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SMEs In Argentina: Who are the Exporters?

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SMEs in Argentina: Who are the Exporters?♦

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Abstract

There exists a growing body of literature which looks at export decisions made by firms. Most studies focus on developed countries and do not explore whether different behavioral patterns prevail over the firm size distribution. This paper aims at filling this gap in the literature by analyzing the export behavior of a statistically representative sample of 192 Small and Medium-Size Enterprises (SMEs) in a developing country, Argentina, over the period 1996-1998. We find that the level of employment, sourcing from abroad, investment in product improvement and average productivity are associated with a higher probability of exporting. Training activities for employees are important to export outside of MERCOSUR.

Keywords: SME, Exports, Argentina
JEL-Codes F10, F14, D21, L60

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SMEs in Argentina: Who are the Exporters?

1 Introduction

There is a growing body of literature analyzing the export behavior of firms. Most studies look at developed countries and do not explicitly explore whether the corresponding findings remain robust across firm sizes.[1] In particular, most firm-level dataset only include firms with size above a certain threshold. Thus, evidence on the lower segments of the size distribution in developing countries is rather scarce.[2] Yet, a priori there are good reasons to believe that not only firms of different sizes may react differently to the various factors determining their export decisions but also the importance of these factors may depend on the development level of their countries. In particular, macroeconomic and trade policy environments are more volatile in developing countries than in developed ones, thus different transition rates into and out of the export markets can be expected. Further, smaller firms are likely to be particularly affected by those conditions.[3]

Assessing the factors that affect the export behavior of Small and Medium Size Firms (SMEs) in developing countries is important because such behavior has relevant implications for aggregate exports. Existing studies on developed countries show that the change in the number of exporting firms accounts for most of the negative impact of trade barriers and most of the positive impact of the importing country's size on bilateral exports. Moreover, the increase in the number of exporting firms accounts entirely for the positive impact of the exporting country's size on bilateral exports (see Mayer and Ottaviano, 2007). These adjustments along the so called "extensive margin" of exports are typically driven by the export participation decisions of smaller firms. From the point of view of developing countries, that implies that a better understanding of what drives such decisions of crucial to achieve the often stated goal of export diversification. Our aim is to start filling this important gap in the literature by examining the export decisions by SMEs in Argentina and assessing whether they exhibit distinguishing export behavior patterns with respect to those already observed for larger firms in developed

[1] Bernard and Jensen (1999, 2004) examine the determinants of firms' export performance in the United States; Bernard and Wagner (2001) and Arnold and Hussinger (2005) in Germany; Castellani (2002) and Castellani et al. (2009) in Italy; Delgado et al. (2002), Barrios et al. (2003), and Blanes-Cristóbal et al. (2008) in Spain; Head and Ries (2003) in Japan; Eaton et al. (2004, 2008) in France; Girma et al. (2004), Greenaway et al. (2007), and Kneller et al. (2008) in the United Kingdom; and Lawless (2009) in Ireland.

[2] Alvarez (2004) examines determinants of export performance of Chilean manufacturing SMEs. He finds that greater effort in international business, process innovation, and use of export promotion programs are associated with higher probability of being a permanent exporter.

countries.In so doing we extend the existing empirical methodology to exploit the unique features of our dataset.

An already well established stylized fact in the empirical literature on international trade is that trade flows exhibit hysteresis, i.e., changes in these flows may persist after the changes in economic conditions that caused them have disappeared (e.g., Campa, 1993; Roberts et al., 1995; and Roberts and Tybout, 1997).[4] More specifically, firms' current foreign market participation is strongly influenced by prior experience, thus reflecting the existence of sunk costs in entering external markets. Hence, when assessing the factors that shape firms' entry and exit from these markets, it is necessary to properly account for these sunk costs. For this reason our analysis starts with the theoretical model of firms' export decision featuring sunk entry costs proposed by Roberts and Tybout (1997) and later used, among others, by Bernard and Jensen (1999, 2004). We then derive and empirically estimate binary choice models of firms' exporting behavior. In particular, we first estimate pooled probit regressions with both errors clustered by firm to deal with autocorrelation and bootstrapped standard errors. Successively, we turn to random-effects probit regressions to account for possible unobserved heterogeneity.

This kind of analysis allows us to uncover the factors associated with firms' participation to international markets. In addition, it is interesting to check whether firms' export behavior differs across specific destination countries. The reason is that it has been recently argued in the theoretical literature that the existence of differences in the toughness of competition across countries (as determined by market size and the extent of trade integration) translate into differences in the set of heterogeneous firms that are active across them (see Melitz and Ottaviano, 2008). Furthermore, sunk entry costs can differ among destination countries (see, e.g., Blanes-Cristóbal et al., 2008). For instance, the costs of gathering information on business opportunities abroad are likely to be smaller for nearby countries because commercial exchanges are more intense and media coverage is better (see, e.g., Grossman, 1998; Anderson, 2000; Portes et al., 2001; Loungani et al., 2002; Hwang, 2007; Guiso et al., 2008). The same would hold for countries that are partners in a preferential trade agreement. Lastly, different countries may demand goods of different quality (see, e.g., Hallak, 2006). For example, in the case of Argentine firms, exporting to specific destinations outside of Latin America, which are primarily distant developed countries, might be more likely if the quality of the workforce is improved via training and better or directly new products are introduced (see, e.g., Bernard and Jensen, 2004).

Accounting for the heterogeneity of destination markets requires an extension of the

[3] Das et al. (2007) find that the option value of export market participation is quantitatively important for small scale exporters among the Colombian chemical producers, whose foreign demand is relatively limited.
[4] Thus, for instance, real exchange rate movements can have lasting effects on trade volumes after having been reversed.

methodology used by Roberts and Tybout (1997) as well as Bernard and Jensen (1999, 2004). Specifically, we also estimate seemingly unrelated biprobit regressions to analyze export behavior across two destinations, the neighboring trade partners, which are also members of MERCOSUR (Brazil, Paraguay, and Uruguay) and represented the main destination for Argentine manufacturing exports over the sample period, and the rest of the world.[5]

In so doing, we exploit a new database collected by the University of Bologna's Representation in Argentina that provides information for a statistically representative sample of 192 Argentinean SMEs over the period 1996-1998. This database identifies both the location and the industry the firm belongs to (i.e., its main activity) and contains data on several variables including information on whether the firm exports or not and, if it exports, to which markets, total sales, employment, training activities for employees, input sourcing structure, investments aimed at improving already existing products and at introducing new products.

Estimation results suggest that sunk entry costs play an important role in shaping export decisions and that those firms with larger employment levels and average sales per employee are more likely to export. This is in line with findings reported in the existing empirical literature (see, e.g., Bernard and Jensen, 2004; Wagner, 2001; Arnold and Hussinger, 2005). Furthermore, we find that sourcing from abroad and investment in product improvement are associated with increased probability to export. After introducing these explanatory variables together, there is no residual heterogeneity and thus panel probit estimates are not significantly different from the pooled ones. Finally, training activities for employees raise the odds of export outside of MERCOSUR.

The remainder of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on the determinants of firms' export behavior, discussing the reasons why a priori one may expect firms of different sizes to behave differently and such differential behavior to be affected by the level of development. Section 3 describes the dataset and presents some descriptive evidence. Section 4 explains the empirical methodology. Section 5 discusses the estimation results. Section 6 concludes.

