Export Strategies of New Exporters: Why is Export Expansion Along the Extensive Margins so Sluggish?[*][†]

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Abstract

Several recent studies found that a typical first-time exporter starts by exporting a single variety to one foreign market. Surviving exporters add new varieties to existing export markets very gradually while expansions to new destination markets happens at an even slower rate. Recent advances in studying exporting activities of firms do not offer a satisfactory explanation for the generally sluggish expansion of new exporters. This paper argues that, though firms may have realized their productivity after starting to export, there are two detrimental factors preventing an instantaneous adjustment in terms of the number of varieties exported and export destinations served. These are the "*aggregate cost of exporting*" and the "*aggregate uncertainty*" faced by firms, both increasing in the product-destination complexity. By studying the export expansion pattern of the universe of Slovenian exporters, we find empirical evidence that adding new varieties to existing export markets and expanding to new foreign destinations is associated positively with firm size, productivity and access to finance for both new and incumbent exporters. Interestingly, though, we find that - when controlling for firm size, productivity and skill intensity - firm equity, return on assets, access to bank finance and to internal credit markets play a more important role for export expansion than firm productivity. This suggests that, ceteris paribus, firm ability to finance the costly and risky export expansion might be essential for explaining the speed of expansion.

Keywords: exports, multi-product firms, firm heterogeneity, financial constraints
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1 Introduction

Most of the recent empirical research on export activity of individual firms focuses on the causes and consequences of the gap between exporters and non-exporters.[1] On the other hand, much less attention has so far been paid to heterogeneity of exporters themselves and the evolution of export activity. With access to more detailed information on all dimensions of exporting activity, some of the reasearch focus has shifted towards explaining the patterns of exporting growth. There is a growing number of recent empirical studies using transaction-level data that focus either on the number of exporting markets or on the dynamics of the exported product mix (Eaton et al. 2004, 2006; Damijan et al. 2007, Eaton et al. 2008). A study by Eaton, Eslava, Kugler, and Tybout (2008), employing transaction level data for Colombia, represents a rare glimpse into the evolution of exporting activity of first-time exporters. Predominantly, they are shown to be small firms starting off tentatively with only one initial export market with most first-time exporters ultimately managing only a short stint in the export markets. Their future expansion and survival depend crucially on the choice of that initial export destination. Additionally, these studies provide evidence on the existence of destination-specific sunk costs of market entry, a finding echoed at the product level by Iacovone and Smarzynska Javorcik (2010). Studying the dynamics of the export product mix on a sample of Mexican firms they confirm the existence of within-firm product heterogeneity. They also find that new exporters test the foreign markets with a single variety and very small volumes relative to their total sales. While most exported varieties do not survive in a given foreign market any longer than a year, their survival rate is shown to increase with a variety's tenure in the export market. This suggests that exporters are facing great uncertainty in the foreign markets, making the strategy of experimenting with a small number of varieties, small sales volumes and/or different partners in the export markets a likely choice for first-time exporters. A recent paper by Albornoz, Calvo Pardo, Corcos and Ornelas (2010) provides theoretical rationale for the observed export patterns of new exporters incuring sunk costs of entry into the initial foreign market in spite of the high failure rates. Namely, by proposing that export profitability is positively correlated over time and across exporting destinations, they show that upon realizing its true exporting productivity a firm has the option of entering new exporting destinations or, alternatively, upon realizing a less favourable "profitability" draw to exit the foreign markets after the initial period. It is the possibility of a profitable ensuing expansion for surviving exporters in terms of both the intensive and extensive margins, which drives firms to experiment with new destinations and new varieties.

This mechanism, however, still does not offer a satisfactory explanation for the generally sluggish expansion of new exporters. Namely, once a firm has paid a fixed entry cost, firm's adjustment in export markets in terms of volumes, number of varieties and number of destinations does not happen instantaneously as is implicit in Melitz's (2003) workhorse model of trade with heterogeneous firms. Among the questions remaining unanswered are therefore: Why do new exporters not start by

[1] Exporters' superiority has been extensively documented since the seminal work of Bernard and Jensen (1995, 1997). See Wagner (2008) for a survey of the empirical studies.

exporting all available varieties to all perspective markets? Why do they not adjust instantaneously in the second year of exporting or in the subsequent years once having realized their exporting profitability?

This paper sheds new light on the evolution of exporters by proposing that demand uncertainty and financial constraints serve a principal role in delaying the adjustment of firms in foreign markets. We first summarize the basic stylized facts on the evolution of exporting for the universe of Slovenian exporting firms along the two dimensions of the extensive margin, i.e. introduction of new exported varieties and the number of destinations served. We highlight the markable differences between new and incumbent exporters and show that the expansion along both extensive dimensions of exporting is extremely slow. While an average first-time exporter typically starts by exporting a single variety to one foreign market, the most productive new exporters can start by exporting up to 4 varieties to no more than two foreign markets. After the initial entry, export expansion - controlling for survival - is very protracted. The surviving exporters add new varieties to existing export markets very gradually while expansions to new destination markets happens at an even slower rate. This suggests that adding a new variety to an existing exporting destination is less costly than entering a completely new foreign market. We show that the slow pace of expansion, on one hand, is due to the cost of serving foreign markets which increases with the dimensionality of the pattern of export products and markets. The more complex a firm's product-market space becomes, the higher the '*aggregate cost of exporting*'. On the other hand, exporting is associated with demand uncertainties a firm faces for each variety in every single foreign market. Although there are possible complementarities between markets and products in terms of risk, generally more complex exporting patterns mean higher '*aggregate uncertainty*' faced by the firm. The aggregate cost of exporting a firm can bear and the magnitude of uncertainty it can cope with, however, are related not only to its size and productivity, but also to its access to either internal or external sources of finance.

The issues of export expansion fits into a more general question on the fundamentals of firm dynamics.[2] Exporting markets can be viewed as only another layer of added complexity in a firm's choice set. This view is consistent with a recent unified model of firm growth by Arkolakis (2009), who assumes that firm growth is balanced across all markets in which a firm has to pay a market penetration cost. In general, recent firm growth literature shows that growth dynamics depend decisively upon market uncertainties (Luttmer, 2007)[3] and firm heterogeneity in terms of access to finance (Cooley and Quadrini 2001, Cabral and Mata 2003). Therefore, as the theory would suggest, firm overall growth/survival and expansion under uncertainty depend crucially on productivity, size, market characteristics and access to financing.

In order to underpin these exporters dynamics we develop a simple theoretical setup, which explains the sluggish sequencing of exporting by firm's inherent financial constraints. As financing

[2] Recently, Foster et al (2008) explore the reasons for the slow growth of small firms. Their findings are in contrast to Luttmer's (2007) finding, which implies independence of the growth rate and size (of productivity).

[3] A novelty in Luttmer's approach is that entrant firms can imperfectly immitate incumbent firms technology. This adds another source of firm-specific uncertainity into the model.

a complex product-market export pattern is costly, each firm's export expansion is limited by its internal finance, i.e. its equity, as well as by its access to external finance. In order to ensure tractability in modelling financial constraints, we assume that firms face the cash-in-advance constraint (Clower 1967). It requires firms to finance a fixed share of expenses in advance, which in turn prevents those with insufficient funds from expanding at a rapid rate. Firm growth is limited by their equity, which in turn determines firms' access to external finance through the size of the possible collateral. Such financial constraints along with aggregate fixed cost of exporting and the associated aggregate uncertainty in foreign markets in a multi product - multi destination setting, imply that firm size is the single most important determinant of the speed of a firm's export expansion. The amount of equity, raised by firm owners directly and indirectly through accumulation of profits, and external debt may hence explain variation of margins of exports across firms. Ceteris paribus, smaller firms will find export growth, both in terms of geographical expansion as well as in terms of number of exported varieties, a much slower process. We find empirical evidence of the above theoretical propositions on the sample of Slovenian exporting firms as adding new varieties to existing export markets and expanding to new foreign destinations is associated positively with firm size, productivity and access to finance for both new and incumbent exporters.Interestingly, though, we find that - when controlling for firm size and skill intensity - firm equity, return on assets, access to bank finance and to internal credit markets play a more important role for export expansion than firm productivity. New exporters who face positive demand shocks in foreign markets that also translate into their positive cash flows will not only more likely decide to expand at a faster rate, but will primarily have the means to finance it themselves or be able to get external finance. This suggests that, other things equal, firm ability to finance costly and risky export expansion might be essential for understanding why some firms expand faster than the others.

The outline of the paper is as follows. Section 2 presents a simple model that generates testable predictions regarding the firm behavior in foreign markets. Section 3 presents new stylized facts for exporters in Slovenian manufacturing. Section 4 accounts empirically for exporters strategies in terms of expanding along both dimension of the extensive margins and Section 5 concludes.

2 Model

In this section we develop a simple model that yields basic testable predictions regarding export strategies of exporters. In line with the workhorse model with heterogeneous firms (Melitz, 2003), we assume that firms differ in terms of productivity. Firms decide how many products to produce and how many of these to export to different product-markets. Unlike Bernard, Redding and Schott (2006) we make a more realistic assumption that a firm must pay a fixed development cost for each new product, entry cost to each new market and entry cost for each new product-market. Only upon payment of these development and entry costs do firms learn the ex-ante unknown production and demand parameters.

The motivating feature of our paper is sequential expansion in foreign markets. As discussed

above, one of the explanations for gradual adjustment of firm size to productivity may be in limited access to financing in equity and debt markets. **see Hall (2010)...** One of the simplest ways to introduce financing constraint to this partial equilibrium model is to assume Clower's (1967) cash-in advance constraint. This constraint requires that firms finance a fixed share of expenses in advance and prevents highly productive firms with insufficient resources to expand at the rate they would have grown if productivity and demand parameters were the only factors that determine firm size. This constraint is similar to Chaney (2005), who introduced liquidity constraints to exporting. However, in his model financing constraint is limited to sunk entry costs, which yields an instantaneous adjustment to foreign markets after entry.

