The Internationalization Process of Firms: from Exports to FDI*

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Abstract

This paper examines firms' choice between serving a foreign market through exports or foreign direct investment (FDI). We begin by unveiling a new empirical regularity: using a unique dataset that allows us to study the dynamics of firms' export and FDI choices in individual destination markets, we show that the overwhelming majority of firms serve a foreign market via exports before establishing affiliates in that market. To explain this pattern, we develop a simple dynamic model of export and FDI choices, in which a firm can only discover its ability to earn profits in a foreign market once it starts serving it. We show that uncertainty can lead to a gradual internationalization process, whereby the firm tests the foreign market via exports, before engaging in FDI. Consistent with the model's predictions, we find that most firms start serving a foreign market through exports; in the first years following export entry, many firms drop out of the foreign market, others survive and expand as exporters, some establish foreign affiliates. We show that a firm's export experience in a foreign market increases its probability of FDI entry; this effect decreases over time and increases with foreign market uncertainty. Our analysis suggests that exports and FDI, although substitutes from a static perspective, may be complements over time, since the knowledge acquired through export experimentation can lead firms to start investing abroad.

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1 Introduction

In recent decades, more and more companies have started to operate outside their domestic markets, selling their goods to foreign customers through exports or foreign direct investment (FDI). When deciding whether and how to serve foreign markets, firms face considerable uncertainty: they are often unaware of local regulation 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.[1]

A vast literature in international business based on case studies 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 covering the universe of all companies registered in Belgium, we find that a firm's FDI entry in a foreign market is almost always preceded by exports: 86.32% of the firms that start investing in a new market have already been serving it via exports. The reverse is not true: 99.99% of firms that start exporting to a foreign market do so without having previously invested there. These findings are consistent with the idea that firms follow a gradual internationalization process: they start 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, they then engage in FDI to save on future trade costs.

Standard static models of firms' internationalization choices cannot explain why FDI entry is almost always preceded by export entry. In these models, a firm will either serve a foreign market through export *or* FDI, a choice that is driven by a tradeoff between proximity and concentration (e.g. Markusen, 1984; Brainard, 1997; Helpman *et al.*,

[1]We focus on horizontal FDI, the establishment of foreign production facilities with the purpose of serving the local market. In their review of the empirical literature on FDI, Markusen and Maskus (2003) and Blonigen (2005) conclude that most FDI is horizontal in nature. Indeed, foreign affiliates worldwide sell most of their products locally. For example, over the period 2005-2010, less than 19 percent of affiliate sales were sold outside of the country of production (UNCTAD, 2011). Our analysis can also be applied to investments in distribution to penetrate export markets. We abstract instead from vertical FDI, which involves the fragmentation of the production process across different countries and, unlike horizontal and distribution-oriented FDI, is not meant to serve customers in the host country.

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. To explain switches from one mode to the other, we describe a simple dynamic model of export and FDI choices, which formalizes the idea of a gradual internationalization process. 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, a firm may initially serve a market via exports, before establishing foreign affiliates. The intuition for this result is simple: in the face of uncertainty, exporting is more efficient way to test a foreign market.

Internationalization involves trials and errors: a firm will 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 serving the foreign market via exports; for higher levels of profitability, it will find it worthwhile to pay the fixed cost of setting up a foreign subsidiary to reduce its variable costs.

To assess the evidence, we focus on all Belgian firms that started exporting to new markets during the 1998-2008 period. In our benchmark analysis, we consider only destinations outside the European Single Market (ESM), which comprises the members of the European Union (EU) plus Iceland, Liechtenstein, Norway and Switzerland. There are two reasons for this choice. First, data for exports to countries outside the ESM come from customs declarations and cover virtually all transactions. We can thus precisely identify all Belgian new exporters. This is not the case for intra-ESM trade. Second, our theoretical model best applies to destinations outside the ESM. Within the Single Market, trade barriers have long been removed and transport costs are very low, so Belgian firms are less likely to face a proximity-concentration tradeoff and uncertain market conditions.[2]

Our theoretical model predicts that new exporters will exit a foreign market, if they discover that their profitability there is too low to justify the trade costs. In line with this prediction, we find that many new exporters drop out of foreign markets in the first year after entry. Our model also suggests that, when firms are uncertain about their profitability in foreign markets, they should start by exporting small amounts; conditional on surviving as exporters, their exports should expand. Consistent with this prediction, we find that new exporters start by exporting small amounts and that

[2]In robustness checks, we verify that our results continue to hold if we include in our sample destinations within the European Single Market.

exports of surviving new exporters increase significantly in the following years. These findings suggest that firms engage in a process of trial and error in foreign markets.

We also show that export experimentation can lead firms to start investing in foreign markets: new exporters can become new FDIers. The panel structure of our data allows us to trace export and FDI entries of each Belgian firm in foreign markets. Using proportional hazard models, we examine the probability that new exporters start investing in foreign markets.[3] We find that a firm's export experience in a market has a positive but decaying effect on its probability of FDI entry in that market: a firm is more likely to start investing in a foreign market in the first few years following export entry, after which export experience has no impact on the probability of FDI entry. Moreover, the impact of export experience depends on the extent of foreign market uncertainty: in destinations where market conditions are more uncertain, export experience has a bigger impact on firms' decision to establish foreign affiliates. These results are consistent with the hypothesis that, when faced with foreign market uncertainty, firms experiment via exports before deciding whether to engage in FDI.

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.

In line with the literature on the proximity-concentration tradeoff, our theoretical model focuses on a firm that must decide whether to serve a foreign market via exports (the mode characterized by lower fixed cost) or horizontal FDI (characterized by lower variable costs). As shown in Appendix A.3, the same logic applies to an exporting firm that must decide how to distribute its goods in a foreign market. In this case, the choice is between using a local distributor (the mode that involves lower fixed cost) and setting up its own distribution network (involving lower variable costs). As in our benchmark model, uncertainty can lead to a gradual internationalization process, in which a firm's FDI entry is preceded by its export entry: during an initial trial period, the firm distributes its exports via a local agent; if it discovers that it can earn large profits in the foreign market, it then establishes its own distribution network.

Our analysis has important implications concerning the effects of trade and FDI liber-

[3]Proportional hazard models are widely used class of duration models, which allow to study the time it takes for an event to occur, avoiding (left and right) censoring problems. In empirical studies of real option theories, these models are used to verify whether uncertainty delays investment decisions.

alization. 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, this 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.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 uncovers new empirical regularities concerning firms' export and FDI entries in individual foreign markets. To explain these regularities, Section 4 presents a simple model of firms' internationalization choices under uncertainty. Section 5 describes the datasets and variables used in our empirical analysis. Section 6 presents evidence on exit rates and the evolution of exports of new exporters. In Section 7, we use proportional hazard models to study FDI entry of new exporters. Section 8 concludes.

2 Related literature

Our paper builds on the vast literature on the proximity-concentration tradeoff, which examines firms' decision on whether to serve a foreign market, and whether to do so through export or horizontal FDI. The key prediction of traditional models in this literature is that firms will invest abroad when the gains from avoiding trade costs outweigh the costs of maintaining capacity in multiple markets (e.g. Markusen, 1984; Horstmann and Markusen, 1992; Brainard, 1997; Markusen and Venables, 2000). Our paper shows 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 switching to FDI.[4]

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. Using data on exports and FDI sales of US firms in 38 countries and 52 industries, they provide cross-sectional evidence supporting this prediction.

[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.

The paper by Helpman *et al.* (2004) emphasizes the importance of productivity differences in explaining static export and FDI choices of different firms within sectors. Our paper focuses instead on the dynamic choices of individual firms, highlighting the importance of market uncertainty and experimentation. Ramondo *et al.* (2014) 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.[5]

Most closely related to ours is the paper by Rob and Vettas (2003), which examines the impact of foreign market uncertainty on the dynamics of 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.

The idea that uncertainty affects investment decisions is central to real options theory, which 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, when faced with the choice on how to serve foreign markets, firms may first test a foreign market via exports before establishing foreign affiliates.

The difficulty for firms to acquire information about foreign markets has long been emphasized by the international business literature. Starting from Johanson and Vahlne (1977), many studies have argued that market-specific knowledge can only be gained by operating in individual foreign markets because it is often tacit in nature, highly dependent on individuals, and thus difficult to transfer to other individuals or other contexts. To acquire such knowledge, firms first serve foreign markets via exports and may eventually establish foreign production subsidiaries.[6] Our paper develops a simple

[5]Oldenski (2012) focuses instead on interaction effects between task content and country characteristics in firms' decision between exports and horizontal FDI.

[6]This literature also suggests that firms may first engage in joint ventures with local firms, which provide the right (but not the obligation) for future investment (e.g. Chi, 2000) and can help to obtain knowledge about local market conditions (Chi and McGuire, 1996). Once uncertainties have been reduced, firms involved in joint ventures may choose to purchase more equity in the venture, sell their equity share, or dissolve the venture (e.g. Kumar, 2005). See Raff and Ryan (2008) for an analysis of

dynamic model to formalize these ideas and provides systematic evidence for firms' gradual involvement in foreign markets.[7]

Finally, our paper is related to the recent but increasingly vast literature on firms' export dynamics, which has established important stylized facts about new exporters: they 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.[8] Theoretical models seeking to account for firms' export dynamics emphasize learning about foreign markets and trade relationships.[9] Most related to our analysis is the paper by Albornoz *et al.* (2012), in which firms discover their profitability in foreign markets by exporting to them and make export choices across different destinations. Our focus is instead on how learning and experimentation can lead firms to switch from exports to FDI within a given destination.

3 The dynamics 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 foreign affiliates in that market.

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the timing of FDI projects.

[7]The international business literature has relied on case studies or surveys to examine firms' internationalization choices. For example, the seminal contribution by Johanson and Vahlne (1977) is based on case studies of few Swedish firms, while the more recent paper by Brouthers *et al.* (2008) relies on a survey of Dutch and Greek firms.

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

[9]One of the earlier papers on trade dynamics and incomplete information is Rauch and Watson (2003). They describe a model with costly search in which a buyer from a developed country is uncertain about whether exporters from developing countries are able to fill a large scale order. In this setting, trade relations start small because importers test exporters by placing small orders that reveal their type. Eaton *et al.* (2010) develop a model where producers learn about the appeal of their products by devoting resources to finding consumers and observing the experiences of competitors. Freund and Pierola (2010) focus on the incentives of firms to develop new export products in the face of uncertainty about export costs. Their analysis of the frequency of entry and exit from foreign markets for Peruvian firms in the non-traditional agricultural sector in Peru shows a process of "trials and errors".

3.1 Data on exports and FDI

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.[10] 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 is exporting 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. For each transaction, this data gives the product code, the type of transaction, and the destination or origin of the goods, the value, the net mass and units. In our benchmark analysis, we focus on destinations outside the European Single Market (ESM).[11] The main reason is that the Extrastat dataset is based on customs declarations and covers virtually all trade transactions (all flows are recorded, as long as their value is at least 1,000 euro or their weight is at least one ton). For destinations outside the ESM, we can thus identify all Belgian firms that start exporting to a new country. By contrast, for destinations within the ESM, we cannot identify all Belgian new exporters, since the Intrastat dataset covers only firms whose annual trade flows (receipts or shipments) exceed a considerable threshold.[12] Even if a firm is included in the dataset, we risk only observing its exports once it has successfully completed the initial phase of experimentation in a foreign market.

Data on FDI come from the NBBs annual Survey on Foreign Direct Investment. The survey, conducted since 1997, provides information on all 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

[10] In general, firms can serve foreign buyers through three channels: they can export their products to foreign customers, serve them through foreign subsidiaries, or license foreign firms to produce their products. Given the very limited role played by the third channel (i.e. less than 0.4 percent of Belgian firms engage in foreign markets via licensing), we focus on the first two channels.

[11] The European Single Market comprises the 27 EU Member States plus Iceland, Liechtenstein and Norway through the European Economic Area. Switzerland is also considered part of it because it has a series of bilateral treaties with the EU. In Appendix A-2, we provide descriptive statistics of export and FDI activities of Belgian firms in the world, and in countries outside the European Single Market.

[12] The reporting threshold has been increased twice during our sample period (from 104,115 euros to 250,000 euros in 1998, and to 1 million euros in 2006). In robustness checks, we show that our results continue to hold when we consider all destination countries.

social capital of foreign firms. All firms are required to report their FDI stocks and flows in individual foreign countries.

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.

Identifying firms that start exporting to a foreign country is less straightforward, due to the lumpiness of firms' exports. Some studies classify a firm as a new exporter to a specific market for a specific year if it was not exporting to that market the year before (e.g. Besedes and Prusa, 2006; Eaton *et al.*, 2008; Ruhl and Willis, 2008). The problem is that firms often ship their goods at intervals, so applying this definition can lead to classify as new exporters many firms that were already exporting to a specific foreign market previously. To deal with this issue, we define the variable *Export entry*$_{f,i,t}$, which is equal to 1 if firm f exports to foreign market i in year t after at least five years of no exporting to that market.[13] This definition allows us to minimize the problem of export re-entries and to identify firms that start exporting to a foreign market without prior direct knowledge of the destination (i.e. any such knowledge is assumed to completely depreciate after at least five years of no exporting).

Table 1 provides statistics on all Belgian manufacturing firms that started exporting to or investing in destinations outside the European Single Market during our sample period. Note that export entries are much more frequent than FDI entries (30,002 compared to 380). This finding is in line with previous studies of firms' internationalization choices (e.g. Head and Ries, 2003; Helpman *et al.*, 2004), which show that only a few highly productive firms engage in FDI (see also Appendix A-2).

The key novelty of our analysis is that, thanks to the panel structure of our data, we can examine the dynamics of firms' export and FDI choices in individual foreign markets. Table 1 shows that 99.99% of the firms that started exporting to a foreign market, did so without having previously invested there. By contrast, 86.32% of the firms that started investing in a foreign market had already been exporting to that destination.[14]

[13]This is the most stringent definition we can apply without incurring left-censoring problems: for all export entries in the 1998-2008 period, we can observe exports in the previous five years (since firm-level export data is available from 1993).

[14]This is a lower bound, since it is based on firms' exports in the five years before FDI entry. Similar patterns have been documented for French firms by Gazaniol (2012), who finds that in 95% of the cases exports precede FDI.

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	2,925	0	2,925	0	20	20
1999	2,760	1	2,761	3	28	31
2000	2,892	0	2,892	5	52	57
2001	2,773	0	2,773	8	50	58
2002	2,575	0	2,575	3	24	27
2003	2,469	1	2,470	1	24	25
2004	2,971	1	2,972	4	27	31
2005	2,511	0	2,511	16	24	40
2006	2,530	1	2,531	5	33	38
2007	2,745	0	2,745	6	19	25
2008	2,847	0	2,847	1	27	28
Total	29,998 (99,99%)	4 (0.01%)	30,002 (100%)	52 (13.68%)	328 (86.32%)	380 (100%)

Notes: The table includes all export and FDI entries by Belgian manufacturing firms in destinations outside the European Single Market over the 1998-2008 period. An export entry is classified "with previous FDI" if firm f starts exporting to foreign market i in year t, having positive FDI stock in that market in the previous year. An FDI entry is classified "with previous exports" if firm f starts investing in foreign market i in year t, having exported to that market in any of the previous five years.

The statistics in Table 1 indicate that virtually all Belgian firms were "new exporters" before becoming "new FDIers". This result is in line with the idea that firms experiment in foreign markets via exports before deciding whether or not it is worth investing there.

4 Export and FDI choices under uncertainty

In this section, we present a simple model of firms' internationalization choices, which provides an explanation for the dynamic patterns that emerge in Table 1. As discussed in the introduction, the international business literature 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.

We develop a simple dynamic model of firms' export and FDI choices to formalize this idea. There are two main ingredients of our model. First, in line with the proximity-concentration tradeoff literature (e.g. Markusen, 1984; Horstmann and Markusen, 1992; Brainard, 1997; Markusen and Venables, 2000), we focus on a setting wherefirms choose to serve a foreign market either via exports or horizontal FDI and assume a cost asymmetry these two modes: exporting involves a lower fixed cost, while FDI involves lower variable costs. As discussed in Appendix A.3, the logic of our theoretical model applies to a setting where exporting firms chooses whether or not to invest in a foreign distribution network.

Second, firms are uncertain about their profitability in foreign markets. To capture the process of experimentation, we follow Albornoz *et al.* (2012), who describe a simple two-period game in which firms are initially uncertain about demand and supply conditions in a foreign market and can only learn whether they can profitably serve it by actually operating there.

4.1 Setup

We abstract from firm heterogeneity, which has been extensively studied in the literature (e.g. Head and Ries, 2003; Helpman *et al.*, 2004), focusing on the dynamics of the internationalization choices of individual firms. We consider a representative risk-neutral firm producing good k in its domestic market, which must decide whether to serve a foreign market i, and whether to do so via exports or foreign affiliate sales.

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_{ik}. If the firm serves the foreign market via exports, it bears a unit trade cost τ_{ik} (reflecting both transport costs and barriers to trade) and incurs a one-time fixed cost equal to F_{ik}^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 $F_{ik}^I > F_{ik}^E$. Both fixed costs are assumed to be irreversible.[15] The firm faces a linear demand in the foreign market: $q_{ik}(p_{ik}) = a_{ik} - p_{ik}$, where q_{ik} and p_{ik} denote the output sold in the foreign market and the corresponding price, and a_{ik} is an unknown parameter.

Following Albornoz *et al.* (2012), uncertainty in foreign profitability is captured by the random variable

$$\mu_{ik} \equiv a_{ik} - c_{ik}, \tag{1}$$

with continuous cumulative distribution function $G(.)$ on the support $[\underline{\mu}_{ik}, \overline{\mu}_{ik}]$, mean $E\mu_{ik}$, and variance σ^2. The value $\overline{\mu}_{ik}$ is realized with the highest possible demand intercept and the lowest possible distributions cost; the value $\underline{\mu}_{ik}$ 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 country and sector subscripts, with the understanding that country variables refer to foreign market i and sectoral variables refer to industry k.

For a proximity-concentration tradeoff to arise, the fixed cost of FDI must be larger than the fixed cost of exporting. Thus, we assume the following:

Assumption 1 $F^I \geq \frac{1}{2}(2\sqrt{F^E} + \tau)^2$.

This restriction ensures that the cost of setting up a subsidiary is sufficiently large that FDI does not always dominate exports as a mode of serving the foreign market. We further assume that

Assumption 2 $2\sqrt{F^E}) + \tau \geq 0$.

This restriction guarantees that export entry is profitable for some values of realized profitability.

[15] The fixed cost of setting up a foreign subsidiary in a given market is also assumed to be independent of whether or not a firm has already exported to that market. The implications of relaxing this assumption are discussed in Section 4.3.

4.2 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 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.

4.3 Period $t = 2$

a) Entry via exports at $t = 1$

Consider first the case in which the firm has started serving the foreign markets via exports in the first period, discovering its profitability μ. In the second period, it must

decide 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

$$\pi^{EE}(\tau, q^{EE}) \equiv (\mu - \tau - q^{EE})q^{EE}. \tag{2}$$

The firm chooses q^{EE} so as to maximize (2), which yields second-period export sales equal to $\hat{q}^{EE}(\tau) = K_{\{\mu>\tau\}}\frac{\mu-\tau}{2}$, where $K_{\{.\}}$ is an indicator variable, here denoting whether $\mu > \tau$. Second-period export profits can then be re-written as

$$\pi^{EE}(\tau) = K_{\{\mu>\tau\}}\Big(\frac{\mu-\tau}{2}\Big)^2. \tag{3}$$

Alternatively, if the firm discovers that it is very profitable in serving the foreign market, it may decide that it is 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

$$\pi^{EI}(F^I) \equiv (\mu - q^{EI})q^{EI} - F^I. \tag{4}$$

Maximization of (4) 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

$$\pi^{EI}(F^I) = \Big(\frac{\mu^2}{4} - F^I\Big), \tag{5}$$

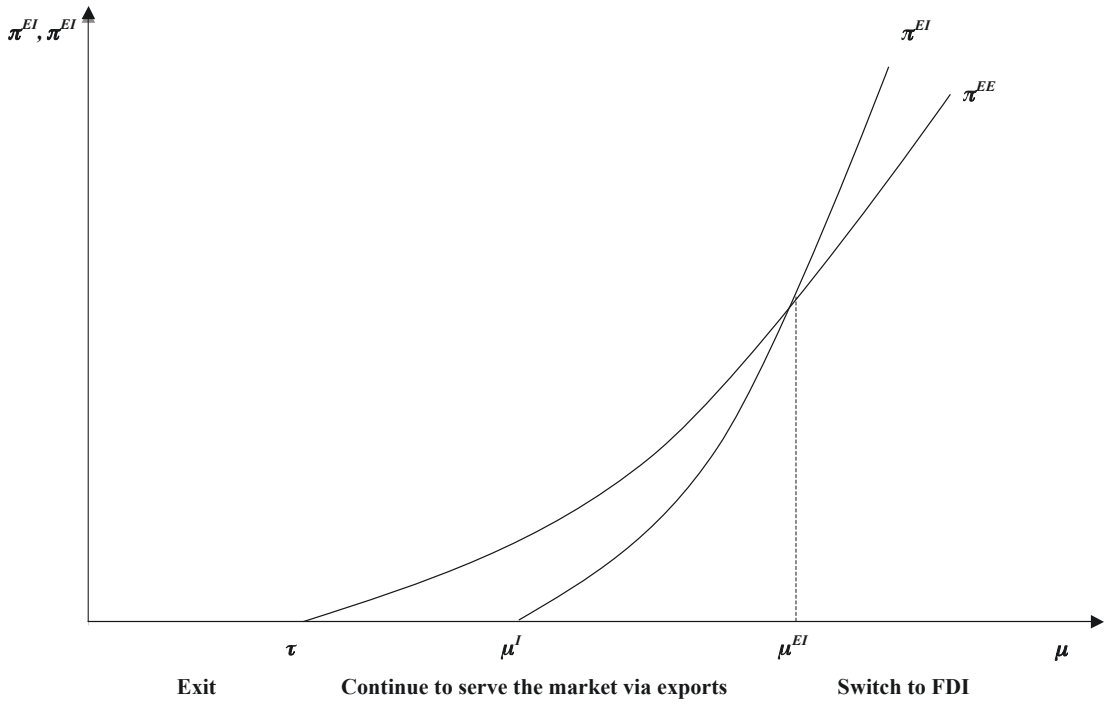
which are positive if realized profitability is above $\mu^I \equiv 2\sqrt{F^I}$.