2 Export Behavior of Firms: Theory and Evidence

Exporting is a rather complex decision. Many factors are likely to affect whether a firm exports or only serves the domestic market. Over the last two decades, several contributions to the trade literature have highlighted the role played by various factors. These can be broadly

[5] MERCOSUR is a trade agreement established in 1991 by Argentina, Brazil, Uruguay, and Paraguay.

classified into two groups: *sunk export costs* and forces affecting the profitability of exporting net of sunk costs, including firms' individual *characteristics*, *actions*, and *environment*.

Sunk costs are at the core of the theoretical models developed by Baldwin (1988), Baldwin and Krugman (1989) and Dixit (1989). These models highlight the interactions between the sunk costs associated with selling abroad and expectations formed in an uncertain environment. They predict that, due to sunk costs, current foreign market participation is affected by previous export experience. Specifically, firms that have sunk their entry costs and begun to export in response to a shock, such as a large devaluation, may not cease to export when the shock is reversed, so persistence in exporter status should be observed. By now several microeconometric studies have brought this prediction to data in the wake of Roberts and Tybout (1997). Their empirical approach is particularly designed to assess the role of the two aforementioned groups of factors as it takes into account that a firm's exports in a given year if the current and expected revenues are greater than the current period costs plus sunk entry costs, and the resulting net profit of exports hinges upon firm-specific attributes. The overall evidence is consistent with the theoretical prediction: sunk costs seem to be large and a significant source of export persistence (e.g., Roberts and Tybout, 1997; Bernard and Jensen, 1999, 2004; Bernard and Wagner, 2001; Arnold and Hussinger, 2005). After controlling for other sources of persistence, the probability that a firm will export can be more than 60% higher if it exported last period.

Turning to firms' *characteristics*, further theoretical work by Melitz (2003) has shown that the existence of entry costs into the export market affects the distribution of the gains from trade across heterogeneous firms. In particular, only a portion of more efficient firms enter the export market and reap the benefits from trade in the form of larger market share and profit, whereas less efficient firms continue to produce only for the domestic market or disappear altogether.[6] In other words, more efficient firms self-select into the export markets.[7]

From an empirical point of view, these theoretical results suggest that the heterogeneity of firm characteristics can play an important role in shaping export behavior.[8] Size is one of these characteristics.[9] As measured by the number of workers or the capital stock, it has been found to be positively related to export propensity (e.g., Roberts and Tybout, 1997; Hasan and Raturi, 2003; Bernard and Jensen, 2004). In this respect, size may account for diverse effects. On the one

[6] The exposure to trade only benefits the most efficient firms. The least efficient ones are forced to exit the industry. The implied trade-induced reallocations explain why trade may result in aggregate productivity gains without improving individual firms' productivity. For further details see Melitz (2003).
[7] The underlying heterogeneity due to persistent differences across firms in terms of gross profit from exporting might also lead to persistence of exporter status (see Tybout, 2001).
[8] Empirical evidence is abundant. However, the direction of causality is not always well established. In many cases we do not know whether firms with certain characteristics become exporters or firms get particular attributes by becoming exporters.
[9] Caves (1989), Berry (1992), and Wagner (2001) review the evidence relating size and propensity to export.

hand, it may serve as a proxy for productivity. Firms with lower average or marginal costs and thus higher efficiency tend to grow relative to the others.[10] On the other hand, size may capture scale-economy based exporting (e.g., Krugman, 1984). A second characteristic is age, which may be also considered as reflecting cost differences across producers. If market forces induce inefficient producers to exit, then older firms tend to be more competitive in world markets, either because of cost advantages that cannot be imitated by rivals or because they have had time to move down a learning curve. Even if the annual payoff from exporting were the same for young and old firms, the young ones would perceive smaller returns to entering the export markets since they have lower survival probabilities (see Tybout, 2001). A few studies provide empirical support to this effect (e.g., Roberts and Tybout, 1997 and Tucci, 2005). The structure of ownership is a third characteristic that can also affect the odds of exporting (e.g., Brainard, 1997; Roberts and Tybout, 1997; Aitken et al., 1997; Greenaway et al., 2006). More precisely, multinationals are more likely to export as, in virtue of their multi-market presence, have better information about foreign markets and can exploit their already established distribution networks.

Firms' *actions* may also influence the profitability of exporting and thereby a firm exporting status. First, product quality may be a key factor for a firm to enter certain export markets (e.g., Brooks, 2006).[11] More specifically, firms may start exporting after improving or changing their products. Findings in a few papers lend support to this argument (e.g., Bernard and Jensen, 1999, 2004; Arnold and Hussinger, 2005). Second, the sourcing structure of inputs may also play an important role as long as inputs from different sources differ in terms of quality and incorporated technology (see, e.g., Hasan and Raturi, 2003; Tucci, 2005). If imported inputs are better along these dimensions, they may increase the efficiency of the production process and, therefore, the probability of exporting. Similar effects may arise if input variety is richer in the foreign than in the domestic markets, thus allowing for a better match between the input mix and the production technology or the desired product characteristics (see Either, 1982). Furthermore, having contact with a foreign supplier may help entry into export markets by attenuating informational problems. Lastly, in the case of firms that participate in international production networks, inputs requirements may be part of licensing agreements so that firms must first import specific inputs from contractually defined sources before they can process and export their products.

[10] Some papers introduce an explicit measure of productivity such as those estimated in the wake of Olley and Pakes (1996) or Levinsohn and Petrin (2003). The data consistently suggest a positive correlation between productivity at the firm level and exporting (e.g., Clerides et al., 1998; Bernard and Jensen, 1999; Kraay, 1999; Aw et al., 1997; Aw et al., 2000; Pavnick, 2002; Castellani, 2002; Delgado et al., 2002; Head and Ries, 2003; Hwang, 2003; Alessandria and Choi, 2007).

[11] If high product quality requires high workforce quality, a positive link between the level of qualification of the employees and the probability to export may be expected. Evidence on the impact of this variable, as proxied by average

Finally, the *environment* in which firms operate can also affect their export behavior. First, in the presence of significant differences across regions in terms of infrastructural quality and access to foreign markets, firm location may be a critical determinant for the feasibility of exporting (see, e.g., Roberts and Tybout, 1997). Second, different sectors of activity may be associated with different probabilities of exporting since not only the strength of a country's comparative advantage but also intra-industry patterns of producer heterogeneity and international demand vary across sector (see, e.g., Roberts and Tybout, 1997; and Das et al., 2007). Third, firms may benefit from spillovers from other firms. In particular, proximity to exporters, both from the technological and the geographical points of view, may lead to informational spillovers, lower costs of access to foreign markets and, thereby, higher probabilities of exporting. The evidence on these effects is mixed as existing export activities have been found to have positive, zero, or negative impacts on other firms' exports in the same sector or region (see, e.g., Aitken et al., 1997; and Bernard and Jensen, 2004).

All these findings are generally based on firms sampled across all possible size segments. This raises two interesting questions when it comes to SMEs: Do those findings also hold for the lower tail of the firm size distribution? Are the factors that appear to be important in general also relevant in the specific case of the export behavior of SMEs? A priori answers are not necessarily positive.

As for *sunk costs*, these may be more relevant and therefore persistence may be larger for small than large firms (e.g., Das et al., 2007; and Mánez et al., 2008).[12] In particular, large firms have an advantage in coping with the fixed costs implied by operating abroad (such as setting up an export department, redesigning products, performing market studies, providing pre-sale and post-sale services, etc.) (e.g., Hirsch, 1971; and Wagner, 1995).