2.1 The Demand Side

We start the description of the partial equilibrium model with description of demand side. We assume that monopolistically competitive firms face linear demand functions in each product-market:

$$q_{mhit} = \lambda_{mhi} - p_{mhit},$$

where p_{mhit} is the price of product h charged by firm i in market m in period t, and λ_{mhi} is a time-invariant product-market-firm-specific demand shifter that reflects factors like average income, income inequality, preferences and market structure. This parameter is only learnt after a firm starts supplying a particular product-market. The demand shifters are determined by three components: a market specific component, a product specific component and firm specific component:

$$\lambda_{mhi} = \lambda_m + \lambda_h + \lambda_i,$$

each of these is drawn from a binomial distribution with high and low values of parameters. Note that this assumption generates correlations between demand shifters of a given firm in different markets, although these correlations are in general less than perfect. Firm is assumed to learn each of these parameters upon entry in a given market. However, to learn these parameters firms need to pay a fixed entry cost f_{em}, but to enter this market with a specific product, it must pay f_{ehm}. For the sake of simplicity, we assume these costs are the same for all markets.

2.2 Production Technology

The supply side is characterized by production functions for specific products and entry costs to different markets. Following Bernard, Eaton, Jensen and Kortum (2003) we assume that firms use a simple Ricardian production function to transform labor into output. The product specific productivity parameter is time-invariant and ex-ante unknown. Thus the labor demand for production of product h is:

$$l_{hit} = \frac{1}{\varphi_{hi}} \sum_{m=1}^{M_{ht}} q_{mhit},$$

where φ_{hi} is product-specific productivity. In line with Bernard, Jensen and Schott (2006) we assume that the productivity parameter has two time invariant components:

$$\varphi_{hi} = \varphi_h + \varphi_i.$$

Again, this assumption creates a positive correlation between the productivity of product h and h' through common firm-specific component. In order to start producing product h, a firm needs to pay a fixed research and development cost f_{rh}.

2.2.1 Cash-in-advance constraint

We assume that firms must finance development and entry costs in advance from accumulated assets, which may be either in a form of equity of debt. This assumption extends the idea of Clower (1967) who introduced the cash-in-advance constraint to the monetary economics literature. It implies that introduction of new products and entry to foreign markets are activities of firms that are hard to collateralize and are harder to obtain financing in capital markets. It also generalizes the assumption introduced by Chaney (2005) to a trade model with single-product firms that may serve only one foreign market. The empirical support for relevance of financing constraints to entry to foreign markets is found by Campa and Shaver (2001) for Spanish manufacturing firms, Greenaway, Guariglia and Kneller (2007) for UK manufacturing firms, and Bellone, Musso, Nesta and Schiavo (2010) for Italian firms. Hall (2010)**: check it..**

The assumption that firms must pay for development of new products and cost of entry to new product-markets can be expressed in the following way:

$$\phi(f_{em}M^e_{it} + f_{rh}H^e_{it} + f_{emh}MH^e_{it}) \leq a_{it-1}, \tag{1}$$

where a_{it-1} denotes assets of firm i at the end of period $t-1$, ϕ is the share of total expenditure that a firm needs to finance in period t. M^e_{it} is the number of new markets that a firm starts supplying in period t, H^e_t is the number of newly developed products and MH^e_t is the number of new product-markets.

The law of motion for total assets is:

$$a_{it} = a_{it-1} + \pi_{it} - (f_{em}M^e_{it} + f_{rh}H^e_{it} + f_{emh}MH^e_{it}) - d_{it}, \tag{2}$$

where π_{it} is firm's current profit and d_{it} denotes the dividends a firm pays. In what follows, we shall assume that a firm pays no dividend $d_{it} = 0$.

2.2.2 Partial equilibrium

Firms maximize the value of assets. The state variables in this model are the total value of assets, the number of products a firm knows how to produce (H_{it}), the number of markets a firm entered

(M_{it}) and the number product-markets a firm supplies (MH_{it}), and demand (λ_{it}) and productivity parameters (φ_{it}). Hence the value function can be expressed as

$$\begin{aligned} V(a_{it}, M_{it}, H_{it}, MH_{it}, \lambda_{it}, \varphi_{it}) &= \sup\{0, \pi_{it}(M_{it}, H_{it}, MH_{it}, \lambda_{it}, \varphi_{it}) - (f_{em}M_{it}^e + f_{rh}H_{it}^e + f_{emh}MH_{it}^e) \\ &\quad EV(a_{it+1}, M_{it+1}, H_{it+1}, MH_{it+1}, \lambda_{it+1}, \varphi_{it+1})\}, \end{aligned} \tag{3}$$

subject to (1). The profit maximizing price for a firm producing product h and exporting it to market m is obtained by :

$$\frac{\partial \pi_{hmit}}{\partial p_{hmit}} = \lambda_{hmi} - 2p_{hmit} + \frac{w}{\varphi_{hi}} = 0 \Rightarrow p_{hmit} = \frac{1}{2}(\lambda_{hmi} + \frac{w}{\varphi_{hi}}). \tag{4}$$

The corresponding profit is

$$\pi_{hmit} = \frac{1}{4}(\lambda_{hmi} - \frac{w}{\varphi_{hi}})^2 \tag{5}$$

The total firm-level profit is a sum of profits:

$$\pi_{it} = \sum_{m=1}^{M_{it}} \sum_{h=1}^{H_{mit}} \pi_{mhit} = \frac{1}{4} \sum_{m=1}^{M_{it}} \sum_{h=1}^{H_{mit}} (\lambda_{hmi} - \frac{w}{\varphi_{hi}})^2.$$

The decision to enter an additional market with product h that is already produced is:

$$\chi_{hmit} = \begin{cases} 1 \ (enter) \ if \ E_t(\sum_{\tau=t}^{\infty} \pi_{hmi\tau}) > f_{ehm} \text{ and } a_{it-1} \geq f_{ehm} \\ 0 \ \text{ otherwise} \end{cases} \tag{6}$$

This implies that probability of entry to new product-market depends on elasticity of demand, productivity parameter, φ_{hi}, demand shifter, λ_{hm}, and lagged amount of assets, a_{it-1}. From the financing point of view, it is important to note that a firm with insufficient amount of assets will not enter additional market with its product if it can not afford to finance the entry cost. A firm with higher productivity parameter for product φ_{hi} is more likely to start exporting. The expected value of parameter λ determines the profitability, although if the λ_h is not correlated across markets, the information obtained in other markets is irrelevant and can be integrated out. Note that lagged productivity has also an indirect effect: since it increases profitability, it relaxes the financing constraint and increases the likelihood of entry. At the same time, the number of markets and products that firm serves also determines the volume of exports. Thus, we can write the conditional likelihood of entry to a new market as:

$$\Pr[\chi_{mhit} = 1 | a_{it-1}, \varphi_{hi}, \lambda_{mhi}] = f(a_{it-1}, \varphi_{hi}). \tag{7}$$

Since $a_{it-1} = f(a_{it-2}, \pi_{it-1})$ and total profit is a function of number of markets and products,

average productivity and average value of demand shifter,we can rewrite (7) as:

$$\begin{aligned} \Pr[\chi_{mhit} &= 1|a_{it-2}, \pi_{it-1}, \varphi_{hi}, \lambda_{mhi}] = g(a_{it-2}, \pi_{it-1}, \varphi_{hi}) \\ &= g(a_{it-2}, M_{it-1}, H_{it-1}, \bar{\varphi}_{it}, \bar{\lambda}_{it}, \varphi_{hi}). \end{aligned} \tag{8}$$

The decision to enter a new market, m, depends on the expected profits earned given the number of products:

$$\chi_{mit} = \begin{cases} 1 \ (enter) \ if \ E_t(\sum_{\tau=t}^{\infty} \pi_{mi\tau}) > f_{em} \text{ and } a_{it-1} \geq f_{em} \\ 0 \ \ otherwise \end{cases} \tag{9}$$

Note that the likelihood to enter market m depends on expected profits a firm can generate in market m. The likelihood of entry to foreign market increases with lagged assets - larger they are, more likely it is that a firm will be able to finance the entry cost. Again, the decision to start exporting to market m is influenced by firm's accumulated assets, which is a function of firm's past profit realizations. Next, the number of products also plays an important role because it affects the expected profitability in market m. This follows from the faxt that, if a firm has more products, the expected profit of entry with a new product to a given market is higher. Thus, the number of products influences the decision to enter additional foreign market. The discussion on indirect effects regarding assets is again relevant.

The decision to start exporting a product h depends on the expected profits. Again, the expected profits are crucial:

$$\chi_{hit} = \begin{cases} 1 \ (enter) \ if \ E_t(\sum_{\tau=t}^{\infty} \pi_{hi\tau}) > f_{eh} \text{ and } a_{it-1} \geq f_{eh} \\ 0 \ \ otherwise \end{cases} \tag{10}$$

3 Data and Stylized facts

3.1 Data

Our empirical investigation of exporters' strategies uses firm-level data on foreign transactions of Slovenian manufacturers. The source of data is the Slovenian Customs Administration (CARS), which used to record all foreign transactions of firms engaged in international trade in goods. From the original dataset, we extract the following information for each shipment: the value of exported product in USD, the physical quantity in units of output and the corresponding product and country codes. The export volumes and quantities are then aggregated to create an annual dataset that is matched with annual data on firm characteristics. Note that the products in our data set are defined according to the Combined Nomenclature (CNTP), which distinguishes between 10,828 8-digit product codes in 1995 and 10,511 product codes in 2003. The dataset covers the period 1994-2003 to avoid the break in time-series caused by accession of Slovenia to the EU. While all flows were recorded before entry to EU, after May 1st 2004 flows of firms with annual value of intra-EU trade below 100 thousand euros are not reported anymore.

To relate the margins of exports to firm characteristics, we merge the data on foreign transactions with two additional sources that are also collected at the level of individual firms: the balance sheet and income statement data, and data on employment structure. All Slovenian firms and large sole proprietors with at least 30 employees are obliged to report annually the balance sheets and income statements to the Agency of the Republic Slovenia for Public Records and Related Services (AJPES). In particular, the accounting data contain information on the total domestic and foreign sales, costs of intermediate goods, materials and services, the physical capital engaged in production process, the total value of assets, owners' equity and outstanding debt, the number of employees calculated from the number of working hours, and the NACE 5-digit industry code.

The source of data on skill structure of workers is the registry maintained by the Employment Service of Slovenia (ESA). This organization records all the employment spells of part and full-time employees in Slovenia with exception of students. The key variable of interest is the structure of employment by educational attainment, which is constructed from the employment spells by aggregating the number of employees with up to 12 years of schooling (low-skilled workers) and the number of employees with more than 12 years of schooling (high-skilled workers). To calculate the share of skilled employees the full-time equivalents for both part and full-time workers are used.[4]

3.2 Stylized Facts on New Exporters

Although the workhorse models of international trade with heterogeneous firms in terms of productivity/quality feature entry and exit of firms, they are essentially static. Melitz (2003) and Bernard, Redding and Schott (2006) assume that new and incumbent exporters drew the productivity parameters from the same distributions, which implies, assuming that no factor hinders instantaneous adjustment of sales to productivity, that new and incumbent exporters should have the same distributions for intensive and extensive margins of exports. In other words, the time of entry or age of firm can not explain the differences in the average volumes of exports, the number of products exported and the number of foreign destinations supplied.

Using dataset for Colombian manufacturing firms Eaton, Eslava, Kugler and Tybout (2008) were the first to show that new exporters are significantly smaller in terms of the average volume of exports per market and the number of markets served. They also found that the surviving expand quickly in foreign markets. In this section we complement their results with evidence on large differences between the new and the incumbent exporters for Slovenian manufacturing firms. These differences are, however, significantly larger in Slovenia; moreover, time that new exporters in Slovenia need to catch up with the incumbent exporters in terms of extensive margins is relatively long. Finally, we extend their results to capture another extensive margin of exports: the number of products exported.

[4] The information on over-time of individual workers is not recorded in the registry and therefore not used in calculation of skill-structure of workers.

3.2.1 New vs. Incumbent exporters

Let us start with a comparison between new and incumbent exporters in terms of distributional moments for the key margins of exports. Following the relevant trade literature, we split the total value of exports for each firm, denoted X, into three factors that reflect extensive and intensive margins in the following two ways:

$$X = M\ \overline{H}\ \overline{X} = H\ \overline{M}\ \overline{X}, \tag{11}$$

where M and H denote the total number of markets and products that a firm supplies in a given year, $\overline{H}$ is the average number of products per market, $\overline{M}$ is the average number of markets per product, and $\overline{X}$ is the average volume of exports per product-market. In each of these decompositions, the first two components measure the extensive margins, while the last component is the intensive margin of exports.

Table 1 shows the average, the median and the standard deviation for each of these components, in addition to the total value of exports and the number of product-markets. The reported statistics are based on samples of 120 new exporters that started exporting in 1996 and 2529 firms that started exporting prior 1996 and continued to export at least until 1996. We define new exporters as firms that were supplying only the domestic market in the period prior to entry into foreign markets.[5] We find that the total value of foreign sales for the incumbent exporters is significantly higher and more dispersed than that of the new exporters. This is due to a significant size premium of incumbent exporters along all measured export margins. However, the differences in the average values for extensive margins are far more pronounced than the differences in the intensive margins, which suggests that the primary source of heterogeneity among incumbent and new exporters are the differences in the numbers of products and markets. Note also that the size premium of incumbent exporters is large for the alternative mean value (the median) and less aggregated definition of products, although the differences are somewhat smaller.[6] We also recognize that an important part of measured differences in the average values of export margins may reflect differences in the industry composition between new and incumbent exporters due to differences in entry costs. To control for these differences we regress the margins of exports (in logs) on a dummy for incumbent exporters, and industry and time fixed effects. We find that the export margins premia of incumbent exporters remain large and statistically significant.[7]

[5] This definition avoids treating restructured firms as new exporters, although one year does not completely eliminate the re-entering firms from the group of new exporters. However, if re-entering firms are larger than true new exporters, the measured differences of export margins may be lower than the actual differences.

[6] The qualitative features of results presented here also for wider definition of products (5-digit CNTP code).

[7] We also calculate the incumbent exporters' premia by regressing the log of each of these measures on the industry and time dummies, and a dummy for incumbent exporters on the full sample of exporters in the period 1995-2003. The incumbent exporters' premia are: 331 log points for the total exports ($s.e. = 0.08$); 132 log points for the exports per product-market ($s.e. = 0.048$); 199 log points for the number of product-markets ($s.e. = 0.052$); 108 log points for the number of markets ($s.e. = 0.033$); 177 log points for the number of products ($s.e. = 0.046$); 91 log points for the average number of products per market ($s.e. = 0.030$); and 23 log points for the average number of markets per product ($s.e. = 0.010$).

Table 1: Summary Statistics for New and Incumbent Exporters in Slovenian Manufacturing, 1996

	New Exporters			Incumbent Exporters		
Variable	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Exports	75.16	6.49	320.34	4,425.23	220.64	35,684.27
Exports per product market	9.23	2.62	17.07	23.64	9.69	47.81
Product-markets	5.98	2.00	11.13	84.18	24.00	203.85
Markets	1.58	1.00	1.29	7.49	4.00	9.20
Products per market	3.89	1.50	7.63	8.67	5.57	10.70
Products	4.98	2.00	8.36	45.08	18.00	76.52
Markets per product	1.11	1.00	0.28	1.44	1.27	0.52

Source: CARS and own calculations.
Note. The statistics are calculated for a sample of 120 new exporters and 2,529 incumbent exporters that had positive exports in 1996. The nominal values of exports are given in thousand USD (1996 prices).

The differences between the new and the incumbent exporters extend beyond the first two distributional moments. The differences in probability density functions for a subset of key variables shown in Table 1 (in logs) are reported in Figure 2 in the Appendix.[8] A comparison of density functions between new and incumbent exporters affirms our belief that new exporters tend to be small relative to the market average both in terms of the extensive and intensive margins. While the density plots for the intensive margin remain comparatively similar between the two cohorts, the pronounced differences in the extensive margins are dictated by the greater mass of firms below the relevant average in case of new exporters as compared with incumbent exporting firms.

3.2.2 Dynamics of New Exporters

The observed differences between new and incumbent exporters imply that the former should exhibit a significant upward adjustment of margins of exports after their first entry to foreign markets. In this section, we provide evidence that this indeed takes place and, in addition, provide some insight about the speed of this adjustment process. Following the tradition in the empirical industrial organization that investigates firm dynamics (Evans, 1988; Hall, 1988; Dunne, Roberts and Samuelson, 1989), we distinguish between shifts in firm size (e.g. sales or employment) and survival. In the present context, this distinction translates into adjustments of margins of exports on one hand and survival in the foreign markets on the other hand, conditional on firm overall survival. This allows us to gain insight into the relative importance of post-entry adjustment as opposed to selection for the observed upward adjustment of margins of exports.

[8] Due to small samples of firms, we estimate the densities using the nonparametric stochastic kernel method. Since the standard estimators of nonparametric stochastic kernels give biased distributions for variables with greater probability mass at the extreme values, we use the Stata module kdens written by Ben Jann (2005), which deals with bounded domain problem.

We first show the evolution of margins of exports in technical time, which is calculated relative to the time of first entry to export markets. In order to obtain a sufficiently large sample of new exporters that continue supplying foreign markets, we use data for three cohorts of new exporters that started supplying foreign markets between 1995 and 1997. This allows us to observe firms up to 6 years after the start of exporting. The combined sample consists of 391 firms in the year of entry to export markets and 138 firms in the last period of observation. Within this sample there is a subsample of 69 firms that started exporting in the 1995-1997 period and continue exporting in all 7 years of available data. In Table 2 we label the broad sample as '*surviving new exporters*' and the subsample as '*continuous new exporters*'.

The top panel of Table 2 depicts the evolution of key statistics for the sample of surviving new exporters. The sharp decline in their numbers provides evidence on significant demand uncertainty in export markets. The survival rate one year after entry is about 53%, which is significantly lower than the corresponding survival rates for domestic market. While high hazard rate one year after entry may be a consequence of temporary trade (see Besedes and Prusa, 2006; Murakozy and Bekes, 2009), relatively high exit rates four years after the first entry suggest that demand uncertainty may indeed play an important role. Comparison of the number of surviving new exporters to continuous new exporters (lower-middle panel of Table 2), confirms that re-entry into foreign markets is a part of the dynamics of the number of exporters. The aggregate volume of exports for surviving new exporters also declines over time, which is reflected in the declining share of new exporters in the aggregate volume of exports for all manufacturing firms.[9] Comparison of the volumes of surviving new exporters to those for a set of 69 continuous new exporters suggests that a large part of the decline in the aggregate export share is related to high exit rates among new exporters. Aggregate volume of exports of continuous new exporters and its share in the aggregate exports for all firms exhibit lower variation over time than the corresponding figures for surviving new exporters.

The average total exports per firm exhibits no systematic variation (middle-top panel of Table 2), which can be attributed to changes in composition and volumes of surviving exporters. Such dynamics are also reflected in the average exports per product market, with more pronounced decline 2 years after entry to foreign markets. The U-shaped pattern can be explained by firms expanding to product-markets with lower volumes of sales in the early periods and expanding volumes of exports in the subsequent periods. While this pattern contradicts the evidence of the large premium of incumbent exporters, we need to point out that the value of exports per product-market rebounds 6 years after entry. The average exports per product-market has also U-shaped pattern after period 1, although the average exports is almost double and the average exports per product-market is up to 20 percent higher in all time periods.

The dynamics of extensive margins (middle-top and bottom panel in Table 2) reveal several striking features. First, it is evident for both samples of new exporters (surviving and continuous new exporters) that firms expand along all extensive margins. However, they are more likely to

[9] We attribute the rise in exports one year after entry to imperfect comparability between exports in $t = 0$ and $t = 1$. The data in period 1 cover the entire year, while the data in period 0 cover the period after the firm starts to export.

increase the number of exported products than to increase the number of markets. For example, a typical exporter in the set of continuous new exporters starts exporting roughly 10 varieties to 2.7 markets and will end up exporting roughly 21 varieties to 4 markets after 6 years. This suggests that product-specific export cost seem to be lower than the market-specific export cost, possibly reflecting differences in geographical market proximity.[10] Second, although the trajectories are similar, the corresponding figures for a sample of surviving new exporters are significantly lower both in terms of products and markets when compared to the cohort of continuous new exporters. This suggests that the continuing new exporters start supplying a larger number of products and markets than the exporters that will cease exporting after surviving in foreign markets for a short period of time. Finally, despite significant growth in the numbers of markets and varieties over a 6-year period, these average figures for a cohort of continuous new exporters are only about a half of the corresponding values for incumbent exporters (see Table 1). We can conclude that it takes significantly more than 6 years before a new exporter is comparable in terms of the extensive margin to an average incumbent exporter. Further details on the evolution of export margins are provided in Figure 4, where by plotting probability density functions we trace the evolution of the same cohorts of new exporters that entered foreign markets between 1995 and 1997.

To conclude the presentation of stylized facts on evolution of export patterns for new exporters, we provide some evidence on significant persistence of export margins for the subsample of surviving new exporters. In Figure 1 we plot current values of variables in logs against the lagged values in logs for the key margins of exports using the cohort of continuous new exporters that first entered foreign markets in the period 1995-1997. The plots also contain the 45 degree line and the line of linear fit, which helps to infer on the extent of persistence of export margins over time. The autoregressive coefficients of these linear regresion lines are high, ranging between 0.70 ($s.e. = 0.038$) for total firm-level exports, 0.54 ($s.e. = 0.038$) for exports per product-market, 0.73 ($s.e. = 0.037$) for the number of products and 0.75 ($s.e. = 0.037$) for the number of markets. These values suggest high persistence of margins of exports between the first and second periods of exporting. However, the coefficients below 1 also imply that surviving new exporters that started with smaller margins of exports grow at faster rate, conditional on survival in foreign markets. In the following section we show that this holds also when we control for survival, which is consistent with existing evidence on faster growth rates of smaller firms in terms of number of employees and sales (see e.g. Dunne et al. 1988; Hall and Evans, 1988). Finally, note that the autoregressive coefficients for exporters with greater experience are even higher, suggesting even greater persistence of margins of exports.

[10] Although differences in trade costs across markets are beyond the scope of this paper, we find in our data set that new exporters tend to start exporting to geographically closer markets and continue to expand to more distant markets.

Table 2: Evolution of Margins of Export for New Exporters in Slovenian Manufacturing, 1995-1997 cohorts

Surviving New Exporters							
Technical time	0	1	2	3	4	5	6
Number of firms	391	209	181	153	140	136	138
Survival rate (percent)	-	53.45	86.60	84.53	91.50	97.14	101.47
Aggregate exports	28,274.03	45,807.38	31,768.49	17,980.13	21,177.83	20,827.41	19,974.37
Share of agg. exports (percent)	0.13	0.21	0.13	0.07	0.08	0.07	0.06
Average values							
Exports	72.31	219.17	175.52	117.52	151.27	153.14	144.74
Exports per product-market	6.59	9.12	7.68	4.72	6.71	6.19	7.80
Product-markets	7.40	16.87	17.81	18.40	19.14	19.94	19.16
Markets	1.79	2.92	3.10	3.09	3.14	3.26	3.10
Products	5.86	11.91	12.70	13.39	13.80	14.54	14.17
Products per market	3.45	4.08	4.23	4.72	4.66	4.80	4.90
Markets per product	1.12	1.18	1.21	1.30	1.21	1.23	1.22
Continuous New Exporters							
Number of firms	69	69	69	69	69	69	69
Aggregate exports	8,177.60	14,651.30	11,814.41	15,053.56	18,402.88	17,220.40	16,265.79
Share of agg. exports (percent)	0.04	0.07	0.05	0.06	0.07	0.06	0.05
Average values							
Exports	118.52	212.34	171.22	218.17	266.71	249.57	235.74
Exports per product-market	9.08	9.50	7.91	5.45	8.24	7.33	9.59
Product-markets	12.52	21.96	23.80	29.83	30.20	29.25	28.17
Markets	2.71	3.94	4.16	4.45	4.19	4.33	4.06
Products	9.96	15.83	16.70	20.88	21.25	21.35	20.68
Products per market	4.49	4.32	4.43	5.33	5.77	6.53	6.17
Markets per product	1.23	1.26	1.32	1.47	1.31	1.34	1.31

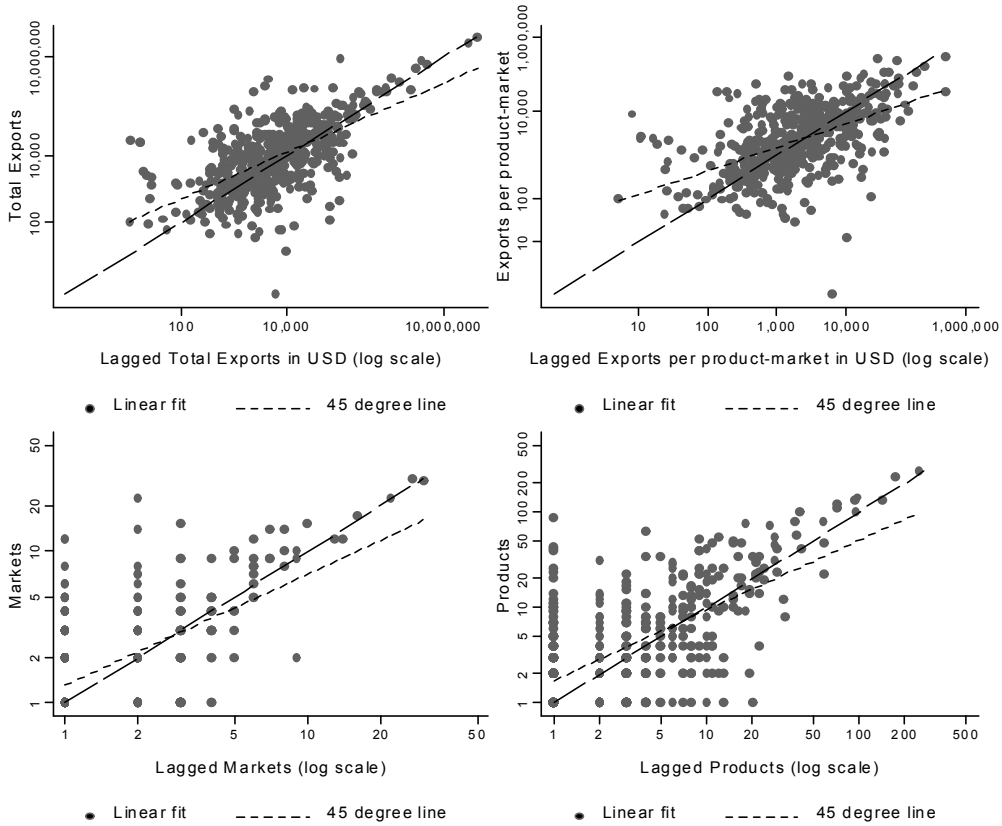
Source. CARS and own calculations.
Notes. The statistics are based on data for three cohorts of new exporters that first entered foreign markets in the period 1995-1997. The values of exports are given in thousandUSD (constant 1996 prices).

4 Strategies of New Exporters

4.1 Measurement of Variables and Summary Statistics

Theoretical model developed in Section 2 yields a rich set of predictions that relate to distinct margins of exports to product, market and firm-characteristics. To test these predictions fully would require detailed information on products and markets served by firms, and costs of production. Our aim, however, is to identify dynamic relationships between extensive margins of exports, in particular the number of products and the number of foreign markets supplied by a firm, to firm-level characteristics, while leaving the information on products and markets aside. This approach prevents us from distinguishing the demand-side parameters (demand shifters) from production-

Figure 1: Persistence of Export Margins for New Exporters in Slovenian Manufacturing, cohorts of 1995-1997 entrants



Source: CARS and own calculations.
Notes: The non-parametric densities are estimated using the Stata module kdens that deals with bounded domain problem. The volumes of exports are given in USD, constant 1996 prices.

side parameters (productivity), but allows us to focus on the overall dynamics of the extensive margins of exports.

One of the key variables of interest in the literature that aims to explain the patterns of trade is a measure of technical efficiency or physical productivity (φ). For data sets with incomplete information on input and output prices, the standard approach is to use the revenue-based estimates of total factor productivity (TFPR), obtained as residuals from regression of revenues deflated by industry-wide producer price index on a set of physical (typically employment) and nominal inputs (value of physical capital, and costs of materials and services). In spite of attempts to distinguish the demand and supply side parameters for single- and multi-product firms, these can not be easily extended to multi-product firms that serve multiple foreign markets. As elaborated in Katayama, Lu and Tybout (2010), TFPR may, in addition to technical efficiency, reflect a number of factors such as: (i) product quality, (ii) elasticity of demand and consequently mark ups, (iii) costs of intermediate inputs that are not measured in physical units, (iv) scale effects, and (v) exchange rate variation. In an attempt to control for differences in output prices Foster, Haltiwanger and

Syverson (2008) find positive correlation between the true technical productivity and TFPR for a set of single-product U.S. firms that produce nearly homogenous products. However, the results of structural estimation of technical efficiency by Katayama, Lu and Tybout (2010), based on a set of firms in Colombian paper mill industry, suggest that firm-level TFPR is highly positively correlated with own profits (as a share in total costs), while the true technical efficiency and TFPR are not correlated. However, this result is not very surprising as TFPR, under a set of commonly used assumptions, captures the weighted average of gross markups across distinct product markets.[11] Nevertheless, while TFPR may not capture the true technical efficiency, it may have greater predictive power in explaining the patterns of expansion in foreign markets, as shown by Foster, Haltiwanger and Syverson (2008).

To estimate TFPR, we follow the tradition in the literature and use the Olley-Pakes (1996) approach to estimation of production functions that deals with endogeneity of physical capital in response to shocks to TFPR, although, as suggested by de Loecker (2010), the difference between regression coefficients of OLS and Olley-Pakes estimators is rather small. The estimates of TFPR are calculated as the residuals from the estimation of revenue function with value added deflated by the industry-wide producer price index as the dependent variable, and the numbers of skilled workers (employees with at least 12 years of formal education), unskilled workers (less than 12 years of schooling) and physical capital deflated by economy-wide capital goods price index as the explanatory variables. The TFPR is estimated separately for each of the NACE 2-digit industries

[11] To show this, consider a multi-product firm that exports to multiple markets with total revenues equal to a sum of revenues in distinct product markets:

$$r = \sum_{mh} r_{mh}.$$

Assuming mark-up pricing that depends on output volumes (for linear demand functions) and differs across product-markets, the revenues can be reritten as

$$r = \sum_{mh} p_{mh}(q_{mh})q_{mh} = \sum_{mh} \mu_{mh}(q_{mh})c_{mh}q_{mh},$$

where μ_{mh}, c_{mh} and q_{mh} denote the product-market-specific markup, marginal cost of production, and output. Assuming the Cobb-Douglas production function with constant returns to scale, two factors of production - capital and labor and competitive factor markets, the revenue function can be rewritten as

$$\begin{aligned} r &= \sum_{mh} \mu_{mh}(q_{mh}) \frac{1}{\varphi_{mh}} \left(\frac{w}{\alpha}\right)^{\alpha} (\frac{r}{\beta})^{1-\alpha} \varphi_{mh} k^{\alpha} l^{1-\alpha} \\ &= \left(\frac{w}{\alpha}\right)^{\alpha} (\frac{r}{\beta})^{1-\alpha} \sum_{mh} \mu_{mh}(q_{mh}) k_{mh}^{\alpha} l_{mh}^{1-\alpha}. \end{aligned}$$

Since all product-markets have the same production function, the capital-to labor is the same (k/l), which allows us to write total revenues as

$$r = \left(\frac{w}{\alpha}\right)^{\alpha} (\frac{r}{\beta})^{1-\alpha} k^{\alpha} l^{1-\alpha} \sum_{mh} \mu_{mh}(q_{mh}) \frac{l_{mh}}{l}.$$

Thus, the residual of the revenue production function regressed on firm-level capital and labor for multi-product firms that supply multple foreign markets captures the labor weighted gross markups:

$$\ln r - cons - \alpha \ln k - (1-\alpha) \ln l = \ln \sum_{mh} \mu_{mh}(q_{mh}) \frac{l_{mh}}{l},$$

where *cons* captures the common factor prices. The gross markups may still reflect the productivity parameters, although this is not necessarily the case. For example, the CES structure of preferences has constant markups and technical efficiency does not enter the TFPR unless we assume fixed costs of production. Also, applying industry-wide price deflator grants that the aggregate TFPR reflects changes in technical efficiency, while cross-sectional differences between firms still reflect differences in mark-ups rather than the average technical efficiency.

to allow for variation in the estimated coefficients across industries. In addition to TFPR, we use an alternative perfomance measure, the rate of return on total assets (ROA), which may play an even greater role in explaining export strategies.

The model in Section 2 predicts that access to financing plays an important role in explaining dynamics of exports if cash-in-advance constraint is binding. Then the amount of equity, raised by firm owners directly and indirectly through accumulation of profits, and external debt may explain variation of margins of exports across firms. Hence, in empirical models, we use two measures that proxy access to financing: (i) the total value of equity, and (ii) the debt to asset ratio. Since affiliates of foreign multinational companies may have better access to internal credit markets within larger multinational firms, foreign ownership may also explain part of the variation in access to financing.

In empirical models we also include control variables that capture the heterogeneity of human and physical capital between firms. The ratio between the value of physical capital deflated by investment goods price index and total number of employees captures the within industry differences in embodied technology in capital equipment and structures across firms (Solow, 1960). Firms with higher value of capital equipment per employee may use newer technology or higher quality, which may lead firms to produce products of higher quality, increase demand and market power (markups), and allow them to charge higher prices. Similarly, skilled labor may be essential to foreign market penetration, since such workers may possess greater managerial and technical ability in addition to language skills that are important for engagement in exporting. Hence, we expect firms with higher share of skilled workers to expand faster both in terms of exported products and export markets. In part, high share of skilled workers may also reflect higher share of workers in research and development and thus affect the number of products that firms develop, produce and sell to foreign markets. We distinguish between two high-skill levels: workers with completed high-school or 12 years of formal training and workers with completed 2-year undegraduate (henceforth UG) programme or higher.

The summary statistics for these variables are given in Table 3. These are calculated for a set of firms that were active in the period 1995-2003 with complete information on physical capital, total number and structure of employees by educational attainment, total domestic and foreign sales, total debt, equity, assets, operating profits, and costs of materials and services.[12] Table 3 compares the statistics for three groups of firms distinguished in empirical analysis: (i) the sample of non-exporting firms; (ii) incumbent exporters, defined as firms that export in periods t and $t-1$ and started to export prior 1995; and (iii) new exporters, defined as firms that started to export in the period 1995-2003, and in the year prior to start of exporting, they served only the domestic market.[13] The average values (and standard deviations) reveal significant differences between these firms in terms of size, performance, physical and human capital intensity and foreign ownership.

[12] An active firm satisfies two fairly non-restrictive conditions, which aim to exclude either starting firms with no employees and firms that are de facto bankrupt: i) firm employs at least one full-time employee and ii) the debt to assets ratio is in the range between 0 and 1.

[13] Although new exporters that continue to export could be labeled incumbent exporters, we label them as new exporters to distinguish them from firms that started to export before 1995.

The most striking differences are in terms of various measures of size. In particular, the values of assets, equity and employment for the incumbent exporters greatly exceed the corresponding values for new exporters, while the latter have smaller, although still large size premia over the non-exporters. The differences in terms of performance measures (labor productivity (value added per employee), TFPR and ROA) are significantly smaller. However, for labor productivity and TFPR, the rankings of firms are consistent with rankings based on firm size, while the rankings based on ROA show well-documented negative relationship between size and rate of return. The predominant rankings of firms are also observed for physical capital intensity and for the share of employees with at least 2-year completed undergraduate program. This pattern suggests that the labor productivity advantage of large firms stems from both TFPR and capital intensity. The three groups of firms also differ in terms of the average values of debt to assets ratio. The highest values are observed for new exporters, followed by the incumbent exporters and non-exporters, although these differences are rather small. We find also that foreign ownership is more frequent among firms engaged in foreign trade, particularly among the incumbent exporters. To complement the summary statistics, Table 6 in Appendix shows the correlations of these variables.

Table 3: Summary Statistics for Exporters and Non-Exporters, 1995-2003

	Non-Exporters		New Exporters		Incumbent Exporters	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Export Markets	-	-	1.58	1.84	8.43	10.12
Exported Products	-	-	4.30	12.08	48.04	76.79
Assets	296.27	1,638.96	782.89	7,618.60	7,113.54	31,772.85
Equity	140.31	946.01	341.77	3,974.62	3,984.91	20,421.42
Debt to Assets Ratio	54.07	24.68	59.27	22.41	58.37	24.26
Value Added per Employee	24.27	29.18	29.45	46.88	35.40	71,82
TFPR (log)	7.40	0.70	7.55	0.66	7.61	0.64
ROA	3.05	12.00	4.99	10.42	3.77	9.70
Employees	4.74	12.91	8.83	28.84	59.89	164.69
Capital per Employee	29.64	77.24	36.51	61.93	57.39	257.43
4-year High school (percent)	36.98	37.37	35.91	32.79	30.07	24.75
2-year UG degree or higher (percent)	11.92	26.65	12.66	24.53	13.78	21.01
Foreign Ownership (percent)	0.71	8.42	1.62	12.62	9.65	29.53
Observations	9,967	9,967	1,483	1,483	20,462	20,462

Source. AJPES, ESA, CARS and own calculations.
Notes. The estimates of TFPR are calculated using the Olley-Pakes (1996) estimator.
The value added per employee and capital per employee are given in USD, constant 1996 prices.
The value of assets and equity are given in USD, current prices. All nominal variables are given in thousand USD.

4.2 The entry decisions

We start the testing of hypotheses by first addressing a well-studied question of what are the determinants of the decision to start exporting. The main conclusions of a large number of empirical studies, echoed in a recent study by a group of trade economists[14] (ISGEP, 2008) that uses data for manufacturing firms from 14 countries (including Slovenian manufacturers), is that new exporters tend to be larger in terms of employment and more productive in terms of TFPR, although the latter does not hold for all countries and sets of firms. We revisit this question by considering the set of described firm characteristics that measure firm size, performance, access to financing, capital intensity and foreign ownership. However, our main interest is in testing the role of financing for entry to foreign markets. In addition, we consider the role of the same set of determinants for explaining the differences in the extensive margins of exports in the year of first entry.

The empirical model of the decision to start exporting is the standard conditional probability model:

$$\Pr[Export_{it} = 1 | Export_{it-1} = 0] = \Phi(\boldsymbol{\beta}\mathbf{x}'_{it-1} + \sum_j \alpha_j I\{i \in j\} + \sum_\tau \alpha_\tau I\{\tau = t\}), \qquad (12)$$

where Pr denotes probability, Exp_{it} denotes a binary variable that assumes value 1 if firm i recorded a positive value of exports in period t and 0 otherwise. Φ denotes the cumulative distribution function of the standard normal distribution. To deal with endogeneity, the vector of explanatory variables, $\mathbf{x}_{it-1}$, includes the lagged values of measures of firm size, performance, access to financing and ownership. The corresponding set of coefficients is in vector $\boldsymbol{\beta}$. To control for industry and time-specific export market opportunities, the model includes the industry (α_j) and time (α_τ) fixed effects. I denotes an indicator function that assumes value 1 if condition in parentheses (e.g. firm i is in industry j) is true and 0 otherwise.

To model the decisions on the extensive margins of exports in the first year of exporting, we consider the following log-linear specifications:

$$m_{it} = \boldsymbol{\beta}'_m \mathbf{x}_{it-1} + \sum_j \alpha_{jm} I\{i \in j\} + \sum_\tau \alpha_{\tau m} I\{\tau = t\} + \xi_{itm}, \qquad (13)$$

$$h_{it} = \boldsymbol{\beta}'_h \mathbf{x}_{it-1} + \sum_j \alpha_{jh} I\{i \in j\} + \sum_\tau \alpha_{\tau h} I\{\tau = t\} + \xi_{ith}, \qquad (14)$$

where, m_{it} and h_{it} denote the log of numbers of export markets and exported products for firm i in period t, respectively. As above, the vectors $\mathbf{x}_{it-1}$, $\boldsymbol{\beta}_m$ and $\boldsymbol{\beta}_h$ contain the lagged values of explanatory variables and regression coefficients, $\alpha's$ are time and industry fixed effects, and $\xi's$ are the error terms. Note that we consider these two equations using a subsample of new exporters in their first year of exporting.

