Is Previous Export Experience Important for New Exports?[†]

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Abstract

Recent models of international trade show that trade costs are important determinants of exporting decisions and productivity dynamics. By assuming that these costs are exogenous and constant across firms, these theories do not take into account that experienced firms may have lower trade costs or that new exporters may reduce these costs by observing the decisions of other exporters. This paper uses a firm-level dataset with information on exports by product and destination market to examine the role of previous export experience on the decision to introduce a new export relationship (a new product-market pair). The results show that a firm's previous export experience increases the probability that the firm will export a previously exported product to a different market or a different product to a market where this firm already exported a product. The paper also shows that an increase in the number of firms with previous export experience in a product, or in a foreign market, raises the probability that firms export new products and/or to new markets. The results of this paper suggest that previous export experience may help reduce entry costs for firms in international markets. The rich dataset used in this paper allows the identification of these effects controlling for various time-varying observed and unobserved characteristics which may create a spurious correlation between firms' export decisions, their previous export experience, and the number of other exporters.

Keywords: New Exports, Previous Export Experience

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1 Introduction

This study uses a unique and new firm-level dataset to examine the decision to export a new product or to a new market. The data contain information on exports by product (at the 8-digit Harmonized System level) and destination country for all Chilean firms that exported during 1991-2001. Unlike most firm-level datasets used in the literature, this one details the actual value of each firm's shipment of each product to individual destinations.[1] The dataset provides a unique opportunity to study how firms introduce new products to new markets.

Special attention is given to the potential role of previous exporting experience either of a firm or of other exporters. Previous experience may be an important source of information about new production technologies, new destination markets, and new export products. This information may reduce entry costs for new products and new markets. Firms with previous experience in a given market, or a given product, may be more likely to start exporting a different product to that market, or an existing product to a new market.[2] For example, the experience of a firm that is exporting *red wine* to the USA (e.g., in terms of product packaging/labeling, domestic market regulations, distribution channels, etc.) may allow it to start exporting *white wine* to the USA, while other firms without that knowledge may not be able to do so. Similarly, the experience from other exporting firms may generate important information about potential destination markets or products, which may facilitate the entry of new exports. Anecdotal evidence indicates that the role of export experience may be

[1] Most of the recent empirical literature on exporting activity (see López, 2005; Greenaway and Kneller, 2007; Wagner, 2007 for reviews) uses aggregate information on exporting activity. Typically, datasets contain information about export status and how much it is sold in international markets.

[2] In the business literature it is often argued that export impediments are perceived to be more difficult for inexperienced exporters because they lack the familiarity of the export process (see, for example, Leonidou, 1995).

important in the case of Chile. Agosin and Bravo-Ortega (2009), for example, describe how the success of a pioneer exporter of wine allowed the entry of other firms in export markets: "The exemplary role of the success enjoyed by Viña Miguel Torres in exporting high-quality wine moved other firms to seek to enter the export market." (Agosin and Bravo-Ortega, 2009, page 16). [3]

This paper investigates the role of previous experience by examining whether the probability of exporting a new product or to a new market is increasing in (1) the firm's previous experience exporting the same product to other markets or exporting other products to the same market and (2) the number of firms that previously exported the same product to the same market, the same product to other markets, and other products to the same market. This paper defines a new product in export markets as a new trade relationship (product-market pair) for a firm, not necessarily a new trade relationship in the Chilean export basket. More specifically, a new product is a product that is exported by a firm for the first time to another country. For example, red wine exported by a Chilean firm for the first time to the U.S. is considered a new product, even if the firm may have previously exported red wine to other countries or exported another product to the U.S. Since firms may export a new product, or to a new market, by "accident," i.e., due to a demand shock (e.g., a customer order) or supply shock (e.g., a temporary increase in the price of the product in a particular market), the empirical analysis considers only cases in which a firm exports a new product or to a new market for at least three years. The analysis is also performed

[3] Hausmann and Rodrik (2001) suggest that knowledge and information may spill over from first entrants to other exporters. This hypothesis, known as self-discovery, has not been tested due to the lack of detailed firm-level data on exporting activity. The dataset used in this study allows investigating whether the introduction of a new product is facilitated by the previous experience of other exporters.

with a stricter definition considering cases in which a firm exports a new product or to a new market for at least five years.

By examining how the probability of a new export depends on the firm's own past experience or the experience of other firms, this paper sheds light on the nature of trade costs. Are these trade costs market-specific, product-specific, or both market and product specific? Most models of trade with firm heterogeneity assume that entry costs to export markets are constant and exogenous to the firm (e.g., Melitz, 2003). The evidence this paper presents suggests that these entry costs can be product-specific, market-specific and product-market specific. This paper thus adds to the understanding of firm behavior in international markets, since empirical and theoretical analyses of this subject have been limited by the lack of detailed information on exporting activities. More specifically, there is little evidence in the literature on why firms export to some countries and not to others, how many products they export, how many destination countries they target, and how their export basket evolves over time.

This study also adds to the knowledge about the relationship between a firm's entry decision and the exporting activities by other firms. According to Hausmann and Rodrik (2001), new entrants may erode potential profits and therefore reduce investments in new export-related activities. Their model highlights possible failures of the laissez-faire equilibrium. On one hand, there is too little investment and entrepreneurship *ex-ante*. On the other hand, there is too much entry *ex-post*. Thus, if potential entrants erode profits significantly, little entry should be observed in equilibrium. This study, however, finds that entry is an important phenomenon. First, around 30% of the observations correspond to new product-market pairs introduced by firms each year. Second, the magnitude of entry is significant in terms of products

and export value. In the Chilean manufacturing sector, entry represents about 17% of the total number of exported products and about 12% of total exports.

The results of this study are the following. A firm exporting a particular product is about 20% more likely to export the same product to other markets in the following years. Similarly, a firm exporting to a particular market is a little over 20% more likely to export a new product to the same market in the following years. This evidence supports the notion that previous experience may be important to reduce entry/trade costs of exporting. The evidence is also consistent with the idea that the experience of other exporters may be important. The paper finds that the probability of exporting a new product to a specific market is increasing in the number of firms that previously exported (i) the same product to the same market, (ii) the same product to other markets, and (iii) other products to the same market.

An important challenge this study faces is the identification of the experience effects. A positive correlation between the introduction of new exports and previous export experience of the firm or of other firms may be also explained by shocks or unobserved heterogeneity. The paper shows that the positive effects from experience observed among Chilean exporters are not driven by time-varying market and industry shocks, or by time-varying firm unobserved heterogeneity. The results are robust even after controlling for trade barriers, real exchange rates, and free trade agreements.