With respect to *characteristics*, SMEs are a heterogeneous group in terms of size and age, so one can *a priori* still expect that these variables play a significant role in shaping their specific export behavior. However, in samples encompassing all firm sizes one may expect that after a certain threshold size ceases to be an advantage because of the coordination problems associated with scale (e.g. Wagner 2001). This is less likely to happen in a sample exclusively composed by SMEs. Being part of a group of companies can be expected to matter more for SMEs than for larger firms as belonging to a group may help the former overcome some barriers that are particularly deterring when lacking scale such as access to relevant commercial information and

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wages and the ratio of white collars to total employees, is however not robust (see Roberts and Tybout, 1997; Bernard and Jensen, 1999, 2004; Bernard and Wagner, 2001; Arnold and Hussinger, 2005).

[12] In particular, smaller companies bear higher costs for information (e.g., Gimede, 2004). Importantly, evidence based on data for three manufacturing sectors in Colombia (basic chemicals, leather products, and knitted fabrics) suggest that for

distribution networks (e.g., Gimede, 2004). In order to sell in foreign (developed) countries' markets, (developing countries') firms frequently need to upgrade the quality of their products. Larger companies are in a better position to do so since either have the internal resources or, if needed, they can more easily gather the financial means to obtain them externally (e.g., Cohen and Levin, 1989). Hence, small differences would be anticipated across large firms along this dimension. In contrast, those (fewer, in developing countries) SMEs that are actually able to improve their products would clearly differentiate from their peers in the same size segment and would therefore have higher probabilities of placing their products abroad (and likely more than in developed countries).

Turning to the *environment*, small and large firms may differ in their absorptive capabilities and thus in the importance of given spillovers for their respective export performances. Spillovers are typically mediated by physical, technological, and communication infrastructures, whose quality is markedly different between developing and developed countries. More generally, entry costs in international markets and the uncertainty of the profitability of exporting can be expected to be larger in the developing countries not only for this reason but also because of higher economic regime uncertainty, the absence of a developed trading service sector and difficulties in the access to financing (e.g., Roberts and Tybout, 1997).

To sum up, the relative importance of sunk costs as well as firms' characteristics, actions, and environment in determining export decisions may differ between SMEs in developing countries and larger firms in developed countries. In the next sections, we will use a unique dataset on Argentinean SMEs to start shedding some light on these issues.

3 Data and Descriptive Evidence

We use data from the "Observatorio PyME" database collected by the University of Bologna's Representation in Argentina for the years 1996-1998. The universe consists of all industrial firms that according to the 1994 National Economic Census, have between 10 and 200 employees and annual revenues up to 20 millions pesos.[13] The size of this universe is 9,683 firms that jointly employed 305,425 workers (i.e., 30% of total manufacturing employment in 1994). From this universe, firms were sampled using panel techniques. In particular, the sample was designed following a three step procedure proposed by the INDEC (Argentina's Statistical Bureau). First,

smaller firms the option value of being able to export in future years with incurring in entry costs is likely to substantially exceed the expected export profits in the current year (see Das et al., 2007).

[13] In order to ensure comparability of firms' economic and financial data coming from their balance sheets, additional exclusion criteria have been used. Thus, the data set also excludes firms that due to their legal status are difficult to survey

employment level strata were identified such that their limits were defined according to Neumann's optimal allocation method when the same number of cases in each stratus is assumed: Stratus 1: 10-24 employees; Stratus 2: 25-54 employees; and Stratus 3: 55-100 employees. Second, six regions were defined to study the sample size distribution for each of them that corresponds to an optimal allocation. This distribution was used to determine the sample size for each region.[14] Third, within each region, this sample was distributed across the employment strata according to the optimal allocation method taking production value as the reference value. It should be stressed that the coefficients of variation of the estimations derived from simple expansions of production values are statistically acceptable, i.e., estimations are precise (expected error below 7% in all cases). Hence, the sample is statistically representative.

192 one-plant firms completed all three surveys carried out by "Observatorio PyME" each year over the period 1996-1998. This is the sample we use in our empirical analysis. The database provides basic information such as location and main activity (i.e., industry the firm belongs to), and includes data on sales, employment, date of creation, membership of an economic group, training, investments to introduce a new product, investments to improve an existing product, main origin of inputs used in the production process, exports and their main destinations. The exact definition of these variables can be found in the Appendix.

The number of exporting firms has decreased between 1996 and 1998 and the same is true for the average export share. This drop coincides with both a real exchange appreciation of the Argentine peso (see, e.g., Escudé et al., 2001) and a worsening of macroeconomic conditions in the Southern Cone provoked by the Asian and Russian crises, especially in Brazil (see e.g., Werneck, 2009), which was the main destination of manufacturing exports. Firms are primarily located in two regions: Buenos Aires and Centro. This is far from surprising. These two regions accounted for almost 80% of total manufacturing employment in 1994. No significant differences are observed in the share of exporting firms across most regions, except for the region Sur, which systematically exhibits lower shares.

Transition rates into and out of the export markets are reported in Table 1. Though there is clearly substantial persistence in the export status of individual plants, these transition rates indicate that year-to-year transitions for Argentinean SMEs are relatively large. Thus, 27.10% of the firms in the export market in 1996 exited the market in 1997, while 14.81% of firms that did

(i.e., one-person and de facto firms), those that are not relevant for the purpose of the survey (i.e., state-owned firms and non-profit institutions), and firms that are not obliged to submit balance sheets.

[14]The six regions consist of the following provinces. Buenos Aires: Province of Buenos Aires; Centro: City of Buenos Aires, Santa Fe, and Córdoba; Cuyo: San Juan, San Luis, and Mendoza; NEA: Formosa, Chaco, Misiones, Entre Ríos, and Corrientes; NOA: Jujuy, Salta, Tucumá n, Catamarca, La Rioja, and Santiago del Estero; Sur: La Pampa, Rí o Negro, Neuquén, Santa Cruz, and Tierra del Fuego.

not export in 1997, started to export in 1998.[15] The main variables that will be used to explain these firms' export patterns are presented in Table 2 and broadly correspond to the factors reviewed in Section 2.[16]

The first three columns of Table 3 present the mean of the main variables for exporting firms and non-exporting firms along with their difference. Exporters are larger (in terms of employment), have larger sales per employee, are more active in training activities, invest more in product improvement, and belong to an economic group. Similar conclusions can be reached by looking at the "exporter premia". These are OLS (Probit) estimates of the relationship between each variable and firms' exporter status, controlling for industry, region, and year fixed effects and therefore reflect the percentage differences between exporters and non-exporters in the same industry, state, and year (see Bernard and Jensen, 1999). Premia are shown in the last column of Table 3. Note that, in this case, estimates suggest that exporters mainly use inputs from abroad.

4 Empirical Methodology

As discussed in Section 2, export behavior can be explained in terms of sunk costs as well as firms' characteristics, actions, and environment. In this section, we capture these determinants through the export market participation equation and describe the empirical methodology used to estimate it. In particular, the decision to export by the firm is modeled following Roberts and Tybout (1997) and Bernard and Jensen (1999, 2004).[17] Formally, in the one period case and in the absence of entry costs, the firm maximizes current profits:

$$\pi_{it}\left(q^*_{it}, Z_{it}, Y_{it}\right) = p_{it}q^*_{it} - c_{it}\left(q^*_{it}, Z_{it}, Y_{it}\right) \quad (1)$$

where p_{it} is the export price of goods sold abroad by the firm i in period t; c_{it} is the variable cost of producing the profit-maximizing level of exports q^*_{it}; Z_{it} is a vector of firm-specific features that

[15] Sánchez et al. (2008) examine the determinants of the emergence of three new successful activities in Argentina, blueberries, chocolate confection, and biotechnology applied to human health. In particular, they analyze who were the pioneering companies, what were the *ex ante* uncertainties regarding the profitability of exports, how these uncertainties were overcome, and to what extent business opportunities diffused. In this analysis, they consider the role played by previously accumulated capabilities, industry-specific public goods, and public policies.

