDI could occur in a model à la Helpman *et al.* (2004), if a firm's productivity increases over time and eventually reaches the threshold above which FDI becomes more profitable than export. However, these mechanisms could not explain the fact that acquiring export experience matters more when firms invest in more uncertain foreign markets, as documented in Table 5.[25]

5.2 Additional robustness checks

In what follows, we show that the results concerning the role of export experience and foreign market uncertainty continue to hold for different samples of FDI entries and when using alternative econometric methodologies.

[25]Moreover, alternative mechanisms unrelated to foreign market uncertainty cannot explain the high exit rates of new exporters and the evolution of exports of surviving new exporters. In line with previous studies on firms' export dynamics (e.g. Eaton *et al.*, 2008; Iacovone and Javorcik, 2010; Albornoz *et al.*, 2012), over 50% of Belgian new exporters drop out of foreign markets in the first year after entry, after which the survival probability increases steadily; firms start by exporting small amounts, but exports of those firms that survive in the foreign market increase significantly over time (see Conconi *et al.*, 2013). These findings suggest that firms engage in a process of trials and errors in foreign markets.

Table 7: FDI entry and export experience, the role of uncertainty (excluding vertical FDI)

	(1)	(2)	(3)	(4)	(5)	(6)
Experience14$_{f,i,t}$ × Exit rate$_i$	1.218					
	(2.688)					
Experience5+$_{f,i,t}$ × Exit rate$_i$	5.449**					
	(2.615)					
Experience14$_{f,i,t}$ × ICR $_i$		0.061				
		(0.043)				
Experience5+$_{f,i,t}$ × ICR$_i$		0.118***				
		(0.039)				
Experience14$_{f,i,t}$ × Expropriation$_i$			0.150			
			(0.161)			
Experience5+$_{f,i,t}$ × Expropriation$_i$			0.290**			
			(0.143)			
Experience14$_{f,i,t}$ × Transfer risk$_i$				-0.025		
				(0.120)		
Experience5+$_{f,i,t}$ × Transfer risk$_i$				0.246**		
				(0.107)		
Experience14$_{f,i,t}$ × No common language$_i$					0.166	
					(0.600)	
Experience5+$_{f,i,t}$ × No common language$_i$					1.248**	
					(0.533)	
Experience14$_{f,i,t}$ × log Distance$_i$						0.043
						(0.144)
Experience5+$_{f,i,t}$ × log Distance$_i$						0.152
						(0.125)
Experience14$_{f,i,t}$	1.184	4.179**	1.388***	1.615***	1.802***	1.709***
	(0.726)	(1.820)	(0.304)	(0.293)	(0.346)	(0.219)
Experience5+$_{f,i,t}$	0.295	6.746***	1.352***	1.297***	2.470***	1.843***
	(0.724)	(1.657)	(0.293)	(0.296)	(0.312)	(0.238)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	191,920	189,703	199,052	202,562	196,322	199,832
FDI entries	667	665	669	670	640	641
Log likelihood	-5,537.3	-5,502.8	-5,562.0	-5,571.4	-5,271.5	-5,288.6

Notes: The dependent variable is *FDI entry*$_{f,i}(t)$, the probability that an exporter f starts investing in country i at time t. The table reports the estimated coefficients of Cox regression models, with robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

Our theoretical model applies to both horizontal and distribution FDI, whereby firms establish production facilities of distribution centers in foreign countries to serve consumers in those countries. The model does not apply to vertical FDI, which occurs when firms relocate some production stages abroad to reduce their costs. To rule out vertical FDI entries, we use information on intra-firm trade between foreign affiliates and their Belgian parent firm, following the literature on the boundaries of multinational enterprises (e.g. Antras, 2003; Nunn, 2007; Nunn and Trefler, 2008).[26] In particular,

[26]An alternative methodology to identify vertical integration is to combine information on firms' production activities with Input-Output tables (e.g. Alfaro *et al.*, 2013; and Alfaro *et al*, 2015). Unfortunately, the NBB Survey on Foreign Direct Investment does not contain information on the production activities of Belgian affiliates. The data also does not provide information about the geographical destination of foreign affiliate's sales, which can also be used to distinguish between different types of FDI (e.g. Helpman *et al.*, 2004; Ramondo *et al.*, 2013).

we examine intra-firm trade between each new affiliate and its Belgian parent firm. If in any of the years following FDI entry exports to the Belgian parent company exceed one third of the affiliate's sales, we classify the FDI entries as vertical and we exclude it from our analysis.[27] The results reported in Table 7 confirm the importance of export experience and foreign market uncertainty for FDI entry decisions.