To control for unobserved heterogeneity, this study relies on the richness of the data and uses different fixed effects combinations. The basic specification includes firm, product, destination market, and year fixed effects. Some models also include destination market*sector*year fixed effects. In these models, identification comes from changes over time within each destination market and sector. Other

specifications expand these models by adding firm*year fixed effects. In this case identification comes from changes within firms in each destination market and sector.

These different specifications allow controlling for unobserved time-invariant heterogeneity at the firm, product and market level, as well as for temporal shocks affecting exporting decisions to any industry and market combination. It also allows controlling for time-varying unobserved heterogeneity at the firm level (such as productivity) that may affect export decisions. The only unobserved time-varying shock that this paper does not control for are those shocks that are product, year, and market specific. However, it seems unlikely that these shocks are the main determinants of the positive relationship between exporting new products and the number of previous exporters to the market in which a firm is entering.

This study is related to several papers exploring firm-level exporting activity. Bernard and Jensen (2004) examine the role of previous export experience on the probability of exporting for the case of US manufacturing firms. Bernard et al. (2005) document the characteristics of U.S. firms by using detailed information on products and markets. Eaton et al. (2004, 2005) follow a similar approach to describe some stylized facts about French exporters by using information on destination markets. Damijan et al. (2004) analyze evidence of self-selection and learning-by-exporting in Slovenia by using information on exports and destination markets. This study is also related to Debaere and Mostashari (2005) and Feenstra and Kee (2008), which analyze the determinants of the extensive margin (i.e., export variety). By examining entry of firms into new markets, the introduction of new products, and the role of experience, this study extends the existing literature in several dimensions.

The rest of this paper is structured as follows. Section 2 presents the data and describes some stylized facts on exporting activity at the firm level. Section 3 develops

the econometric strategy, based on a simple model of a firm's decision to introduce a new product. Section 4 presents the main results. Section 5 discusses several robustness checks. Section 6 concludes.

2 Data and Basic Patterns

This paper employs a dataset that contains information on exports by product (at the 8-digit Harmonized System level) and destination country for all Chilean firms during 1991-2001. The data are collected by Customs and cover all firms that exported during the period. The dataset contains the actual value of each firm's shipments of each product to individual market destinations. Thus, it provides an exclusive opportunity to study how firms introduce new products to different destination markets. The dataset also lists a unique identification number for each firm and its industry affiliation at the 3-digit ISIC (Rev. 2) level. Based on the ISIC classification, the data contain information for exporting firms in agriculture, mining, manufacturing, and other sectors. [4]

The data reveal several facts about exporting. During the period 1991-2001, there was an increase in the number of exporting firms, the number of products exported, and the number of destination markets. Table 1 shows that, on average, 5,615 firms exported during the period 1991-2001. The number of exporters increased from 5,207 in 1991 to 5,904 in 2001, which represents a 13.4% increase for the entire period. The number of products increased by 14.7% during the same period: 3,233 in 1991 compared to 3,708 in 2001. However, the largest increase occurred in the number of markets, which went up by 40.7%: 113 in 1991 versus 159 in 2001.

[4] Unfortunately, this dataset lacks information on other firm characteristics such as productivity, employment, factor intensity and the use of imported inputs. These characteristics are likely to affect entry to foreign markets and firm survival (Álvarez and López, 2005; López, 2006).

These trends resulted in an increase in the number of products per firm, the number of markets per firm, and the number of product-market pairs per firm. While the average firm exported to 2.4 markets in 1991, the number of markets had increased to 3.2 by 2001. Figure 1 shows that the average number of markets per firm increased steadily during the period. The number of products per firm, on the other hand, increased from an average 4.6 in 1991 to 5.8 in 1994, although it started to decline up to the end of the period, when it reached 5.1 products per firm. The increase in both the number of products and the number of destination markets per firm resulted in an increase in the number of product-market pairs. Figure 2 shows that the average number of product-market pairs increased from 7.0 in 1991 to 9.0 in 2001. It also shows that the number of product-market pairs increased between 1991 and 1996, but then it started to decrease gradually afterwards.

These averages, however, hide significant variation across firms. For example, many firms export only one product to one market. Table 2 shows that about 41% of the firms exported only one product in 2001 (down from 45% in 1991), while 16% exported only 2 products in 2001 (14% in 1991). Although the majority of firms exported one or two products, the value exported by this group of firms was only 12.8% in 2001. In contrast, only 1.7% of the firms exported more than 10 products in 2001, but they accounted for 50.3% of the total value exported. These figures show that there is an enormous heterogeneity among exporters and that export activity is highly concentrated in a few firms.[5]

A similar pattern is also observed in terms of the number of destination markets. Table 3 shows that almost 53% of the firms exported to one country in 2001 (down

[5] This high degree of heterogeneity and concentration has also been documented for the US by Bernard, et al. (2005). In the US, firms that export more than 10 products accounted for 94.3% of exports in 2000 although they represent only 17.4% of the number of firms in the same year.

from 61% in 1991), and about 16% exported to only two countries (compared to 16% in 1991). Most of the value exported, however, is accounted for by firms that exported to several countries. In 2001, firms that exported to more than 10 countries accounted for only 5.8% of the firms, but they exported 71.4% of the total value exported by Chile that year.[6]

3 Model and Econometric Strategy

3.1 The Decision to Introduce a New Export Relationship

This section examines a firm's decision to introduce a new export relationship (a new product-market pair). In this setup, a firm can export different products to different markets.[7] The firm must decide how much of each good to produce for each market, and the combination of products and markets that maximize joint profits. For convenience, product-market pairs are sorted in the order in which they would be introduced. Thus, product-market pair 1 would be the first introduced, product-market pair 2 would be the next combination introduced, which is exported in addition to good 1, and so on. It then must be the case that:

$$\pi_1 > \pi_j, \ \forall j, \tag{1}$$

where j represents a certain product-market pair, and π_j is the current (π_{jt}) and expected profit of exporting the j product-market pair alone.

[6] Eaton et al. (2004, 2005) and Bernard et al. (2005) document similar patters on export destinations for France and the US, respectively.
[7] This framework does not consider the decision to exit the market or stop exporting a product. This can be an interesting extension for future studies in this area.

If the firm exports a total of x product-market pairs, the joint profit of exporting all these goods at any given time t ($\pi_{1,\ldots,xt}$) is given by the difference between total revenue ($TR_{1,\ldots,xt}$) and total cost ($TC_{1,\ldots,xt}$):

$$\pi_{1,\ldots,xt} = TR_{1,\ldots,xt} - TC_{1,\ldots,xt}. \tag{2}$$

Total revenue is defined as $TR_{1,\ldots,xt} = \sum_{j=1}^{j=x} p_{jt} q_{jt}$, where p_{jt} is the price of each of the product-market pairs at time t, and q_{jt} is the quantity exported of product-market pair j at time t. Total cost is:

$$TC_{1,\ldots,xt} = \sum_{j=1}^{j=x} c_j(q_{jt}), \tag{3}$$

where $c_j(\cdot)$ is the variable cost function of product-market pair j. This cost includes the cost of producing each product-market pair, as well as trade costs, such as the costs of shipping the product to the destination market. For a given x, the firm will choose quantity q_{jt} such that $\pi_{1,\ldots,xt}$ is maximized.

Following the multiproduct firm literature,[8] the firm will introduce a new product-market pair if the increase in the current plus expected joint profits net of any entry costs exceeds the current and expected profits of the existing x combinations:

$$\pi_{1,\ldots,x+1} - e_{x+1} - \pi_{1,\ldots,x} > 0, \tag{4}$$

[8] An earlier example of this literature is Nicolaou and Spencer (1975), which examines the case of a multiproduct firm deciding how many products to produce.

where e_{x+1} is the start-up sunk-cost of exporting product-market x+1, which includes the costs of contacting potential customers, establishing distribution channels, and adapting the product to market specific preferences or regulations. Based on the empirical patterns described in the previous section, it is assumed that these costs are product and market specific.

It is clear that the firm will continue introducing new products into new markets as long as (4) is satisfied. The last product-market pair, z, will satisfy:

$$\pi_{1,\ldots,z} - e_z - \pi_{1,\ldots,z-1} > 0 \text{ and } \pi_{z+1} - e_{z+1} - \pi_z < 0. \quad (5)$$

3.2 Empirical Implementation

The empirical analysis examines the determinants of the probability of introducing new product-market pairs. The main hypothesis to be tested is whether the experience of the firm and of other exporters is a significant determinant of the probability to introduce a new product-market pair.

Let X_{ipct} be equal to 1 if firm i exported product p to destination country c at time t, and define $Y_{ipct} = 1$ if $X_{ipct} = 1$ and $X_{ipc,\tau<t} = 0$. In words a new product-market pair is a pair that is exported at time t and was never exported before t. Since firms may export a new product or to a new market by "accident" in the sense that it may be the result of a specific demand shock (e.g., a customer order) or a supply shock (e.g., a temporary increase in the price of the product in a particular market), the empirical analysis considers only cases in which a product-market pair is exported for at least three years; this is the '3-year definition.' The analysis also uses a stricter definition

considering product-market pairs that are exported for at least 5 years; this is the '5-year definition.' [9]

The theoretical analysis suggests that a firm will start exporting product *p* to market *c* at time *t* if current and expected joint profits $\pi_{i,1,\ldots,pc}$ are greater than the cost of entry e_{ipct} plus the joint profits from exporting the existing product-market pairs ($\pi_{i,1,\ldots,pc-1}$):

$$Y_{ipct} = \begin{cases} 1 \text{ if } \pi_{i,1,\ldots,pc} > e_{ipct} + \pi_{i,1,\ldots,pc-1} \\ 0 \text{ otherwise} \end{cases}. \quad (6)$$

Since $\pi_{i,1,\ldots,pc}$, $\pi_{i,1,\ldots,pc-1}$, and e_{ipct} are unobservable, it is assumed that:

$$\Pr[Y_{ipct} = 1/Z_{ipct}, W_{pct}] = \Pr[\pi_{i,1,\ldots,pc} > e_{ipct} + \pi_{i,1,\ldots,pc-1}],$$

$$\Pr[Y_{ipct} = 1/Z_{ipct}, W_{pct}] = \Pr[\pi_{i,1,\ldots,pc} - e_{ipct} - \pi_{i,1,\ldots,pc-1} > 0],$$

$$\Pr[Y_{ipct} = 1/Z_{ipct}, W_{pct}] = \Pr[Z'_{ipct}\alpha + W'_{pct}\beta + \varepsilon_{ipct} > 0], \quad (7)$$

where Z_{ipct} is a vector of firm characteristics and W_{pct} a vector of product and destination country characteristics.

The main econometric issue that needs to be addressed is the potential influence of unobserved heterogeneity. Some firms may have managers more willing to explore new opportunities in international markets and therefore be more likely to start

[9] The results using a 1-year definition are very similar and are available from the authors upon request.

exporting new products to new markets.[10] In a similar way, some products are more likely to be exported while some countries may be more attractive for the introduction of new products. These issues are not easy to address with traditional probability models such as probit or logit, thus this study uses a linear probability model with fixed effects:

$$Y_{ipct} = Z'_{ipct}\alpha + W'_{pct}\beta + \delta_p + \delta_c + \delta_t + u_i + \omega_{ipct}, \quad (8)$$

where δ_p, δ_c, and δ_t are product, destination country, and time dummy variables; u_i is the time-invariant firm fixed effect, while ω_{ipct} is an error term that satisfies $\varepsilon_{ipct} = u_i + \omega_{ipct}$.[11]

The empirical analysis assumes that $Z_{ipct} = [X_{ipt-1}, X_{ict-1}, S_{it-1}, H_{it-1}]$, where $X_{ipt-1} = 1$ if firm *i* exported product *p* to markets other than *c* at *t* – 1, and $X_{ict-1} = 1$ if firm *i* exported to market *c* products other than *p* at *t* – 1. The estimates for these two variables are expected to be positive if previous experience is important to explain entry of new products/markets. Firms with previous experience with a given market or a given product should be more likely to start exporting that particular product to that market. For example, suppose that a firm decides to export product *p* to market *c*. The experience gained in exporting product *p* (for example, in terms of product characteristics or how to deliver the product to other markets) may allow the firm to start exporting the same product to a new market, say *c'*. Similarly, a firm that is exporting product *p'* to market *c* may be able to start exporting other products to

[10] In the international business literature it is commonly argued that managers who speak several languages or managers with higher levels of education are more likely to internationalize their firms (e.g., Reid, 1981).
[11] A similar approach is followed in Bernard and Jensen (2004).

market *c* because its knowledge of the market (for example, about commercialization channels) may reduce the entry cost for other products.