[16] In general, employment and age are defined as in most papers in the existing empirical literature. The role of imported (as opposite to domestic) inputs has been captured by Tucci (2005) through the share of expenditures on imported intermediate inputs in the total expenditures on intermediate inputs. Product improvements and product introduction can be considered to be (at least partially) outputs of innovation activities, whose influence in shaping firms' foreign market participation has been accounted for by, among others, Arnold and Hussinger (2005) and Blanes-Cristóbal et al., 2008) using measures involving expenditure in R&D. Arnold and Hussinger (2005) also explicitly control for the impact of new products by including the share of new products in firms' total sales, whereas Bernard and Jensen (2004) incorporate a binary variable that identifies whether firms report to different industries over time. Spillovers can take place at different levels: region, industry, and region-industry. In the latter case, Bernard and Jensen (2004) proxy these effects using the share of exporting plants (exports) in total plants (shipments) in the same region and the same industry (excluding the plant in question).

influence the probability of exporting and include both firms' characteristics and actions such as size, age, sourcing structure, etc; Y_{it} is a vector of environmental factors that are exogenous to the firm and affect its probability of exporting such as industry demand shocks and region-industry spillovers. A firm exports if expected profits are greater than zero, i.e. if current revenues are larger than current period costs:

$$X_{it} = \begin{cases} 1 & if \quad \pi_{it}\left(q_{it}^{*}, Z_{it}, Y_{it}\right) = p_{it}q_{it}^{*} - c_{it}\left(q_{it}^{*}, Z_{it}, Y_{it}\right) \rangle\ 0 \\ 0 & otherwise \end{cases} \tag{2}$$

where X_{it} is binary variable indicating the export status of the firm i in period t.

In a multi-period setting and in the presence of entry costs, the firm chooses a sequence of output levels in order to maximize current and discounted future profits:

$$\Pi_{it} = E_t\left\{\sum_{s=t}^{\infty}\delta^{s-t}\left[\tilde{\pi}_{is}\left(q_{is}^{*}, Z_{is}, Y_{is}\right)X_{is}\right]\right\} = E_t\left\{\sum_{s=t}^{\infty}\delta^{s-t}\left[p_{ts}q_{is}^{*} - c_{is}\left(q_{is}^{*}, Z_{is}, Y_{is}\right) - N\left(1 - X_{is-1}\right)\right]\left[X_{is}\right]\right\} \tag{3}$$

where N is the entry cost for the firm. These costs may include the costs of gathering information on demand conditions in foreign markets and those of establishing a distribution system that can be thought as sunk in nature. The firm does not pay these costs if it exported in the previous period, i.e., X_{it-1}=1. The existence of sunk entry costs makes the decision rule dynamic because exporting today implies an additional option value of being able to export tomorrow without facing again those costs. In other words, revenues in each period t are equal to revenues from export sales in that period plus any discounted increase in the value of the firm from exporting in t. Formally, the value function for the dynamic programming problem is given by:

$$V_{it} = \max_{X_{it}\in[0,1]}\left\{\tilde{\pi}_{it}\left[X_{it} = 1\right]\right\} + \delta E_t\left[V_{it+1}(.)\middle| X_{it}\right] \tag{4}$$

The solution to this problem is the following decision rule:

$$X_{it} = \begin{cases} 1 & if \quad p_{it}q_{it}^{*} + \delta\left\{E_t\left[V_{it+1}(.)\middle|\ X_{it} = 1\right] - \left[V_{it+1}(.)\middle|\ X_{it} = 0\right]\right\} - \left[c_{it}\left(q_{it}^{*}, Z_{it}, Y_{it}\right) + N_{it}\left(1 - X_{it-1}\right)\right] \rangle\ 0 \\ 0 & otherwise \end{cases} \tag{5}$$

The firm therefore exports if expected profits are greater than zero in present value, i.e., if current and expected future revenues are larger than the current period costs c_{it} plus any costs of entry. Accordingly, the actual decision to export in a particular period depends on whether the firm has exported in the previous period (i.e., lagged exporter status), firm-specific features Z_{it} and factors exogenous to the firm Y_{it}. The theoretical decision rule can then be expressed as an empirical binary choice model of the form:

$$X_{it} = \begin{cases} 1 & if \quad \beta' Z_{it} + \gamma' Y_{it} - N\left(1 - X_{it-1}\right) + \varepsilon_{it} \rangle\ 0 \\ 0 & otherwise \end{cases} \tag{6}$$

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[17] This is a reduced-form model. Das et al. (2007) develop a dynamic structural model featuring uncertainty, plant-level heterogeneity in export profits, and sunk entry costs for firms breaking into foreign markets that characterizes firms' decisions about whether to export as well as quantifies the volume of foreign sales among those who do.

Operationally, we quantify the effect of the aforementioned factors on the probability of exporting by estimating the following probit model:

$$P(X_{it}=1)=\Phi(\alpha+\lambda X_{it-1}+\beta' Z_{it-1}+\gamma' Y_{it-1}+\tau_t+\varepsilon_{it}) \quad (7)$$

where Z_{it-1}={employment$_{it-1}$, age$_{it-1}$, training$_{it-1}$, group$_{it-1}$, domestic inputs$_{it-1}$, product improvement$_{it-1}$, product introduction$_{it-1}$, sales per employee$_{it-1}$}; Y_{it-1}={industry fixed effects, region fixed effects, exporting neighbors$_{it-1}$}; and τ_t denotes year fixed effects that control for the role of macroeconomic factors such as business cycles and real exchange rate (see, e.g., Alessandria and Choi, 2007; and Blanes-Cristóbal et al., 2008).[18] These variables (already defined in Table 2 of Section 3) are lagged one period to avoid simultaneity problems.[19] Moreover, since we need to include a lagged dependent variable, estimations will be performed over the period 1997-1998. Even though some of the variables resemble those included in the econometric analysis performed by Roberts and Tybout (1997) and Bernard and Jensen (1999, 2004), we deviate from these studies by introducing additional variables such as the share of domestic inputs and an indicator of firms' investments towards product improvement. As discussed in Section 2, these extra variable may be of specific relevance for SMEs. in a developing country.

As highlighted by Bernard and Jensen (1999, 2004), there likely exist unobserved characteristics, such as product attributes or managerial ability, affecting the decision to export. These characteristics are potentially permanent so they will lead to persistence in export behavior and thus failing to account for them can result in the overestimation of the entry costs. These unobserved firm characteristics can be formally modeled assuming that the error term has two components: a permanent firm-specific component υ_i and the remainder (transitory) disturbance μ_{it}. Introducing this feature, we get a dynamic binary panel data model. We will also estimate this model as a probit with random effects:[20]

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[18] Using a general equilibrium model where firms face an up-front sunk cost of entering foreign markets and smaller period-by-period continuation cost, Alessandria and Choi (2007) show that business cycles affect the moments when firms start or stop exporting. In particular, during economic expansions, more firms start exporting and more exporters are likely to stay in export markets than in normal times.

[19] We report the pair-wise correlation between these variables in Table A1 in Appendix A. The correlations clearly indicate that multicollinearity does not seem to be an issue in our estimations.