Table 4 summarizes the estimates of equations (12), (13) and (14). Columns (1)-(3) contain

[14] ISGEP is an acronym for International Study Group on Exports and Productivity.

the estimates of the probit model for foreign markets entry decision (12). The results are based on a sample of 6,042 observations for firms with no prior experience in foreign markets. In line with existing studies, we find that larger firms are more likely to become exporters if size is measured either in terms of equity (column 1) or employment (column 2). However, when both of these measures are included in the model (column 3), employment is no longer statistically significant, which implies that employment alone has no additional predictive power, beyond the part already accounted for by equity. This is the first result that shows importance of access to financing for foreign markets entry rather than the firm size per se. The data also lend some support to self-selection of better performing firms. While firms with higher rate of return on assets are more likely to expand to foreign markets (column 1), this is not the case for firms with higher TFPR (column 2). When both of these measures are included in the model (column 3), the coefficient for TFPR becomes negative, which suggests that TFPR is not the best predictor of foreign markets entry. With exception of share of high school graduates in employment, all the remaining variables have positive and statistically significant coefficients (columns 1-3). Thus the likelihood of entry is also higher for firms with higher human and physical capital intensity, debt to assets ratio and foreign ownership. Note that the highly significant coefficient for the debt to assets ratio suggests that firms with either better access to debt financing or lower risk aversion are more likely to enter foreign markets. Combined with the afformentioned positive effect of firm equity on the decision to start exporting, the strong influence of the greater access to additional funds provides strong evidence of the importance of financing for the initial entry into foreign markets.

The results for extensive margins of exports at the time of entry into exports are summarized in columns (4)-(9) of Table 4. These estimates are obtained for a significantly smaller sample of 559 new exporters observed in the year of first entry to foreign markets. Looking at columns (4)-(6), we find that the number of markets increases with improved access to financing as both equity and debt to assets have positive and significant coefficients. In contrast to the entry decision, the measures of size in terms of employment, performance and capital intensity play no role in explaining variation of markets at entry, while foreign ownership has a positive coefficient in a specification that excludes equity and ROA from the model (column 5). For the number of products at entry, the results are very similar, but with two differences. The coefficient for equity is not significant and physical capital intensity has a negative coefficient in specifications that include equity, revealing high correlation between these two variables. Although not as definitive as in the case of export-entry, estimates of decisions regarding the number of markets and products served in the initial year of exporting offer further evidence of the importance of access to finance for success in foreign markets. To summarize, the variables that measure access to financing play an important role in explaining both entry decision and variation of extensive margins, while the other variables affect only entry decision.

Table 4: Decision to Export, Number of Markets and Products, 1995-2003

Dependent Variable	Pr[Export$_t$=1|Export$_{t-1}$=0]			Markets$_t$ (log)			Products$_t$ (log)		
Est. Method	Probit	Probit	Probit	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Equity$_{t-1}$	0.0958***		0.149***	0.0351*		0.0600**	0.0462		0.0646
	(0.023)		(0.035)	(0.021)		(0.031)	(0.046)		(0.068)
Employment$_{t-1}$		0.0442*	-0.0549		0.00977	-0.0318		0.0471	0.00225
		(0.026)	(0.036)		(0.024)	(0.035)		(0.048)	(0.067)
Return on Assets$_{t-1}$	0.868***		0.999***	0.0224		0.0245	-0.239		-0.0426
	(0.24)		(0.26)	(0.098)		(0.13)	(0.24)		(0.25)
TFPR$_{t-1}$		0.0570	-0.0832**		0.0139	-0.00881		-0.0913	-0.109
		(0.037)	(0.042)		(0.033)	(0.041)		(0.069)	(0.079)
High School$_{t-1}$	0.0941	0.0673	0.0858	0.0334	0.0228	0.0231	0.119	0.136	0.134
	(0.067)	(0.067)	(0.068)	(0.049)	(0.049)	(0.049)	(0.10)	(0.11)	(0.11)
2-year UG or higher$_{t-1}$	0.275***	0.247***	0.275***	0.101	0.0860	0.0935	0.00837	0.0392	0.0449
	(0.090)	(0.090)	(0.091)	(0.070)	(0.071)	(0.072)	(0.13)	(0.14)	(0.14)
Capital per employee$_{t-1}$	0.0334*	0.0802***	0.00765	-0.0199	-0.00553	-0.0329	-0.0817**	-0.0526	-0.0819*
	(0.019)	(0.018)	(0.022)	(0.020)	(0.017)	(0.020)	(0.039)	(0.034)	(0.047)
Debt-to-Assets Ratio$_{t-1}$	0.744***	0.534***	0.872***	0.309***	0.256***	0.369***	0.580***	0.506***	0.624***
	(0.11)	(0.097)	(0.12)	(0.084)	(0.083)	(0.097)	(0.17)	(0.18)	(0.20)
Foreign Ownership$_{t-1}$	0.608**	0.668***	0.595**	0.455	0.481*	0.450	0.761	0.761*	0.724
	(0.24)	(0.23)	(0.24)	(0.28)	(0.28)	(0.28)	(0.46)	(0.46)	(0.46)
Constant	-5.682***	-6.879***	-7.145***	-0.609*	-0.582*	-0.845**	-0.817	-0.0283	-0.348
	(0.34)	(0.44)	(0.37)	(0.31)	(0.35)	(0.41)	(0.55)	(0.69)	(0.80)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6042	6042	6042	559	559	559	559	559	559
Pseudo R2 / R2 Adjusted	0.039	0.029	0.041	0.123	0.119	0.122	0.104	0.106	0.104
Log-likelihood	-1790.3	-1809.8	-1787.4	-	-	-	-	-	-
Wald Chi2 / F	293.2	286.3	363.9	3.53	3.42	3.35	3.08	3.13	2.97

Source: AJPES, ESA, CARS and own calculations.

Notes. The estimates of TFPR are obtained using the Olley-Pakes estimator. Equity, employment, TFPR and capital per employee are included in logs. The educational attainment variables are shares in total firm employment. The industry fixed effects are captured with inclusion of NACE 2-digit industry dummies. The dummy variable for foreign ownership is 1 if foreign ownership share is at least 10 percent of equity.
Robust standard errors in parentheses. ***, ** and * denote statistical signi.cance at 1, 5 and 10 percent.

4.3 Extensive Margins Dynamics

In this section, we investigate the strategies of exporters after they enter foreign markets. We follow the standard approach in empirical studies of firm dynamics that feature both survival and growth (Dunne et al., 1988). Here survival refers to continued presence in foreign markets and growth to dynamics of extensive margins of exports. This structure is consistent with the bivariate selection model or type-2 tobit model proposed by Heckman (1979). The model without exclusion restrictions has the following specification:

$$\begin{aligned}
\Pr[Export_{it} &= 1|Export_{it-1}=1] && (15)\\
&= \Phi(\delta_m m_{it-1} + \delta_m m_{it-1} + \boldsymbol{\beta}\mathbf{x}'_{it-1} + \sum_j \alpha_j I\{i \in j\} + \sum_\tau \alpha_\tau I\{\tau = t\}),\\
m_{it} &= \rho m_{it-1} + \beta_h h_{it-1} + \boldsymbol{\beta}'_m \mathbf{x}_{it-1} + \sum_j \alpha_{jm} I\{i \in j\} + \sum_\tau \alpha_{\tau m} I\{\tau = t\} + \xi_{ith}, && (16)\\
h_{it} &= \rho h_{it-1} + \beta_m m_{it-1} + \boldsymbol{\beta}'_h \mathbf{x}_{it-1} + \sum_j \alpha_{jh} I\{i \in j\} + \sum_\tau \alpha_{\tau h} I\{\tau = t\} + \xi_{itm}. && (17)
\end{aligned}$$

In selection or survival equation (15), $\Pr[Export_{it} = 1|Export_{it-1}]$ denotes the probability that exporter i (in period $t-1$) continues to export in period t and Φ is a cumulative density of the standard normal distribution. In addition to the set of explanatory variables introduced in the model of entry decision, the probability of survival in foreign markets contains the lagged number of markets (m_{it-1}) and products (h_{it-1}), both in logs. The equations that describe the dynamics of the number of markets (16) and products (17), we include lagged dependent variables with corresponding autoregressive coefficients (ρ_m and ρ_h), and terms that allow for product-market complementarities or substitution ($\beta_h h_{it-1}$ and $\beta_m m_{it-1}$). The set of other explanatory variables that may affect the decisions on the extensive margins of exports is the same as above.[15]

The results, shown in Table 5, are based on a sample of both new and incumbent exporting firms, that continued to operate in domestic markets. This increases the sample size to 19,084 observations. Columns (1)-(3) contain estimates of the export survival equation (15), where different columns correspond to estimates obtained with different sets of measures of firm size and performance. As expected, we find that the likelihood of survival in foreign markets increases with the number of markets and number of products, but with no significant difference between the new and incumbent exporters. This finding can be interpreted as either another manifestation of the importance of firm size in export-market survival and/or an indication of the significance of

[15] The empirical estimation uses the two-step Heckman estimator without exclusion restrictions. In the first stage is estimated the export survival equation (15) and in the second stage the Mills ratio (ϕ/Φ) is included in the market and product dynamics equations (16 and 17). This allows us to obtain the corresponing parameters, λ_h and λ_m, which reflect the correlations between the error terms in the export survival equation and the extensive margins of exports. Note that these correlations are positive and statistically significant, thereby confirming the choice of the Heckman selection model (see Table 5, columns (4)-(9)). In order to allow time-variation of coefficients with respect to experience in export markets, we also interact all the right-hand side variables in equations (15), (16) and (17) with dummy variables for firms with up to three years since their first entry to any export market. With slight abuse of terminology, we call these firms new exporters.

risk diversification. A less obvious - but not unexpected - finding is that firm size, measured by either equity (column (1)) or employment (column (2)), increases the likelihood of foreign markets survival in addition to the extensive margins of exports, with some indication that this effect might be stronger for new exporters. As above, if both employment and equity are included in the model (column (3)), only equity preserves a significant effect on the probability of export survival. Assuming firm equity is a reasonable predictor of a firm's ability to generate funding, this result yields further credence to the notion that access to financing is the primary determinant of exporter success even when controlling for firm size and performance. Furthermore, debt to assets ratio also improves the likelihood of survival in foreign markets. This suggests that firms that are financially less constrained (either internally or externally) are more likely to survive in foreign markets.[16] Although better performing firms are more likely to continue exporting when performance is measured either by ROA (column (1)) or TFPR (column (2)), ROA clearly outperforms TFPR as a predictor of exporting survival when both measures are entered in the model (column (3)). This suggests that firms base their export-exit decisions primarily on their profitability rather than on productive efficiency, which can, in turn, be interpreted as further evidence of the importance of the access to finance. It is evident that firms that are better able to generate own funds (i.e. have a higher ROA) or have a better access to external finance (i.e. access to bank loans or to internal credit markets), will be better able to withstand the negative shocks associated with foreign-market operations.

Estimates of the second stage equations (16 and 17) that describe the dynamics of the number of markets and products are summarized in Table 5, columns (4)-(6) and columns (7)-(9), respectively. Since the qualitative features of the main results are similar, we focus on the overall features and point out the main differences. First, note that both sets of equations feature high, positive and significant autoregressive coefficients, which implies high persistence of both number of markets and products. A comparison of coefficients between products and markets suggests that persistence is higher for the number of products, whereas the differences between coefficients for the new and incumbent exporters suggests higher persistence for the latter. The economic interpretation of high autoregressive coefficients is that a large proportion of costs for introduction of new products and for exports to new destinations is sunk. The coefficients for the number of products in equation (16) and the number of markets in equation (17) are positive and significant, which implies that firms that exported more products tend to increase the number of markets at higher pace and vice versa. The economic interpretation of this is a potential existence of strategic complementarities between exporting products and markets. In addition, these findings could be interpreted as further evidence in support of the role of firm size and even its capacity to obtain finance for the dynamics of the extensive margin of exporting.

In addition to extensive margins of exports, the measures of firm size have additional explanatory power for growth rates of both number of markets and products. In line with the results reported

[16] A typical finding in empirical studies of firm survival is that firms with higher debt to assets ratio are less likely to survive. Note that our sample of firms also features this empirical regularity.

above, we find that equity is robust to inclusion of employment (see columns (6) and (9)), while the coefficient for employment is reduced significantly. Again, we interpret this result as importance of access to financing, which is reinforced with positive effect of debt to asset ratio on the number of markets. As before, ROA and TFPR, considered individually both positively impact the growth rate of number of markets and products while only the former retains its statistical significance when both are includede simultaneously (columns (6) and (9)). We also find that human capital intensity has a positive effect on the growth rate of markets and products, while the effect of physical capital intensity is mixed.[17] Finally, foreign ownership has no effect on the growth rate of number of markets, but has a positive effect for the number of products.

[17] Note that the coefficient for physical capital per employee is sensitive to inclusion of equity due to positive correlation between these two variables ($\hat{\rho} = 0.42$ for the sample of all exporters).

Table 5: Export Survival, Number of Export Markets and Exported Products

Dependent Variable	Pr[Export$_t$=1|Export$_{t-1}$=1]			Markets$_t$ (log)			Products$_t$ (log)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Markets$_{t-1}$	0.417***	0.434***	0.419***	0.772***	0.782***	0.769***	0.0938***	0.110***	0.0941***
	(0.044)	(0.044)	(0.044)	(0.0081)	(0.0087)	(0.0081)	(0.014)	(0.015)	(0.014)
Markets$_{t-1}$*NewExport$_{t-1}$	-0.148	-0.164	-0.154	-0.110**	-0.104*	-0.107**	0.0485	0.0523	0.0472
	(0.16)	(0.16)	(0.16)	(0.050)	(0.054)	(0.050)	(0.084)	(0.092)	(0.085)
Products$_{t-1}$	0.540***	0.542***	0.540***	0.0842***	0.0945***	0.0836***	0.865***	0.880***	0.865***
	(0.025)	(0.025)	(0.025)	(0.0063)	(0.0068)	(0.0063)	(0.011)	(0.012)	(0.011)
Products$_{t-1}$*NewExport$_{t-1}$	-0.122	-0.122	-0.122	0.0209	0.00819	0.0147	-0.0519	-0.0689	-0.0626
	(0.092)	(0.093)	(0.093)	(0.030)	(0.033)	(0.030)	(0.050)	(0.055)	(0.051)
Equity$_{t-1}$	0.0861***		0.111***	0.0751***		0.0576***	0.0750***		0.0744***
	(0.018)		(0.029)	(0.0043)		(0.0069)	(0.0072)		(0.012)
Equity$_{t-1}$*NewExport$_{t-1}$	0.136*		0.0210	0.0501*		0.0202	0.0961**		0.000836
	(0.072)		(0.13)	(0.027)		(0.052)	(0.046)		(0.088)
Employment$_{t-1}$		0.0381**	-0.0393		0.0615***	0.0207***		0.0508***	-0.00102
		(0.018)	(0.028)		(0.0044)	(0.0066)		(0.0075)	(0.011)
Employment$_{t-1}$*NewExport$_{t-1}$		0.166**	0.133		0.0678**	0.0434		0.135**	0.123
		(0.075)	(0.13)		(0.031)	(0.051)		(0.052)	(0.087)
Return on assets$_{t-1}$	0.706***		0.554***	0.161***		0.154***	0.334***		0.277***
	(0.19)		(0.21)	(0.045)		(0.050)	(0.076)		(0.084)
Return on assets$_{t-1}$*NewExport$_{t-1}$	-0.247		-0.297	0.113		0.185	0.174		0.282
	(0.70)		(0.76)	(0.26)		(0.28)	(0.44)		(0.48)
TFPR$_{t-1}$		0.113***	0.0420		0.0413***	0.0121		0.0660***	0.0223
		(0.030)	(0.035)		(0.0084)	(0.0086)		(0.014)	(0.015)
TFPR$_{t-1}$*NewExport$_{t-1}$		0.0835	0.0795		0.00915	-0.0233		0.0278	-0.00598
		(0.13)	(0.15)		(0.052)	(0.057)		(0.088)	(0.097)
High School$_{t-1}$	-0.146**	-0.175***	-0.165**	0.00969	0.0228	0.0218	0.0195	0.0134	0.0139
	(0.065)	(0.066)	(0.066)	(0.020)	(0.022)	(0.020)	(0.033)	(0.037)	(0.034)
High School$_{t-1}$*NewExport$_{t-1}$	0.395*	0.462**	0.433*	0.202**	0.247**	0.231**	0.259*	0.349**	0.333**
	(0.22)	(0.23)	(0.23)	(0.092)	(0.10)	(0.095)	(0.16)	(0.18)	(0.16)
2-year UG and higher$_{t-1}$	0.0171	-0.0131	-0.0149	0.0871***	0.113***	0.104***	0.0637*	0.0625	0.0526
	(0.084)	(0.086)	(0.086)	(0.023)	(0.026)	(0.024)	(0.039)	(0.044)	(0.041)
2-year UG and higher$_{t-1}$*NewExport$_{t-1}$	0.868***	0.883***	0.889***	0.180	0.206*	0.207*	0.182	0.259	0.259
	(0.30)	(0.30)	(0.30)	(0.11)	(0.12)	(0.11)	(0.19)	(0.21)	(0.19)

Continued on the next page.

Dependent Variable	Pr[Export$_t$=1|Export$_{t-1}$=1]			Markets$_t$ (log)			Products$_t$ (log)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Capital per employee$_{t-1}$	-0.0167	0.0246	-0.0275	-0.0188***	0.0146***	-0.0105**	-0.0261***	0.00704	-0.0255***
	(0.017)	(0.015)	(0.020)	(0.0040)	(0.0040)	(0.0047)	(0.0068)	(0.0068)	(0.0081)
Capital per employee$_{t-1}$*NewExport$_{t-1}$	-0.0811	-0.0132	-0.0249	-0.0327	-0.000869	-0.0178	-0.0328	0.0251	0.0141
	(0.066)	(0.057)	(0.085)	(0.025)	(0.024)	(0.033)	(0.043)	(0.040)	(0.057)
Debt-to-Assets Ratio$_{t-1}$	0.348***	0.119	0.407***	0.298***	0.0876***	0.255***	0.418***	0.195***	0.415***
	(0.094)	(0.082)	(0.11)	(0.024)	(0.021)	(0.027)	(0.041)	(0.036)	(0.047)
Debt-to-Assets Ratio$_{t-1}$*NewExport$_{t-1}$	0.245	0.0646	0.0261	0.00151	-0.0865	-0.0763	-0.138	-0.332	-0.366
	(0.34)	(0.34)	(0.42)	(0.14)	(0.14)	(0.17)	(0.23)	(0.24)	(0.29)
Foreign Ownership$_{t-1}$	0.378***	0.376***	0.376***	-0.0119	-0.00897	-0.0129	0.0930***	0.0975***	0.0920***
	(0.13)	(0.13)	(0.13)	(0.016)	(0.017)	(0.015)	(0.026)	(0.029)	(0.026)
Foreign Ownership$_{t-1}$*NewExport$_{t-1}$	-0.934*	-0.959*	-0.974*	-0.346	-0.355	-0.328	-0.630*	-0.673*	-0.618*
	(0.52)	(0.53)	(0.53)	(0.21)	(0.23)	(0.21)	(0.36)	(0.39)	(0.36)
NewExport	-1.484**	-1.197	-1.238	-0.531**	-0.276	-0.146	-0.984**	-0.562	-0.251
	(0.70)	(1.03)	(1.27)	(0.27)	(0.42)	(0.46)	(0.46)	(0.71)	(0.79)
Lambda				0.583***	0.635***	0.578***	0.982***	1.076***	0.986***
				(0.039)	(0.043)	(0.039)	(0.065)	(0.072)	(0.066)
Constant	-0.122	-0.0418	-0.604	-0.847***	-0.645***	-0.804***	-0.946***	-0.885**	-1.113***
	(0.41)	(0.43)	(0.48)	(0.20)	(0.23)	(0.21)	(0.34)	(0.39)	(0.36)
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19084	19084	19084	19084	19084	19084	19084	19084	19084
Wald Chi2				33160.0	27870.8	33794.2	18970.5	15800.1	18897.7

Source: AJPES, ESA, CARS and own calculations.