Table 8: FDI entry and export experience, the role uncertainty (Weibull)

	(1)	(2)	(3)	(4)	(5)	(6)
Experience14$_{f,i,t}$ × Exit rate$_i$	-0.263					
	(2.486)					
Experience5+$_{f,i,t}$ × Exit rate$_i$	5.514**					
	(2.346)					
Experience14$_{f,i,t}$ × ICR$_i$		0.043				
		(0.038)				
Experience5+$_{f,i,t}$ × ICR$_i$		0.126***				
		(0.035)				
Experience14$_{f,i,t}$ × Expropriation$_i$			0.122			
			(0.158)			
Experience5+$_{f,i,t}$ × Expropriation$_i$			0.379***			
			(0.140)			
Experience14$_{f,i,t}$ × Transfer risk$_i$				-0.003		
				(0.109)		
Experience5+$_{f,i,t}$ × Transfer risk$_i$				0.264***		
				(0.095)		
Experience14$_{f,i,t}$ × No common language$_i$					-0.246	
					(0.541)	
Experience5+$_{f,i,t}$ × No common language$_i$					1.237**	
					(0.481)	
Experience14$_{f,i,t}$ × log Distance$_i$						-0.082
						(0.130)
Experience5+$_{f,i,t}$ × log Distance$_i$						0.152
						(0.113)
Experience14$_{f,i,t}$	1.970***	3.828**	1.831***	1.988***	1.983***	2.129***
	(0.673)	(1.613)	(0.291)	(0.271)	(0.316)	(0.210)
Experience5+$_{f,i,t}$	0.310	7.067***	1.230***	1.272***	2.499***	1.885***
	(0.652)	(1.461)	(0.276)	(0.265)	(0.281)	(0.218)
log p	5.285***	5.262***	5.264***	5.274***	5.272***	5.261***
	(0.083)	(0.085)	(0.084)	(0.084)	(0.087)	(0.088)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm and Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	234,983	232,432	243,248	247,319	240,074	244,145
FDI entries	858	856	860	861	826	827
Log likelihood	1,996.5	2,005.7	1,992.4	1,995.0	1,940.6	1,934.1

Notes: The dependent variable is *FDI entry*$_{f,i}(t)$, the probability that an exporter f starts investing in country i at time t. The table reports the estimated coefficients of Weibull regression models, with robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

In Tables 4-7, we have reported the results of regressions based on a Cox model. This semi-parametric model imposes no restriction on the functional form of the baseline hazard rate $h_0(t)$, which is not estimated. This flexibility may come at the cost of an

[27]We obtain similar results if we use even stricter thresholds of intra-firm trade (20% or 15%) to define vertical FDI entries.

efficiency loss compared to parametric models that impose a functional form on the baseline hazard rate. Among the possible parametric models, the Weibull model is often used because of its generality (the baseline is allowed to be constant, increasing or decreasing over time).[28] In Table 8, we reproduce our main results on country-level uncertainty using a Weibull proportional hazard rate model to estimate the probability of FDI entry. Our results continue to hold when using this alternative econometric methodology.

Table 9: FDI entry and export experience, the role of uncertainty (stratified Cox Procedure)

	(1)	(2)	(3)	(4)	(5)	(6)
Experience14$_{f,i,t}$ × Exit rate$_i$	2.176					
	(2.567)					
Experience5+$_{f,i,t}$ × Exit rate$_i$	7.099***					
	(2.372)					
Experience14$_{f,i,t}$ × ICR rate$_i$		0.059*				
		(0.035)				
Experience5+$_{f,i,t}$ × ICR rate$_i$		0.119***				
		(0.031)				
Experience14$_{f,i,t}$ × Expropriation$_i$			0.218			
			(0.149)			
Experience5+$_{f,i,t}$ × Expropriation$_i$			0.388***			
			(0.130)			
Experience14$_{f,i,t}$ × Transfer risk$_i$				0.098		
				(0.109)		
Experience5+$_{f,i,t}$ × Transfer risk$_i$				0.300***		
				(0.093)		
Experience14$_{f,i,t}$ × No common language$_i$					-0.021	
					(0.575)	
Experience5+$_{f,i,t}$ × No common language$_i$					1.325***	
					(0.511)	
Experience14$_{f,i,t}$ × log Distance$_i$						0.035
						(0.132)
Experience5+$_{f,i,t}$ × log Distance$_i$						0.260**
						(0.117)
Experience14$_{f,i,t}$	0.965	4.107***	1.317***	1.441***	1.781***	1.738***
	(0.709)	(1.482)	(0.290)	(0.277)	(0.299)	(0.206)
Experience5+$_{f,i,t}$	0.004	6.912***	1.342***	1.348***	2.729***	1.960***
	(0.671)	(1.293)	(0.274)	(0.264)	(0.254)	(0.216)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Strata	Strata	Strata	Strata	Strata	Strata
Observations	268,779	265,920	278,361	283,081	274,986	279,706
FDI entries	881	879	883	884	849	850
Log likelihood	-2,802.0	-2,786.8	-2,820.3	-2,826.1	-2,672.6	-2,684.5

Notes: The dependent variable is *FDI entry*$_{f,i}(t)$, the probability that an exporter f starts investing in country i at time t. The table reports the estimated coefficients of Cox regression models, with robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level.

[28]The Weibull model imposes a specific functional form for the baseline hazard, $h_0(t) = pt^{p-1}\exp(\beta_0)$, where $p > 0$ is an ancillary parameter to be estimated and β_0 is a constant. The baseline hazard rate is constant if p is equal to 1 while it is increasing (decreasing) for p above (below) 1. Compared to a Cox model, the Weibull estimator is more efficient if the baseline hazard rate is appropriately modeled.

In our benchmark regressions, we have estimated the firm fixed effects, exploiting within-firm variation in FDI entry (across markets and over time). This may give rise to an incidental parameters bias in the Cox regressions. To deal with this concern, we have allowed the baseline hazards to be different for each firm, without estimating the firm fixed effects (Allison, 2002). Table 9 shows that the qualitative results of our analysis are unaffected if we use this alternative econometric methodology (i.e. stratification).

We have also tried using a less stringent definition of a firm's export entry (based on the previous 4 years) and a more stringent definition (based on the previous 6 years). To do so, we have reconstructed the dataset, looking at exports of all Belgian firms over the period 1993-2008 and redefining the variable *Export entry*$_{f,i,t}$ (and the corresponding experience and exit variables) for all firm-destinations. The results continue to hold: the probability that a firm starts investing in a foreign country increases with its export experience in that country; in more uncertain destinations, firms delay FDI entry, experimenting longer with exports before establishing foreign affiliates.[29]

6 Conclusion

Before they start operating in a foreign market, firms typically possess imperfect information about local supply and demand conditions: they are often uncertain about local regulations and legal requirements for selling their goods in a particular market, the size of foreign demand, and the adequacy of their products to local tastes. A vast literature in international business studies argues that the need to acquire market-specific knowledge leads firms to follow a gradual internationalization process, testing a foreign market first via exports before deciding whether to invest there.

We have started by presenting a novel fact about firms' internationalization choices, which confirms the findings of case studies in the international business literature. Using a unique dataset covering all companies registered in Belgium, which allows us to study the dynamics of firms' export and FDI choices in individual destination markets, we have shown that FDI entry is almost always preceded by export entry: in almost 90% of the cases, firms serve a foreign market via exports before they start investing there. The opposite is not true: 99.95% of firms start exporting to a foreign market without

[29]The results of these regressions are omitted for space considerations, but are available upon request. The main difference with the results reported in the paper is that, when using the less stringent definition of export entry, we gain observations and FDI entries, because the corresponding bins of export experience (0, 1-3, 4+ years) can be defined for more firms in our sample. By contrast, the bins of export experience corresponding to the more stringent definition of export entry (0, 1-5, 6+ years) can be defined for fewer firms, leading us to drop observations and FDI entries.

having previously invested there.

This fact cannot be explained by standard theoretical models of firms internationalization choices. To provide a rationale for the dynamic pattern of export and FDI entries, we have used a simple model that formalizes the idea of a gradual internationalization process. Firms are uncertain about their ability to earn profits in new foreign markets, which they can only discover once they start serving it. In this setting, a firm may initially serve a foreign market by exporting. After the initial trial period, the firm will exit the foreign market, if it discovers that it cannot make enough profits to cover the trade costs; for intermediate levels of realized profitability, the firm will continue serving the market via exports; for higher levels of profitability, it will find it worthwhile to establish foreign (production or distribution) affiliates to reduce its variable costs.

Using proportional hazard models, we have shown that a firm's export experience in a foreign market has a positive effect on the probability that it starts investing in that market. More importantly, the role of export experience depends crucially on the extent of foreign market uncertainty: acquiring export experience matters more when firms invest in destinations in which market conditions are more uncertain.

Our analysis shows that firms' export and FDI decisions must be understood as part of a broader dynamic strategy to serve foreign markets in the face of uncertainty. It suggests that, even when exports and FDI are substitutes from a static perspective – when they represent alternative ways of serving a foreign market – they may be complements over time – since the knowledge acquired through export experience can lead firms to invest abroad. In contrast to the predictions of standard internationalization choice models that abstract from uncertainty and experimentation, our results imply that trade liberalization may actually foster FDI – by decreasing the cost of experimenting in foreign markets – and that FDI liberalization may stimulate exports – by increasing the option value of export entry.

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Appendix

Table A-1: Definition of variables

Export entry$_{f,i,t}$	Dummy equal to 1 if firm f starts exporting to country i in year t
FDI entry$_{f,i,t}$	Dummy equal to 1 if firm f starts investing in country i in year t
Export experience$_{f,i,t}$	Number of years since the export entry of firm f in market i
No export experience$_{f,i,t}$	Dummy equal to 1 if firm f in country i has no export experience in market i in year t
Export experience14$_{f,i,t}$	Dummy equal to 1 if firm f in country i has between 1 and 4 years of export experience in market i in year t
Export experience5+$_{f,i,t}$	Dummy equal to 1 if firm f in country i has at least 5 years of export experience in market i in year t
Exit rate$_i$	Average exit rate of all Belgian firms that started exporting to country i during the 1998-2003 period
ICR rate$_i$	Negative of average composite risk rate by International Country Risk Guide during the 1998-2008 period
Expropriation risk$_i$	Average expropriation and government action risk rate by Belgium's public credit insurer during the 1998-2008 period
Transfer risk$_i$	Average transfer risk rate by Belgium's public credit insurer during the 1998-2008 period
No common language$_i$	Negative of probability that a pair of people at random from the two countries understand one another in some language
Distance$_i$	Distance between Bruxelles and the capital of country i (in thousands of kilometers)
Productivity$_{f,t}$	Value added of firm f (in thousands) divided by its employment (in thousands)
Employment$_{f,t}$	Employment of firm f in year t (in thousands)
Foreign ownership$_{f,t}$	Dummy equal to 1 if firm f receives inward FDI in year t
FDI in region$_{f,t-1,r}$	Number of countries in continent r in which firm f had foreign affiliates at $t-1$
Exports to region$_{f,t-1,c}$	Number of countries in continent r to which firm f exported at $t-1$

Table A-2: List of countries and FDI entries by Belgian firms (1998-2008)

Countries	FDI entries	Countries	FDI entries
Algeria	2	Macao	1
Angola	1	Malawi	1
Argentina	3	Malaysia	7
Australia	12	Mauritius	2
Austria	15	Mexico	10
Bahrain	1	Moldova	1
Bosnia and Herzegovina	1	Morocco	1
Brazil	13	Netherlands	75
Bulgaria	5	New Zealand	1
Canada	15	Nigeria	2
Chile	2	Norway	9
China	19	Peru	1
Colombia	1	Philippines	2
Croatia	3	Poland	26
Cyprus	2	Portugal	9
Czech Republic	31	Romania	12
Denmark	8	Russia	7
Egypt	4	Saudi Arabia	4
Estonia	1	Singapore	14
Finland	10	Slovak Rep	7
France	96	Slovenia	2
Georgia	1	South Africa	5
Germany	67	South Korea	1
Greece	7	Spain	37
Hong Kong	17	Sweden	12
Hungary	13	Switzerland	19
India	9	Taiwan	3
Indonesia	4	Thailand	3
Iran	1	Tunisia	2
Ireland	14	Turkey	15
Israel	2	Ukraine	4
Italy	38	United Arab Emirates	4
Japan	7	United Kingdom	79
Lebanon	1	United States	43
Lithuania	1	Vietnam	1
Luxembourg	34	Zimbabwe	1