[20] Ensuring consistency in this framework requires solving the initial conditions problem. In linear models with additive unobserved effects, this problem can be solved using a transformation such as differentiation to eliminate these effects and then applying instrumental variables to perform generalized method of moments (GMM) estimations. In the nonlinear case, solving the problem is much more difficult. Woodridge (2005) proposes, however, a simple solution consisting of modeling the distribution of the unobserved effect conditional on the initial value and any exogenous variable. Operatively, this implies including as explanatory variables the exporter status in the initial year, the exporter status in the previous year, and a vector of all (non-redundant) explanatory variables in all time periods to allow for correlation between these regressors and the unobserved effect in all years. Given the short extension of our panel, doing this creates severe multicollinearity problems, which unfortunately prevent us from using this strategy. The impossibility of properly addressing the initial condition issue as well as the potential correlation between the regressors and the firm-specific effect should be kept in mind when considering the probit random effect estimates reported below. Recall that the probit model does not lend itself to the fixed effect treatment (see Greene, 1997).

$$P(X_{it}=1)=\Phi(\alpha+\lambda X_{it-1}+\beta' Z_{it-1}+\gamma' Y_{it-1}+\upsilon_i+\tau_t+\mu_{it}) \quad (8)$$

Firms not only choose whether to export or not at all, but also whether to export or not *to a particular market*. Our database provides information on export presence in two main destination markets, MERCOSUR and the rest of the world, and thus, unlike Roberts and Tybout (1997) and Bernard and Jensen (1999, 2004), we can explicitly examine whether the relative importance of the determinants of exports decisions varies across these markets. We believe that distinguishing between these destinations is interesting and worthy of being explored. In general, as discussed above, factors influencing export behavior may differ across trade partners. More specifically, exporting to MERCOSUR implies exporting under tariff preferences, to geographically close and thereby more familiar countries, and probably to less demanding markets in terms of product quality and technological sophistication. Clearly, many of these conditions do not necessarily hold when exporting to the rest of the world. Being active therein would seem *a priori* more difficult. Hence, firms' characteristics and actions required to break into countries of this group can be expected to differ from those relevant to export to MERCOSUR partners.

We therefore extend our original probit model in a way that resembles the seemingly unrelated regressions model, i.e., we specify one equation for each market (MERC for MERCOSUR and ROW for rest the world) and assume that the disturbances are correlated:

$$P(X_{it}^{MERC}=1)=\Phi(\alpha^{MERC}+\lambda^{MERC}X_{it-1}+\beta^{MERC'}Z_{it-1}+\gamma^{MERC'}Y_{it-1}+\tau_t^{MERC}+\varepsilon_{it}^{MERC}) \quad (9)$$

$$P(X_{it}^{ROW}=1)=\Phi(\alpha^{ROW}+\lambda^{ROW}X_{it-1}+\beta^{ROW'}Z_{it-1}+\gamma^{ROW'}Y_{it-1}+\tau_t^{ROW}+\varepsilon_{it}^{ROW}) \quad (10)$$

$$with \quad Cov(\varepsilon_{it}^{MERC},\varepsilon_{it}^{ROW})=\rho$$

This model can be estimated by maximum-likelihood and the null hypothesis that the correlation of the error terms is equal to zero can be tested with a Wald test (Greene, 1997). We now turn to the estimation results.

5 Estimation Results

Table 4 reports Probit estimates of Equation (7). Region-, industry-, and year-fixed effects are included but not reported. Sunk entry costs seem to be an important determinant of export decisions by SMEs in Argentina. Lagged exporter status has a large and significant impact on current export activity. Thus, having been an exporter the period before is associated with higher probability of being an exporter in the present period. In particular, a discrete change from zero to one in the variable representing lagged exporter status in the preceding year increases the probability of exporting by almost 70%, at the mean of all remaining variables (see Table A2 in the Appendix). Moreover, the estimated coefficient on employment is positive and significantly

different from zero suggesting that large firms are more likely to export. These results coincide with those reported in the existing empirical literature (e.g., Roberts and Tybout, 1997; Bernard and Jensen, 1999, 2004; and Arnold and Hussinger, 2005).

Sourcing patterns are also relevant to understanding the export behavior of SMEs in Argentina. More specifically, firms that rely more heavily on domestic providers are less likely to export. This is in line with findings in Hasan and Raturi (2003) and Tucci (2005).

Improving products seems to pay off in terms of export performance. Investing in enhancements of already commercialized goods increases the probability of exporting by approximately 20% as compared with no investment, when all remaining variables are their mean values (see Table A2 in the Appendix).

Several papers assess the effect of productivity on firm's export behavior (see, e.g., Bernard and Jensen, 2004; Arnold and Hussinger, 2005). Unfortunately, we are unable to estimate a measure of total factor productivity following the procedures proposed by Olley and Pakes (1996) or Levinsohn and Petrin (2000) because we do not have the required data. To control for this factor and in addition to employment and age, we include total sales divided by employment as a raw proxy for average productivity. Of course, this variable is subject to many caveats and these should be kept in mind when interpreting the corresponding estimates. We find that average sales per employee are positively and significantly associated with the probability of exporting.

Estimated coefficients on training, product introduction, and closeness to exporters in the same industry and region are not significantly different from zero. This may be related to the temporal dimension of their effects. Thus, to substantially change their export behavior, firms may need to learn for more than one year about new products launched to the market or from other exporters and to develop training activities over longer periods in order to alter their production process or the quality of their products. The remaining variables, i.e., age and belonging to larger economic group are not significant either.[21]

Including a lagged dependent variable and using one-year lagged regressors imply that our estimations only consider firms that participated in all surveys. However, there are firms that did not answer the questionnaires as well as firms that only answered some of them. It is clear that there may be systematic differences between the firms that always answered and the firms that did not answer all the questionnaires. In short, there may be a sample selection bias, which could potentially make our estimates inconsistent. In order to address this issue, we have re-

[21]In additional estimations, we also incorporate leverage as an additional explanatory variable (see Greenaway et al., 2006). This variable turns out to be non-significant. These results are not shown but are available from the authors upon request.

constructed the universe by industry and region using the weighting factors in our sample. This estimated universe has then been utilized to post-stratify the firms in our panel and accordingly generate a new weighting factor. Finally, we have used this new factor to re-estimate our probit models, thereby accounting for the probability that the firms appear in the sample and therefore controlling for potential selection biases created by our economic approach. In doing this, we explicitly consider the strata structure of our data.[22] Estimations results are shown in Table 5.[23] These results coincide with those reported above.

Table 6 presents estimation results when standard errors are bootstrapped. Note that these errors are now larger. However, the main message remains the same: size, sourcing intermediate inputs from abroad, investing in product improvement and average sales per employee are all associated with larger export probabilities. Table 7 shows estimates obtained when the sample is restricted to firms that do not change their status in terms of export participation ("non-switchers"). This somehow arbitrary subsample has a valuable property, namely, it allows us to abstract from the effect of lagged exporter status and thus, to check for the robustness of the results for the remaining variables (see Arnold and Hussinger, 2005). Most results are qualitatively the same as before. Note that performing training activities for employees significantly now increases the odds of exports.

As mentioned above, there might be significant unobserved plant effects and ignoring these effects when present would lead to biased estimates. To account for this unobserved heterogeneity, we estimate Equation (8) using a random-effects probit estimator. Results are reported in Table 8 and are essentially the same as those shown before. More precisely, as suggested by the likelihood ratio test, the panel variance component is unimportant and hence the panel estimator is not significantly different from the pooled probit estimator.