Comparing (5) with (3), we can derive the threshold of realized profitability above which the firm will switch from exports to FDI:

$$\mu^{EI} \equiv \frac{2F^I}{\tau} + \frac{\tau}{2}. \tag{6}$$

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 $\mu > \mu^{EI}$, realized profitability is high enough that FDI profits are higher than export profits, so the firm is willing to pay the fixed cost of

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



setting up a foreign subsidiary to avoid trade costs. We can thus state the following:

Result 1 *After entering the foreign market via exports and discovering its profitability* μ*, the firm will exit if* $\mu < \tau$*, will continue to export if* $\tau < \mu \leq \mu^{EI}$*, and will switch to FDI if* $\mu > \mu^{EI}$*.*

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 $\pi^{II} = (\mu - q^{II})q^{II}$. Substituting optimal foreign affiliate sales, $\hat{q}^{II} = \frac{\mu}{2}$, yields

$$\pi^{II} = \frac{\mu^2}{4}, \tag{7}$$

which are positive as long as $\mu > 0$.

The profits associated with switching from FDI to exports in the second-period can

be written as

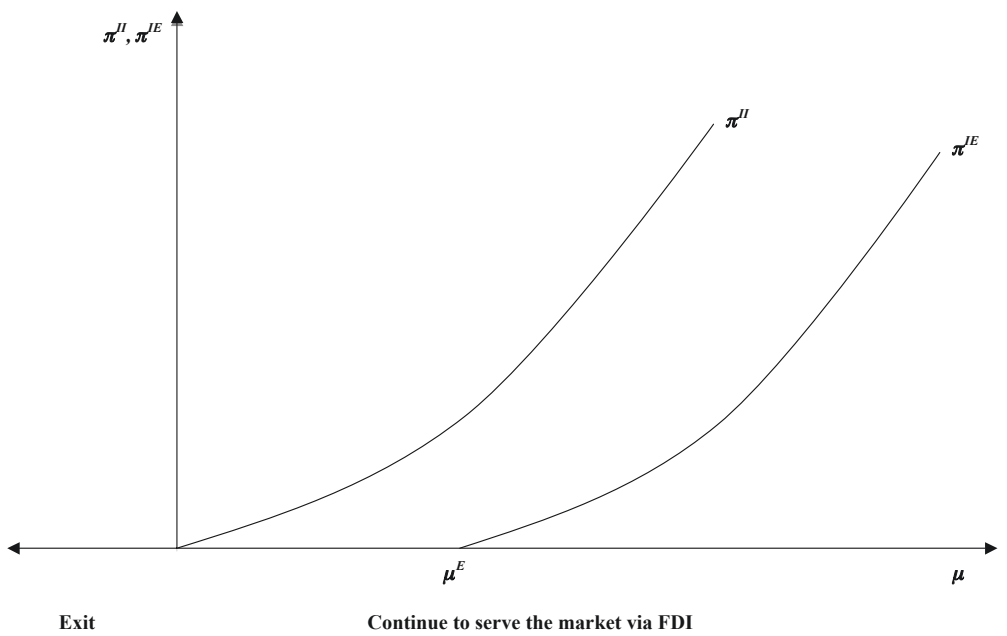
$$\pi^{IE}(\tau, F^E) = \left(\frac{\mu - \tau}{2}\right)^2 - F^E. \tag{8}$$

Profits from export entry are positive if realized profitability exceeds the following threshold:

$$\mu^E \equiv 2\sqrt{F^E)} + \tau. \tag{9}$$

A firm entering the foreign market via FDI in the first period will never switch to exports in the second period. To verify this, Figure 2 plots second-period export and FDI profits, following FDI entry in the first 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. The intuition for this result is simple: once the firm has paid the sunk cost F^I, starting to serve the foreign market via exports would imply paying an additional fixed cost F^E, as well as the trade cost τ for each unit sold in the foreign market.

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



Result 2 *After entering the foreign market via FDI and discovering its profitability μ, the firm will exit if $\mu < 0$ and will continue to serve the foreign market through foreign affiliate sales if $\mu \geq 0$.*

Together, Results 1 and 2 imply that uncertainty can lead a firm to switch from exports to FDI as a way to serve a foreign market, but not vice versa.

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.

4.4 Period $t = 1$

Having derived second-period profits, we can now move to the analysis of first-period entry strategies. In what follows, we evaluate the profits associated with different entry strategies from an ex ante perspective, i.e. when the firm is still uncertain about its profitability in the foreign market.

a) Entry via exports at $t = 1$

Entering the foreign market via exports in the first period yields expected second-period profits equal to

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

Equation (10) 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 entering the foreign market via exports can thus be written as

$$\omega^E(\tau, F^E, F^I, q^E) \equiv \int_{\underline{\mu}}^{\overline{\mu}} (\mu - \tau - q^E) q^E dG(\mu) - F^E + K_{\{q^E > 0\}} V^E. \tag{11}$$

The first two terms of (11) represent expected first-period profits from export entry. The last term captures expected second-period profits, as defined in equation (10). Recall from equation (9) that μ^E defines the threshold of profitability for which the firm expects zero first-period profits from entering via exports.

Optimal first-period exports depend on expected profitability in the foreign market. 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

$$\begin{aligned}\Omega^E(\tau, F^I, F^E) \equiv & \int_{\tau}^{\overline{\mu}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) - F^E \\ & + K_{\{q^E>0\}} \Big\{ \int_{\tau}^{\mu^{EI}} \Big(\frac{\mu - \tau}{2}\Big)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \Big(\frac{\mu^2}{4} - F^I\Big) dG(\mu) \Big\}. \end{aligned} \tag{12}$$

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

$$\omega^I(F^I, q^I) \equiv \int_{\underline{\mu}}^{\overline{\mu}} (\mu - q^I) q^I dG(\mu) - F^I + K_{\{q^I>0\}} \int_0^{\overline{\mu}} (\mu - q^I) q^I dG(\mu). \tag{13}$$

The first two terms of (13) 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:

$$\Omega^I(F^I) \equiv \frac{1}{4} \int_{\underline{\mu}}^{\overline{\mu}} \mu^2 dG(\mu) - F^I + K_{\{q^I>0\}} \frac{1}{4} \int_0^{\overline{\mu}} \mu^2 dG(\mu) \tag{14}$$

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 in the foreign market 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:

Result 3 *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 $\tilde{\mu}^E \leq E\mu < \tilde{\mu}^I$, it enters via exports, possibly switching to FDI in the second period; if $E\mu > \tilde{\mu}^I$, it enters directly via FDI.*

It easy to show that, 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 $E\mu = \mu^E$ as defined in equation (9), 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

$$\Omega^E = \int_{\tau}^{\mu^{EI}} \left(\frac{\mu - \tau}{2}\right)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \left(\frac{\mu^2}{4} - F^I\right) dG(\mu) > 0, \tag{15}$$

while expected profits from FDI entry are given by[16]

$$\Omega^I = \frac{1}{2}(2\sqrt{F^E} + \tau)^2 - F^I \leq 0. \tag{16}$$

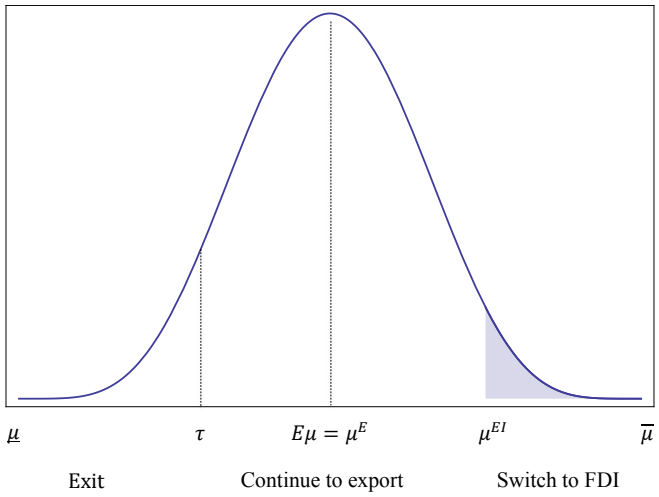
In this scenario, uncertainty leads to a gradual internationalization process: the firm enters the foreign market via exports, even if it expects to make zero profits in the first period; in the second period, if its realized profitability is high enough, it starts investing in the foreign market.

As an illustration, in Figure 3 we have drawn the probability density function of a beta-type distribution of the random variable μ, with mean equal to μ^E.[17] As discussed above, the case in which $E\mu = \mu^E$ is one in which the firm enters the foreign market via

[16]The fact that expected profits from FDI entry cannot be positive when $E\mu = \mu^E$ follows from the restriction on the fixed cost of FDI (Assumption 1).

[17]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 3 corresponds to a beta distribution with $\alpha = \beta = 6$, with support $[\underline{\mu}, \overline{\mu}]$.

Figure 3: Probability of a switch from exports to FDI at $t = 2$



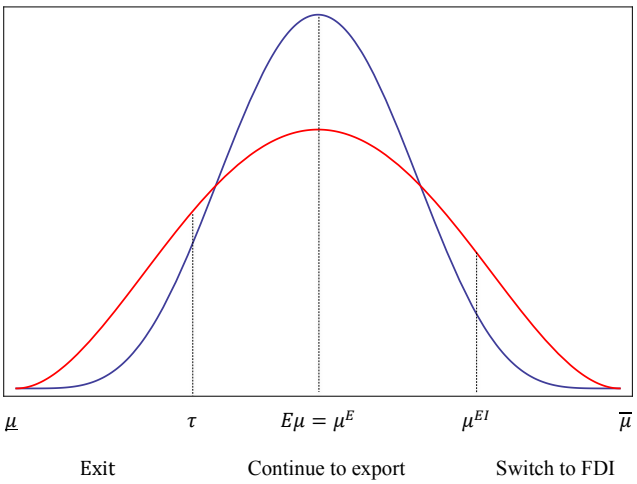
exports, even if it expects to make zero profits in the first period.[18] The shaded area captures the probability that the firm starts investing in the second period, which is equal to $1 - G(\mu^{EI})$. The area below τ captures instead the probability that a firm entering the foreign market in the first period exits in the following period, if it discovers that its profitability is below the unit trade costs. Finally, with probability $G(\mu^{EI}) - G(\tau)$, the firm will continue to export.

Note that, if the firms survives as an exporter, the volume of its exports increases. This is because, when the firm enters the foreign market in the first period, it expects a profitability of μ^E. In the second period, if the firm continues to export in the second period, it must be because its realized profitability is above τ; conditional on surviving, the relevant distribution of μ is thus a truncation of the original one, implying that the firm expands its exports.

An increase in ex-ante uncertainty increases the likelihood of export trials and errors. To illustrate this, in Figure 4 we have drawn a mean-preserving spread of the distribution in Figure 3: an increase in σ^2, 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). Higher ex-ante uncertainty also makes it more likely that, following export entry, the firm discovers that FDI entry is profitable (the area above μ^{EI} gets larger).

[18] 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 12, 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.

Figure 4: Increase in foreign market uncertainty



We have assumed 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). However, 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, but the switch from exports to FDI will be more likely.[19]

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 broad 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 static models of the proximity-concentration tradeoff, these two objectives are always in conflict with each other: reducing import barriers makes export-

[19]Under this alternative formulation, the profitability threshold above which a firm will switch from exports to FDI is $\mu^{EI\prime} = \frac{2f^I}{\tau} + \frac{\tau}{2} < \mu^{EI}$ and the probability of a switch is thus $1-G(\mu^{EI\prime}) > 1-G(\mu^{EI})$.

ing 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 then lead the firm to start investing in the foreign market.[20]

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.[21] By contrast, in standard internationalization models, FDI liberalization cannot trigger export entry.

5 Exit rates and export values of new exporters

The statistics presented in Section 3 show that essentially all firms start serving foreign markets via exports, possibly engaging in FDI later on. The model described above provides a theoretical rationale for this stylized fact: when firms are uncertain about their ability to earn profits in a new market, exporting is a more efficient way to experiment than FDI, since it involves lower fixed cost.

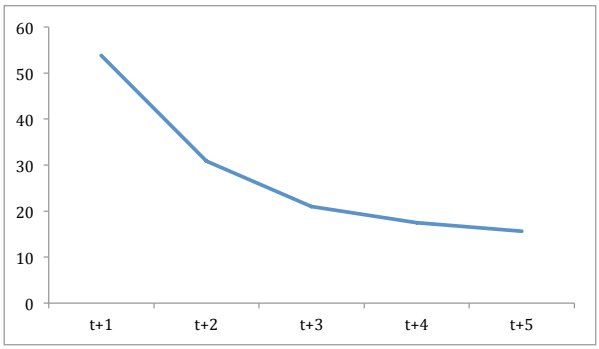
We now focus on all Belgian firms that started exporting to new destinations during our sample period. In this section, we look at the evolution of their exit rates and export values in the years following export entry. In the following section, we examine instead the probability that new exporters start investing in the foreign market.

[20] However, if trade costs are small enough that export experimentation is already profitable ($\tau \leq E\mu - 2\sqrt{F^E}$), further trade liberalization will clearly have a negative effect on FDI. The effect of trade costs on the ratio exports/FDI activities should thus be non-linear.

[21] 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 $\int_{\tau}^{\mu^{EI}} \left(\frac{\mu-\tau}{2}\right)^2 dG(\mu) + \int_{\mu^{EI}}^{\overline{\mu}} \left(\frac{\mu^2}{4} - F^I\right) dG(\mu)$.

According to our model, after an initial trial period, new exporters will exit a foreign market, if they discover that their profitability in that market is too low to justify the trade costs.

Figure 5: Exit rate of new exporters



Note: Exit rates based on the number of new exporters surviving in the previous year.

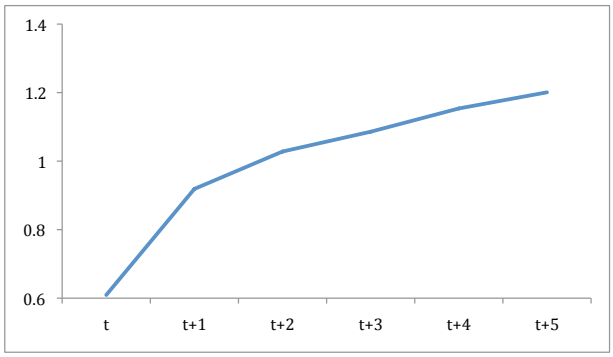
Figure 5 reports exit rates of Belgian new exporters. We focus on the 16,394 export entries that occurred during the 1998-2003 period, so that we can observe at least five years of exports following entry since our sample period ends in 2008. In line with the predictions of our model and with previous studies on export dynamics, we find that new exporters are likely to drop out of foreign markets soon after entry. In almost 54% of the cases new exporters exited foreign markets after just one year of exporting, with the exit rate falling steadily in the following years (around 15.6% at $t+5$).[22] Figure 5 hides substantial cross-country heterogeneity in exit rates. For example, after one year the exit rate of new Belgian exporters is as high high as 75% in Malawi but only 34% in Australia.

Our model also suggests that, when firms are uncertain about their profitability in the foreign market, they should start by exporting small amounts; and conditional on surviving as exporters, their exports should expand gradually. This is indeed the pattern emerging from Figure 6, in which we plot the evolution of exports for all firms that started exporting to a new market during the 1998-2003 period and continued to export to that market in the following five years.[23]

[22]If we use a more stringent definition of death (at least five years of no exports after entry), new exporters exit in around 35.11% of cases.

[23]For each year between t (the year of export entry) and $t+5$, we have computed the ratio of a firm's export to a given market over its total exports to that market between t and $t+5$. Figure 6 plots the evolution of the average of this ratio for all new exporters. The same pattern emerges if we disregard the year of export entry, when trade volumes are affected by the month of entry in the export market (see Berthou and Vicard (2013) for a discussion).

Figure 6: Export values of surviving new exporters



Note: Ratio of firms' exports to average exports in a given market (between t and $t+5$).

While our theoretical model provides an explanation for the dynamic patterns of firms' export and FDI entries documented in Table 1, in principle these patterns could be explained by alternative mechanisms. 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, alternative mechanisms unrelated to foreign market uncertainty cannot also explain the high exit rates of new exporters and the evolution of exports of surviving new exporters documented in Figures 5 and 6. The patterns observed in these figures suggest that firms engage in a process of trial and error: in the face of uncertainty, they experiment in foreign markets via exports, to find out whether they can make profits abroad; after an initial trial period, they often exit the market; conditional on surviving, they expand their exports. The analysis carried out in the next section shows that export experimentation may also lead new exporters to start investing in foreign markets.

6 FDI entry of new exporters

As discussed in Section 3, the statistics on export and FDI entries 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 a foreign subsidiary to reduce variable costs.

In the simple two-period model described in Section 4, firms discover their profitability in a foreign market as soon as they start operating there. In this setting, export experimentation lasts only one period. In reality, firms may experiment with exports for several periods, before deciding whether or not to engage in FDI.

The summary statistics in Table 2 show that most FDI entries by Belgian firms (almost 34%) occur early, with the investing firm having just two years of export experience in the foreign market (defined as the number of years of positive exports since export entry). These statistics suggest that export experience has a positive but decaying effect: most FDI entries of new exporters occur in the first four years of export experience and become quite rare afterwards.

Table 2: FDI entries by export experience

Years of experience	FDI entries	Percentage	Cumulative
1	4	6.45	6.45
2	21	33.87	40.32
3	12	19.35	59.68
4	10	16.13	75.81
5	3	4.84	80.65
6	1	1.61	82.26
7	1	1.61	83.87
8	5	8.06	91.94
9	3	4.84	96.77
10	2	3.23	100.00

Notes: The table includes all FDI entries by Belgian manufacturing firms in countries outside the European Single Market over the 1998-2008 period. A firm is coded as having 1 year of experience in the year in which it starts exporting to a foreign market. Experience increases with each additional year in which the firm has positive exports to the foreign market.

It is also interesting to look at the evolution of firms' exports following FDI entry. The benchmark model presented in Section 4 focuses on horizontal FDI, i.e. foreign production facilities to serve the destination market. As discussed in Appendix A.3, the logic of our model can be extended to distribution FDI, i.e. investments in foreign distribution centers and sales offices. The main difference is that, when foreign investments are horizontal, exports should fall after FDI entry, while the opposite should occur for distribution investments. Looking at the evolution of exports for firms that started investing abroad suggests that Belgian firms engage in both types of FDI: in many instances, exports fall drastically after FDI entry, suggesting that the firm established a foreign production facility; in other cases, exports increase dramatically after FDI entry, suggesting that the firm established distribution centers or sales offices in the foreign country rather than production facilities.

6.1 Empirical methodology

To examine the role of export experience on FDI entry decisions, we use survival analysis to estimate the hazard rate $h_{f,i}(t)$, i.e. the probability that new exporter f starts investing in country i at time t:[24]

$$h_{f,i}(t) = h_0(t) \exp(\beta X_{f,i,t}), \tag{17}$$

where $h_0(t)$ is the baseline hazard rate, $X_{f,i,t}$ is the matrix of covariates and β is the vector of coefficients to be estimated. 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 $h_0(t)$.

Survival analysis does not suffer from right censoring problems since it explicitly takes into account the fact that FDI entry may not occur for some firms in some countries by the end of the sample period: starting from the year in which a firm starts exporting to a foreign market (export entry), we can thus track each firm over time, until it opens a subsidiary in that country (FDI entry), or until the end of the sample period if no FDI occurs. Using this methodology, we can examine the determinants of FDI entry decisions of all Belgian firms that started exporting to foreign markets during the sample period.[25]

6.2 Explanatory variables

In what follows, we describe the variables used in the empirical analysis. The definition of all the main variables can also be found in Appendix Table A-1.

[24]Survival analysis (or duration analysis) is widely used in economics to estimate the time it takes for an event to materialize. In empirical studies of real option theories, proportional hazard models are used to verify whether uncertainty delays investment decisions (e.g. Hurn and Wright, 1994; Favero *et al.*, 1994; Kogut and Chang, 1996). Duration models are also widely used in labor economics, to study the time it takes for unemployed workers to find a job. In our case, the event of interest is the FDI entry of a new exporter.

[25]If we employed alternative methodologies to estimate the probability of FDI entry, we would need to restrict the analysis to new exporters for which we can observe k periods following export entry, to avoid problems of right censoring. For example, we could focus on the export entries that have occurred during the 1998-2003 period and use a linear probability model to estimate the likelihood of FDI entry within $k = 5$ periods. This methodology would drastically reduce the number of observations and would impose a restriction on the time it takes for a new exporter to start investing in the foreign market.

Firm-level variables

Our theoretical model studies export and FDI choices of a representative firm that is uncertain about its profitability in foreign markets and can only discover it by operating there. The model is very stylized, since all uncertainty is revealed upon entry. In this simple setting, export experimentation lasts only one period, at the end of which the firm decides whether or not to engage in FDI.

In reality, firms may need to export to foreign markets during several periods to find out whether it is worthwhile to invest there. To measure 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 of positive exports by firm f to country i since its export entry.[26] To verify whether export experience has a decaying effect on FDI entry decisions, as suggested by Table 2, we also construct dummy variables capturing different "bins" of export experience: *Export experience12*$_{f,i,t}$ is equal to 1 if firm f has 1 or 2 years of export experience in country i; analogous definitions apply to *Export experience34*$_{f,i,t}$, *Export experience56*$_{f,i,t}$, and *Export experience7+*$_{f,i,t}$.[27]

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 define the variables *Exports in close markets*$_{f,t-1,c}$ and *FDI in close markets*$_{f,t-1,c}$, which measure respectively the number of countries in continent c to which firm f is exporting to and where it has foreign affiliates at $t-1$.[28]

The Central Balance Sheet Office of the NBB collects the annual accounts of all companies registered in Belgium. They provide measures for firms' value added, turnover, employment, and capital stock. Using these data, we control for various firm characteristics that can affect export and FDI choices: the variable *Employment*$_{f,t}$ is the number of full-time equivalent employees and is used as a proxy for firm size; the variable *Productivity*$_{f,t}$ measures the firm's value added per employee; the dummy variable *Foreign participation*$_{f,t}$ takes the value 1 if the Belgian firm is foreign-owned.[29]

[26]Notice that our definition of export experience does not coincide with the number of years since export entry, since it excludes years in which a firm does not export to a foreign market. See Section 3.1 for a precise definition of export entry.

[27]We use two-year bins of export experience because, in the case of single-year bins, some dummies would be equal to 1 for very few observations.

[28]To capture the possibility of within-industry learning spillovers, emphasized in other studies (e.g. Hausmann and Rodrik, 2003; Segura-Cayuela and Vilarrubia, 2008), we have also constructed the variables *Exports by other firms*$_{i,t-1,k}$ and *FDI by other firms*$_{i,t-1,k}$ measuring the number of Belgian firms in sector k (at the 2-digit NACE) exporting or having foreign affiliates in country i at $t-1$. These controls were never significant when included in our regressions.

[29]Information about foreign ownership comes from the Survey on Foreign Direct Investment. Foreign ownership is defined as direct or indirect foreign participation of at least 10 percent of a firm's capital.

Country-level variables

Our theoretical model studies export and FDI choices when firms are uncertain about their profitability in foreign markets. In our empirical analysis, we construct two alternative measures of foreign market uncertainty.[30]

The variable *Uncertainty1*$_i$ is constructed using information on all Belgian firms that started exporting to a given country during the period 1998-2007 and measures 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 profitability 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 Figure 4).

This uncertainty measure has two appealing features. First, it captures both demand and supply uncertainty, like the random variable μ in our theoretical model.[31] Second, it specifically reflects the extent to which Belgian firms face uncertain conditions in a particular foreign market. Notice that, since the variable *Uncertainty1*$_i$ is constructed based on information on *all* Belgian firms that start exporting to country i during our sample period (148 firms per country, on average), it can be taken as exogenous from the point of view of individual new exporters.[32]

The variable *Uncertainty1*$_i$ is highly correlated with commonly used measures of countries' risk. For example, if we consider the ratings published in the International Country Risk Guide (ICRG) by the PSR Group, we find that the correlation between

[30]Recent studies have constructed uncertainty measures using rich data on newspaper coverage of policy-related economic uncertainty (e.g. Scott *et al.*, 2013). Unfortunately, these measures are only available for a handful of countries (see www.policyuncertainty.com).

[31]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 Single Market (0.52 on average) than for destinations within the Single Market (0.32 on average), with the lowest rates for Luxembourg (0.15), France (0.19), and the Netherlands (0.23), countries with which Belgium has both a common language and a common border. If cross-country differences were driven by differences in the fixed costs of exporting rather than by differences in the degree of uncertainty faced by new exporters, we would expect the variable *Uncertainty1*$_i$ to be significantly *higher* for destinations within the Single Market.

[32]In our main regressions, we compute the exit rate in the year following export entry. As discussed in Section 6.4, our results are unaffected if we compute the exit rate of new exporters at $t+2$ instead of $t+1$ to take into account that exports are often lumpy. Our results are also robust to restricting the analysis to destinations for which the variable *Uncertainty1*$_i$ is constructed based on at least 100 Belgian new exporters.

the variable *Uncertainty1*$_i$ and their composite risk rating is -0.68, where higher values of the composite risk identify less risky countries. Similarly, the correlation between our first uncertainty measure and the ICRG corruption rating is -0.58, where higher ratings are assigned to less corrupt countries.[33]

As an alternative measure of the degree of foreign market uncertainty, we construct the variable *Uncertainty2*$_i$ based on information on the quality of institutions in different countries. In particular, we use the World Bank's index *Rule of Law*$_{i,t}$, a weighted average of a number of variables (e.g. perception of incidences of crime, effectiveness of the judiciary, enforceability of contracts; see Kaufmann *et al.*, 2009). It ranges from 0 to 1 and is increasing in the quality of institutions. The variable *Uncertainty2*$_i$ is the standard deviation of *Rule of Law*$_{i,t}$ over our sample period. It captures the unpredictability of a country's business environment. As expected, this measure is positively correlated with our first uncertainty measure (the correlation between *Uncertainty1*$_i$ and *Uncertainty2*$_i$ is 0.40).

In line with previous studies on the determinants of FDI, we use the variable $GDP_{i,t}$ to proxy for the size of destination markets.[34] We also include two bilateral dummy variables (from CEPII) that are commonly used in the literature to capture relations between countries: *Common language*$_i$, which is equal to 1 if the foreign market i shares an official language with Belgium; and *Distance*$_i$, which measures the distance between the capital of Belgium and the capital of country i.[35]

6.3 Empirical results

The results of our benchmark regressions are reported in Table 3, where we examine the determinants of FDI entry decisions of new exporters. The key variables of interest are those capturing a firm's export experience in foreign markets (with the dummy variable representing seven or more years of experience being the omitted category).

[33]The ICRG 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%). The ICRG corruption ratings provide an assessment of corruption in a country's political system. See Wei (2000) for a discussion of various corruption indices.

[34]The variables *Population*$_{i,t}$ and *GDP per capita*$_{i,t}$ cannot be included, since they are collinear with $GDP_{i,t}$.

[35]As an additional measure for trade barriers, we have constructed the variable *Tariff*$_{i,t,k}$, which measures the average tariff applied by country i on imports from Belgium in sector k (over the previous three years). The procedure to construct this variable is rather cumbersome, since it requires matching different sector classifications (HS-NACE-ISIC). Due to the limited availability of tariff data, including this variable drastically reduces the number of observations in our analysis. For this reason, we only report specifications without tariffs. If included, these are never significant and do not affect the qualitative results of our analysis.

Table 3: FDI entry of new exporters, the decaying effect of export experience

	(1)	(2)	(3)	(4)	(5)	(6)
Experience12$_{f,i,t}$	1.125***	0.876***	1.197***	0.959***	1.142***	1.029***
	(0.324)	(0.327)	(0.363)	(0.363)	(0.358)	(0.367)
Experience34$_{f,i,t}$	1.303***	0.767*	1.042**	0.693	0.596	0.530
	(0.385)	(0.415)	(0.484)	(0.485)	(0.478)	(0.458)
Experience56$_{f,i,t}$	0.557	-0.222	0.063	-0.538	-0.669	-0.810
	(0.654)	(0.684)	(0.842)	(0.838)	(0.838)	(0.837)
log Productivity$_{f,t}$		0.230		-0.662		-0.671
		(0.200)		(0.487)		(0.534)
log Employment$_{f,t}$		0.506***		1.444		1.266
		(0.090)		(0.953)		(0.967)
Foreign participation$_{f,t}$		0.696**		3.362***		3.508***
		(0.312)		(0.889)		(0.944)
FDI in close markets$_{f,t-1,c}$		0.223***		-0.141		-0.394**
		(0.044)		(0.095)		(0.195)
Exports in close markets$_{f,t-1,c}$		0.014		0.033		0.027
		(0.014)		(0.023)		(0.030)
log GDP$_{i,t}$		0.363***		0.367***		-1.414
		(0.089)		(0.094)		(2.160)
Rule of law$_{i,t}$		0.263		0.386**		2.748
		(0.182)		(0.181)		(1.722)
log Distance$_i$		-0.095		-0.360		
		(0.257)		(0.233)		
Common language$_i$		-0.297		-0.474		
		(0.496)		(0.477)		
Firm fixed effects	No	No	Yes	Yes	Yes	Yes
Country fixed effects	No	No	No	No	Yes	Yes
Observations	176,040	155,791	5,411	4,969	2,929	2,842
Export entries	29,998	27,586	961	898	502	495
FDI entries	62	62	62	62	62	62
Log likelihood	-602.8	-550.9	-376.4	-340.8	-322.0	-302.5

Notes: The dependent variable is $h_{f,i}(t)$, the probability that new 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 sample includes all FDI entries by new exporters in countries outside the EU Single Market during the 1998-2008 period.

In columns (1)-(2), we examine FDI entry decisions of all Belgian new exporters. Notice that, in these specifications, the number of observations is very large, since all firms that started exporting to at least one new destination outside the ESM during our sample period are included in the analysis.[36] The number of observations is drastically reduced in columns (3)-(6), where we include firm fixed effects to account for the role of time-invariant firm characteristics that may affect internationalization choices. In these

[36]In these regressions, the total number of FDI entries is 62 (see bottom of Table 3), which is a subset of the 328 FDI entries that were preceded by exports (see Table 1). This is because we only include FDI entries of new exporters, i.e. firms that started exporting to new markets during our sample period, for which we can measure the experience acquired since their export entry.

specifications, all observations for which there is no variation in the dependent variable within the fixed effects are dropped; only firms that started exporting to more than one foreign market and started investing in at least one of them 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, abstracting from the role of firm heterogeneity. These specifications also alleviate concerns about possible selection effects, since the impact of export experience on FDI entry decisions is identified by exploiting within-firm variation across different destinations. In columns (5)-(6) we add country fixed effects to account for the role of time-invariant characteristics of destination markets. This further reduces the sample size, since all countries where no new exporter started investing are dropped.[37]

Notice that in Table 3 the coefficient of *Export experience12*$_{f,i,t}$ is always positive and statistically significant at 1%. The coefficients for the other dummies for export experience are also positive, but smaller in values and in most cases not statistically different from zero. The results suggest that export experience has a decaying effect on the probability of FDI entry.[38] The effect is sizable. If we compute the hazard ratio for the variable *Export experience12*$_{f,i,t}$, we find that new exporters are between 140 and 213 percent more likely to start investing in a foreign market in the first two years of exporting than those with seven or more years of experience.

These results are consistent with the idea that firms initially test a foreign market via exports; if they discover that they can earn sufficient profits in that market, they then set up foreign production plants (or distribution networks) to reduce variable costs. The fact that most FDI entries occur in the first few years after export entry suggests that, once a firm starts exporting to a new market, it quickly discovers whether or not it is worthwhile to invest there.

As for the other firm controls, the estimated coefficient of *Foreign participation*$_{f,t}$ is positive and significant, showing that Belgian firms that are foreign owned are more likely to start investing abroad. The role of the variable *FDI in close markets*$_{f,t-1,r}$ depends on the specification and the underlying identification strategy. Its coefficient is positive and significant in column (2), where we compare across firms, but becomes negative in the other two columns (and significant in the last one) where we compare

[37] In these specifications, we exclude the time-invariant country-level controls (*Distance*$_i$ and *Common language*$_i$).

[38] In all specifications with the additional controls, the estimates for the first bin of export experience are statistically different from those of the third bin. We have also tried including single-year bins and the results are qualitatively the same. Since some of these dummy variables are equal to 1 for very few observations, we prefer to report results for bins grouping two years of export experience.

a given firm across destinations. In this case, the likelihood that a firm will engage in FDI in a particular destination market decreases if the firm already has affiliates in neighboring markets. Productivity is never significant, while employment has a positive effect only in the second column, when comparing across firms.

With respect to country variables, in column (4) we find a positive and significant coefficient for both $GDP_{i,t}$ and *Rule of Law*$_{i,t}$, suggesting that new exporters are more willing to engage in FDI in countries that are larger and have sounder institutions. The coefficients lose significance in column (6), indicating that there is limited within-country variation in these variables during our sample period.

In Table 4, we examine whether the role of export experience depends on the extent of foreign market uncertainty. For this purpose, we interact the variable log *Export experience*$_{f,i,t}$ with our two measures of foreign market uncertainty.[39] In the first four columns, we use the variable *Uncertainty1*$_i$, which captures the extent to which Belgian firms engage in a trial-and-error process in foreign market i. In the last four columns, we use instead the variable *Uncertainty2*$_i$, which captures the predictability of a country's business environment.

Column (1) reports the results of a specification in which we include only the interaction term between *Export experience*$_{f,i,t}$ and *Uncertainty1*$_i$, and each of the two variables separately. In column (2), we include additional firm and country controls. In columns (3) and (4), we add firm fixed effects to the specifications of columns (1)-(2).[40] In columns (5)-(8), we repeat the same strategy using the alternative uncertainty measure.

The results of Table 4 suggest that export experience has a bigger impact on firms' decision to start investing abroad in markets where they face more uncertainty. The estimated coefficient for the interaction term between log *Export experience*$_{f,i,t}$ and *Uncertainty1*$_i$ is always positive and significant; when we use the alternative uncertainty uncertainty measure, the interaction term is positive and significant in all but one specification (the last one, where the p-value is 10.1%).

[39] We use log *Export experience*$_{f,i,t}$ since it is a good proxy of the nonlinear effect of *Export experience*$_{f,i,t}$ and it simplifies the analysis when interacting with the uncertainty measures (instead of having to create several interaction terms, one per bin of export experience).

[40] Country dummies cannot be included since our uncertainty measures only vary at the country level.

Table 4: FDI entry of new exporters, the role of uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log Experience$_{f,i,t}$ × Uncertainty1$_i$	6.344***	6.357***	4.562*	7.266**				
	(2.120)	(2.318)	(2.568)	(2.965)				
Uncertainty1$_i$	-12.638***	-9.443**	-11.916***	-9.025**				
	(3.123)	(3.686)	(3.530)	(4.365)				
log Experience$_{f,i,t}$ × Uncertainty2$_i$					6.180**	4.446**	5.744*	4.138
					(2.746)	(2.073)	(3.240)	(2.519)
Uncertainty2$_i$					-9.526**	-3.413	-10.033**	-4.074
					(4.355)	(3.492)	(4.481)	(3.550)
log Experience$_{f,i,t}$	-1.752*	-2.109*	-0.526	-1.894	0.508	0.330	1.000**	0.999**
	(0.983)	(1.089)	(1.260)	(1.460)	(0.343)	(0.305)	(0.479)	(0.464)
log Productivity$_{f,t}$		0.224		-0.745		0.207		-0.706
		(0.205)		(0.588)		(0.202)		(0.595)
log Employment$_{f,t}$		0.505***		1.319		0.502***		1.217
		(0.089)		(1.067)		(0.090)		(1.071)
Foreign participation$_{f,t}$		0.524		3.150***		0.534*		3.011***
		(0.321)		(0.888)		(0.324)		(0.910)
FDI in close markets$_{f,t-1,c}$		0.231***		-0.236**		0.236***		-0.226**
		(0.043)		(0.095)		(0.044)		(0.101)
Exports in close markets$_{f,t-1,c}$		-0.003		0.038		-0.004		0.038
		(0.014)		(0.023)		(0.015)		(0.024)
log GDP$_{i,t}$		0.319***		0.357***		0.357***		0.367***
		(0.092)		(0.090)		(0.089)		(0.089)
Rule of law$_{i,t}$		0.205		0.343*		0.262		0.373**
		(0.180)		(0.181)		(0.188)		(0.178)
log Distance$_i$		-0.114		-0.299		-0.148		-0.311
		(0.245)		(0.247)		(0.262)		(0.255)
Common language$_i$		-0.318		-0.602		-0.390		-0.611
		(0.509)		(0.543)		(0.494)		(0.514)
Firm fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Observations	176,040	155,791	5,411	4,969	174,412	155,791	5,342	4,969
Export entries	29,998	27,586	961	898	29,998	27,586	920	898
FDI entries	62	62	62	62	62	62	62	62
Log likelihood	-587.7	-547.2	-358.3	-331.3	-589.3	-546.4	-360.1	-331.6

Notes: The dependent variable is $h_{f,i}(t)$, the probability that new 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 sample includes all FDI entries by new exporters in countries outside the EU Single Market during the 1998-2008 period.

6.4 Robustness checks

The results in Table 3 show that the experience acquired by new exporters in foreign market has a positive but decaying effect on the probability that they start investing in that market. This finding is consistent with our simple learning model. Table 4 shows that export experience has a larger impact on the probability of FDI entry in more uncertain foreign markets.

In the remainder of this section, we discuss a series of robustness checks, which show that the results in Tables 3 and 4 are unaffected when using alternative econometric methodologies and different samples of firms and countries. For each robustness check, we report specifications that exploit variations both across and within firms. The results can be found in Appendix tables A-5 to A-7.

As discussed in Section 3.1, we use a stringent definition of export entry (at least five consecutive years of no exporting before entry), which minimizes the problem of firms entering several times in the same foreign market. Nevertheless, some firms in our sample re-enter the same foreign market once. Following previous studies on export dynamics (e.g. Besedes and Prusa, 2006), we verify that our conclusions are robust to focusing on first entry spells only, i.e. excluding all observations corresponding to re-entries. The results of this exercise are reported in Table A-5 and show no qualitative difference with respect to Tables 3 and 4.

Our theoretical model can be applied to international choices involving both horizontal and export-supporting FDI (i.e. investments to build foreign production facilities or distribution networks), where the goal is to serve foreign consumers in foreign markets. The model does not apply to vertical FDI, which is driven by the desire to reduce production costs rather than by market access motives. The NBB Survey on Foreign Direct Investment does not contain information about the geographical destination of foreign affiliate sales, which could be used to directly distinguish between different types of FDI. However, the data contains information on intra-firm trade between foreign affiliates and their Belgian parent. In Table A-6, we use information on intra-firm trade between the foreign affiliate and the Belgian parent firm to remove from our sample FDI entries that are potentially vertical in nature.[41] Although doing so reduces the number of observations, the results confirm that a firm's export experience has a positive but decaying effect on the probability that new exporters establish foreign affiliates. The positive and significant coefficient of the interaction term between log *Export experience*$_{f,i,t}$ and the

[41] We compute the share of exports (out of total affiliate sales) that a foreign subsidiary ships back to the Belgian parent company in the years following FDI entry. We classify FDI entries as vertical if exports to the Belgian parent company exceed one third of the affiliate's sales.

two uncertainty measures confirms that the effect of experience is larger in destination markets characterized by more uncertainty.

In our benchmark regressions, we restricted the analysis to destinations outside the European Single Market. As discussed in Section 3.1, data on firm-level exports to these countries come from customs declarations and cover virtually all transactions. We can thus clearly identify all Belgian new exporters. In the case of destinations within the ESM, on the other hand, firm-level export data are only available for firms that exceed a significant export threshold, implying that we might not observe some firms that start exporting to a new market (or that we might only observe them after the initial phase of export experimentation, when their exports pass the reporting threshold). In Table A-7, we nevertheless reproduce our main specifications on the much larger sample that includes all destinations. The results confirm that export experience has a positive but decaying effect on the probability of FDI entry and that the effect is larger in more uncertain destinations.[42]

We also carried out a series of additional robustness checks, which are omitted from the paper due to space considerations, but are briefly discussed and are fully available upon request.

First, we reproduced our main results using a parametric Weibull proportional hazard rate model to estimate the probability of FDI entry of new exporters. 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. The results of Tables 3 and 4 are unaffected when we use this alternative econometric methodology.[43]

Second, we performed robustness checks involving the variable $Uncertainty1_i$. Recall that it is based on the percentage of firms that start exporting to country i at year t, but stop exporting at $t+1$. As argued above, our model suggests that the exit rate of new exporters at $t+1$ should be correlated with the degree of ex-ante uncertainty faced by firms in a foreign market. In some cases, however, the fact that a firm does not export

[42]There may be the concern that many FDI entries within the European Single Market, especially in the Central and Eastern European countries that have become members during our sample period, might be vertical in nature. For this reason, we re-estimated these regressions excluding vertical FDI entries using information on intra-firm trade and the result were qualitatively unchanged.

[43]In Weibull regressions, an incorrectly specified baseline rate would lead to inconsistent estimates. If the baseline hazard rate is not mis-specified, the estimates obtained should not systematically differ from those obtained with the semi-parametric Cox model. The estimated ancillary parameters that we obtain are larger than one and statistically significant, implying an ever increasing baseline hazard rate. Since this restrictive assumption is not verified in our data (most FDI entries occur in the first few years following export entry), we present the results of the non-parametric Cox model as our benchmark.

at $t+1$ may simply be driven by lumpiness in trade transactions. To deal with this issue, we used an alternative measure of the average exit rate of new exporters, based on their export values at $t+2$. Notice that this reduces the number of observations used to construct our uncertainty measure, since we cannot anymore include Belgian firms that started exporting to a foreign market in 2007. These regressions confirm that export experience has a larger impact on FDI entry in the first few years following export entry and in countries in which exporting firms are more likely to engage in trials and errors. All our results also continue to hold when we restrict the analysis to destinations in which there are at least 100 new exporters.[44]

Third, our results are robust to the inclusion of additional firm-level controls. In particular, we constructed the variables *Exports by other firms*$_{i,t-1,k}$ and *FDI by other firms*$_{i,t-1,k}$ measuring the number of Belgian firms in sector k (at the 2-digit NACE) exporting or having foreign affiliates in country i at $t-1$. These are meant to capture the possibility of within-industry learning spillovers, emphasized in previous studies of firms' export dynamics (e.g. Hausmann and Rodrik, 2003; Segura-Cayuela and Vilarrubia, 2008). The estimated coefficients for these additional controls were never significant.

Finally, our results continue to hold if we include additional country-level variables to account for other determinants of FDI entry decisions. For example, we used information from the ICSID database to construct a dummy variable $BIT_{i,t}$, which is equal to 1 if country i has a bilateral investment treaty with Belgium at time t. Investment treaties may stimulate FDI entry through different channels: they can decrease the cost of setting up foreign affiliates;[45] they may also decrease the degree of uncertainty faced by foreign investors, e.g. through the establishment of dispute settlement provisions.[46] When included in the analysis, the variable $BIT_{i,t}$ is positive and significant, suggesting that the probability that Belgian new exporters start investing in a country increases if that country has a bilateral investment treaty with Belgium.[47]

[44]As mentioned before, the measure *Uncertainty1*$_i$ is constructed using information on the export patterns of all Belgian new exporters to country i during our sample period. On average, there are 148 new exporters per country. For some countries, however, the number of new exporters is much smaller, raising possible endogeneity concerns.

[45]In our model, a reduction in F^I lowers $\mu^{EI} \equiv \frac{2F^I}{\tau} + \frac{\tau}{2}$, the threshold of realized profitability above which a firm switches from exports to FDI.

[46]These provisions are "one of the key elements in diminishing the country risk, and thus encourage investors of one contracting party to invest in the territory of the other" (UNCTAD, 2006).

[47]We do not include the variable $BIT_{i,t}$ in our our main regressions because of endogeneity concerns: the implementation of investment treaties may not be random, but driven by characteristics of a foreign country that make it a more appealing destination for Belgian firms to invest. Egger and Merlo (2012) show that BITs have a positive effect on FDI by German multinationals, using a propensity score-matching procedure to take into account possible selection effects.

7 Conclusion

Before they start operating in new foreign markets, firms typically possess imperfect information about local supply and demand conditions: they are uncertain about local regulations and legal requirements for selling their goods in a particular market, about the size of foreign demand and about 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.

This paper started by presenting a novel fact about firms' internationalization choices. 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 show 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: 99.99% of firms start exporting to a foreign market without having previously invested there.

This fact cannot be explained by standard theoretical models of firms internationalization choices. To provide a rationale for the dynamic patterns of export and FDI entries, we 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 through exports or FDI. In this setting, a firm will initially serve new foreign markets by exporting, which allows to experiment at a lower fixed cost than FDI. 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 affiliates to reduce its variable costs.

In line with the predictions of our model, we found that new Belgian exporters are likely to rapidly drop out of foreign markets after entry: in almost 54% of the cases, firms stop exporting after one year; the exit rate falls steadily over time (it is 15.6% after five years). We also find that new exporters start by exporting small amounts. Conditional on surviving, their exports grow rapidly in the years following export entry. The statistics on exit rates and the evolution of exports of new exporters confirm the findings of recent studies on export dynamics and suggest that firms engage in a process of trial and error in foreign markets.

Finally, using proportional hazard models, we showed that export experimentation

can lead firms to start investing in the foreign market: new exporters can become new FDIers. A firm's export experience in a foreign market has a positive effect on the probability that it starts investing in that market. This effect decays over time: firms are more likely to start investing in a foreign market in the first few years following export entry, after which export experience has no impact on their probability of FDI entry. Finally, export experience has a bigger impact on investment decisions in foreign markets where firms face more uncertainty.

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, although exports and horizontal FDI are substitutes from a static perspective – since 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 main variables

Export entry$_{f,i,t}$	Dummy equal to 1 if firm f starts exporting to country i in year t (after at least 5 years of no exporting)
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 of positive exports of firm f to country i since entry (equal to 1 in the year of export entry)
Export experience12$_{f,i,t}$	Dummy equal to 1 if firm f in country i has 1 or 2 years of export experience in country i
Export experience34$_{f,i,t}$	Dummy equal to 1 if firm f in country i has 3 or 4 years of export experience in country i
Export experience56$_{f,i,t}$	Dummy equal to 1 if firm f in country i has 5 or 6 years of export experience in country i
Export experience7+$_{f,i,t}$	Dummy equal to 1 if firm f in country i has 7 or more years of export experience in country i
Uncertainty1$_i$	Average exit rate of all Belgian firms that started exporting to country i during 1998-2008 period
Uncertainty2$_i$	Standard deviation of *Rule of Law*$_{i,t}$ during 1998-2008 period
GDP$_{i,t}$	Gross Domestic Product of country i in year t (in constant 2000 US$ in billions)
Rule of Law$_{i,t}$	Rule of law index of country i in year t
Distance$_i$	Distance between Bruxelles and the capital of country i (in thousands of kilometers)
Common language$_i$	Dummy equal to 1 if country i shares an official language with Belgium
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 participation$_{f,t}$	Dummy equal to 1 if firm f receives inward FDI in year t
FDI in close markets$_{f,t-1,c}$	Number of countries in continent c in which firm f has foreign affiliates at $t-1$
Exports in close markets$_{f,t-1,c}$	Number of countries in continent c to which firm f exported at $t-1$

Notes: See Sections 3.1 and 6.2 for detailed information on the construction of the variables.

A.1: Descriptive statistics on exports and FDI

In what follows, we present some descriptive statistics about exports and FDI activities of Belgian firms. 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).

In Table A-2 we report descriptive statistics for all destinations and those outside the EU Single Market. Notice that Belgian firms are very open: over the entire sample, on average 52 percent of firms export. Notice that the total number of exporting firms is decreasing over time, but this observation is partly driven by the fact that the minimum threshold required for firms to report their intra-EU exports has significantly increased during the sample period (the Intrastat dataset includes transactions exceeding a value of 104,115 euros in 1993-1997, 250,000 euros in 1998-2005, and 1 million euros in 2006-2008). Table A-2 also shows that firms engaging in outward FDI are a much smaller group (4.6% of the total number of Belgian firms). When considering the location of foreign affiliates, it is clear that most of them are located within the Single Market.

Table A-2: Population of firms by export and FDI status

Year	Total Firms	World		Outside EU Single Market	
	in Belgium	Exporting	With FDI	Exporting	With FDI
1998	8,763	4,561	346	2,876	98
1999	8,839	4,566	347	2,852	103
2000	8,787	4,557	360	2,851	121
2001	8,667	4,575	435	2,824	146
2002	8,499	4,520	446	2,814	143
2003	8,416	4,511	451	2,786	148
2004	8,350	4,454	464	2,828	150
2005	8,345	4,392	388	2,824	143
2006	8,369	3,958	391	2,807	154
2007	8,372	3,869	379	2,862	157
2008	7,168	3,477	323	2,543	137

Table A-3 reports the total number of export and FDI relationships (i.e. firm-destination pairs) that Belgian firms maintain every year. Combining Tables A-2 and A-3, we see that firms export to 13 countries on average. Restricting our attention to firms that serve destinations outside the European Single Market, on average they export to 9 countries and have foreign affiliates in 2.3 countries.

Table A-3: Export and FDI relationships

Year	Export Relationships		FDI Relationships	
	World	Outside SM	World	Outside SM
1998	55,822	23,119	974	214
1999	56,025	22,923	1,004	230
2000	57,330	23,748	1,127	283
2001	58,603	24,135	1,335	330
2002	58,693	24,172	1,383	332
2003	58,846	24,025	1,369	336
2004	60,046	24,517	1,324	334
2005	60,774	25,194	1,222	322
2006	57,155	25,366	1,312	390
2007	57,156	25,591	1,296	387
2008	53,408	24,764	1,147	349

Table A-4 provides some statistics on the size and productivity of three groups of firms Belgian firm, defined based on 1998, the first year of our sample (the same patterns hold for any other year in our sample period): those that did not export to any country outside the European Single Market (Domestic firms), those that exported to at least one country outside outside the Single Market (Exporting firms), and those that engaged in FDI in at least one destination outside the Single Market (Firms with FDI).

Table A-4: Firm size and productivity

	Mean	St. dev.	Min	Max
Domestic firms				
Employment	69	123	5	1,600
Productivity	67.32	67.03	2.19	485.95
Exporting firms				
Employment	470	1055	5	9,736
Productivity	74.62	53.02	5.21	894.59
Firms with FDI				
Employment	1,750	2,036	10	7,297
Productivity	83.94	32.83	5.16	310.38

Notes: Employment in units; productivity is value added (in thousands) divided by employment (in units). Statistics based on first year of our sample.

It should be stressed that these statistics are based on a sample of firms that export to at least one country outside of the EU Single Market during the 1998-2008 period. Firms defined as domestic in 1998 would be exporting at some other point in time and, as such, are thus likely to be larger and more productive that truly domestic firms (i.e. firms that never export). With this caveat in mind, Table A-4 confirms the sorting patterns emphasized by the literature on heterogeneous firms and trade (e.g. Head and Ries, 2003; Helpman *et al.*, 2004): firms that only serve the domestic market are on average smaller and less productive than firms that export to foreign markets; in turn, exporting firms tend to be smaller and less productive than firms that engage in FDI.

A.3: Distribution-oriented FDI

Building on the literature on the proximity-concentration tradeoff, the model described in Section 4 examines a firm's choice between two alternative ways of serving a foreign market: exporting (the mode characterized by lower fixed cost) or horizontal FDI (characterized by lower variable costs). Our analysis formalizes of the international business literature 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, they setup foreign production facilities to save on trade costs.

In what follows, we show that the logic of our theoretical model can be extended to an exporting firm choosing how to distribute its goods in a foreign market.[48] In this case, the choice is between using a local agent (the mode involving lower fixed costs) and setting up its own distribution network (involving lower variable costs).

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. As in the model described in Sections 4.1-4.4, the firm is uncertain about its ability to earn profits in the foreign market, and can only discover it by operating there. We normalize unit production costs to zero and denote unit trade costs with τ. The firm can choose to distribute its export using a local agent, in which case its unit distribution costs are equal to c. If instead it invests in its own distribution centers and sales offices, 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 about profitability in the foreign market is captured by the random variable μ, defined in equation (1). If 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, the firm will exit the foreign market, if its realized profitability is below the unit trade costs τ; for intermediate levels of profitability, it will continue using a local agent to distribute its

[48] In the international business literature, gradualism also applies to distribution decisions: firms initially begin distributing their products in foreign markets through deals with intermediaries; if they are successful, they then establish their own distribution centers and sales offices (Johanson, and Vahlne, 1977). The importance of "export-supporting FDI", i.e. foreign investments in distribution to penetrate export markets, has been emphasized by Aeberhardt *et al.* (2009); Arkolakis (2010) and Krautheim (2013).

exports; if profitability exceeds the threshold $\mu^{EI'} = \frac{2F^I}{\phi} - \frac{\phi}{2} + \tau$, the exporting firm will find it profitable to invest in a distribution network, paying the fixed cost F^I to reduce its variable costs.[49]

As in our benchmark model, uncertainty can thus lead to a gradual internationalization process, whereby 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 invests in distribution-oriented FDI. The main difference with the model described in Section 4 is that, when the investment is to establish a distribution network (rather than a production facility), exports increase (rather than fall) following FDI entry. This is because, when the firm enters the foreign market in the first period, its expected profitability is $E\mu$. In the second period, if the firm continues to export and invests in a distribution network, it must be because its realized profitability is above $\mu^{EI'}$; the distribution of μ is thus a truncation of the original one, so export volumes expand. Notice also that, in the case of distribution-oriented FDI, higher trade barriers decrease (rather than increase) the likelihood that a firm starts investing in the foreign market in the second period.[50]

[49] 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 $\Pi^E = \Pi^I$.

[50] To see this, notice that $\mu^{EI'}$ is increasing in τ, while μ^{EI} in equation (6) is decreasing in τ.

A.4: Robustness checks

Table A-5: FDI entry of new exporters (only first entry spells)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience12$_{f,i,t}$	0.886***	0.991***	0.872***	1.132***				
	(0.325)	(0.362)	(0.332)	(0.384)				
Experience34$_{f,i,t}$	0.735*	0.710	0.714*	0.576				
	(0.413)	(0.484)	(0.424)	(0.462)				
Experience56$_{f,i,t}$	-0.270	-0.538	-0.290	-0.794				
	(0.683)	(0.836)	(0.689)	(0.836)				
log Experience$_{f,i,t}$ × Uncertainty1$_i$					6.212***	7.779**		
					(2.290)	(3.060)		
Uncertainty1$_i$					-9.217**	-9.673**		
					(3.635)	(4.365)		
log Experience$_{f,i,t}$ × Uncertainty2$_i$							4.436**	4.312*
							(2.073)	(2.539)
Uncertainty2$_i$							-3.416	-4.360
							(3.504)	(3.608)
log Experience$_{f,i,t}$					-2.082*	-2.128	0.292	0.980**
					(1.077)	(1.492)	(0.304)	(0.461)
log Productivity$_{f,t}$	0.226	-0.667	0.256	-0.793	0.222	-0.732	0.206	-0.695
	(0.198)	(0.490)	(0.196)	(0.590)	(0.203)	(0.595)	(0.201)	(0.600)
log Employment$_{f,t}$	0.505***	1.414	0.548***	1.234	0.505***	1.278	0.503***	1.175
	(0.090)	(0.954)	(0.091)	(0.983)	(0.089)	(1.058)	(0.090)	(1.067)
Foreign participation$_{f,t}$	0.690**	3.327***	0.607*	3.467***	0.520	3.140***	0.530	2.998***
	(0.312)	(0.872)	(0.318)	(0.931)	(0.320)	(0.875)	(0.323)	(0.903)
FDI in close markets$_{f,t-1,c}$	0.225***	-0.144	0.195***	-0.403**	0.232***	-0.255**	0.238***	-0.235**
	(0.046)	(0.093)	(0.057)	(0.198)	(0.044)	(0.102)	(0.045)	(0.101)
Exports in close markets$_{f,t-1,c}$	0.014	0.032	0.009	0.025	-0.003	0.036	-0.005	0.037
	(0.014)	(0.023)	(0.018)	(0.031)	(0.014)	(0.023)	(0.015)	(0.024)
log GDP$_{i,t}$	0.363***	0.368***	-1.268	-1.334	0.320***	0.358***	0.357***	0.367***
	(0.088)	(0.094)	(2.038)	(2.172)	(0.092)	(0.090)	(0.088)	(0.089)
Rule of law$_{i,t}$	0.252	0.382**	1.820	2.581	0.198	0.338*	0.254	0.370**
	(0.182)	(0.181)	(1.411)	(1.724)	(0.180)	(0.181)	(0.189)	(0.178)
log Distance$_i$	-0.099	-0.361			-0.116	-0.311	-0.150	-0.317
	(0.257)	(0.234)			(0.245)	(0.250)	(0.262)	(0.257)
Common language$_i$	-0.292	-0.487			-0.318	-0.630	-0.387	-0.627
	(0.496)	(0.479)			(0.509)	(0.547)	(0.494)	(0.515)
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Country fixed effects	No	No	Yes	Yes	No	No	No	No
Observations	148,323	4,918	134,622	2,810	148,323	4,918	148,323	4,918
Export entries	26,055	876	23,721	482	26,055	876	23,721	876
FDI entries	62	62	62	62	62	62	62	62
Log likelihood	-548.1	-340.1	-519.2	-301.2	-545.1	-330.7	-544.3	-331.2

Notes: The dependent variable is $h_{f,i}(t)$, the probability that new exporter f starts investing in country i at time t. Robust standard errors in parenthesis. * denotes significance at the 10% level, ** 5% level, and *** 1% level. The sample includes all FDI entries by new exporters in countries outside the EU Single Market during the 1998-2008 period but excludes all observations corresponding to export re-entries.

Table A-6: FDI entry of new exporters (excluding vertical FDI)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience12$_{f,i,t}$	0.983***	1.040**	0.976***	1.206***				
	(0.358)	(0.408)	(0.365)	(0.429)				
Experience34$_{f,i,t}$	0.778*	0.703	0.753	0.623				
	(0.452)	(0.537)	(0.459)	(0.517)				
Experience56$_{f,i,t}$	-0.016	-0.452	-0.055	-0.656				
	(0.698)	(0.863)	(0.704)	(0.851)				
log Experience$_{f,i,t}$ × Uncertainty1$_i$					6.381**	6.292**		
					(2.505)	(3.050)		
Uncertainty1$_i$					-8.935**	-8.912*		
					(4.060)	(4.616)		
log Experience$_{f,i,t}$ × Uncertainty2$_i$							4.973**	5.033**
							(1.980)	(2.549)
Uncertainty2$_i$							-2.547	-3.766
							(3.533)	(3.741)
log Experience$_{f,i,t}$					-2.241*	-1.607	0.124	0.715
					(1.171)	(1.505)	(0.304)	(0.465)
log Productivity$_{f,t}$	0.300	-0.795	0.320	-0.718	0.303	-0.761	0.273	-0.720
	(0.221)	(0.534)	(0.218)	(0.556)	(0.225)	(0.670)	(0.223)	(0.693)
log Employment$_{f,t}$	0.539***	0.805	0.578***	0.472	0.540***	0.775	0.537***	0.753
	(0.100)	(1.176)	(0.103)	(1.128)	(0.099)	(1.273)	(0.099)	(1.300)
Foreign participation$_{f,t}$	0.718**	3.267***	0.635*	3.433***	0.582*	3.062***	0.597*	2.879***
	(0.337)	(0.892)	(0.340)	(1.041)	(0.354)	(0.900)	(0.359)	(0.933)
FDI in close markets$_{f,t-1,c}$	0.282***	-0.098	0.284***	-0.314*	0.285***	-0.174**	0.298***	-0.162*
	(0.039)	(0.096)	(0.052)	(0.189)	(0.038)	(0.087)	(0.040)	(0.097)
Exports in close markets$_{f,t-1,c}$	0.006	0.024	0.010	0.005	-0.009	0.031	-0.010	0.033
	(0.016)	(0.024)	(0.020)	(0.031)	(0.016)	(0.023)	(0.017)	(0.025)
log GDP$_{i,t}$	0.430***	0.445***	-0.864	-1.552	0.396***	0.424***	0.456***	0.475***
	(0.096)	(0.106)	(2.007)	(2.102)	(0.099)	(0.102)	(0.094)	(0.101)
Rule of law$_{i,t}$	0.219	0.276	1.957	3.333	0.174	0.241	0.253	0.290
	(0.202)	(0.196)	(1.551)	(2.032)	(0.201)	(0.194)	(0.208)	(0.191)
log Distance$_i$	0.203	-0.211			0.166	-0.117	0.125	-0.156
	(0.312)	(0.282)			(0.298)	(0.286)	(0.332)	(0.308)
Common language$_i$	-0.406	-0.787			-0.413	-0.884	-0.445	-0.900
	(0.647)	(0.579)			(0.658)	(0.635)	(0.651)	(0.633)
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Country fixed effects	No	No	Yes	Yes	No	No	No	No
Observations	155,704	4,424	139,969	2,179	155,704	15,157	155,704	4,424
Export entries	27,576	810	24,863	383	27,576	2,593	27,576	810
FDI entries	52	53	52	53	52	53	52	53
Log likelihood	-452.6	-280.5	-423.8	-242.5	-451.5	-274.8	-448.5	-273.7

Notes: The dependent variable is $h_{f,i}(t)$, the probability that new 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 sample includes all FDI entries by new exporters in countries outside the EU Single Market during the 1998-2008 period, excluding vertical FDI entries of new exporters.

Table A-7: FDI entry of new exporters (all destinations)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experience12$_{f,i,t}$	1.162***	1.132***	1.168***	1.147***				
	(0.202)	(0.229)	(0.202)	(0.228)				
Experience34$_{f,i,t}$	0.965***	0.980***	0.915***	0.892***				
	(0.241)	(0.277)	(0.240)	(0.263)				
Experience56$_{f,i,t}$	0.413	0.644*	0.333	0.491				
	(0.316)	(0.353)	(0.316)	(0.336)				
log Experience$_{f,i,t}$ × Uncertainty1$_i$					3.471***	2.361**		
					(0.754)	(0.930)		
Uncertainty1$_i$					-7.385***	-6.763***		
					(1.291)	(1.539)		
log Experience$_{f,i,t}$ × Uncertainty2$_i$							5.503***	3.802*
							(1.838)	(1.966)
Uncertainty2$_i$							-8.023**	-6.059*
							(3.400)	(3.198)
log Experience$_{f,i,t}$					-0.722***	0.307	0.070	0.910***
					(0.265)	(0.377)	(0.182)	(0.273)
log Productivity$_{f,t}$	0.307**	-0.247	0.325**	-0.234	0.325**	-0.315	0.309**	-0.310
	(0.128)	(0.309)	(0.129)	(0.313)	(0.128)	(0.301)	(0.127)	(0.300)
log Employment$_{f,t}$	0.563***	0.789**	0.583***	0.780**	0.561***	0.949**	0.553***	0.887**
	(0.050)	(0.373)	(0.051)	(0.358)	(0.049)	(0.371)	(0.049)	(0.373)
Foreign participation$_{f,t}$	0.154	0.542*	0.068	0.433	0.042	0.330	0.078	0.345
	(0.181)	(0.308)	(0.187)	(0.311)	(0.188)	(0.307)	(0.186)	(0.306)
FDI in close markets$_{f,t-1,c}$	0.156***	-0.193***	0.143***	-0.314***	0.150***	-0.230***	0.154***	-0.219***
	(0.024)	(0.042)	(0.026)	(0.060)	(0.024)	(0.043)	(0.023)	(0.044)
Exports in close markets$_{f,t-1,c}$	0.046***	0.065***	0.047***	0.060***	0.036***	0.059***	0.037***	0.064***
	(0.009)	(0.014)	(0.009)	(0.016)	(0.009)	(0.013)	(0.009)	(0.014)
log GDP$_{i,t}$	0.458***	0.375***	-1.124	-1.774	0.448***	0.358***	0.431***	0.344***
	(0.049)	(0.053)	(1.294)	(1.401)	(0.050)	(0.053)	(0.050)	(0.052)
Rule of law$_{i,t}$	0.161	0.272***	1.379	1.470	0.007	0.044	0.087	0.164
	(0.103)	(0.101)	(0.924)	(1.010)	(0.110)	(0.112)	(0.133)	(0.131)
log Distance$_i$	-0.236***	-0.186**			-0.089	-0.033	-0.244***	-0.165*
	(0.078)	(0.087)			(0.088)	(0.090)	(0.077)	(0.085)
Common language$_i$	0.764***	0.683***			0.522***	0.287	0.651***	0.482***
	(0.161)	(0.157)			(0.179)	(0.179)	(0.166)	(0.165)
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Country fixed effects	No	No	Yes	Yes	No	No	No	No
Observations	327,884	19,101	239,636	12,938	327,884	19,101	327,884	19,101
Export entries	55,317	3,024	39,901	1,968	55,317	3,024	55,317	3,024
FDI entries	198	198	198	198	198	198	198	198
Log likelihood	-1,844.5	-1,330.9	-1,787.4	-1,263.6	-1,845.4	-1,314.6	-1,852.8	-1,320.5

Notes: The dependent variable is $h_{f,i}(t)$, the probability that new 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 sample includes all FDI entries by new exporters in all destination countries during the 1998-2008 period.