Variables S_{it-1} and H_{it-1} are firm-specific variables that can affect profits and entry costs. Ideally, one would like to include measures of productivity, size, capital intensity and skill intensity. All these variables have been shown to affect the probability of exporting in previous studies.[12] Since the dataset has no information on most of these variables, the estimates may be biased due to potentially omitted variables. To minimize this problem this paper constructs two variables to proxy firm size and productivity. First, the total value of exports by the firm (S_{it-1}) attempts to proxy firm size and productivity. Larger firms tend to be more productive and therefore are more likely to have higher profits from exporting. Size may also be correlated with entry costs. Larger firms may, for example, have more foreign contacts and obtain better deals in contracts with foreign distributors. Second, a firm-level Herfindahl index H_{it-1} attempts to measure how concentrated the exports of a firm are. It is defined as:

$$H_{it} = \sum_{pc} \left(\frac{V_{ipct}}{V_{it}} \right)^2 ,$$

where V_{ipct} is the value of each product-market pair *pc* exported by firm *i* at time *t* and V_{it} is the total value exported by the firm at time *t*. Firms that are highly concentrated in a few product-market pairs –for example, because they are less productive– may be less likely to introduce new products to new markets.

[12] See, for example, Roberts and Tybout (1997) and Bernard and Jensen (2004).

The vector W_{pct} contains several variables that affect profits and trade costs. It is assumed that $W_{pct} = [N_{ct-1}, N_{pt-1}, N_{pct-1}, \tau_{pct}, r_{ct}, g_{ct}]$, where N_{ct-1} is the number of other firms exporting to market/country *c* in *t* – 1, N_{pt-1} is the number of other firms exporting product *p* in *t* – 1, and N_{pct-1} is the number of other firms exporting product *p* to market *c* at *t* – 1. These three variables attempt to measure the potential effect of other exporters' previous experience. For example, an increase in the number of firms exporting to a given market may reduce the cost of obtaining information about tastes, regulations, and distribution channels in that particular market. Thus, an increase in the probability of exporting to that market by other firms is expected.

Variable τ_{pct} corresponds to government-imposed trade barriers, such as tariffs, in the destination countries. They should have a negative impact on Y_{ipct}. Unfortunately, detailed information on tariffs at the product level for a large number of countries is unavailable. This study uses the simple and the weighted average tariff rate for each 3-digit ISIC manufacturing sector applied by each destination country in each year.[13]

The next two variables are measured at the country level. Variable r_{ct} is the bilateral real exchange rate between Chile and country *c* at time *t*, and is defined as $r_{ct} = (n_{ct} * P_{ct}) / P_t$, where n_{ct} is the nominal exchange rate between Chile and country *c* (Chilean pesos/Local currency), P_{ct} is the consumer price index (CPI) of country *c* at *t*, while P_t is the Chilean CPI at *t*.[14] This implies that an increase in r_{ct} represents a real depreciation of the Chilean currency. Thus, r_{ct} should be, in principle, positively

[13] The information on tariffs imposed by Chilean trading partners was obtained from Nicita and Olarreaga (2007).
[14] The nominal exchange rates and the CPIs were obtained from the World Development Indicators (World Bank).

correlated with the probability of introducing new products to new markets. It is possible, however, that only large and persistent changes in the real exchange rate induce firms to start exporting products to new markets. This idea is known as *hysteresis* (e.g., Baldwin and Krugman, 1989, Dixit, 1989), and suggests that in the presence of entry costs, a more favorable real exchange rate may not induce entry if the present value of profits is not larger than the entry costs. Therefore, the estimate for this variable may not be statistically significant. Finally, the regressions include the total GDP (PPP) of the destination country, g_{ct}.[15] It is possible that a larger market is more attractive to the introduction of new products if economies of scale are important. However, entering a larger market may be more difficult if establishing distribution channels or differentiating the product from the domestic varieties is more costly than in small markets.

4 Results

Table 4 presents summary statistics for the variables used in the estimations. The original sample consists of 550,422 firm-product-country-year observations for 1991-2001. The actual sample used in this study consists of a little more than 400,000 observations during 1992-2001. Missing observations for the tariff variables effectively reduce the sample size to around 270,000 for the baseline regression given by (8) using the 3-year definition.

Table 5 reports the estimates from the linear probability model given by equation (8) using the 3-year definition. This table shows the regression results with *firm, product, market, and year* fixed-effects. The estimation proceeds in two steps. In the first step the dependent variable is purged from all fixed effects. In the second step

[15] Source: World Development Indicators (World Bank).

this new variable is used as dependent variable to estimate the main regression. Since the dependent variable has been estimated in the first stage, the standard errors have been bootstrapped in the second stage. The estimations drop all observations corresponding to the first year of observations (1991) and the year of entry to the dataset for each firm. The first procedure is needed to define entry of a new export relationship properly. The second one excludes new firms that may be different from the rest of the population, and for which all variables of own experience are zero in the first year.[16]

The estimated coefficients of X_{ipt-1} and X_{ict-1} are positive and statistically significant, which confirms the hypothesis that a firm's past experience with a product or market affects its decision to introduce a new product to a particular market. The estimates suggest that exporting a particular product in the previous period increases the probability that the firm will export the same product to a new market by 20% to 27%, while previous experience in a given market increases the probability of exporting different products to that market by 23% to 28%. In other words, there appears to be evidence that previous export experience reduces entry costs to export markets.

Second, the coefficient of S_{it-1}, a proxy for firm size, is also positive and significant. Thus, larger firms, which are likely to be more productive and earn higher profits, are also more likely to introduce a new product.[17] Interestingly, the likelihood of introducing a new product decreases for the largest firms, as indicated by the negative coefficient corresponding to the square of S_{it-1} in the regressions.

[16] Our results hold even if we include the first year a firm is observed in the estimation.
[17] Alvarez and López (2005) show that larger and more productive plants are more likely to enter export markets for the case of Chile.

Third, there is evidence consistent with the idea that firms may benefit from the experience of other exporters. The estimates show that the probability of exporting a new product-market pair increases when more firms have exported to the same market (N_{ct-1}), or the same product-market pair (N_{pct-1}), in the previous period. This suggests that exporters may learn from each other about consumer tastes, regulatory environment, or distribution channels before entering a foreign market. The coefficient for the number of firms exporting the same product to other markets is positive but not significant.

Table 5 also reveals a positive relationship between a firm's decision to introduce a new product and the size of the destination market (as measured by destination countries' GDP). This implies that firms may benefit from exploiting economies of scale in larger markets. The estimates for the real exchange rate are negative but not always statistically significant, thereby suggesting that real exchange rate movements play little role in a firm's decision to export a new product. This result supports the notion of hysteresis, i.e., that exporters only respond to large and persistent shocks to real exchange rate.[18]

Columns (1) and (2) of Table 5 include the simple average tariff rate for each 3-digit ISIC manufacturing sector and the weighted tariff, respectively. The estimates for these variables are negative but not significant. Column (3) introduces the lagged value of the log of the Herfindahl index. This index measures how concentrated the exports of a firm are. The estimate for this variable is negative and significant confirming that concentration of product-market pairs negatively affects the probability of introducing new products in new markets.

[18] This result is consistent with the finding that the real exchange rate does not explain entry to international markets for the case of Chilean manufacturing plants (see Álvarez and López, 2008).

Table 6 shows the estimates of equation (8) using the 5-year definition. Most of the estimates are comparable to the estimates obtained with the 3-year definition. The only notable difference is that now the estimate for the number of firms exporting the same product to other markets is positive and statistically significant.

5 Robustness Checks

This study performs a large number of tests to check the robustness of the results. Table 7 reports the regression results by interacting country and year fixed effects with sector fixed effects at the 3-digit ISIC level. In other words, the paper estimates the following variant of (8):

$$Y_{ipct} = Z'_{ipct}\alpha + W'_{pct}\beta + \delta_p + \delta_c * \delta_j * \delta_t + u_i + \omega_{ipct},$$

where δ_j are 3-digit ISIC dummy variables.[19] This is done to control for time varying country and sector specific unobserved shocks or characteristics that may have affected the probability of introducing a new product into a particular market and industry. This specification allows controlling for demand shocks that may influence the entry of new product-market pairs among firms. For example, an increase in the demand for wine in the USA may increase the probability that Chilean firms start exporting wine to the USA. Identification in this case comes from changes over time within a destination country and sector.

The regressions results in Table 7, using the 3-year definition, are similar to those obtained with the basic specification and hence, confirm the existence of experience effects – i.e., firms are more likely to introduce a new product based on its past

[19] This specification does not include tariffs since the tariff data used in this paper vary by each 3-digit ISIC industry, destination country, and year.

experience with a product or market, or another firm's experience with the product or market.

The dataset does not have information on firm characteristics, such as productivity. According to theoretical models of trade, productivity is an important determinant of the probability of exporting. Thus, the results may be reflecting the effect of this omitted variable. Since this study can not measure productivity directly, it attempts to control for time-varying firm-specific effects by introducing firm*year fixed effects, in addition to country*sector*year effects. This specification also substitutes the number of other exporters by the value exported by other exporters to check whether it is the number of exporters that matters or the magnitude of their exports. In this specification, identification comes from changes within a firm in each destination market and sector.

The results are given in Table 8, using the 3-year definition. Column (1) shows that the estimated coefficients for firm's previous experience and for other exporters' experience are smaller, but are still positive and statistically significant.

Using the same specification, the paper then examines the role of past experience distinguishing between traditional export industries and non-traditional export industries. If the positive effect from other exporters is the result of unobserved shocks, there should not be any systematic differences between traditional and non-traditional sectors; but if previous experience from other exporters is relatively easier in traditional export industries, then the effect of other exporters on the probability of introducing new products should be larger in these sectors.

To examine this idea this study constructs a "traditionality" index which is defined as:[20]

[20] See, for example, Amin Gutiérrez de Piñeres and Ferrantino (1997).

$$Trad_j = \frac{\sum_{t=t_0}^{t_1} ce_{jt}}{t_1 - t_0 + 1},$$

where t_0=1983, t_1=2001 and ce_{jt} is defined as

$$ce_{jt} = \frac{\sum_{t=t_0}^{t} e_{jt}}{\sum_{t=t_0}^{t_1} e_{jt}},$$

where e_{it} measures exports by industry j at the 3-digit ISIC level and time t. The variable ce_{jt} represents cumulative exports. It takes a value close to zero in the initial period and it rises to 1 in the final period. The traditionally index is the mean of the cumulative exports $ce_{jt.}$ A sector with a higher value of the traditionality index is considered a more traditional export sector.

Column (2) of Table 8 shows that the estimate for this index is not statistically significant and its inclusion does not affect the estimates for the other variables. Column (3) includes interaction terms between each of the three variables measuring the effect of other exporters and the traditionally index to see if the experience of other exporters is more important in traditional sectors. All the estimated coefficients for the interaction terms are positive and significant, indicating that previous experience is more important in traditional sectors. This suggests that firms are more likely to obtain information relevant for introducing new product-market pairs in sectors in which the country already has a comparative advantage.

An additional robustness check is presented in Column (4) of Table 8. It re-estimates the specification in Column (1) using 4-digit level export data instead of 8-digit level. The motivation behind this is that some new product-market pairs at the 8-digit level may be reflecting classification changes or may be products that are very similar to existing ones. The estimated coefficients for previous experience are positive, significant and even higher than what was obtained using the 8-digit level data in

Column 1. The estimates for the number of other exporters are positive but much smaller than those obtained with the 8-digit level data. The real exchange rate does not have any effect while the size of the destination market has a positive effect on the probability of introducing a new product-market pair.

The paper also estimates a regression that includes an indicator variable for the countries that have free trade agreements with Chile (in this case the country dummy is omitted). Chile signed free trade agreements with several countries during the period 1992-2001. These countries are Canada (implemented in 1997), Mexico (1999), Ecuador (1995), Bolivia and Venezuela (1993), and the MERCOSUR (Argentina, Brazil, Paraguay, and Uruguay) (1996). The results, not presented here, indicate that this variable is not statistically significant and its inclusion does not lead to any noticeable changes in the estimates. Finally, the analysis employed a different measure of market size, such as population, but the results are similar to those obtained using GDP as measure of size.

6 Conclusions

This study uses a new firm-level dataset with information on exports by product and destination country to examine the decision to start exporting a new product-market pair. Special attention is given to the role of previous experience of the firm and of other exporters. This study makes two important contributions to the literature. The first contribution is to show that there is enormous heterogeneity in terms of the number of products exported and the number of destination countries targeted by exporters. Some firms export only one product, but other firms export more. Moreover, many firms export to more than one country. The data shows that an important fraction of all firms introduce new products to new markets each year.

The second contribution of this study is to examine, for the first time in the literature, the decision to introduce a new product to a new destination market at the firm level. By doing this we shed some light on the nature of trade costs. The empirical analysis shows that previous experience exporting a certain product, or exporting to a certain market, increases the probability that a firm will export those products to new markets, or export new products to the same markets. The econometric analysis also shows that the likelihood of exporting a new product increases in the number of firms which have exported a certain product or catered to a certain market previously. These findings suggest that previous experience may be an important way to reduce entry costs in new products and in new markets and that entry costs are product, market, and product-market specific.

In addition, larger markets are easier to enter and are therefore more likely to be targeted as destinations for new products. Finally, firm characteristics, such as the size of the firm (total exports) or its export concentration (in terms of product-market pairs) are important determinants of the decision to export new products.

These results suggest that new theoretical models may be needed to explain why there is so much heterogeneity in terms of the number of products exported and the number of destination markets targeted by exporters. The results also suggest that more work is needed to understand why previous experience is an important determinant of new trade relationships. It is possible that firms learn from experience and from the experience of others. If this is the case, then policies aimed to increase the number of exporters may generate additional positive externalities for other firms.

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Table 1: Number of Exporting Firms, Destination Markets and Products Exported

	Exporting Firms	Destination Markets	Products Exported
1991	5,207	113	3,233
1992	5,323	135	3,413
1993	5,343	137	3,491
1994	5,708	131	3,607
1995	5,692	146	3,628
1996	5,699	154	3,854
1997	5,679	158	3,731
1998	5,732	159	3,803
1999	5,917	157	3,752
2000	5,559	162	3,705
2001	5,904	159	3,708
Average 1991-2001	5,615	146	3,630
Change 1991-2001 (Number)	697	46	475
Change 1991-2001 (%)	13.4	40.7	14.7

Source: Authors' elaboration.

Table 2: Share of Firms by Number of Products Exported

Number of Products	1991		1996		2001	
	% Firms	% Value	% Firms	% Value	% Firms	% Value
1	45.1	5.3	40.7	4.0	40.8	6.3
2	14.0	5.5	15.4	9.4	16.0	6.5
3	9.2	9.7	9.6	7.6	9.3	6.7
4	6.3	3.6	5.8	4.9	6.7	8.7
5	4.4	5.9	4.4	2.8	4.2	2.2
6	3.5	4.4	3.2	4.8	3.6	4.2
7	3.1	11.2	2.8	5.6	2.6	2.2
8	2.1	2.4	2.3	1.2	2.2	1.6
9	1.7	1.6	1.6	13.0	2.0	4.1
10	1.3	1.8	1.6	2.9	1.7	7.2
More than 10	9.4	48.6	12.8	43.7	11.0	50.3

Source: Authors' calculations. Note: % Firms: The percentage of firms in each category on the total number of firms in that year. % Value: The percentage of value exported by firms in each category on the total value exported in that year.

Table 3: Share of Firms by Number of Destination Markets

Number of Markets	1991		1996		2001	
	% Firms	% Value	% Firms	% Value	% Firms	% Value
1	61.1	4.7	54.9	3.5	52.8	2.3
2	16.1	3.6	15.8	4.5	15.8	3.5
3	6.7	4.0	7.8	2.6	8.2	2.7
4	4.6	3.1	5.1	3.1	5.6	2.8
5	2.8	3.6	3.1	2.8	3.5	3.1
6	1.7	3.0	2.6	3.3	2.6	3.9
7	1.3	1.7	2.0	2.4	2.0	2.8
8	1.0	2.0	1.6	2.4	1.4	2.8
9	1.1	5.2	1.1	3.8	1.2	3.4
10	0.5	1.8	0.9	1.4	1.1	1.3
More than 10	3.1	67.2	5.0	70.3	5.8	71.4

Source: Authors' calculations. Note: % Firms: The percentage of firms in each category on the total number of firms in that year. % Value: The percentage of value exported by firms in each category on the total value exported in that year.

Table 4: Summary Statistics

	Observations	Mean	Standard Deviation
New Product (3 Year Entry)	404,239	0.312	0.463
New Product (5 Year Entry)	302,209	0.309	0.462
Firm exported the same product in (t-1)	514,064	0.133	0.340
Firm exported to the same market in (t-1)	514,064	0.247	0.431
No. of firms exporting the same product to the same market in (t-1)	514,064	0.051	0.364
No. of firms exporting the same product to other market in (t-1)	514,064	0.030	0.231
No. of firms exporting other products to the same market in (t-1)	514,064	0.013	0.154
(Log) Value of the same product exported to the same market by other firms in (t-1)	555,118	0.168	1.196
(Log) Value of the same product exported to other markets by other firms in (t-1)	555,118	0.121	0.991
(Log) Value of other products exported to the same market by other firms in (t-1)	555,118	0.066	0.789
Lagged Export Value	514,064	8.629	9.300
Lagged Herfindahl Index (Log)	514,064	– 2.377	2.023
Traditionality Index	482,566	0.335	0.053
Simple average tariff rate for the sector	312,802	11.009	6.474
Weighted average tariff rate for the sector	312,724	10.266	6.518
Real Exchange Rate (Log)	507,883	4.628	0.149
Importer GDP-PPP (Log)	509,855	26.965	2.228

Table 5: Probability of Exporting New Products (3 Year Definition) – Linear Probability Model with Product + Firm + Country + Year Fixed Effects

	(1)	(2)	(3)
FIRM'S OWN PREVIOUS EXPERIENCE			
Firm exported the same product in (t-1)	0.20**	0.20**	0.27**
	(4.34)	(4.39)	(6.12)
Firm exported to the same market in (t-1)	0.23**	0.23**	0.28**
	(3.48)	(3.76)	(5.09)
PREVIOUS EXPERIENCE OF OTHERS			
No. of firms that exported the same	0.08**	0.08**	0.07**
product to the same market in (t-1)	(4.16)	(4.26)	(5.07)
No. of firms that exported the same	0.06	0.06	0.05†
product to other markets in (t-1)	(1.57)	(1.56)	(1.68)
No. of firms that exported other products	0.28**	0.28**	0.19**
to the same market in (t-1)	(16.19)	(17.20)	(7.17)
FIRM SIZE			
Lagged Export value (Log)	0.03**	0.03**	0.02**
	(4.07)	(4.48)	(3.09)
Lagged Export value squared (Log)	– 0.00**	– 0.00**	– 0.00*
	(2.84)	(3.11)	(2.12)
REAL EXCHANGE RATE (Log)	– 0.02	– 0.02	– 0.01*
	(1.26)	(1.20)	(2.07)
MARKET SIZE: PPP-adjusted GDP (Log)	0.01**	0.01**	0.01**
	(2.91)	(3.03)	(2.98)
TRADE BARRIERS			
Simple average tariff rate for the sector	– 0.00		
	(1.03)		
Weighted average tariff rate for the sector		– 0.00	
		(1.41)	
EXPORT CONCENTRATION			
Lagged Herfindahl Index (Log)			– 0.04**
			(13.28)
Constant	– 0.38**	– 0.38**	– 0.46**
	(3.09)	(3.18)	(5.00)
R^2 (Adjusted)	0.23	0.23	0.30
Number of Observations	271,605	271,546	401,977

NOTES: Initial year for each firm excluded from all regressions. New entry is defined as a product that is exported for at least 3 years. Bootstrapped standard errors used (200 replications), errors clustered by country. Absolute values of z-statistics in parentheses. **, *, †: significant at 1%, 5%, and 10% respectively.

Table 6: Probability of Exporting New Products (5 Year Definition) – Linear Probability Model with Product + Firm + Country + Year Fixed Effects

	(1)	(2)	(3)
FIRM'S OWN PREVIOUS EXPERIENCE			
Firm exported the same product in (t-1)	0.21**	0.21**	0.28**
	(3.95)	(3.73)	(6.32)
Firm exported to the same market in (t-1)	0.24**	0.24**	0.30**
	(3.58)	(3.37)	(5.36)
PREVIOUS EXPERIENCE OF OTHERS			
No. of firms that exported the same product to the same market in (t-1)	0.09**	0.09**	0.07**
	(5.23)	(4.54)	(6.94)
No. of firms that exported the same product to other markets in (t-1)	0.10**	0.11**	0.08**
	(5.56)	(5.26)	(5.38)
No. of firms that exported other products to the same market in (t-1)	0.30**	0.30**	0.19**
	(19.43)	(18.52)	(5.17)
FIRM SIZE			
Lagged Export value (Log)	0.04**	0.04**	0.03**
	(6.62)	(5.62)	(4.85)
Lagged Export value squared (Log)	– 0.00**	– 0.00**	– 0.00**
	(4.68)	(3.99)	(3.39)
REAL EXCHANGE RATE (Log)	– 0.03	– 0.03	– 0.02†
	(1.41)	(1.48)	(1.90)
MARKET SIZE: PPP-adjusted GDP (Log)	0.01*	0.01**	0.01*
	(2.49)	(2.68)	(2.35)
TRADE BARRIERS			
Simple average tariff rate for the sector	– 0.00		
	(0.94)		
Weighted average tariff rate for the sector		– 0.00	
		(1.18)	
EXPORT CONCENTRATION			
Lagged Herfindahl Index (Log)			– 0.04**
			(14.01)
Constant	– 0.39**	– 0.38**	– 0.46**
	(2.64)	(2.81)	(4.14)
		0.21**	
R^2 (Adjusted)	0.26	0.27	0.33
Number of Observations	189,748	189,689	300,776

NOTES: Initial year for each firm excluded from all regressions. New entry is defined as a product that is exported for at least 5 years. Bootstrapped standard errors used (200 replications), errors clustered by country. Absolute values of z-statistics in parentheses. **, *, †: significant at 1%, 5%, and 10% respectively.

Table 7: Probability of Exporting New Products – Linear Probability Model with Product + Firm + Country x Sector x Year Fixed Effects

	(1) 3 year definition	(2) 5 year definition
FIRM'S OWN PREVIOUS EXPERIENCE		
Firm exported the same product in (t-1)	0.23**	0.24**
	(6.59)	(6.19)
Firm exported to the same market in (t-1)	0.27**	0.29**
	(5.13)	(5.21)
PREVIOUS EXPERIENCE OF OTHERS		
No. of firms that exported the same product to the same market in (t-1)	0.07**	0.07**
	(5.16)	(6.84)
No. of firms that exported the same product to other markets in (t-1)	0.04	0.08**
	(1.56)	(4.66)
No. of firms that exported other products to the same market in (t-1)	0.16**	0.16**
	(6.70)	(4.53)
FIRM SIZE		
Lagged Export value (Log)	0.02**	0.03**
	(4.11)	(6.30)
Lagged Export value squared (Log)	– 0.00**	– 0.00**
	(2.99)	(4.60)
REAL EXCHANGE RATE (Log)	– 0.01	– 0.01
	(1.44)	(1.53)
MARKET SIZE: PPP-adjusted GDP (Log)	0.01**	0.01*
	(2.80)	(2.27)
EXPORT CONCENTRATION		
Lagged Herfindahl Index (Log)	– 0.03**	– 0.03**
	(12.37)	(14.59)
Constant	– 0.45**	– 0.49**
	(4.69)	(3.73)
R^2 (Adjusted)	0.27	0.30
Number of Observations	401,977	300,776

NOTES: Initial year for each firm excluded from all regressions. New entry is defined as a product that is exported for at least 3 years in column (1) and 5 years in column (2). Bootstrapped standard errors used (200 replications), errors clustered by country. Absolute values of z-statistics in parentheses. **, *, †: significant at 1%, 5%, and 10% respectively.

Table 8: Robustness Checks – Linear Probability Model with Product + Firm x Year + Country x Sector x Year Fixed Effects

	(1)	(2)	(3)	[4]
FIRM'S OWN PREVIOUS EXPERIENCE				
Firm exported the same product in (t-1)	0.20**	0.17**	0.17**	0.32**
	(6.88)	(5.42)	(5.60)	(27.21)
Firm exported to the same market in (t-1)	0.25**	0.24**	0.24**	0.39**
	(5.11)	(4.33)	(4.44)	(20.29)
PREVIOUS EXPERIENCE OF OTHERS				
A: (Log) Value of the same product exported to the same market by other firms in (t-1)	0.02**	0.02**	0.01*	0.01**
	(23.55)	(25.81)	(2.41)	(10.97)
B: (Log) Value of the same product exported to other markets by other firms in (t-1)	0.02**	0.02**	0.01	0.01**
	(22.07)	(17.53)	(1.24)	(9.74)
C: (Log) Value of other products exported to the same market by other firms in (t-1)	0.02**	0.02**	0.01	0.01**
	(10.23)	(10.48)	(1.36)	(10.94)
TRADITIONALITY INDEX		0.04	0.03	
		(0.52)	(0.35)	
A x TRADITIONALITY INDEX			0.04**	
			(4.46)	
B x TRADITIONALITY INDEX			0.03*	
			(2.55)	
C x TRADITIONALITY INDEX			0.04*	
			(2.53)	
REAL EXCHANGE RATE (Log)	– 0.00	– 0.01	– 0.01	0.00
	(1.27)	(1.15)	(1.19)	(0.06)
MARKET SIZE: PPP-adjusted GDP (Log)	0.01†	0.01	0.01	0.01*
	(1.78)	(1.56)	(1.55)	(2.40)
Constant	– 0.26**	– 0.29**	– 0.28**	– 0.34**
	(2.79)	(3.52)	(3.57)	(3.44)
R^2 (Adjusted)	0.26	0.24	0.24	0.27
Number of Observations	401,977	351,253	351,253	401,978

NOTES: Initial year for each firm excluded from all regressions. New entry is defined as a product that is exported for at least 3 years. All regressions include Product + Firm x Year + Country x Sector x Year Fixed Effects. Column (1) reports the results of the baseline regression. Column (2) includes a "traditionality" index which distinguishes between traditional and new sectors. Column (3) reports the results after this traditionality index is interacted with the variables that capture the previous experience of other firms. Column (4) re-estimates the regression in column (1) using 4 digit product-level definitions. Bootstrapped standard errors used (200 replications), errors clustered by country. Absolute values of z-statistics in parentheses. **, *, †: significant at 1%, 5%, and 10% respectively.

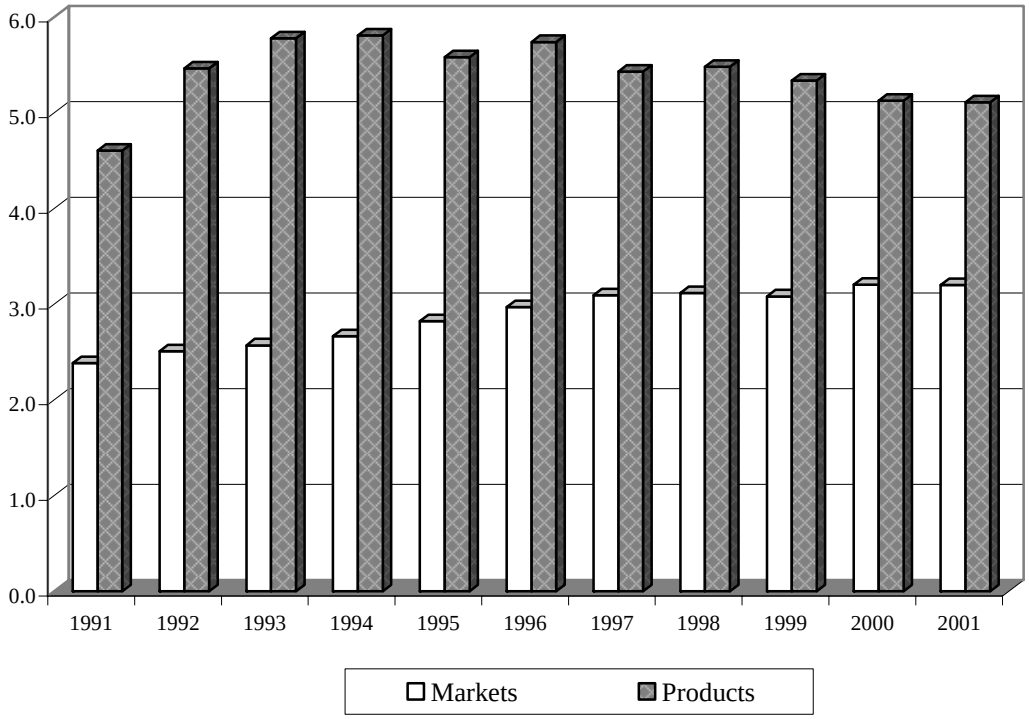

Figure 1: Average Number of Markets per Firm and Products per Firm

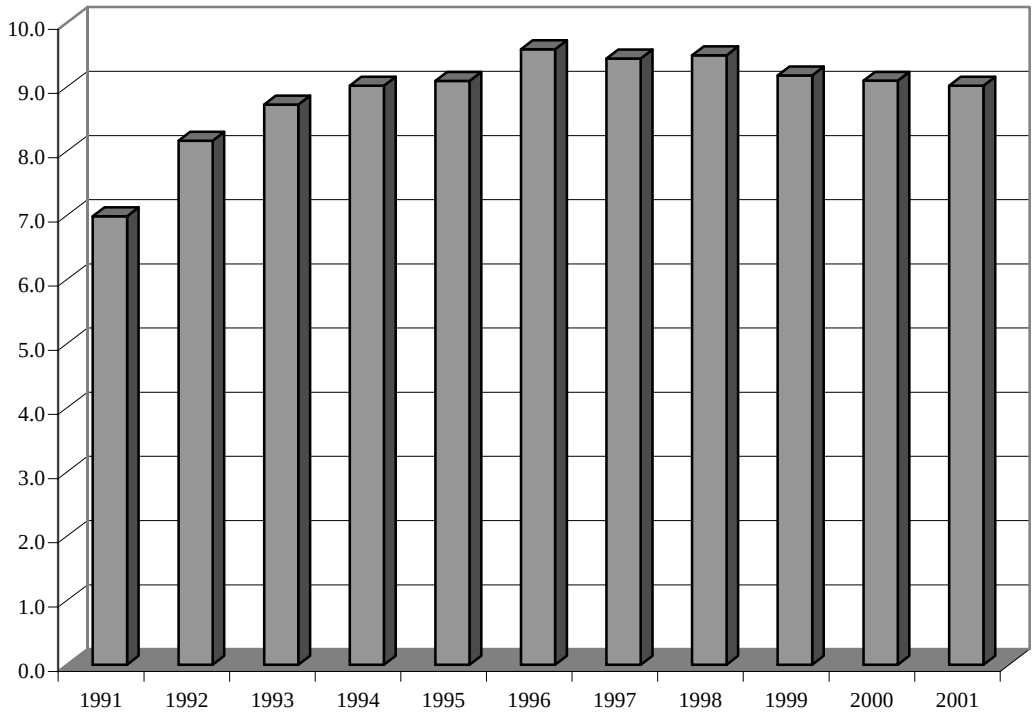

Figure 2: Average Number of Product-Market Pairs per Firm