We now turn to export behavior across two main destination markets, MERCOSUR and the rest of the world. Table 9 presents seemingly unrelated biprobit regressions. Note first that, according to the Wald test, the null hypothesis that the correlation of the disturbances is equal to zero should be rejected. Probit equations in the model are therefore not independent and hence cannot be estimated separately. Sunk entry costs are similarly important for exports to both markets. Firms exporting to MERCOSUR essentially have the same characteristics identified previously: they are larger, mainly sourced from abroad, have invested in improving their products, and have larger average sales per employee. For exports to the rest of the world, training activities seem to be a key factor.

[22] These estimates are obtained assuming stratification by region. Similar results are found when stratification by industry is assumed instead. These results are not reported but are available from the authors upon request.
[23] Estimations have been performed using STATA´s command for survey estimation *svy*.

6 Concluding Remarks

A sizable body of research has recently focused on the export behavior patterns of firms. Most empirical investigations concentrate on developed countries and do not distinguish across firm size segments. Robust evidence on smaller firms in developing countries is therefore scarce. This is far from being a minor issue. Conditions prevailing in these countries such as higher economic regime uncertainty and poorer exporting infrastructure in terms of transport, communication, intermediation, and financing tend to aggravate the problems that SMEs naturally face when attempting to penetrate international markets (such as their disadvantages in gathering relevant trade information). Moreover, in the wake of recent findings on developed countries, one may conjecture that the limited export participation of SMEs is likely to represent a crucial bottleneck to aggregate export diversification in developing countries.

This paper has started to fill the foregoing gap in the literature by analyzing the export decisions of a statistically representative sample of 192 SMEs in a developing country, Argentina, over the period 1996-1998. In so doing, we have used a new database created by the University of Bologna's Representation in Argentina. This database contains information on standard key variables such as size, age, sales, exports, training activities, inputs sourcing patterns, investment in introducing and improving already existing products. It also provides information on the main destination of exports (MERCOSUR vs. rest of the world). Admittedly, although rich, these data have two main limitations that should be kept in mind when interpreting the estimation results: first, the sample period is short and, second, most explanatory variables are binary.

Our pooled probit estimates suggest that sunk entry costs play a significant role in determining export decisions. Furthermore, larger firms and those with greater average sales per employee are more likely to export. These results confirm the findings in existing studies based on samples of larger firms in developed countries. More specific to our study are the results on the additional explanatory variables we have introduce as being of peculiar relevance for SMEs in developing countries. In particular, we have found that sourcing from abroad and investment in product improvement are also associated with an increased probability of exporting. After introducing these explanatory variables together, there is no residual heterogeneity and thus random-effects panel probit estimates are not significantly different from the pooled ones. Finally, we have extended the standard probit approach used in the literature to allow for different results depending on export destinations. According to our seemingly unrelated bivariate estimates, the training of employees helps raise the odds of exporting to (developed) countries outside of MERCOSUR. While put into practice in the case of Argentinean firms and

MERCOSUR markets, our empirical methodology can be easily applied to any situation in which the heterogeneity of export destinations is a potentially important feature of the data.

Short of harmonized datasets covering both SMEs and larger firms across countries at different levels of development, the generalization of our findings to the export behavior of SMEs in developing countries should be handled with care. We nonetheless hope that such findings will stimulate further data collection and econometric investigation on such an important but so far much neglected subject.

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Table 1
Transition Probabilities of Firms' Exporter Status

Percentage Probabilities		
1996-1997		
Status t\ Status t+1	**Non-Exporter**	**Exporter**
Non-Exporter	92.940	7.600
Exporter	27.100	72.900
1997-1998		
Status t\ Status t+1	**Non-Exporter**	**Exporter**
Non-Exporter	85.190	14.810
Exporter	13.100	86.900

Table 2:
Variables' Definition

Variable	Definition
Export	Binary variable taking the value of 1 if the firm exports and 0 otherwise
Employment	Number of employees of the firm
Age	Difference between sample year and firm's creation year
Training	Binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise
Domestic Inputs	Binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers (i.e., over 50%) and 0 otherwise
Group	Binary variable taking the value of 1 if the firm belongs to larger economic group and 0 otherwise
Product Improvement	Binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent products the previous year and 0 otherwise
Production Introduction	Binary variable taking the value of 1 if the firm has invested in introducing new products into the market the previous year and 0 otherwise
Exporting Neighbors	Binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same region the previous year and 0 otherwise
Sales per Employee	Total sales divided by number of employees

Table 3
Differences between Exporters and Non-Exporters across Main Firm's Characteristics

Exporter vs. Non-Exporters				
Variable	**Exporters**	**Non-Exporters**	**Difference**	**Exporter Premia**
Employment	68.982	42.976	26.006***	56.127*
Age	30.948	31.479	-0.531	-3.275
Training	0.671	0.398	0.273***	26.667*
Domestic Inputs	0.514	0.550	-0.036	-14.448*
Group	0.200	0.125	0.075**	7.983*
Product Improvement	0.361	0.257	0.104**	8.452
Product Introduction	0.386	0.422	-0.036	-8.076
Exporting Neighbors	0.769	0.697	0.072	0.039
Sales per Employee	121.733	63.733	58.000**	30.356***

The first three columns of the table report the average values of the variables for each exporter status as well as their differences. The significance of these differences is tested using a t-test for differences in mean.
The fourth column of the table shows the slope coefficient of an OLS (Probit) of each of the (binary) variables on a dummy characterizing the exporter status of the firm, industry-fixed effects, region-fixed effects, and year-fixed effects (multiplied by 100).
*** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 4
Determinants of the Probability of Exporting
Probit Estimates with Exporter Status as Dependent Variable

	Estimates based on Alternative Specifications of the Estimation Equation									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Export(-1)	2.132***	1.942***	1.936***	1.917***	1.936***	1.936***	2.118***	2.105***	2.118***	2.059***
	(0.204)	(0.208)	(0.209)	(0.210)	(0.216)	(0.216)	(0.231)	(0.231)	(0.232)	(0.235)
Employment		0.511***	0.528***	0.511***	0.516***	0.538***	0.716***	0.718***	0.715***	0.828***
		(0.124)	(0.131)	(0.133)	(0.136)	(0.141)	(0.168)	(0.170)	(0.170)	(0.169)
Age			-0.089	-0.079	-0.059	-0.056	-0.073	-0.065	-0.064	-0.074
			(0.107)	(0.107)	(0.108)	(0.108)	(0.119)	(0.122)	(0.122)	(0.128)
Training				0.114	0.149	0.156	0.138	0.152	0.155	0.036
				(0.183)	(0.187)	(0.189)	(0.208)	(0.215)	(0.216)	(0.224)
Domestic Inputs					-0.597**	-0.582*	-0.895***	-0.890***	-0.934***	-0.801**
					(0.300)	(0.300)	(0.312)	(0.310)	(0.311)	(0.314)
Group						-0.163	-0.131	-0.146	-0.096	-0.259
						(0.223)	(0.235)	(0.240)	(0.253)	(0.272)
Product Improvement							0.450**	0.452***	0.456***	0.532***
							(0.177)	(0.176)	(0.175)	(0.168)
Product Introduction								-0.118	-0.109	-0.072
								(0.218)	(0.219)	(0.220)
Exporting Neighbors									0.266	0.362
									(0.295)	(0.293)
Sales per Employee										0.471***
										(0.146)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.400	0.421	0.422	0.423	0.433	0.434	0.477	0.477	0.478	0.497
Observations	376	367	367	367	367	367	330	330	330	328

The table reports probit estimates of Equation (7) for the period 1997-1998. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Robust standard errors clustered on firm are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 5
Determinants of the Probability of Exporting
Probit Estimates with Exporter Status as Dependent Variable when Correcting for Potential Sample Selection Bias

	Estimates based on Alternative Specifications of the Estimation Equation									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Export(-1)	2.613***	1.960***	1.936***	1.917***	1.936***	1.936***	2.120***	2.101***	2.117***	2.075***
	(0.208)	(0.215)	(0.187)	(0.190)	(0.194)	(0.193)	(0.237)	(0.239)	(0.239)	(0.243)
Employment		0.512***	0.528***	0.511***	0.516***	0.538***	0.710***	0.723***	0.713***	0.824***
		(0.131)	(0.130)	(0.135)	(0.140)	(0.146)	(0.172)	(0.173)	(0.174)	(0.176)
Age			-0.092	-0.079	-0.059	-0.056	-0.044	-0.031	-0.030	-0.029
			(0.131)	(0.123)	(0.122)	(0.124)	(0.122)	(0.125)	(0.126)	(0.130)
Training				0.114	0.149	0.156	0.181	0.196	0.199	0.094
				(0.179)	(0.179)	(0.180)	(0.219)	(0.227)	(0.228)	(0.234)
Domestic Inputs					-0.597**	-0.582*	-0.817**	-0.813**	-0.861***	-0.714**
					(0.301)	(0.301)	(0.325)	(0.323)	(0.331)	(0.331)
Group						-0.163	-0.073	-0.097	-0.033	-0.180
						(0.246)	(0.268)	(0.271)	(0.296)	(0.317)
Product Improvement							0.459***	0.462***	0.472***	0.551***
							(0.177)	(0.177)	(0.175)	(0.171)
Product Introduction								-0.177	-0.164	-0.126
								(0.227)	(0.228)	(0.231)
Exporting Neighbors									0.273	0.335
									(0.301)	(0.295)
Sales per Employee										0.448***
										(0.148)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	376	367	367	367	367	367	330	330	330	328

The table reports probit estimates of Equation (7) for the period 1997-1998 controlling for potential sample selection bias as indicated in the main text (Page 10). Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Standard errors accounting for stratification by region are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6
Determinants of the Probability of Exporting
Probit Estimates with Exporter Status as Dependent Variable and Bootstrapped Standard Errors

	Estimates based on Alternative Specifications of the Estimation Equation									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Export(-1)	2.132***	1.942***	1.936***	1.917***	1.936***	1.936***	2.118***	2.105***	2.118***	2.059***
	(0.206)	(0.220)	(0.238)	(0.245)	(0.253)	(0.245)	(0.308)	(0.319)	(0.312)	(0.268)
Employment		0.511***	0.528***	0.511***	0.516***	0.538***	0.716***	0.718***	0.715***	0.828***
		(0.151)	(0.151)	(0.169)	(0.167)	(0.182)	(0.196)	(0.218)	(0.216)	(0.236)
Age			-0.089	-0.079	-0.059	-0.056	-0.073	-0.065	-0.064	-0.074
			(0.143)	(0.147)	(0.151)	(0.151)	(0.162)	(0.172)	(0.173)	(0.179)
Training				0.114	0.149	0.156	0.138	0.152	0.155	0.036
				(0.213)	(0.210)	(0.212)	(0.248)	(0.264)	(0.257)	(0.267)
Domestic Inputs					-0.597*	-0.582	-0.895***	-0.890**	-0.934***	-0.801**
					(0.361)	(0.376)	(0.403)	(0.434)	(0.396)	(0.429)
Group						-0.163	-0.131	-0.146	-0.096	-0.259
						(0.306)	(0.330)	(0.369)	(0.357)	(0.383)
Product Improvement							0.450**	0.452*	0.456*	0.532***
							(0.241)	(0.263)	(0.258)	(0.254)
Product Introduction								-0.118	-0.109	-0.072
								(0.275)	(0.285)	(0.304)
Exporting Neighbors									0.266	0.362
									(0.454)	(0.491)
Sales per Employee										0.471***
										(0.218)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.400	0.421	0.422	0.423	0.433	0.434	0.477	0.477	0.478	0.497
Observations	376	367	367	367	367	367	330	330	330	328

The table reports probit estimates of Equation (7) for the period 1997-1998. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Bootstrapped standard errors are reported below estimated coefficients between parentheses (based on 1,000 replications). *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 7
Determinants of the Probability of Exporting
Probit Estimates with Exporter Status as Dependent Variable when the Sample of Firms is Restricted to Non-Switching Ones

Estimates based on Alternative Specifications of the Estimation Equation									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Employment	0.982***	0.999***	0.876***	0.875***	0.879***	0.968***	0.993***	0.993***	1.224***
	(0.233)	(0.238)	(0.245)	(0.244)	(0.251)	(0.289)	(0.301)	(0.301)	(0.318)
Age		-0.114	-0.060	-0.053	-0.052	0.034	0.041	0.043	0.040
		(0.172)	(0.174)	(0.174)	(0.173)	(0.180)	(0.184)	(0.185)	(0.198)
Training			0.635***	0.628***	0.629***	0.455*	0.483**	0.481**	0.295
			(0.233)	(0.234)	(0.234)	(0.236)	(0.239)	(0.239)	(0.250)
Domestic Inputs				-0.190	-0.185	-0.445*	-0.422	-0.446*	-0.244
				(0.252)	(0.252)	(0.258)	(0.263)	(0.263)	(0.288)
Group					-0.043	0.098	-0.026	-0.007	-0.080
					(0.316)	(0.304)	(0.320)	(0.321)	(0.351)
Product Improvement						0.221	0.293*	0.294*	0.387**
						(0.181)	(0.172)	(0.172)	(0.177)
Product Introduction							-0.470*	-0.465*	-0.412
							(0.253)	(0.256)	(0.267)
Exporting Neighbors								0.120	0.167
								(0.431)	(0.507)
Sales per Employee									0.752***
									(0.209)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.277	0.278	0.305	0.306	0.306	0.313	0.327	0.328	0.328
Observations	258	258	258	258	258	231	231	231	229

The table reports probit estimates of Equation (7) for the period 1997-1998 based on a sample that only includes non-switching firms. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Robust standard errors clustered on firm are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 8
Determinants of the Probability of Exporting
Random Effects Probit Estimates with Exporter Status as Dependent Variable

Estimates based on Alternative Specifications of the Estimation Equation				
	(1)	**(2)**	**(3)**	**(4)**
Export(-1)	2.118***	2.105***	2.118***	2.059***
	(0.220)	(0.221)	(0.224)	(0.229)
Employment	0.716***	0.718***	0.715***	0.828***
	(0.164)	(0.164)	(0.165)	(0.177)
Age	-0.073	-0.065	-0.064	-0.074
	(0.130)	(0.130)	(0.130)	(0.133)
Training	0.138	0.152	0.155	0.036
	(0.205)	(0.207)	(0.207)	(0.217)
Domestic Inputs	-0.895***	-0.890***	-0.934***	-0.801**
	(0.303)	(0.304)	(0.314)	(0.217)
Group	-0.131	-0.146	-0.096	-0.260
	(0.291)	(0.292)	(0.302)	(0.319)
Product Improvement	0.450**	0.452**	0.456***	0.532**
	(0.215)	(0.215)	(0.215)	(0.221)
Product Introduction		-0.118	-0.109	-0.072
		(0.204)	(0.205)	(0.210)
Exporting Neighbors			0.266	0.362
			(0.385)	(0.400)
Sales per Employee				0.471***
				(0.175)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes
Likelihood Ratio Test	0.000	0.000	0.000	0.000
	[1.000]	[1.000]	[1.000]	[1.000]
Observations	338	338	338	336

The table reports random-effects probit estimates of Equation (8) for the period 1997-1998. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Standard errors are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 9
Determinants of the Probability of Exporing by Destination Markets
Seemingly Unrelated Bivariate Probit Estimates

Estimates based on Alternative Specifications of the Estimation Equation								
	(1)		(2)		(3)		(4)	
	MERC	**ROW**	**MERC**	**ROW**	**MERC**	**ROW**	**MERC**	**ROW**
Export(-1)	1.920***	1.815***	1.904***	1.817***	1.923***	1.818***	1.917***	1.804***
	(0.217)	(0.225)	(0.220)	(0.227)	(0.222)	(0.227)	(0.230)	(0.229)
Employment	0.744***	0.541***	0.748***	0.541***	0.738***	0.539***	0.887***	0.551***
	(0.170)	(0.172)	(0.170)	(0.172)	(0.171)	(0.172)	(0.190)	(0.175)
Age	-0.170	-0.020	-0.165	-0.021	-0.166	-0.020	-0.195	-0.017
	(0.135)	(0.147)	(0.135)	(0.147)	(0.136)	(0.147)	(0.140)	(0.147)
Training	0.074	0.575**	0.083	0.573**	0.080	0.573**	-0.088	0.559**
	(0.212)	(0.226)	(0.213)	(0.227)	(0.214)	(0.227)	(0.229)	(0.228)
Domestic Inputs	-0.754***	-0.409	-0.750***	-0.408	-0.789***	-0.415	-0.608**	-0.386
	(0.288)	(0.305)	(0.289)	(0.305)	(0.297)	(0.312)	(0.299)	(0.315)
Group	-0.350	0.197	-0.365	0.197	-0.317	0.207	-0.547*	0.177
	(0.288)	(0.276)	(0.291)	(0.277)	(0.298)	(0.283)	(0.319)	(0.290)
Product Improvement	0.324	0.064	0.327	0.066	0.330	0.067	0.397*	0.082
	(0.218)	(0.222)	(0.218)	(0.222)	(0.218)	(0.222)	(0.223)	(0.222)
Product Introduction			-0.081	0.014	-0.067	0.017	-0.037	0.019
			(0.204)	(0.225)	(0.205)	(0.227)	(0.210)	(0.229)
Exporting Neighbors					0.298	0.064	0.364	0.069
					(0.407)	(0.398)	(0.416)	(0.402)
Sales per Employee							0.498***	0.093
							(0.181)	(0.147)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wald Test Rho=0	8.997***		8.802***		8.803***		9.578***	
	[0.002]		[0.003]		[0.003]		[0.002]	
Observations	338	338	338	338	338	338	336	336

The table reports seemingly unrelated bivariate probit estimates of Equations (9)-(10) for the period 1997-1998. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Standard errors are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Appendix

Table A1: Pairwise Correlation among Main Explanatory Variables

Correlations										
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
(1) Export(-1)	1.000									
(2) Employment	0.303	1.000								
(3) Age	0.000	0.104	1.000							
(4) Training	0.243	0.247	-0.065	1.000						
(5) Domestic Inputs	-0.102	0.029	0.084	0.105	1.000					
(6) Group	0.136	0.320	0.043	0.096	0.016	1.000				
(7) Product Improvement	0.027	-0.010	-0.026	0.068	0.144	0.012	1.000			
(8) Product Introduction	-0.039	0.031	0.030	0.134	0.176	-0.097	0.056	1.000		
(9) Exporting Neighbors	0.118	-0.023	0.069	-0.023	0.035	-0.084	0.021	-0.030	1.000	
(10) Sales per Employee	0.175	-0.025	-0.052	0.158	-0.118	0.120	-0.073	0.005	-0.028	1.000

Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year).

Table A2
Determinants of the Probability of Exporting
Marginal Effects based on a Probit Estimation with Exporter Status as Dependent Variable

Marginal Effects based on Alternative Specifications of the Estimation Equation										
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Export(-1)	0.704***	0.657***	0.655***	0.650***	0.656***	0.656***	0.699***	0.696***	0.699***	0.685***
	(0.046)	(0.052)	(0.052)	(0.053)	(0.054)	(0.054)	(0.052)	(0.053)	(0.053)	(0.055)
Employment		0.199***	0.205***	0.198***	0.201***	0.209***	0.279***	0.281***	0.279***	0.323***
		(0.048)	(0.050)	(0.051)	(0.053)	(0.054)	(0.065)	(0.066)	(0.066)	(0.065)
Age			-0.035	-0.031	-0.023	-0.021	-0.028	-0.025	-0.025	-0.029
			(0.041)	(0.042)	(0.042)	(0.042)	(0.047)	(0.048)	(0.048)	(0.051)
Training				0.044	0.058	0.060	0.054	0.059	0.060	0.014
				(0.071)	(0.072)	(0.073)	(0.081)	(0.083)	(0.083)	(0.087)
Domestic Inputs					-0.230**	-0.224**	-0.340***	-0.338***	-0.354***	-0.306***
					(0.113)	(0.113)	(0.112)	(0.112)	(0.111)	(0.115)
Group						-0.062	-0.050	-0.056	-0.037	-0.099
						(0.083)	(0.090)	(0.091)	(0.097)	(0.101)
Product Improvement							0.177***	0.177***	0.179***	0.209***
							(0.069)	(0.069)	(0.068)	(0.065)
Product Introduction								-0.046	-0.042	-0.028
								(0.084)	(0.085)	(0.085)
Exporting Neighbors									0.102	0.138
									(0.111)	(0.108)
Sales per Employee										0.184***
										(0.057)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	0.400	0.421	0.422	0.423	0.433	0.434	0.477	0.477	0.478	0.497
Observations	376	367	367	367	367	367	330	330	330	328

The table reports marginal effects obtained from probit estimates of Equation (7) for the period 1997-1998. Export is a binary variable taking the value of 1 if the firm exports and 0 otherwise (Export(-1) is the one-year lagged value). Employment is the natural logarithm of the firm employment level (lagged one year). Age is the natural logarithm of the firm's age (lagged one year). Training is a binary variable taking the value of 1 if the firm has performed training activities for its employees the previous year and 0 otherwise. Domestic Inputs is a binary variable taking the value of 1 if the firm sources its inputs mainly from domestic providers, i.e., over 50% and 0 otherwise (lagged one year). Group is a binary variable taking the value of 1 if the firm belongs to a larger economic group and 0 otherwise. Product Improvement is a binary variable taking the value of 1 if the firm has invested in changing and improving the quality of its already existent product the previous year and 0 otherwise. Product Introduction is a binary variable taking the value of 1 if the firm has invested in introducing new products into the market in the previous year and 0 otherwise. Exporting Neighbors is a binary variable taking the value of 1 if there has been at least one exporting firm in the same industry in the same province the previous year and 0 otherwise. Sales per Employee is the natural logarithm of the firm's total sales divided by the number of employees (lagged one year). Robust standard errors clustered on firm are reported below estimated coefficients between parentheses. *** significant at 1% level; ** significant at 5% level; * significant at 10% level.