Banco Central de Chile
Documentos de Trabajo

Central Bank of Chile
Working Papers

N° 536

Diciembre 2009

ENTRY INTO EXPORT MARKETS AND PRODUCT QUALITY DIFFERENCES

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BANCO CENTRAL DE CHILE

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Documento de Trabajo
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Resumen

En este trabajo se utiliza información de empresas exportadoras chilenas para analizar varios aspectos de la relación entre la entrada de firmas a los mercados de exportación y la calidad de los productos exportados. Se encuentra que cada año entra un número importante de agentes a los mercados internacionales, ya sean empresas exportadoras nuevas o existentes que comienzan a exportar un nuevo producto o a un nuevo mercado. Sin embargo, la tasa de supervivencia de estas entradas es bastante baja y cae con el tiempo. Utilizando la diferencia de precios como una medida, aunque imperfecta, de la calidad de los productos, la evidencia muestra que la entrada a los mercados internacionales está asociada generalmente a productos de mayor calidad. Estos diferenciales de precio tienden a reducirse a través del tiempo y desaparecen por completo al cabo de unos tres años. Para identificar mejor este efecto, se explora si existen diferencias sistemáticas entre tipos de productos. Los resultados muestran que, para sectores de productos diferenciados, en los cuales habría mayor espacio para una diferenciación por calidad, los precios que reciben los entrantes tienden a ser relativamente mayores y toman más tiempo en converger con los precios de los exportadores existentes. Estos resultados se mantienen si se corrige por sesgo de selección.

Abstract

Using a rich dataset of Chilean exporters, we analyze several issues related to the relationship between entry into export markets and product quality. We find that every year a large number of new exporting relationships are initiated, with either new firms or existent ones that begin exporting, but the survival rate of these entries is very low and declines over time. Using unit values as a proxy for product quality, our estimations show that entry is generally associated with higher product quality. This higher product quality, however, tends to decline over time and eventually disappears three years after entry. To better identify this effect, we explore whether there are systematic differences across sectors. As expected, for sectors in which quality differentiation may be important, our findings reveal that reference-price and differentiated products show a higher price in the year of entry and it takes longer to converge to the incumbent prices. These results hold after controlling for potential sample selection bias.

We thank Daniel Lederman, Bill Maloney, and an anonymous referee for valuable comments and suggestions. We also thank Waldo Riveras for excellent research assistance.

1. Introduction

Recent trade literature has begun to examine in more detail what determines differences in export quality and what the consequences are. One way to approach to this problem is using prices (unit values) as a proxy for unobserved quality of trade (Schott, 2004; Harding and Javorcik, 2007; Iacovonne and Javorcik, 2008). Assuming that unit values of exports within narrow product categories are a proxy for product quality, the main objective of this paper is to analyze the evolution of these unit value once firms start exporting or introduce a new product-market combination in their export baskets[1]. This evidence is important for understanding whether new exporters require upgrading products quality for competing in international markets successfully.

We address the following questions on this regard: how is the unit-value dynamic once a firm begins to export a new product or an existing product to a new destination? That is, do unit values tend to rise or fall after entry? How do the unit values of new exporting firms compare to those of established (or pre-existing) exporters in the same product category? In the absence of detailed information on exports by firms, products and export destinations, this type of question cannot be answered adequately. To address that, we use a rich dataset with information on Chilean exports by firm, product (8-digit HS), and destination for the period 1991-2001.

In this paper we present several novel stylized facts on the behavior of unit value dynamics once a firm starts a new export relationship. Under our definition, an entrant is defined as a firm exporting for the first time or an established exporter selling a product to a new market. Given the richness of our dataset, we can trace the evolution of export prices over time for each firm initiating a new export relationship. To control for intrinsic

[1] As usual in this literature, unit values are obtained by dividing export value by the quantity exported.

differences in export prices across products, given that quantities are measured in different units, we study how unit values for new exporters differ from prices of incumbents. We are also able to control for firm and market heterogeneity that may drive prices differences across firms and markets. Our results show that entry is generally associated with higher unit values, which would be consistent with the idea that new exporters introduce higher-quality products compared to incumbent exporters. We also find significant differences across sectors. In fact, the positive relationship between entry and unit values is concentrated in certain specific sectors. More interestingly, it seems that there is a systematic relationship according to the types of products. The higher quality of entrants is found for all type of products, but it is especially higher for price-referenced and differentiated products.[2] Given the low survival rate of new exports, there is a potential sample selection bias. We deal with this problem using Wooldridge's (1995) methodology. Our main results are robust when controlling for sample selection.

This work shares some shortcomings with previous literature that has used unit values as proxy for quality. There is some emerging literature suggesting that unit values of exports are not necessarily the best proxy for product "quality" (Schott and Hallak, 2008; Borin and Lamieri, 2007)[3]. Khandelwal (2008) examines quality ladders and develops a demand system where consumer utility depends on product quality, which has two dimensions. One is the "vertical" dimension, whereby products unit values reflect quality. The other dimension is "horizontal," whereby consumers choose among equally priced products that differ only in observed characteristics. In this consumer demand system,

[2] We use the product classification developed by Rauch (1999) and adapted by Berman (2006) to create 3-digit ISIC manufacturing industries.
[3] Silver (2007) also criticizes utilization of unit values, but on different grounds. Her concerns are related to the bias of using unit value for representing prices changes in international trade.

product quality is measured by both unit values (the vertical dimension) and market shares within product categories in a given narrow unit-value range (the horizontal dimension). Thus we could study the evolution of product quality not only in terms of unit values, but also in terms of market shares in foreign markets. The latter would require data on imports or domestic sales in the foreign markets for each product exported by our sample of exporting firms. We do not follow this procedure for two reasons. First, we are interested in presenting generalized facts regarding unit value dynamics, which may be a starting point for using more sophisticated methods to compute unobserved quality. Second, the market share of Chilean manufacturing exports in international markets tends to be relatively low. This suggests that not much information about quality could be provided by using this dimension of the data. In addition, we lack data on total exports and domestic sales in market destinations to calculate those shares.

The rest of the paper is structured as follows. In section 2, we describe the dataset and main facts on new exporting relationships. In section 3, we present the empirical model. In section 4, we show the main results and some extensions. In section 5, we summarize our results and conclude.

2. Data Description and Main Facts

This study uses a detailed firm-level dataset with information on exports by product (at the eight-digit level of the Harmonized System) and destination country for all Chilean exporting firms between 1991 and 2001. The data is collected by customs and covers all exporting firms during the period. A unique feature of this dataset is that it contains the actual value of each firm's shipments and the quantities of each product by individual

market destinations. Thus, it provides an exclusive opportunity to study the performance of new exporting relationships to different destination markets.[4]

This paper uses only information for the manufacturing industry, based on the Harmonized System (HS) classification. For each year the dataset contains exports by firm, destination and product. For the period 1991-2001, the dataset includes, on average 4,780 firms, 140 destinations and 3,415 products, as summarized in Table 1. These three export dimensions show similar increases over time. Between these years, the number of exporting firms had increased from 4,375 firms to more than 5,000. The number of destination markets (countries) from 111 to 151, and the number of products form 3,035 to more than 3,500. Total number of observations[5] available is 460,392.

[TABLE 1 ABOUT HERE]

Given that we want to analyze the evolution of unit value exports for new exporters, we need to define what we consider a new exporter. In this case, we define a new exporting relationship as a case where a firm exports a product to a new market. A firm's new market is an economy where this firm has not exported previously. This may be because this firm has not exported at all or because it has not exported a product to that market.

One problem with the dataset is that we have information since only 1991 and not the complete exporting history of the firms. Thus, for example, we do not know if a firm starting to export in 1992 had exported before the first year in the data set. To minimize the potential effect of this sample truncation, we construct a three-year window of observations. A firm *f* is a new entrant in year *t*, if it is exporting commodity *j* to a market *m* at year *t*, but it had not exported that commodity to that market or country in the previous

[4] Alvarez, Lopez and Faruq (2008) use this same dataset to analyze learning in exporting decisions.
[5] Each year comprises a total number of observations resulting from that particular product by the number of firms, the number of markets and the number of products.

three years. As we need three years for defining "entry" and our data set starts in 1991, the first observation is for the year 1994. We use this procedure for defining entry for the period 1994 to 1998. We restrict the observation to end in 1998 as to have information for three years after the entry in the case of the last cohort of entrants.

2.1 Entry and Survival

Table 2 shows that the number of entries (or new exporting relationships) per year is about 20,000 cases over approximately 45,000 observations. We also show these entries as a percentage of both total exporting relationships and export value. It is interesting note that for every year around half of the export observations correspond to new export relationships. This share is relatively stable over time varying from 45% to 55%, except for the years of the Asian and Russian crises (1998-2000), where the importance of entry in terms of exporting relationships decreased.

[TABLE 2 ABOUT HERE]

However, despite the large number of new exporting relationships initiated each year, the percentage of the value of new exports to total exports is only about 13%. In this dimension, 2001 is an outlier, with the share of new export value equal to 22.5%. This evidence seems to be consistent with some previous evidence decomposing exports on the extensive and the intensive margin, where new exporters tend to be of low importance in terms of total export value (Eaton et al., 2007).

If new exports are relatively important in terms of exporting relationships and export value, it is interesting to look at how they evolve after entry. Our results show that entrants do not last very long as exporters. Table 3a shows the percentage of new exporting relationships who survive in the forthcoming years. For instance, about 25% of new exporters remain exporting the first year after entry. After two and three years, the survival

rate is reduced to only 12% and 8%, respectively. The survival rate is continuously falling, reaching 2% seven years after the entry year. This is however, not surprising and is consistent with a search model of international trade (Besedes, 2008) and with the evidence for the US presented by Besedes and Prusa (2006a and 2006b), where the median duration of exporting is approximately 2 years.[6]

[TABLE 3a THROUGH 3c ABOUT HERE]

However if one divides the entries between new exporters and new market-product combination for existing exporters, the former group includes very few entrants, but about 40% of them survive in the first year and about 20% still survive 5 years later. This means that the low survival rate is due to existing exporters targeting a new market.

In sum, the basic data on Chilean manufacturing exports shows that every year about half of the total number of exporting relationship can be classified as new and they contribute 12% of export value. Nevertheless, the survival rate seems to be very low. After a few years, only about 2% of entries are able to survive, but the survival of actual new exporters is above 50%. The number of new exporters is very small in the sample, compared to total new entries.

2.2 Export Growth Decomposition

Despite the low rate of survival, many firms seem to enter and exit new markets every year. There is an interesting way to explore the contribution to export growth of this entry and exit process. Following Eaton *et al* (2007), we decompose the growth rate of exports, $\Delta X(t,t-1)/\overline{X}(t,t-1)$, in the growth rate of continuing export firms $\Delta x_j(t,t-1)/x_j(t,t-1)$ weighted by their share on total exports, and the contribution of new

[6] Note, however, that these authors use country level data and not firm-level data as use in this paper.

entrants (NEN) minus the contribution of exit firms (NEX). The group of entrants could be decomposed in the number of entrants firms in *t*, times the average export of this group in *t-1* plus the difference between the exports of new entrants in *t* and the average export of the existent firms in *t-1*. Analogously the effect of exit group could be decomposed in the number of firms that stop exporting in *t* times the average exports of firms in *t-1* plus the correction by the fact that dropping firms could be smaller or larger than the average in *t-1*.

$$\frac{\Delta X(t,t-1)}{\overline{X}(t,t-1)} = \left(\frac{\sum_{j\in C}\overline{x}_j(t,t-1)}{\overline{X}(t,t-1)}\right)\left(\frac{\sum_{j\in C}\Delta x_j(t.t-1)}{\sum_{j\in C}\overline{x}_j(t,t-1)}\right) + \frac{NEN\ \overline{x}(t-1)}{\overline{X}(t,t-1)} + \frac{\sum_{j\in EN}[x_j(t.)-\overline{x}(t-1)]}{\overline{X}(t,t-1)} - \frac{NEX\ \overline{x}(t-1)}{\overline{X}(t,t-1)} - \frac{\sum_{j\in EX}[x_j(t.)-\overline{x}(t-1)]}{\overline{X}(t,t-1)}$$

Table 4 exhibits Eaton *et al*. (2007) decomposition for annual data and for the period 1991-2001. Based on the average yearly data, the main contribution to export growth, as in the case of Colombia shown by Eaton *et al.* (2007), comes from continuing firms (the simple annual average is 100.5%). The contribution of entrants for export growth is, on average, almost identical to the contribution of exiting firms.

Interestingly, this decomposition shows a different result when the growth rate of exports for the entire period is analyzed. During the period 1991-2001, manufacturing exports increased 64.3%. However, the contribution of continuing firms declined to about 50%. Surviving new exporters contributed an important amount to the growth of total exports. Even they are not larger than average existing exporter, they contributed with 80% of total exports growth. Subtracting the negative contribution of exit, net entry explains approximately 46% of export growth during the period.

These results are, in general, consistent with the idea that over long periods of time entry is an important contributor to export growth. In the remaining sections of this paper, we explore how entrants differ from incumbents in terms of product quality. This may help

in the understanding of how overall export quality could change due to the entry of higher or lower quality products.

[TABLE 4 ABOUT HERE]

3. The Empirical Model

In this section, we explore the behavior of the unit value of exports for new exporters over time. From a theoretical point of view, it is inconclusive as to what type of relationship one should expect between entry and export unit value. One plausible strategy for new exporters is to enter some specific market by selling a similar good to the one offered by actual exporters, but at a lower price. As they are new, they may need to reduce prices to enter the market. On the other hand, they can enter/dispute the market by offering a product with a higher quality. However, as it takes time for the higher quality to be known in the market, they may not be able to charge higher prices even though they are selling higher quality goods. Thus, even though prices may reflect quality adequately, it is not clear that entry is associated to higher unit values.

To analyze how prices and entry are related, we proceed to estimate a model where prices are regressed on a dummy variable taking the value of 1 for new exporting relationships in the year of entry, as defined in the previous section. To analyze the price dynamics, we include dummy variables for 1, 2 and 3 years after entry.[7] This allows us to test whether entrants introduce products with higher or lower price than incumbents and, whether after entry, relative prices decline or increase.

[7] In non-reported estimations we included dummy variables for more years after entry, but the coefficients were not statistically significant.

There is substantial heterogeneity that we need to control for. First, unit values vary across products because they are measured in different units. To deal with this issue, we define our dependent variable as the unit value relative to the average unit values of firms already exporting the products (what we call incumbents). Thus, the entry coefficient captures price differences respect to the incumbents' average price. Second, price differences may reflect systematic differences in firms and markets characteristics. Then, we include a full set of firm and market fixed effects in our estimations.[8]

Export unit values may also vary with time-varying characteristics of markets. In fact, if high-income countries demand high-quality products, we should find a positive relationship between export prices and importer income per-capita. It may be also argued that high-quality exporters may self-select in exporting to high-income countries. Both arguments imply that we need also control for the income per capita of the importer country. Recent empirical evidence on this has been provided by Bastos and Silva (2008), showing that unit values are higher when exporting to rich countries.

In sum, to describe the dynamics of unit value, we estimate the following equation:

$$p_{ifmt} = \alpha_f + \alpha_m + \alpha_t + \gamma\, y_{mt} + \sum_{e=0}^{T} \beta_e D_e + \varepsilon_{ifmt} \qquad (1)$$

Where p_{ifmt} is the log of the unit value of product *i*, exported by firm *f* to the market *m* in year *t relative to the average unit value of the product i exported by incumbents*; y_{mt} is the log of income per capita of the market *m* at time *t*,; the alphas denote firm, market, and year-specific effects. We are mainly interested in the parameters β_e that capture the price differential between "entrants" and the rest of exporters at the year of entry (e=0) and the price differential for subsequent years (e>0).

[8] Naturally, these firm-specific effects do not control for changes in firm characteristics over time.

We extend this basic equation to include interactions terms between per capita income (in logs) and the dummy variables for entry and post-entry years (equation 2). Following the idea that high-income countries demand high-quality products, we may expect entry prices to be increasing in importer's per capita income. By estimating this equation, we are able to test whether entry of higher quality products is positively associated with importer's income:

$$p_{ifmt} = \alpha_f + \alpha_m + \alpha_t + \sum_{e=0}^{T} \beta_e D_e + \sum_{e=0}^{T} \beta_e D_e \mathrm{y}_{\mathrm{mt}} + \varepsilon_{ifmt} \qquad (2)$$

4. Results

This section presents the unit value dynamics for Chilean exports and the estimation results of equations (1) and (2). To show evidence on how entrants differ from incumbents, Table 5 presents descriptive statistics of our dependent variable: the unit value of entrants relative to the average of incumbents. We also compute this variable relative to the median and the 90th percentile of incumbents. It should be noted in Table 5 that entrant's price is about 25% higher than the average of the incumbents and 65% higher than the median. Compared to the 90th percentile, i.e. for those incumbents' varieties in the top 10% of product quality, entrants charge a price that is approximately 12% lower.

Table 6 presents these descriptive statistics by types of goods. For homogeneous, reference and differentiated goods, the evidence is similar. Entrants seem to be products of higher quality than the average and median incumbent, but of lower quality than the top 10% of incumbents. For homogenous goods, new entrants charge a price close to the average of the incumbents. As can be expected, looking at the standard deviation of these three relative prices, dispersion seems to increase with product differentiation.

[TABLE 5 ABOUT HERE]

[TABLE 6 ABOUT HERE]

First, we estimate an equation including only the importer's per-capita income to show how unit values are positively related to income. We estimate these specifications for the whole sample of the manufacturing industry and separately for each sector using a 3-digit ISIC. By estimating sector specific coefficients, we try to capture the heterogeneity across sectors of the relationship between entry and export quality. Finally, we attempt to provide a more systematic analysis of this relationship by estimating equation (2) for three types of products: homogenous, referenced and differentiated.

Table 7 exhibits the estimation of equations (1) and (2) using robust estimates of the variance-covariance matrix.[9] As expected, the positive parameter of importer income indicates that higher income countries receive higher unit values of new products exported compared to the average. Results in column (1) suggest an income-elasticity of about 0.17, i.e. exporting to a country with a 10% higher per capita income allows charging 1.7% higher prices above the average. This positive relationship is robust to the inclusion of entry and post-entry dummies and interactions between these dummies and per capita income (columns (2) through (5)).

[TABLE 7 ABOUT HERE]

The results in columns (2) and (3) show that new export relationships charge, on average, a 15% more than the average price of the incumbents in the year of entry, 10%

[9] Given that we do not know *a priori* the structure of correlations, we use alternatively clustered errors at country-year and importer-year level.

higher in the first year post-entry, and 5% in the subsequent year.[10] The average price charged by "new exporters" is higher than the average price of incumbents up to the third year after the entry. The coefficients of the dummy variables for four years post-entry (not reported) are not statistically significant. Assuming that unit values are a proxy for product quality, our evidence suggests that exporters enter with a higher quality product than the average quality of the incumbents.

To analyze whether entry prices are associated with importer's income, the last two columns – (4) and (5) – include the interaction effect between income and entry and include years after entry. The results show that coefficients of the dummy variables for entry and post entry years are positive, but are only statistically significant the year of entry and the third post-entry year. In terms of income and entry and post –entry dummies, the coefficients are generally negative, but are also mainly not significant. In general, it seems that importer's income plays no role in explaining differences in entry and post-entry prices further that its overall effect on entrants price.

As our definition of entrants includes firms exporting for first time and exporters with some experience in exporting, we analyze whether there are differences in the results for two types of entrants. To do so, we include an interaction term between entry and dummy variables for firms that had exported at least once in the previous three years to entry. The results, shown in Table 8, show a negative parameter for these interaction terms, suggesting that experienced exporters enter with products of lower quality relative to products of new exporters. This evidence may be consistent with the idea that new exporters need to enter

[10] In percentage terms, the entry effect is given by $100[\exp(\beta_e)-1]$.

into international markets with goods of higher quality to obtain reputation and compete with incumbents and domestic producers.

[TABLE 8 ABOUT HERE]

Estimation by Sectors

One shortcoming of previous estimations is that we are assuming that coefficients are common across different industries (and types of goods). This procedure hides potential substantial heterogeneity of the relationship between entry and export quality. To shed light on this issue, we estimate equation (2) for each manufacturing sector at the 3-digit ISIC. Estimations for each 3-digit industry are reproduced in appendix A.[11]

As expected, the results show that the income coefficients are heterogeneous across sectors. Our previous results indicated an average income coefficient of 0.13 for the aggregate manufacturing industry. Industry-specific regressions show that the coefficient of per capita income is positive for 13 sectors and negative for the other 12 manufacturing industries. Some of the coefficients, however, are estimated with low precision, since they are economically significant but not statistically significant.

Concerning pricing dynamics, we find that most coefficients for entry and post-entry years are not statistically significant. The exception, in some cases, is the coefficient for the entry year. However, given that we are including interaction terms between entry and income, the price (and quality) difference in the entry year depends on the income of the importer country. When this interaction is taken into account (i.e., the derivative of unit value respect to entry dummy evaluated on the average of log income), we find almost always a positive relationship between entry and relative unit values. This result may be

[11] Given that country-year and importer-year clustered errors show similar results, we only present the former estimations in the following estimations.

seen in Figure 1, where we show the entry effect evaluated at the average importer income for each manufacturing sectors.[12] The entry effect is positive for most of the sectors and only slightly negative in two manufacturing industries.

[FIGURE 1 ABOUT HERE]

Results by Types of Goods

We attempt to provide a more systematic analysis of the relationship between entry and export quality by estimating equation (2) for three types of products: homogenous, referenced and differentiated. This classification comes originally from Rauch (1999) and provides a useful and detailed product classification for these three groups: homogenous, commodities with reference price and differentiated products. The first category corresponds to those goods traded on organized exchanges, which are typically called commodities. The second group includes relatively homogenous goods (price could be quoted without mentioning the brand), but they are not traded on organized exchanges. The third category comprises branded goods; i.e. the price quotation is specific to a brand. Given that we have products classified according to 3-digit ISIC industries, we use the matching provided by Berman (2006) of the Rauch's classification from the Standard International Trade Classification (SITC) to the International Standard Industrial classification (ISIC).[13]

A priori we expect that quality should be more important for entry in differentiated goods. Table 9 shows the estimation of equation (2) for each group of products. Given that

[12] This average varies across sectors because exports of each sector differ in terms of market destinations.
[13] The Berman (2007) classification is shown in appendix B.

the marginal effects of entry and post-entry years on unit value depends on the income of the importer country, in Table 10 we present these marginal effects.

[TABLE 9 ABOUT HERE]

These results show that unit value dynamic of new exporters depends on the type of good and the income of the importer country. Table 10 shows the magnitude of the entry effect when evaluating on the average per-capita income for each group. The results are in line with the idea that quality differences could be more relevant for differentiated goods. For homogenous products, new exporters charge prices in the entry year that are, on average, 9% higher than the incumbents. However, they rapidly converge to the average incumbent price, which makes sense given that the elasticity of substitution for this type of goods is high (Broda and Weinstein, 2006).

[TABLE 10 ABOUT HERE]

For the intermediate group, new exporters charge a price that is, on average, 20% higher in the entry year, and then this difference falls slowly in the following years. For differentiated goods, new exporters enter with an average price that is 16% higher than the incumbents' price in the entry year. This effect remains over time, since one year after entering there is still a difference of 12% in favor of the new entrant and then it falls to 4% and 3% the following years. Three years after the entry year, the new exporters sell at prices that are not significantly different than those charged by the incumbents.

In summary, all new entrants charged a higher price than incumbents in the year of entry, but in the case of homogenous goods this difference is smaller. This effect decreases in the following years converging to similar price at the fourth year. This convergence toward incumbent's price is faster for homogenous goods than for the other two groups.

These results confirm that quality seems more important in the so called reference-price and differentiated goods.[14]

Sample Selection Issues

One potential caveat of our results is that we are only estimating the entry and post-entry effects on the sample of surviving entrants. As we show in our previous section, survival rates are vey low. This may introduce a bias in our estimations by considering only surviving export relationships. To address this problem, we follow the procedure developed by Wooldridge (1995) to deal with sample selection in panel data models. First, we estimate a probit model for the survival probability for each year and compute the inverse mills ratio. In the second step, we estimate the fixed effects panel data specification for the unit value equation including the same explanatory variables and adding the inverse mills ratio interacted with year dummy variables. As shown by Wooldridge (1995), the null hypothesis for the absence of sample selection is that the inverse mills ratio is equal to zero.

In the selection equation, we have included several firm characteristics that may affect the chances that a firm product-market combination survives. These explanatory variables are the number of products exported by the firm, number of markets where the firm exports, and total firm exports value (all measured in logs). We also include the log of per-capita income of destination country and two proxy variables for product quality. One is the log of median income for all countries where a firm exports. This may be a proxy for firm-specific products quality, under the assumption that a higher importer income is related to higher demand for high-quality products. In the same vein, we introduce the log of median

[14] Interpretations need to be careful on this regard because the matching between Rauch´s classification and 3-digit ISIC industries is far from perfect.

income of destination countries where a product is exported. This variable is included to control for product-specific quality differences.[15]

Table 11 shows the results for the unit values equation including the Mills ratio on the right hand side. The null hypothesis is the absence of sample selection – the coefficient of the inverse Mills ratio equal to zero – which is rejected at the 10% level for homogeneous and price-referenced goods and at 1% for differentiated goods. However, we find that the parameters of the entry variables and their significance are very similar to those obtained in previous regressions as shown in Table 9. In general, this suggests that previous results are robust to sample selection correction.

Using these estimations, we have also computed the effect of entry and post-entry on unit values. These results are almost identical to those shown in Table 10 and thus they are not presented here for space considerations. In general, even though sample selection may be an important issue in this context, it does not seem to affect our main results.

5. Conclusions

Using a rich dataset of Chilean exporters during the period 1991-2001, we have analyzed several issues related to the relationship between entry into exportation and export quality. Under the assumption that unit values reflect product quality, we have empirically studied the unit value dynamics of new exporting relationships in the Chilean manufacturing industry.

We have found four main generalized facts. First, every year a large number of new exporting relationships are initiated, but they represent a small share of the total value of exports. Second, survival rates seem to be very low. After one year, around one quarter of new exporters is still exporting, but by the next year, only about 12% remains. This survival

[15] The results for the Probit estimations of the selection equation are available upon request.

rate declines steadily over time. Third, entry is generally associated with higher unit values. This would be consistent with the idea that new exports are higher-quality products compared to incumbent export products. However, these quality differences do not persist over time. We fail to find evidence of higher unit values for entrants four years after entry. Fourth, we find significant differences across sectors. Most sectors present a positive effect between price and entry year, but the magnitude varies across sectors. More interestingly, we uncover a systematic relationship based on the types of exported products. Referenced-price and differentiated products show a higher price in the year of entry and it takes longer for them to converge to the incumbent prices, while in the case of homogenous goods, the new exporters enter with a higher price but rapidly converge to the price of the incumbents. The latter evidence can be interpreted as new exporters tending to enter more differentiated product markets with higher quality goods for competition.

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Table 1

Number of Exporting Firms, Destination Markets and Products Exported

Year	Firms	Markets	Products	Observations
1991	4,357	111	3,035	29,922
1992	4,463	127	3,198	36,772
1993	4,556	134	3,271	39,354
1994	4,884	121	3,372	43,630
1995	4,808	138	3,393	43,271
1996	4,824	145	3,608	45,396
1997	4,784	152	3,500	44,590
1998	4,891	148	3,557	45,540
1999	5,034	149	3,512	45,152
2000	4,733	156	3,464	42,207
2001	5,020	151	3,464	44,558
Average 1991-2001	4,780	140	3,415	460,392

Source: Authors' calculations.

Table 2

Entry Rates

	Total entries for:		Entry Rates as percentage of	
Year	New Exporting Relationships	Total Exporting Relationships	Exporting Relationships	Total Export Value
1994	24,031	43,630	55.1	12.2
1995	22,051	43,271	51.0	11.9
1996	23,807	45,396	52.4	13.5
1997	22,120	44,590	49.6	12.8
1998	21,828	45,540	47.9	13.6
1999	21,477	45,152	47.6	10.7
2000	18,726	42,207	44.4	11.5
2001	24,849	44,558	55.8	22.5
Average 1994-2001	22,382	44,320	50.5	13.7

Source: Authors' calculations

Table 3a

Entry and Survival

	% of entrants staying in the market							
	Year							
Entry Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
1994	1.00	0.28	0.15	0.09	0.07	0.05	0.04	0.03
1995		1.00	0.26	0.13	0.08	0.06	0.04	0.03
1996			1.00	0.27	0.15	0.09	0.07	0.05
1997				1.00	0.28	0.14	0.09	0.06
1998					1.00	0.26	0.13	0.08
1999						1.00	0.24	0.12
2000							1.00	0.22
2001								1.00
Entrants	20,060	19,677	20,416	20,080	20,026	19,205	17,560	23,085

Source: Authors' Calculations.

Table 3b

Survival and Entry Type: New Exporter

	% of entrants staying in the market						
	Year						
Entry Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
1995	1.00	0.37	0.28	0.22	0.20	0.18	0.17
1996		1.00	0.35	0.26	0.22	0.18	0.16
1997			1.00	0.35	0.29	0.24	0.20
1998				1.00	0.35	0.27	0.21
1999					1.00	0.38	0.28
2000						1.00	0.34
2001							1.00
Entrants	1,677	1,419	1,456	1,360	1,390	1,433	1,231

Source: Authors' Calculations.

Table 3c:

Survival and Entry Type: New Case Product-Market

	% of entrants staying in the market						
	Year						
Entry Year	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
1995	1.00	0.27	0.13	0.08	0.05	0.04	0.03
1996		1.00	0.26	0.12	0.07	0.05	0.04
1997			1.00	0.26	0.13	0.08	0.06
1998				1.00	0.27	0.14	0.08
1999					1.00	0.25	0.12
2000						1.00	0.24
2001							1.00
Entrants	18,383	18,258	18,960	18,720	18,636	17,772	16,329

Source: Authors' Calculations.

Table 4

Decomposition of the Export Growth

$$\frac{\Delta X(t,t-1)}{\overline{X}(t,t-1)} = \left(\frac{\sum_{j\in C} \overline{x}_j(t,t-1)}{\overline{X}(t,t-1)} \right) \left(\frac{\sum_{j\in C} \Delta x_j(t.t-1)}{\sum_{j\in C} \overline{x}_j(t,t-1)} \right) + \frac{NEN\ \overline{x}(t-1)}{\overline{X}(t,t-1)} + \frac{\sum_{j\in EN}[x_j(t.) - \overline{x}(t-1)]}{\overline{X}(t,t-1)} - \frac{NEX\ \overline{x}(t-1)}{\overline{X}(t,t-1)} - \frac{\sum_{j\in EX}[x_j(t.) - \overline{x}(t-1)]}{\overline{X}(t,t-1)}$$

	Contribution of Continuers			Contribution of Entry			Contribution of Exit			Growth of Exports
	Share		Growth	Added firms		Exports relative to average	Dropped firms		Exports relative to average	
	(1)	(1)*(2)/(7)	(2)	(3)	((3)+(4))/(7)	(4)	(5)	((5)+(6))/(7)	(6)	(7)
1992	92.3%	83.1%	18.7%	40.4%	26.4%	-35.0%	-28.9%	-9.5%	27.0%	20.7%
1993	91.7%	44.0%	3.0%	37.6%	89.3%	-32.1%	-9.0%	-33.3%	6.9%	6.2%
1994	95.0%	96.3%	25.3%	32.8%	10.5%	-30.2%	-8.5%	-6.8%	6.8%	25.0%
1995	94.9%	90.6%	27.9%	25.0%	12.9%	-21.2%	-9.6%	-3.5%	8.6%	29.2%
1996	95.2%	197.6%	-4.4%	30.5%	-152.3%	-27.3%	-13.0%	54.8%	11.9%	-2.1%
1997	92.3%	77.0%	8.0%	27.2%	35.4%	-23.8%	-11.8%	-12.3%	10.6%	9.5%
1998	94.7%	71.5%	2.3%	28.0%	84.0%	-25.5%	-12.1%	-55.5%	10.4%	3.0%
1999	95.6%	90.3%	5.8%	27.9%	32.1%	-25.9%	-13.4%	-22.4%	12.0%	6.1%
2000	91.3%	92.3%	14.4%	22.5%	19.5%	-19.7%	-15.0%	-11.8%	13.4%	14.3%
2001	97.5%	162.1%	4.4%	27.0%	72.2%	-25.1%	-18.1%	-134.3%	14.5%	2.7%
Simple Average	94.1%	100.5%	10.5%	29.9%	23.0%	-26.6%	-13.9%	-23.5%	12.2%	11.5%
1991-2001	61.37%	53.75%	56.31%	51.51%	83.2%	2.02%	-42.88%	-37.0%	19.10%	64.30%

Source: Authors' estimations. In the equation, X denotes total exports; Δ is the first difference operator. Sub index *j* represents firm, C, EN, EX is the sets of continuing (exported in *t* and *t-1*), entry (exported in *t* but not in *t-1*) and exit firms (exported in *t-1* but not in t), respectively. NEN and NEX is the number of entry and exit firms, respectively. X□(*t,t-1*) represents the average of total exports in *t* and *t-1*.

Table 5

Relative Prices of Entrants

	Mean	*s.d.*
P/Mean	1.256	1.847
P/Median	1.659	2.381
P/P(90)	0.882	1.525

Table 6

Relative Prices by Types of Goods

	Homogeneous		*Reference*		*Differentiated*	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
P/Mean	1.052	0.923	1.248	1.851	1.352	2.136
P/Median	1.192	1.138	1.693	2.455	1.868	2.730
P/P(90)	0.775	0.758	0.906	1.527	0.926	1.774

Table 7

Price Equation: Full Sample

	(1)	(2)	(3)	(4)	(5)
Importer Income (log)	0.171	0.133	0.133	0.136	0.136
	(2.82)**	(2.18)*	(2.41)*	(2.24)*	(2.47)*
Entry Year		0.149	0.149	0.204	0.204
		(21.48)**	(22.33)**	(5.05)**	(4.94)**
Entry Year+1		0.095	0.095	0.087	0.087
		(12.45)**	(11.99)**	(1.84)	(1.85)
Entry Year+2		0.046	0.046	0.069	0.069
		(5.02)**	(5.80)**	(1.19)	(1.47)
Entry Year+3		0.042	0.042	0.184	0.184
		(3.73)**	(4.20)**	(2.61)**	(2.70)**
Income*Entry Year				-0.006	-0.006
				(1.40)	(1.36)
Income*Entry Year+1				0.001	0.001
				(0.19)	(0.19)
Income*Entry Year+2				-0.003	-0.003
				(0.41)	(0.47)
Income*Entry Year+3				-0.017	-0.017
				(2.09)*	(2.05)*
Constant	-0.754	-0.719	-0.719	-0.755	-0.755
	(2.07)*	(1.97)*	(2.20)*	(2.07)*	(2.29)*
Clustered errors	Firm-year	Firm-year	Country-year	Firm-year	Country-year
Observations	302797	302797	302797	302797	302797
R-squared	0.22	0.22	0.22	0.22	0.22

Robust t statistics in parentheses. * significant at 5%; ** significant at 1%. Firm and market fixed effects are included but not reported.

Table 8

Price Equation and Entrant Type: Full Sample

	(1)	*(2)*
Importer Income (log)	0.129	0.133
	(2.13)*	(2.19)*
Entry Year	0.177	0.229
	(11.97)**	(5.39)**
Entry Year+1	0.216	0.199
	(14.32)**	(4.09)**
Entry Year+2	0.100	0.120
	(5.67)**	(2.02)*
Entry Year+3	0.043	0.183
	(1.82)	(2.53)*
Entry Year*Experience	-0.024	-0.024
	(1.70)	(1.70)
Entry Year+1*Experience	-0.157	-0.157
	(10.19)**	(10.21)**
Entry Year+2*Experience	-0.068	-0.068
	(3.50)**	(3.49)**
Entry Year+3*Experience	0.003	0.004
	(0.13)	(0.16)
Income*Entry Year		-0.006
		(1.32)
Income*Entry Year+1		0.002
		(0.38)
Income*Entry Year+2		-0.002
		(0.35)
Income*Entry Year+3		-0.017
		(2.08)*
Constant	-0.713	-0.748
	(1.96)	(2.05)*
Clustered errors	Firm-year	Firm-year
Observations	302797	302797
R-squared	0.22	0.22

Robust t statistics in parentheses. * significant at 5%; ** significant at 1%. Experience is dummy variable for firms that had exported at least once in the previous three years to entry. Firm and market fixed effects are included but not reported.

Table 9

Price Equation by the Degree of Product Differentiation

	Homogeneous	Reference	Differentiated
Importer Income (log)	0.265	-0.006	-0.003
	(3.73)**	(0.06)	(0.04)
Entry Year	0.258	0.399	0.055
	(5.63)**	(5.25)**	(0.80)
Entry Year+1	0.100	0.110	0.011
	(1.77)	(0.93)	(0.15)
Entry Year+2	0.066	0.152	0.078
	(0.99)	(1.24)	(0.84)
Entry Year+3	-0.017	0.342	0.336
	(0.19)	(2.35)*	(2.58)*
Income*Entry Year	-0.019	-0.024	0.013
	(3.73)**	(2.76)**	(1.51)
Income*Entry Year+1	-0.008	-0.001	0.013
	(1.35)	(0.09)	(1.59)
Income*Entry Year+2	-0.004	-0.009	-0.005
	(0.57)	(0.64)	(0.42)
Income*Entry Year+3	0.005	-0.032	-0.037
	(0.53)	(2.12)*	(2.34)*
Constant	-1.354	0.254	1.099
	(3.26)**	(0.33)	(1.60)
Observations	78998	47932	168749
R-squared	0.26	0.34	0.25

Robust t statistics in parentheses. * significant at 5%; ** significant at 1%. Firm and market fixed effects are included but not reported.

Table 10

Unit Value Dynamics by Type of Product

	Parameter	t-test
Homogeneous		
Entry Year	0.09	13.32
Entry Year +1	0,03	3.51
Entry Year+2	0,03	2.95
Entry Year+3	0,03	2.52
Reference		
Entry Year	0.20	12.66
Entry Year +1	0.10	4.83
Entry Year+2	0.08	3.91
Entry Year+3	0.07	2.84
Differentiated		
Entry Year	0.16	15.74
Entry Year +1	0.12	10.69
Entry Year+2	0.04	3.01
Entry Year+3	0.03	1.49

Table 11

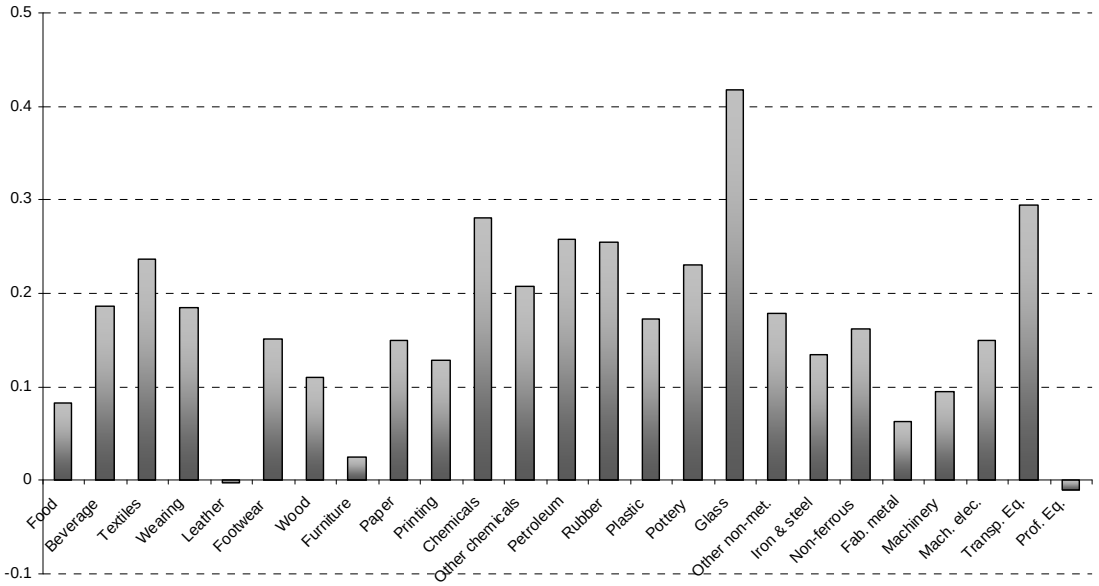
Price Equation by the Degree of Product Differentiation, Sample Selection Model

	Homogeneous	*Reference*	*Differentiated*
Importer Income (log)	0.256	-0.065	-0.039
	(2.95)**	(0.52)	(0.32)
Entry Year	0.254	0.393	0.044
	(6.01)**	(5.25)**	(0.62)
Entry Year+1	0.090	0.104	-0.002
	(1.76)	(0.86)	(0.03)
Entry Year+2	0.063	0.141	0.070
	(1.05)	(1.06)	(0.79)
Entry Year+3	-0.012	0.359	0.325
	(0.13)	(2.23)*	(2.56)*
Income*Entry Year	-0.019	-0.023	0.014
	(3.91)**	(2.72)**	(1.63)
Income*Entry Year+1	-0.007	-0.001	0.015
	(1.29)	(0.05)	(1.62)
Income*Entry Year+2	-0.004	-0.007	-0.004
	(0.61)	(0.51)	(0.34)
Income*Entry Year+3	0.005	-0.034	-0.036
	(0.48)	(2.05)*	(2.33)*
Constant	-1.275	0.747	1.483
	(1.42)	(0.58)	(1.21)
Mills ratio	-0.066	-0.132	-0.274
	(1.62)	(1.84)	(6.33)**
Observations	78998	47932	168749

Robust z-statistics in parentheses. Bootstrapped standard errors with 200 repetitions. * significant at 5%; ** significant at 1%. Firm and market fixed effects are included but not reported.

Figure 1

Entry Coefficient across Manufacturing Industries



Appendix A

Estimation by 3-digit ISIC Industries

	Food	Beverage	Textiles	Wearing	Leather	Footwear	Wood	Furniture	Paper	Printing & Pub.	Industrial chemicals	Other chemicals	Petroleum refineries
Income (log)	0.282	0.206	0.260	0.448	0.159	-0.259	-0.036	0.500	0.257	0.014	0.204	-0.268	-0.651
	(4.07)**	(1.95)	(1.39)	(1.90)	(0.29)	(0.72)	(0.16)	(0.61)	(0.95)	(0.06)	(1.35)	(1.31)	(0.84)
Entry Year	0.242	0.223	-0.015	-0.234	-0.827	0.342	0.083	-0.906	0.264	0.187	-0.004	0.752	1.112
	(4.92)**	(2.42)*	(0.13)	(2.06)*	(1.86)	(1.62)	(0.56)	(1.98)*	(1.38)	(0.95)	(0.03)	(5.05)**	(1.93)
Entry Year+1	0.099	0.030	0.297	-0.035	0.016	-0.367	-0.000	-0.276	-0.087	0.222	-0.263	0.487	0.381
	(1.68)	(0.38)	(1.68)	(0.24)	(0.03)	(1.22)	(0.00)	(0.50)	(0.38)	(0.89)	(1.36)	(2.79)**	(0.71)
Entry Year+2	0.047	-0.169	0.001	-0.087	0.156	-0.623	0.013	0.323	-0.381	0.267	-0.182	0.131	0.599
	(0.70)	(1.87)	(0.01)	(0.50)	(0.29)	(1.64)	(0.07)	(0.49)	(1.15)	(0.74)	(0.78)	(0.61)	(0.83)
Entry Year+3	-0.036	-0.083	-0.001	0.021	-1.257	0.005	-0.442	1.863	0.158	0.832	-0.027	0.106	-1.076
	(0.39)	(0.82)	(0.00)	(0.08)	(1.99)*	(0.01)	(2.13)*	(2.03)*	(0.45)	(2.59)*	(0.12)	(0.45)	(1.26)
Inc.*Entry Year	-0.018	-0.004	0.031	0.052	0.098	-0.024	0.003	0.105	-0.014	-0.007	0.035	-0.069	-0.104
	(3.33)**	(0.35)	(2.27)*	(3.95)**	(1.97)	(0.98)	(0.20)	(2.06)*	(0.58)	(0.30)	(1.96)	(3.63)**	(1.57)
Inc.*Entry Year+1	-0.008	0.008	-0.032	0.010	-0.008	0.051	0.004	0.023	0.017	-0.009	0.037	-0.052	-0.031
	(1.34)	(0.98)	(1.54)	(0.53)	(0.15)	(1.31)	(0.20)	(0.36)	(0.58)	(0.29)	(1.67)	(2.29)*	(0.50)
Inc.*Entry Year+2	-0.002	0.024	-0.002	0.012	-0.019	0.083	-0.001	-0.054	0.053	-0.021	0.021	-0.015	-0.049
	(0.33)	(2.36)*	(0.07)	(0.56)	(0.31)	(1.72)	(0.04)	(0.72)	(1.31)	(0.50)	(0.76)	(0.58)	(0.55)
Inc.*Entry Year+3	0.007	0.012	0.003	-0.007	0.127	-0.025	0.054	-0.224	-0.016	-0.092	0.006	-0.011	0.154
	(0.66)	(1.09)	(0.11)	(0.22)	(1.78)	(0.28)	(2.34)*	(2.17)*	(0.35)	(2.38)*	(0.25)	(0.36)	(1.47)
Constant	-2.019	-1.586	-1.577	-2.041	-1.674	2.284	0.505	-1.204	-2.180	0.168	-2.031	3.106	7.125
	(3.24)**	(1.64)	(0.93)	(1.55)	(0.30)	(1.61)	(0.25)	(0.25)	(0.77)	(0.13)	(1.30)	(2.83)**	(0.88)
Observations	74483	16045	15806	18122	3142	2332	9929	4288	8112	10399	9971	20812	1684
R-squared	0.25	0.46	0.39	0.40	0.50	0.55	0.43	0.64	0.35	0.48	0.32	0.38	0.52

	Rubber	Plastic	Pottery	Glass	Other non-metallic	Iron & steel	Non-ferrous	Fabricated metal	Machinery	Machinery elec.	Transport equ.	Prof. & scientific eq
Income (log)	0.023	-0.406	-1.152	0.327	-0.307	-0.894	-0.315	0.162	-0.159	-0.059	0.463	-0.161
	(0.06)	(0.96)	(1.42)	(0.30)	(0.45)	(1.34)	(1.35)	(0.61)	(0.37)	(0.17)	(0.73)	(0.23)
Entry Year	0.141	0.676	-0.349	1.575	0.171	0.265	0.060	-0.365	0.121	0.141	1.405	0.553
	(0.43)	(2.14)*	(0.75)	(2.51)*	(0.33)	(0.71)	(0.24)	(1.48)	(0.54)	(0.58)	(2.81)**	(1.36)
Entry Year+1	0.122	0.117	-0.801	1.257	0.541	0.383	-0.137	-0.761	0.376	0.268	1.102	0.241
	(0.27)	(0.29)	(1.63)	(1.52)	(1.01)	(0.97)	(0.54)	(2.93)**	(1.04)	(0.98)	(1.64)	(0.35)
Entry Year+2	-0.139	-0.043	-0.463	1.112	0.409	-0.074	0.007	0.237	-0.194	0.213	-0.236	0.191
	(0.23)	(0.08)	(0.78)	(1.02)	(0.63)	(0.15)	(0.02)	(0.54)	(0.35)	(0.38)	(0.24)	(0.23)
Entry Year+3	0.559	0.193	1.439	0.741	0.387	1.522	0.484	-0.413	0.915	0.696	0.903	1.459
	(0.63)	(0.32)	(2.17)*	(0.40)	(0.29)	(2.13)*	(1.12)	(0.80)	(1.43)	(1.08)	(0.95)	(1.65)
Inc.*Entry Year	0.014	-0.062	0.065	-0.138	0.001	-0.016	0.012	0.051	-0.003	0.001	-0.131	-0.064
	(0.36)	(1.53)	(1.25)	(1.86)	(0.02)	(0.35)	(0.42)	(1.73)	(0.12)	(0.04)	(2.23)*	(1.36)
Inc.*Entry Year+1	0.012	0.004	0.104	-0.122	-0.050	-0.050	0.020	0.101	-0.021	-0.003	-0.104	-0.028
	(0.21)	(0.07)	(1.84)	(1.27)	(0.79)	(1.01)	(0.66)	(3.26)**	(0.50)	(0.08)	(1.35)	(0.35)
Inc.*Entry Year+2	0.028	0.030	0.052	-0.119	-0.053	0.008	0.005	-0.026	0.021	-0.008	0.047	-0.034
	(0.37)	(0.45)	(0.78)	(0.91)	(0.64)	(0.13)	(0.14)	(0.49)	(0.32)	(0.13)	(0.42)	(0.35)
Inc.*Entry Year+3	-0.062	-0.002	-0.129	-0.083	-0.058	-0.173	-0.046	0.058	-0.124	-0.082	-0.102	-0.198
	(0.55)	(0.03)	(1.75)	(0.34)	(0.37)	(1.88)	(0.97)	(0.97)	(1.60)	(1.02)	(0.94)	(1.85)
Constant	-2.202	6.265	6.033	-3.322	3.601	3.784	0.967	1.802	2.836	3.002	-0.863	0.669
	(0.59)	(1.39)	(1.58)	(0.29)	(0.51)	(1.03)	(0.70)	(0.80)	(0.61)	(0.98)	(0.27)	(0.20)
Observations	6477	11682	1751	1968	1843	3155	2831	21550	21531	15510	6382	5720
R-squared	0.38	0.47	0.60	0.50	0.52	0.39	0.48	0.32	0.32	0.33	0.54	0.42

Robust t statistics in parentheses. * significant at 5%

Appendix B

Industry Classification

ISIC Number	*Description*	*Rauch Classification*
311	Food	H
313	Beverages	R
314	Tobacco	R
321	Textiles	D
322	Wearing	D
323	Leather	D
324	Footwear	D
331	Wood	D
332	Furniture	D
341	Paper	R
342	Printing & Pub.	D
351	Industrial chemicals	R
352	Other chemicals	D
353	Petroleum refineries	H
354	Petroleum & coal	R
355	Rubber	D
356	Plastic	R
361	Pottery	D
362	Glass	R
369	Other non-metallic	D
371	Iron & steel	D
372	Non-ferrous	H
381	Fabricated metal	D
382	Machinery	D
383	Machinery elec.	D
384	Transport equipment	D
385	Prof. & scientific equipment	D
390	Other manuf.	D

Source: Berman (2006)

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