Notes. The estimates of TFPR are obtained using the Olley-Pakes estimator. Equity, employment, TFPR and capital per employee are included in logs. The educational attainment variables are shares in total firm employment. The industry fixed effects are captured with inclusion of NACE 2-digit industry dummies. The dummy variable for foreign ownership is 1 if foreign ownership share is at least 10 percent of equity.

Robust standard errors in parentheses. ***, ** and * denote statistical signi.cance at 1, 5 and 10 percent.

5 Conclusions

An exploration of exporter heterogeneity offers an array of new insights into the behaviour of exporting firms. Not only is data on exporter growth and survival with information on introduction of new products and markets relevant on its own, but also crucial in terms of understanding firm growth in general. While firm dynamics in domestic markets is often obscured by the lack of product-level data, transaction-level information on exporting offers unparalleled access into the evolution of firms. The aim of the paper is to document the evolution of firm export expansion along the extensive margins and to find the explanation for the sluggish export expansion. In order to do this, we explore data on the universe of Slovenian manufacturing firms' export transactions in the period between 1994 and 2003. A simple theoretical framework based on the premise of the cash-in-advance constraint serves as a foundation for the empirical tests. Due to aggregate cost of exporting and aggregate uncertainty faced by firms in foreign markets, export expansion is subject to firm financial constraint. Firm growth in general and specifically export expansion are assumed to be limited by firm equity and access to external finance. This constraint is binding in the face of fixed market-entry cost and product-introduction cost, which increase in the export markets-products complexity.

We document the overwhelming differences between first-time and incumbent exporters, where on average the latter are found to export to five times as many markets as the former with nine times as many products while achieving three times the turnover per product market. Looking at the whole process of exporting, we first focus on the decision to start exporting. The principal determinant of the decision to start exporting as well as the scope of initial exports is firm size, with both lagged equity as well as lagged number of employees improving the likelihood of starting to export. While strongly improving the probability to start exporting, skill composition and return on assets do not impact the number of markets initially entered nor the number of products exported in the first year of exports. This finding lends support to the proposition of better performing firms self-selecting into exporting, but these performance measures have no additional predictive power in explaining the scope of initial exports. In addition, both the decision to export itself and the extensive margin are heavily impacted by the access to external credit (as measured by the debt-to-assets ratio). Similarly, export survival and expansion are likewise dependent on firm size both in terms of the scope of exporting (number of export markets and products) as well as the actual firm equity and employment. Furthermore, better performing firms (in terms of total factor productivity and return to assets) and those with access to credit are more likely to survive and expand in the exporting markets. Export expansion along both extensive margins features high rates of serial correlation indicating that there are substantial sunk costs of export expansion. The relevant determinants of survival and expansion are also found to differ considerably between new and incumbent exporters. While skill composition of the labor force is found to be more important for new exporters' survival and expansion as compared to incumbent exporters, access to finance exhibits no significant differences between the two groups.

Given the costs associated with with export entry, survival in exporting markets and export

expansion this paper fully confirms the underlying theoretical reasoning that firm size, access to both internal and external sources of finance, skill composition of the labor force and to a lesser extent firm performance are the key determinants of exporting success. The most striking finding, however, is that when controlling for firm size, productivity and skill intensity, firm financial factors, such as equity, return on assets, access to bank finance and to internal credit markets, seem to play a more important role for export expansion than firm productivity. These results offer a different perspective on the export promotion policies and specifically their focus on small and mid-sized firms.

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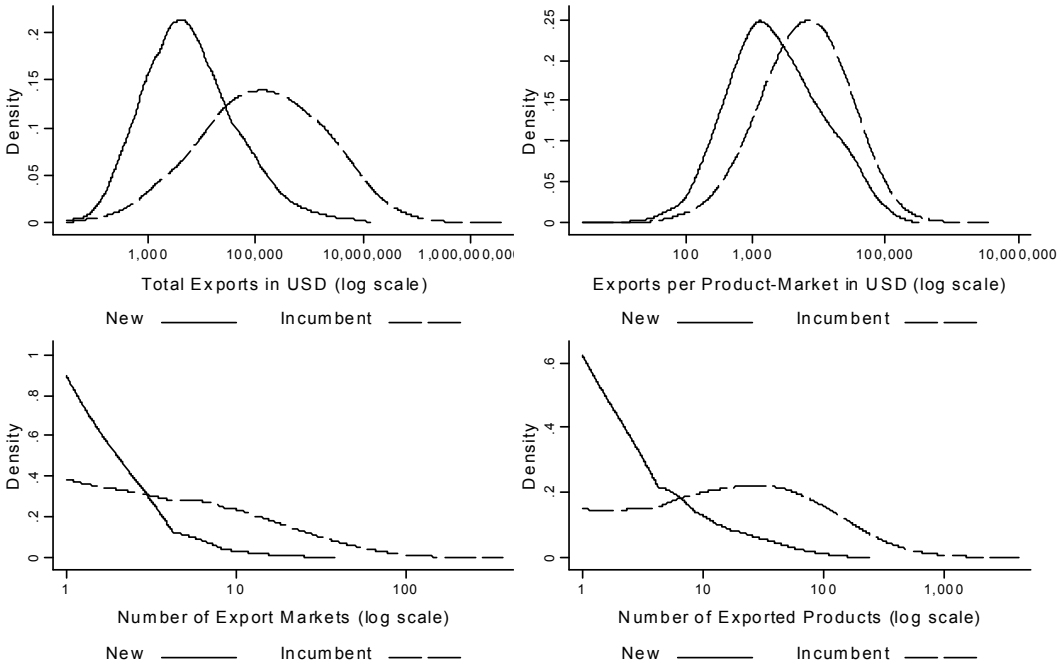
6 Appendix

Table 6: Correlations for New and Incumbent Exporters, 1995-2003

	Incumbent Exporters		New Exporters	
	Markets	Products	Markets	Products
Products	0.802***	-	0.607***	-
Equity	0.665***	0.585***	0.172***	0.087***
Assets	0.733***	0.666***	0.263***	0.188***
Debt to Assets Ratio	-0.124***	-0.057***	0.106**	0.142***
Employment	0.684***	0.626***	0.217***	0.193***
TFPR	0.110***	0.111***	0.033	-0.011
Return on Assets	-0.068***	-0.053***	0.047*	0.046*
Capital per Employee	0.169***	0.117***	0.001	-0.061
High School or higher (share)	-0.112***	-0.090***	-0.002	0.02
2-year UG degree or higher (share)	0.039***	0.008	0.052***	-0.002
Foreign Ownership (dummy)	0.139***	0.217***	0.065***	0.083***
Observations	20,462	20,462	1,483	1,483

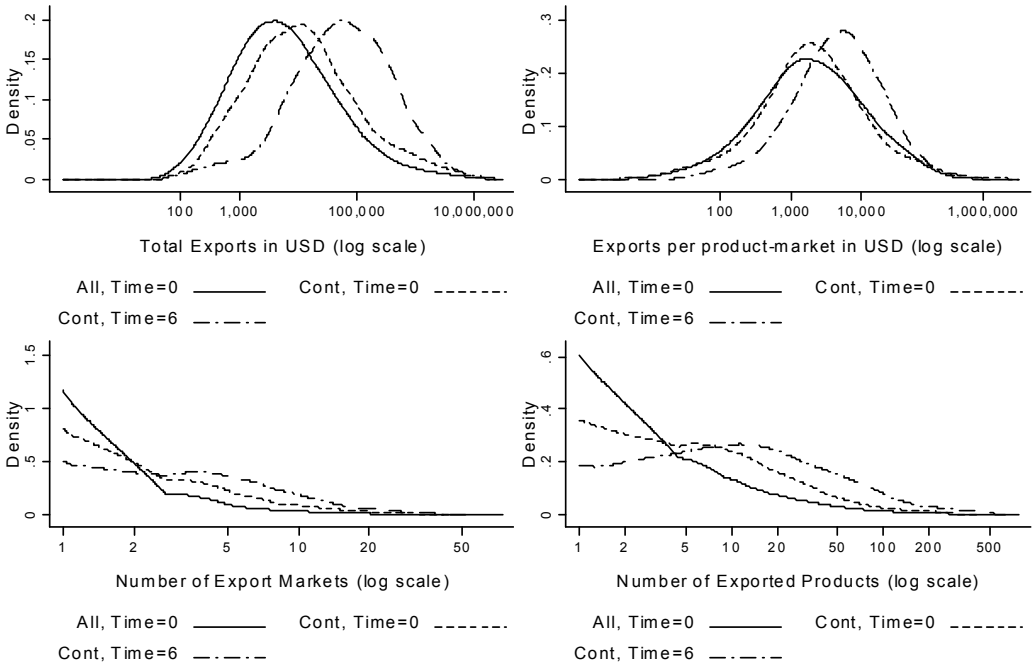
Source: AJPES, ESA, CARS and own calculations.
Notes. The estimates of TFPR are calculated using the Olley-Pakes (1996) estimator. The variables products, markets, equity, assets, employment, capital per employee and TFPR are used in logs.
***, ** and * denote statistical significance at 1, 5 and 10 percent.

Figure 2: Margins of Exports: New vs. Incumbent Exporters in Slovenian Manufacturing, 1996



Source: CARS and own calculations.
Notes: The non-parametric densities are estimated using the Stata module kdens that deals with bounded domain problem. The volumes of exports are given in current (1996) prices.

Figure 3: Evolution of Export Margins for New Exporters in Slovenian Manufacturing, cohorts of 1995-1997 entrants



Source: CARS and own calculations.
Notes: The non-parametric densities are estimated using the Stata module kdens that deals with bounded domain problem. The volumes of exports are given in USD, constant 1996 prices.

Figure 4: