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

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

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Abstract

Recent theoretical models of international trade with heterogeneous firms feature instantaneous adjustment of margins of exports to firm and market characteristics, and equality of distributions of margins of exports between new and incumbent exporters. By using the population of Slovenian firms and their transaction-level trade data we document large differences between these firms that cannot be attributed to the differences in total factor productivity. This paper contributes to the field by demonstrating that access to financing, measured by equity, debt-to-asset ratio and access to internal credit markets within firm groups, may account for an important part of observed differences in the extensive margins of exports between new and incumbent exporters.

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

JEL Classification: D24, F12, F14

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1 Introduction

Recent trade models with heterogeneous firms (e.g. Melitz, 2003; Bernard, Redding and Schott, 2010; Arkolakis and Muendler, 2010; Nocke and Yeaple, 2006) attempt to explain the observed differences between exporters in terms of extensive and intensive margins of exports with differences in product appeal in different markets and product-specific productivity parameters. While providing potentially important determinants of exporter heterogeneity, these models ignore the fact that new exporters tend to be significantly smaller than the incumbent exporters (see Damijan, Polanec and Prašnikar, 2004; Eaton, Eslava, Kugler, and Tybout, 2008; Iacovone and Smarzynska Javorcik, 2010).

In this paper, we provide new stylized facts on the evolution of export activity using the set of Slovenian manufacturing firms. Comparison of new and incumbent exporters shows that new exporters export a smaller product range while their exports are also less geographically dispersed. While new and incumbent exporters tend to have comparable distributions of sales to specific product markets, the incumbent exporters have a greater share of product-markets with larger volume, which is consistent with cross-sectional heterogeneity of exporters (Arkolakis and Muendler, 2010). The modal first-time exporter starts by exporting a single variety to one foreign market, while some new exporters can start by exporting up to 4 varieties to no more than two foreign markets. After initial entry, first-time exporters are highly likely to exit foreign markets while those that continue exporting tend to expand all margins. While the rate of expansion is faster than for incumbent exporters, it is nevertheless slow. We find that firms are more likely to add new varieties to existing export markets than to add new foreign destinations, which suggests that incremental costs of adding a product may be declining with the product range exported to one market.

We argue that the slow pace of expansion reflects the interplay between entry costs of exporting, access to financing, and uncertainty. In line with empirical studies that confirm the importance of financing for exports (e.g. Campa and Shaver, 2001; Greenaway, Guariglia and Kneller, 2007; and Bellone, Musso, Nesta and Schiavo, 2010) and theoretical model of trade with liquidity constraints (Chaney, 2005), we show that new and incumbent exporters differ in terms of access to financing, reflected in the amount of total assets, equity and debt. In contrast to the models of trade with heterogeneous multi-product firms in multi-country setting (e.g. Arkolakis and Muendler, 2010; Mayer, Melitz and Ottaviano, 2010), we observe a modest productivity premium of the incumbent exporters relative to the new exporters. In fact, the latter have a lower profit rate, which is a finding consistent with a theoretical model of firm dynamics that features financial constraints (Cooley and Quadrini, 2001).

In the empirical analysis, we study the decisions of firms regarding the extensive margins of exports and post-entry dynamics. Controlling for capital intensity, human capital intensity and foreign ownership, we show that the variation of exported product range and the number of exporting markets reflect lagged access to financing, while measures of efficiency affect only the decision to enter foreign markets, but not the variation in the exported product range and the number of

markets. We also find that access to finance is crucial for the likelihood of survival in foreign markets and for the dynamics of the extensive margins of exports, particularly for new exporters. In addition, we show that increases in efficiency increase the exported product range and the number of markets. We confront a measure of firm-level efficiency - the revenue-based measure of TFP (TFPR) and a measure of profitability (rate of return on assets) and show that their lagged values have a positive effect on subsequent growth of exported product range and geographic dispersion. However, when both measures are considered together, the rate of return on assets has stronger predictive power, which suggests that profitability of firms' past actions is a key to understanding the pace and effectiveness of their expansion strategies.

The sluggish expansion of surviving new exporters may not be entirely attributable to limited access to finance. A recent paper by Alborno, Calvo Pardo, Corcos and Ornelas (2010) provides a theoretical rationale for gradual expansion, based on the real option theory. The authors show that it may be optimal for firms to expand gradually if profitability in foreign product-markets is positively correlated over time and across destinations. Although real option theory may provide an alternative explanation for sluggish growth of new exporters, their explanation relies on an implausible assumption that domestic demand is *not very informative* about profitability in foreign markets.

The outline of the paper is as follows. Section 2 summarizes the relevant theoretical models of trade with heterogeneous firms and models with financing constraints. Section 3 describes the data and Section 4 presents a set of new stylized facts for exporters in Slovenian manufacturing. Section 5 provides an account of strategies in terms of extensive margins of exports and the last Section concludes.

2 Theoretical Background

In this section, we provide a brief overview of theoretical predictions regarding the export strategies of firms that stem from the models of international trade with heterogeneous firms. Melitz (2003) showed that the existence of fixed and variable trade costs of exporting determines the threshold productivity level that a firm has to satisfy in order to generate positive profits in exporting. Under sufficiently high entry and iceberg trade costs, this productivity threshold exceeds the minimum productivity required for supplying only domestic market and thus the model predicts the empirically validated productivity premium of exporters (see e.g. Bernard and Jensen, 1995, 1999).¹ Bernard, Redding and Schott (2010) modify the Melitz setup to introduce multi-product firms, while allowing only one foreign market. Their model predicts that firms with higher general or overall productivity² will export a larger product range, in addition to which the sales volumes of products with greater product-specific efficiency will be larger. Arkolakis and Muendler (2010) consider firms' export decisions in a multiple products and multiple markets setting, allowing for

¹In the Melitz (2003) model foreign countries are symmetric. As a consequence, a firm that is an exporter supplies all foreign markets.

²Average or total productivity across all products in a firm's product range.

heterogeneity of firms in terms of production efficiency, and heterogeneity of markets in terms of distance, market size and entry costs that varies with the number of products. Assuming heterogeneity of product-firm-specific efficiency, their model predicts that a firm's sales within destination are concentrated in few core products. It also predicts that firms are less likely to export to more distant and smaller countries, while more efficient firms are more likely to export more products to a given country. Similarly, Mayer, Melitz and Ottaviano (2010) also develop a model of multi-product firms in a multi-country setting and study the effects of market size and geography (market sizes of and bilateral distances to trading partners) on distribution of export product mix across destinations. They show that tougher competition in an export market induces firms to skew their export sales towards the best performing products, which is further reflected in measured firm productivity.

These predictions are subject to the possibly very restrictive assumption of strictly increasing incremental costs related to introduction of additional products, reflecting both scope dependent fixed entry costs and productive-efficiency index. Under a plausible assumption that a firm faces high market-specific entry costs (e.g. setting up a distribution network) and low incremental entry costs for additional products, the relationship between the exported product mix and the firm-level productivity (average across all products) might thus exhibit a weaker positive relationship.

The models described thus far predict an instantaneous adjustment of firms' exports to reflect market and firm-specific characteristics. In other words, once starting to export, high productive firms will instantaneously start supplying all exports markets with their best performing products. This prediction is in a stark contrast with existing evidence on the gradual expansion of new exporters (Damijan, Polanec and Prašnikar, 2004; Eaton, Eslava, Kugler and Tybout, 2008). One of the possible reasons for observed gradual adjustment of firm export decisions may be limited access to finance.³ The only theoretical model of international trade with heterogeneous firms that features financing constraints was developed by Chaney (2005), who builds on Melitz's (2003) model. He introduces a variety of Clower's (1967) cash-in-advance constraint to show that if firms differ in terms of productivity and amount of assets, some high productivity firms may not be able to enter foreign markets due to an insufficient amount of assets. As a consequence, the unconditional productivity and profitability premia of exporters (relative to non-exporters) are lower than in the case of financially unconstrained firms. Although Chaney considered only single-product firms, it is straightforward to extend the predictions to multi-product firms that decide to supply multiple foreign product-markets with uncertain demand.⁴

Assuming that entering each product-market requires payment of additional cost, a firm with a given amount of assets may be able to start exporting only to a subset of product-markets with

³The importance of financing constraints for foreign markets entry decision is shown 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.

⁴An alternative explanation may be irreversibility of investments in foreign markets participation (sunk costs to entry to each market) in the context of product-market-specific demand uncertainty. Under the assumption of correlated demand parameters across markets, the optimal response of firms is to enter foreign markets gradually (see Albornos, et al., 2010; Akhmetova, 2010).

sufficiently high combined efficiency, reflecting both productivity and expected product demand. Upon entry a firm learns its product-market demand parameters and continues to export to product-markets with sufficiently high efficiency. Financially constrained firms that generated positive overall profits could expand further to unexploited product-markets as the amount of accessible assets increases. On the other hand, imposed financial constraints will force firms to withdraw from markets with unfavorable demand conditions and hence low profitability. This is why stylized facts on export expansion reveal substantial turnover of first-time exporters and a very slow subsequent expansion of surviving new exporters along the extensive margins.

It is important to note that financing constraints may also affect the ordering of entry into different product-markets. While a firm might consider entry to a specific market to be potentially more profitable, it may decide to start supplying a less profitable market if it can not afford to pay the costs to enter the otherwise preferred destination. If incremental entry costs of exporting additional products to a specific market are lower than the costs of entering more markets with the set of products already exported to one destination, then such financing limitations may also foster a faster expansion of the exported product range to the existing markets rather than expanding the number of markets.

While Chaney (2005) makes no distinction between different sources of assets, Cooley and Quadrini (2001) develop a model of industry dynamics with heterogeneous firms in terms of productivity and assets that distinguishes between equity and debt financing. They show that if all new (single-product) firms enter the market with the same amount of equity, more productive firms may be financially constrained and not able to adjust the levels of capital to reflect productivity due to bank rule on upper bound for debt-to-assets ratio.⁵ Hence in a multi-country context multi-product firms may expand gradually due to either low amount of equity or limited access to external debt.

In the remainder of the paper we follow this line of reasoning by assuming that sluggish export expansion can be attributed to firms' heterogeneity in terms of individual productive efficiency (productivity) and in terms of individual financial constraints. As financing 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 such as bank debt and access internal credit markets. Hence, 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 acquire external finance.

In what follows, we explore the role of efficiency and access to finance for the export strategies of new exporters. In particular, by using the population of Slovenian firms and their transaction-level trade data, we test empirically whether the two extensive margins of exports - exported product range and geographical dispersion - respond to firm-level efficiency and access to financing at entry and in the periods after entry. By confronting the measure of firm-level efficiency (TFP) and the measure of profitability (rate of return on assets), we show that the measure of profitability along

⁵Holtz-Eakin (1994) showed that the entrepreneurs who received an exogenous shock to wealth due to inheritance (an increase in equity), were more likely to survive and grow at higher rates.

with the access to finance variables has stronger predictive power regarding the exports expansion. This suggests that, other things equal, firms' ability to finance a costly and risky export expansion might be essential for understanding why some firms expand faster than the others. Assuming imperfect capital markets, this means that the relationship between firm efficiency and export expansion may become weaker than the theoretical predictions thus far show.

3 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 less than 12 years of schooling (low-skilled workers) and the number of employees with at least 12, but less than 14 years of schooling (medium-skilled workers) and at least 14 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.⁶

⁶The information on over-time of individual workers is not recorded in the registry and therefore not used in calculation of skill-structure of workers.

4 Stylized Facts on New Exporters

As noted above, the models of trade with heterogeneous firms feature instantaneous adjustment of exports to productivity and product appeal parameters. For example, Melitz (2003) and Bernard, Redding and Schott (2010) assume that new and incumbent exporters drew the productivity parameters before entering domestic market from the same distributions, which implies that new and incumbent exporters should have the same distributions for intensive and extensive margins of exports.⁷ 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.

Eaton et al. (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 show relatively fast expansion for Colombian firms. In this section we complement their results with evidence on large differences between the new and the incumbent exporters for the set of 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. We also extend their results to capture another extensive margin of exports: the number of products exported.

4.1 New vs. Incumbent exporters

Let us start with comparison between new and incumbent exporters in terms of distributional moments for the key margins of exports. For this purpose, 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:

$$X = M \bar{H} \bar{X} = H \bar{M} \bar{X}, \quad (1)$$

where M and H denote the total number of markets and products that a firm supplies in a given year, \bar{H} is the average number of products per market, \bar{M} is the average number of markets per product, and \bar{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 domestic market in the period prior to foreign market entry.⁸ We find

⁷These assumptions are also used in models with multi-product firms in multi-country settings (e.g. Arkolakis and Muendler, 2010; Mayer et al., 2010).

⁸This 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.

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. The size premium of incumbent exporters is large also for the alternative mean value (the median) and less aggregated definitions of products, although the differences are somewhat smaller.⁹ We also recognize that an important part of the measured differences in the average values of export margins may reflect the differences in the industry composition between new and incumbent exporters due to differences in the 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.¹⁰

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

Variable	New Exporters			Incumbent Exporters		
	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 new and incumbent exporters extend beyond the first two distributional moments. We illustrate these differences in Figure 2 in the Appendix by using the probability density functions for a subset of key variables (in logs) shown in Table 1.¹¹ A comparison of density

⁹The qualitative features of results presented here also for wider definition of products (5-digit CNTP code).

¹⁰We 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).

¹¹Due 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

functions between new and incumbent exporters confirms 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 differences for the extensive margins are far more pronounced.

4.2 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 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.

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 their 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. 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.¹² Comparison of the volumes of surviving new exporters to those for a

bounded domain problem.

¹²We 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.

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 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.¹³ 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

¹³ 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
<i>Average values</i>							
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
<i>Average values</i>							
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

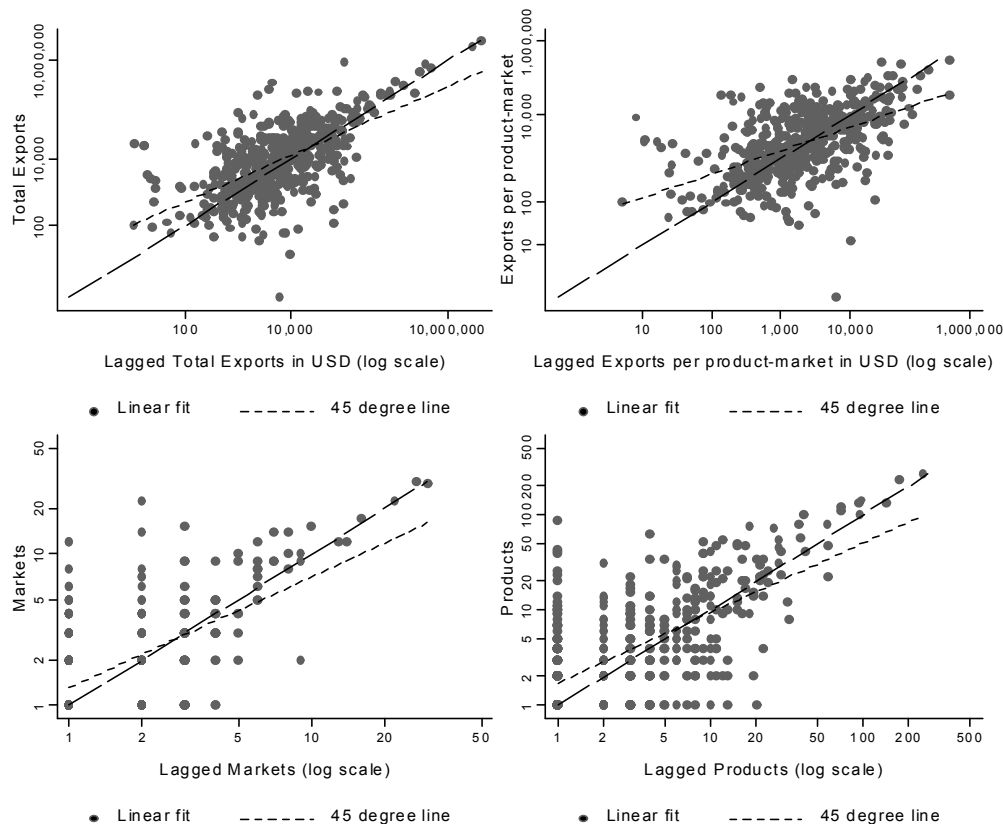
Source. CARS and own calculations.

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).

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 regression 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.

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.

5 Strategies of New Exporters

5.1 Measurement of Variables and Summary Statistics

In this section, we attempt to identify the relationships between the extensive margins of exports and firm characteristics discussed in Section 2. In particular, we are interested in understanding the role of firm-level efficiency measures and access to financing for entry and exit decisions of firms. Thus, we do not attempt to exploit all available information on products and markets aside and will not attempt to distinguish between the demand-side parameters (demand shifters) from production-side parameters (productivity).

One of the key determinants of extensive margins of exports in theoretical models discussed in Section 2 is a measure of technical efficiency or physical productivity. 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 (Foster, Haltiwanger and Syverson, 2008; henceforth TFPR), obtained as residuals from regression of revenues deflated by the industry-wide producer price index on a set of real (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 et al. (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 et al. (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. However, this result is not surprising as TFPR, under a set of commonly used assumptions, captures the weighted average of gross markups across distinct product markets.¹⁴ Nevertheless, while TFPR may not capture the true technical efficiency, it may have greater predictive power in explaining firm dynamics, as suggested by Foster et al. (2008).

¹⁴To 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 rewritten 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

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

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

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

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

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

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

Theoretical models discussed in Section 2 predict that access to financing may play an important role in explaining firm dynamics. That is, 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 exporting activity. 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 undergraduate (henceforth UG) programme or higher.

The summary statistics for the set of variables used in empirical analysis 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.¹⁵ Table 3 compares the statistics for three groups of firms distinguished in

¹⁵ An active firm satisfies two fairly non-restrictive conditions, which aim to exclude either starting firms with no

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 before they start exporting, they served only domestic market.¹⁶ 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. The most striking differences are in terms of various measures of size and access to financing. 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 the negative relationship between the firm size and the rate of return that motivate the models of industry dynamics with financing constraints (Cooley and Quadrini, 2001). 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 also find that foreign ownership is more frequent among firms engaged in foreign trade, particularly among the incumbent exporters. To complement the summary statistics, Table 7 in Appendix shows the correlations of these variables.

5.2 The entry decisions

We start our empirical analysis by 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 economists¹⁷ (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

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.

¹⁶Although 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.

¹⁷ISGEP is an acronym for International Study Group on Exports and Productivity.

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

Variable	Non-Exporters		New Exporters		Incumbent Exporters	
	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.

model:

$$\Pr[Export_{it} = 1 | Export_{it-1} = 0] = \Phi(\beta \mathbf{x}'_{it-1} + \sum_j \alpha_j I\{i \in j\} + \sum_\tau \alpha_\tau I\{\tau = t\}), \quad (2)$$

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 β . 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:

$$m_{it} = \beta'_m \mathbf{x}_{it-1} + \sum_j \alpha_{jm} I\{i \in j\} + \sum_\tau \alpha_{\tau m} I\{\tau = t\} + \xi_{itm}, \quad (3)$$

$$h_{it} = \beta'_h \mathbf{x}_{it-1} + \sum_j \alpha_{jh} I\{i \in j\} + \sum_\tau \alpha_{\tau h} I\{\tau = t\} + \xi_{ith}, \quad (4)$$

where, m_{it} and h_{it} denote the log of numbers of export markets and exported products, respectively. As above, the vectors \mathbf{x}_{it-1} , β_m and β_h contain the lagged values of explanatory variables and regression coefficients, α 's are time and industry fixed effects, and ξ '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 results of equations (2), (3) and (4). Columns (1)-(3) contain the estimates of the probit model for foreign markets entry decision (2). The results are based on a sample of 6,042 observations for firms with no prior experience in foreign markets and that continued to exist in periods $t-1$ and t . 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 and debt-to-asset ratio. This result suggests that access to financing is important for foreign markets entry decision rather than the firm size per se. The data also lend some support to self-selection hypothesis. 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 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 are more likely to enter foreign markets.¹⁸

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

¹⁸Note that this result is also consistent with heterogeneity of risk aversion of firm owners, where less risk averse agents tend to incur more debt and thus expand at a faster rate.

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 important differences. The coefficient for equity is not significant and physical capital intensity has a negative coefficient in the 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 (1)	Probit (2)	Probit (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)	OLS (9)
Equity _{t-1}	0.0958*** (0.023)		0.149*** (0.035)	0.0351* (0.021)		0.0600** (0.031)	0.0462 (0.046)		0.0646 (0.068)
Employment _{t-1}		0.0442* (0.026)	-0.0549 (0.036)		0.00977 (0.024)	-0.0318 (0.035)		0.0471 (0.048)	0.00225 (0.067)
Return on Assets _{t-1}	0.868*** (0.24)		0.999*** (0.26)	0.0224 (0.098)		0.0245 (0.13)	-0.239 (0.24)		-0.0426 (0.25)
TFPR _{t-1}		0.0570 (0.037)	-0.0832** (0.042)		0.0139 (0.033)	-0.00881 (0.041)		-0.0913 (0.069)	-0.109 (0.079)
High School _{t-1}	0.0941 (0.067)	0.0673 (0.067)	0.0858 (0.068)	0.0334 (0.049)	0.0228 (0.049)	0.0231 (0.049)	0.119 (0.10)	0.136 (0.11)	0.134 (0.11)
2-year UG or higher _{t-1}	0.275*** (0.090)	0.247*** (0.090)	0.275*** (0.091)	0.101 (0.070)	0.0860 (0.071)	0.0935 (0.072)	0.00837 (0.13)	0.0392 (0.14)	0.0449 (0.14)
Capital per employee _{t-1}	0.0334* (0.019)	0.0802*** (0.018)	0.00765 (0.022)	-0.0199 (0.020)	-0.00553 (0.017)	-0.0329 (0.020)	-0.0817** (0.039)	-0.0526 (0.034)	-0.0819* (0.047)
Debt-to-Assets Ratio _{t-1}	0.744*** (0.11)	0.534*** (0.097)	0.872*** (0.12)	0.309*** (0.084)	0.256*** (0.083)	0.369*** (0.097)	0.580*** (0.17)	0.506*** (0.18)	0.624*** (0.20)
Foreign Ownership _{t-1}	0.608** (0.24)	0.668*** (0.23)	0.595** (0.24)	0.455 (0.28)	0.481* (0.28)	0.450 (0.28)	0.761 (0.46)	0.761* (0.46)	0.724 (0.46)
Constant	-5.682*** (0.34)	-6.879*** (0.44)	-7.145*** (0.37)	-0.609* (0.31)	-0.582* (0.35)	-0.845** (0.41)	-0.817 (0.55)	-0.0283 (0.69)	-0.348 (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 significance at 1, 5 and 10 percent.

5.3 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 the foreign markets and growth to the changes in the 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:

$$\Pr[Export_{it} = 1 | Export_{it-1} = 1] \quad (5)$$

$$= \Phi(\delta_m m_{it-1} + \delta_h h_{it-1} + \beta'_m \mathbf{x}_{it-1} + \sum_j \alpha_j I\{i \in j\} + \sum_\tau \alpha_\tau I\{\tau = t\}),$$

$$m_{it} = \rho_m m_{it-1} + \beta_h h_{it-1} + \beta'_m \mathbf{x}_{it-1} + \sum_j \alpha_{jm} I\{i \in j\} + \sum_\tau \alpha_{\tau m} I\{\tau = t\} + \xi_{itm}, \quad (6)$$

$$h_{it} = \rho_h h_{it-1} + \beta_m m_{it-1} + \beta'_h \mathbf{x}_{it-1} + \sum_j \alpha_{jh} I\{i \in j\} + \sum_\tau \alpha_{\tau h} I\{\tau = t\} + \xi_{ith}. \quad (7)$$

In selection or survival equation (5), $\Pr[Export_{it} = 1 | Export_{it-1} = 1]$ 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 (6) and products (7), 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 $\beta_m m_{it-1}$) and reflect aspects of productivity/preferences of product-market that are unobserved to econometrician. The other explanatory variables included in the model are the same as above.¹⁹

The results, shown in Table 5, are based on a sample of both the new and incumbent exporters, that continued to operate in domestic markets. The sample covers 19,084 observations for the period 1995-2003. Columns (1)-(3) contain estimates of the export survival equation (5), 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 is straightforward manifestation of the decreasing

¹⁹The empirical estimation uses the two-step Heckman estimator without exclusion restrictions. In the first stage is estimated the export survival equation (5) and in the second stage the Mills ratio (ϕ/Φ) is included in the market and product dynamics equations (6 and 7). This allows us to obtain the corresponding 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 (5), (6) and (7) 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.

likelihood of exiting all markets with the number of products/markets. 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 equity is a good measure of firm's ability to finance exporting, this result is further confirmation of access to financing as the primary determinant of exporter success even when controlling for firm alternative measure of firm size and measures of performance. This may be also due to the fact that a firm may learn from past errors in penetration of foreign markets and correct them if financing is available or firm with better access to financing may be able to make greater investment in a market (e.g. greater marketing expenses or discounted prices). In contrast to the standard survival equations, which feature negative relationship between the debt-to-assets ratio, the likelihood of survival in foreign markets is higher for firms with higher debt to assets ratio. These results suggest that firms with higher internal or external financing are more likely to continue exporting.²⁰ Although better performing firms are more likely to continue exporting when performance is measured either with 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 exit decisions from foreign markets primarily on their profitability rather than on productive efficiency. In turn this can be interpreted as further evidence of the importance of the access to finance, as importance of ROA suggests use of retained profits for firm growth. 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 in the foreign-market operations.

Estimates of the second stage equations (6 and 7) that describe the dynamics of either the number of foreign markets or the number exported 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 discuss the main differences. First, note that both sets of equations feature high, positive and significant autoregressive coefficients, which implies high persistence of both series. Comparison of coefficients for the numbers of products and markets suggests that persistence is higher for the latter, and the differences between coefficients for the new and incumbent exporters shows higher persistence for the latter and faster growth of smaller new exporters. 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 and that firm-level measures of performance are not capturing the importance of specific product-markets. The coefficients for the number of products in equation (6) and the number of markets in equation (7) are positive and significant, which implies that firms that exported more products tend to increase the

²⁰ 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.

number of markets at higher pace and vice versa. The economic interpretation of this is that these variables represent proxies for productivity/quality of specific product-markets that is not captured in the firm-level measures of performance, such as ROA or TFPR. An alternative interpretation is the presence 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 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 access to financing have additional explanatory power for growth rates of the measures of extensive margins of exports. In line with results reported 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 by the 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 included 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.²¹ Finally, foreign ownership has no effect on the growth rate of number of markets, but has a positive effect for the number of products.

²¹Note 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*** (0.044)	0.434*** (0.044)	0.419*** (0.044)	0.772*** (0.0081)	0.782*** (0.0087)	0.769*** (0.0081)	0.0938*** (0.014)	0.110*** (0.015)	0.0941*** (0.014)
Markets _{t-1} *NewExport _{t-1}	-0.148 (0.16)	-0.164 (0.16)	-0.154 (0.16)	-0.110** (0.050)	-0.104* (0.054)	-0.107** (0.050)	0.0485 (0.084)	0.0523 (0.092)	0.0472 (0.085)
Products _{t-1}	0.540*** (0.025)	0.542*** (0.025)	0.540*** (0.025)	0.0842*** (0.0063)	0.0945*** (0.0068)	0.0836*** (0.0063)	0.865*** (0.011)	0.880*** (0.012)	0.865*** (0.011)
Products _{t-1} *NewExport _{t-1}	-0.122 (0.092)	-0.122 (0.093)	-0.122 (0.093)	0.0209 (0.030)	0.00819 (0.033)	0.0147 (0.030)	-0.0519 (0.050)	-0.0689 (0.055)	-0.0626 (0.051)
Equity _{t-1}	0.0861*** (0.018)		0.111*** (0.029)	0.0751*** (0.0043)		0.0576*** (0.0069)	0.0750*** (0.0072)		0.0744*** (0.012)
Equity _{t-1} *NewExport _{t-1}	0.136* (0.072)		0.0210 (0.13)	0.0501* (0.027)		0.0202 (0.052)	0.0961** (0.046)		0.000836 (0.088)
Employment _{t-1}		0.0381** (0.018)	-0.0393 (0.028)		0.0615*** (0.0044)	0.0207*** (0.0066)		0.0508*** (0.0075)	-0.00102 (0.011)
Employment _{t-1} *NewExport _{t-1}		0.166** (0.075)	0.133 (0.13)		0.0678** (0.031)	0.0434 (0.051)		0.135** (0.052)	0.123 (0.087)
Return on assets _{t-1}	0.706*** (0.19)		0.554*** (0.21)	0.161*** (0.045)		0.154*** (0.050)	0.334*** (0.076)		0.277*** (0.084)
Return on assets _{t-1} *NewExport _{t-1}	-0.247 (0.70)		-0.297 (0.76)	0.113 (0.26)		0.185 (0.28)	0.174 (0.44)		0.282 (0.48)
TFPR _{t-1}		0.113*** (0.030)	0.0420 (0.035)		0.0413*** (0.0084)	0.0121 (0.0086)		0.0660*** (0.014)	0.0223 (0.015)
TFPR _{t-1} *NewExport _{t-1}		0.0835 (0.13)	0.0795 (0.15)		0.00915 (0.052)	-0.0233 (0.057)		0.0278 (0.088)	-0.00598 (0.097)
High School _{t-1}	-0.146** (0.065)	-0.175*** (0.066)	-0.165** (0.066)	0.00969 (0.020)	0.0228 (0.022)	0.0218 (0.020)	0.0195 (0.033)	0.0134 (0.037)	0.0139 (0.034)
High School _{t-1} *NewExport _{t-1}	0.395* (0.22)	0.462** (0.23)	0.433* (0.23)	0.202** (0.092)	0.247** (0.10)	0.231** (0.095)	0.259* (0.16)	0.349** (0.18)	0.333** (0.16)
2-year UG and higher _{t-1}	0.0171 (0.084)	-0.0131 (0.086)	-0.0149 (0.086)	0.0871*** (0.023)	0.113*** (0.026)	0.104*** (0.024)	0.0637* (0.039)	0.0625 (0.044)	0.0526 (0.041)
2-year UG and higher _{t-1} *NewExport _{t-1}	0.868*** (0.30)	0.883*** (0.30)	0.889*** (0.30)	0.180 (0.11)	0.206* (0.12)	0.207* (0.11)	0.182 (0.19)	0.259 (0.21)	0.259 (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 (0.017)	0.0246 (0.015)	-0.0275 (0.020)	-0.0188*** (0.0040)	0.0146*** (0.0040)	-0.0105** (0.0047)	-0.0261*** (0.0068)	0.00704 (0.0068)	-0.0255*** (0.0081)
Capital per employee _{t-1} *NewExport _{t-1}	-0.0811 (0.066)	-0.0132 (0.057)	-0.0249 (0.085)	-0.0327 (0.025)	-0.000869 (0.024)	-0.0178 (0.033)	-0.0328 (0.043)	0.0251 (0.040)	0.0141 (0.057)
Debt-to-Assets Ratio _{t-1}	0.348*** (0.094)	0.119 (0.082)	0.407*** (0.11)	0.298*** (0.024)	0.0876*** (0.021)	0.255*** (0.027)	0.418*** (0.041)	0.195*** (0.036)	0.415*** (0.047)
Debt-to-Assets Ratio _{t-1} *NewExport _{t-1}	0.245 (0.34)	0.0646 (0.34)	0.0261 (0.42)	0.00151 (0.14)	-0.0865 (0.14)	-0.0763 (0.17)	-0.138 (0.23)	-0.332 (0.24)	-0.366 (0.29)
Foreign Ownership _{t-1}	0.378*** (0.13)	0.376*** (0.13)	0.376*** (0.13)	-0.0119 (0.016)	-0.00897 (0.017)	-0.0129 (0.015)	0.0930*** (0.026)	0.0975*** (0.029)	0.0920*** (0.026)
Foreign Ownership _{t-1} *NewExport _{t-1}	-0.934* (0.52)	-0.959* (0.53)	-0.974* (0.53)	-0.346 (0.21)	-0.355 (0.23)	-0.328 (0.21)	-0.630* (0.36)	-0.673* (0.39)	-0.618* (0.36)
NewExport	-1.484** (0.70)	-1.197 (1.03)	-1.238 (1.27)	-0.531** (0.27)	-0.276 (0.42)	-0.146 (0.46)	-0.984** (0.46)	-0.562 (0.71)	-0.251 (0.79)
Lambda				0.583*** (0.039)	0.635*** (0.043)	0.578*** (0.039)	0.982*** (0.065)	1.076*** (0.072)	0.986*** (0.066)
Constant	-0.122 (0.41)	-0.0418 (0.43)	-0.604 (0.48)	-0.847*** (0.20)	-0.645*** (0.23)	-0.804*** (0.21)	-0.946*** (0.34)	-0.885** (0.39)	-1.113*** (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	19,084	19,084	19,084	19,084	19,084	19,084	19,084	19,084	19,084
Wald Chi2				33,160.0	27,870.8	33,794.2	18,970.5	15,800.1	18,897.7

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 significance at 1, 5 and 10 percent.

5.4 Robustness check with GMM estimator

In the estimation of dynamic equations (6) and (7) with Heckman two-step selection model, we ignored the problem of inconsistency of estimates caused by the endogeneity of regressors and the presence of firm-specific fixed effects. The issue of endogeneity is particularly problematic for the variables that measure access to financing. For example, the size of (lagged) equity may result from highly profitable exporting or it may be a result of additional equity issued in response to success in exporting. Similarly, lagged debt-to-asset ratio may reflect the willingness of banks to grant additional loans due to success in exporting. Inconsistency of the autoregressive coefficient may also arise in the presence of firm-specific fixed effects. The methods that deal with these two problems rely on (i) elimination of fixed effects by either within transformation or first-difference transformation, and (ii) using instrumental variables techniques that exploit the natural instruments that are either lagged levels of endogenous variables or their lagged first-differences. Since we are dealing with extensive margins that exhibit relatively high autoregressive coefficients, the lagged levels of variables may be poor instruments for the first-difference equations, which suggests that using the levels equations with lagged differences as instruments should also be exploited. Thus, we shall estimate the dynamic equations (6) and (7) using the system GMM estimator that was proposed by Bond and Blundell (1998). It is important to note that the panel data methods that attempt to eliminate the fixed effects tend to attenuate the measurement error bias. That is, the noise to signal ratio is higher for the transformed variables, which may lead to lower values of estimated coefficients. For this reason, we compare the estimates of equations (6) and (7) using three estimators: OLS, fixed effects (FE) and the system GMM estimator. Since the system GMM uses lagged first differences and lagged levels as instruments for equations in levels and first differences, respectively, the sample of firms that have available information on all variables is significantly reduced. We impose a restriction on the sample and require that a firm is an exporter for at least three consecutive periods, which reduces the sample of firms to 2,379 surviving exporters with total of 9,659 observations for the period 1997-2003. Since all firms are exporters for at least three years, we do not attempt to distinguish between the marginal effects for the new and the incumbent exporters.

The OLS results, reported in columns (1) and (4) of Table 6, establish comparability of the estimates of equations (6) and (7) to the estimates of two-step Heckman selection model reported in columns (4) and (7) of Table 5. The coefficients for the measures of extensive margins of exports, access to financing and foreign ownership have the same sign and comparable values of coefficients. With exception of ROA in equation for the number of markets and the measures of human capital in both equations, all the coefficients are also statistically significant. Columns (2) and (5) of Table 6 contain coefficients for the static fixed effects estimator. As expected, the autoregressive coefficients are considerably smaller, but still statistically significant. In addition to these, the variables that capture strategic complementarity and financing are significantly different from zero, while all the remaining variables are not. Finally, columns (3) and (6) of Table 6 report the coefficients obtained with the system-GMM estimator. Hansen test statistics and the AR tests confirm the validity of

the model. Also, in line with the econometric theory for autoregressive models with fixed effects, the autoregressive coefficients of the GMM estimator are between the respective coefficients for the FE and OLS. In addition to the autoregressive coefficients, GMM estimates yield some support to the proposed complementarity between the number of exported markets and products, specifically in the case of the number of markets²². Also, the positive effects of lagged equity and debt-to-assets ratio remain robust, while, in contrast to OLS or FE, foreign ownership displays a positive impact on both changes in the number of markets and products. These results suggest that, also when accounting for endogeneity, the measures of financing explain a large part of variation in the extensive margins of exports.

6 Conclusions

Theoretical models of international trade with heterogeneous firms have seen a rapid evolution in recent years. The contribution by Melitz (2003) has become a workhorse model for development of extensions that attempt to incorporate new empirical insights. In this paper, we argue that these models fail in one important aspect: their inability to explain the observed differences between new and incumbent exporters. Using the universe of Slovenian manufacturing firms, we find that the incumbent exporters to be significantly larger, which is reflected in both extensive and intensive margins of exports, while exhibiting a rather modest measured firm-level productivity advantage. Where theoretical models feature firms that can instantaneously adjust the margins of exports to reflect the demand and supply-side characteristics, our data suggest that the process of adjustment is relatively slow.

One of the factors of slow firm growth and as a consequence a skewed size distribution documented in the literature is a limited access of firms to financing (Cooley and Quadrini, 2001). In this paper we find support for the hypothesis that improved access to financing, measured with equity and debt-to-assets ratio, increases the exported product range and geographical dispersion at the time of first entry to foreign markets. In addition, firms with better access to financing are also more likely to continue to export and to expand the exported product range and the number of destination markets. The evidence in support of financing constraints is robust to the inclusion of a set of control variables, including measures of size and performance, samples of firms and econometric estimators. While we also find some support for hypothesis that more efficient firms are more likely to enter, expand and to survive in foreign markets, it is rather weak. These results suggest that the differences in the extensive margins of exports are mainly explained by the differences in the access to financing, while the performance measures can account for only small portion of the observed variation. Moreover, the standard measure of firm-level productivity (revenue-based total factor productivity) is revealed to be a worse predictor of firms' export decisions than the rate of return on assets.

²²While positive, the coefficient on the number of markets in the products equation (column 6) is not significantly different from zero.

Table 6: Export Markets and Products Dynamics for Surviving Incumbent Exporters

Est. Method	Markets _t (log)			Products _t (log)		
	OLS (1)	FE (2)	GMM (3)	OLS (4)	FE (5)	GMM (6)
Markets _{t-1}	0.781*** (0.0074)	0.119*** (0.013)	0.365*** (0.030)	0.0425*** (0.0098)	0.0720*** (0.017)	0.0439 (0.038)
Products _{t-1}	0.0318*** (0.0052)	0.0712*** (0.0097)	0.133*** (0.023)	0.831*** (0.0069)	0.198*** (0.013)	0.485*** (0.044)
Equity _{t-1}	0.0843*** (0.0042)	0.0492*** (0.014)	0.0931** (0.046)	0.0847*** (0.0055)	0.113*** (0.019)	0.139** (0.064)
High School _{t-1}	0.0220 (0.021)	-0.149*** (0.053)	-0.0632 (0.16)	0.0756*** (0.027)	-0.00532 (0.070)	0.146 (0.21)
2-year UG and higher _{t-1}	0.0360 (0.024)	-0.109 (0.076)	0.174 (0.24)	0.0144 (0.031)	0.0873 (0.10)	0.0780 (0.33)
Return on Assets _{t-1}	0.0543 (0.046)	-0.0365 (0.060)	-0.150 (0.099)	0.321*** (0.061)	0.0495 (0.079)	-0.158 (0.12)
Capital per Employee _{t-1}	-0.0177*** (0.0042)	-0.0139 (0.0089)	-0.0320 (0.024)	-0.0305*** (0.0055)	-0.00734 (0.012)	-0.0479 (0.034)
Debt-to-Assets Ratio _{t-1}	0.227*** (0.023)	0.217*** (0.053)	0.381** (0.19)	0.271*** (0.031)	0.267*** (0.070)	0.856*** (0.30)
Foreign Ownership _{t-1}	-0.0164 (0.014)	0.0205 (0.038)	0.294*** (0.091)	0.0583*** (0.018)	0.0000917 (0.050)	0.344*** (0.12)
Constant	-0.724*** (0.17)	1.304*** (0.33)	7.444 (11.5)	-0.602*** (0.23)	1.328*** (0.43)	57.96 (46.2)
Observations	9,659	9,659	9,659	9,659	9,659	9,659
Firms	2,379	2,379	2,379	2,379	2,379	2,379
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.86	0.06		0.87	0.07	
F-stat.	1,758	16.69		1,903	17.25	
Hansen J-stat.			83.22			81.54
p-value			0.26			0.28
AR(1) test			-16.53			-18.24
p-value			0.00			0.00
AR(2) test			1.48			1.36
p-value			0.07			0.09

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; Windmeijer corrected two-step standard errors for GMM estimator. GMM-type instruments for levels equation: twice lagged right-hand side variables in first differences. GMM-type instruments for first differences equation: twice lagged right-hand side variables in levels. ***, ** and * denote statistical significance at 1, 5 and 10 percent.

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7 Appendix

Table 7: Correlations for New and Incumbent Exporters, 1995-2003

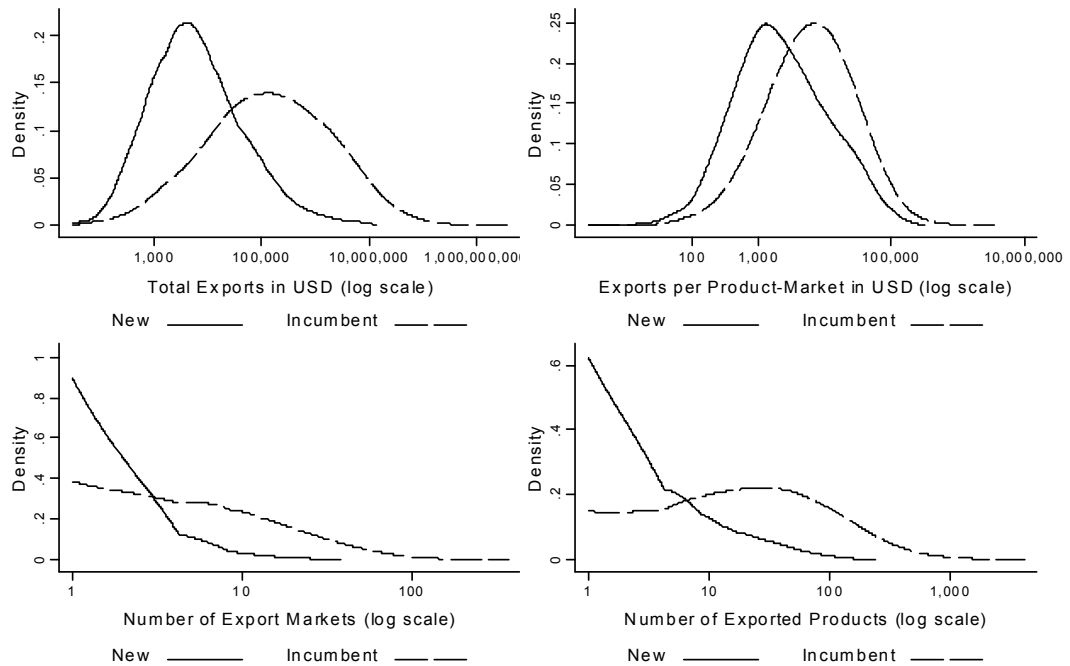
	Incumbent Exporters		New Exporters	
	Markets	Products	Markets	Products
Products	0.802***	-	0.607***	-
Equity	0.665***	0.585***	0.172***	0.087***
Assets	0.733***	0.666***	0.263***	0.188***
Debt to Assets Ratio	-0.124***	-0.057***	0.106**	0.142***
Employment	0.684***	0.626***	0.217***	0.193***
TFPR	0.110***	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.

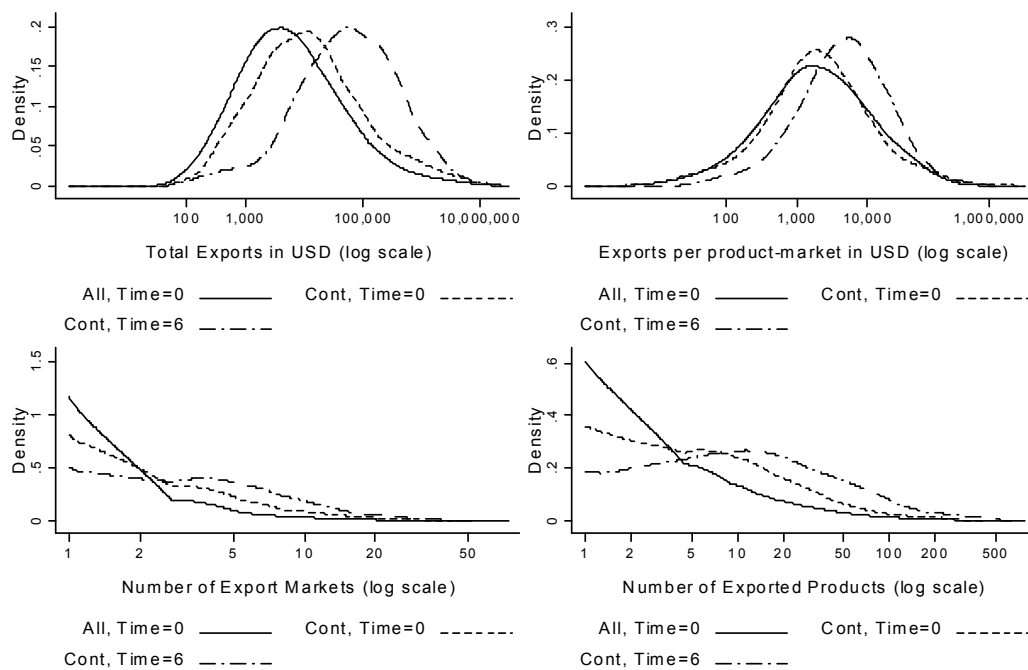
Figure 2: Margins of Exports: New vs. Incumbent Exporters in Slovenian Manufacturing, 1996



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: