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# How do Firms in Argentina get Financing to Export?

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# ¿How do firms in Argentina get financing to export?

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**Abstract**

This paper delves into the importance of access to financing for the performance of firms in export markets. Based on a unique microeconomic database that combines data on Argentine firms' characteristics and export performance with information on their domestic and external financing, we provide a rich insight into their financing patterns. Through the use of a descriptive and econometric analysis, we find that: i) having more access to bank credit facilitates firms' entry into export markets, ii) once they become exporters, it is the access to foreign financing what seems to matters for their success in foreign markets. Also, to study the duration of firms in export markets, we estimate survival functions by firm size, using the Kaplan-Meier estimator. We find that the probability of firms' survival in export markets increases with their size in the earlier years of exporting. Once firms become regular exporters, their permanece in export markets seems to less dependent on their size.

*JEL Classification codes: F10, F13, G20, G28*
*Keywords: Credit constraints, bank credit, international trade*

# Contents

# 1 Introduction

Identifying the factors that drive firms' export dynamism is crucial for the design of policies aimed at facilitating their entry into export markets. A quite established fact in the literature is that exporting involves high entry costs. To enter export markets firms have to invest on acquiring information about specific market characteristics, setting up distribution networks and adapting their products to different market standards, preferences and needs. So, to become exporters or gain access to new markets, firms must have access to enough liquidity to afford these entry costs and credit constraints become a potentially limiting factor for their entry and development in foreign markets.

A growing literature has recently focused on assessing the importance of access to financing for firms' export performance; it has mostly provided theoretical support to this intuition (Chaney, 2005 and Manova, 2012) and less vastly, some empirical evidence at the firm level (Muûls, 2008; Manova et al., 2011; Minetti and Zhu, 2011).

In spite of the relevance of the issue, we know very little, or nothing, about the way firms finance their exporting activity in Argentina. This paper is a first attempt to fill in this blank. Based on the construction of a rich microeconomic data base that combines data on firms' characteristics and export activity with information on their domestic and foreign financing and their characteristics, we provide a deep insight into the financing patterns of exporting firms in Argentina and also evaluate the importance of access to financing in explaining firms' entry and their performance in export markets.

# 2 Export performance and credit constraints: a brief review of the literature

This paper relates to a growing literature that analyzes the effects of financial market imperfections on firms' export performance (see, for example, Chaney, 2005; Manova, 2012). Models in this vein are based on the heterogeneous-firm model developed by Melitz (2003) that assumes that firms are heterogeneous in productivity and face both variable and fixed costs. In the absence of credit constraints these models predict that only firms above a certain level of productivity will be able to become exporters. The introduction of credit constraints in Melitz's framework could interact with heterogeneity, reinforcing the selection of the most productive firms, since they are the only ones

that earn sufficiently large profits to offer their creditors a high probability of repayment and thus get financing to enter foreign markets.

While in Melitz's framework differences in exporting performance across firms arise due to their heterogeneity in productivity, the predictions of these models were initially tested using variation in financial development across countries and variation in financial vulnerability across sectors (Manova, 2012). A scant number of studies has recently addressed this shortcoming, providing evidence at the firm level (Greenaway et al., 2007; Muûls, 2008; Manova et al. 2011; Minetti and Zhu, 2011). In these papers firms' balance sheet data are used to proxy firms' credit constraints.

We contribute to this literature by using a very rich data set that allows us to study in great detail the incidence of financial frictions on export performance through the use of firm level data on two sources of financing that are particularly relevant for the export activity: (i) domestic bank credit and (ii) foreign financing.

As stressed by Manova (2010), having established a bank relationship is necessary for firms to enter and participate in export markets, since the exporting activity usually requires the use of bank services and bank guarantees. Thus, we can expect access to domestic bank credit and bank relationship to be important for the probability of firms to enter export markets.

The asymmetric information problems that characterize the borrower-lender relationship can be an important channel through which financial markets frictions can affect export behavior. The fact that firms' productivity is unobservable can restrict their access to financing and thus limit their entry into export markets. This problem can be particularly acute for small and medium sized enterprises (SME), that mostly rely on bank financing due to their opaqueness. In this case, banks become important entities in their role of gathering information about debtors to overcome information asymmetries, and bank relationships become relevant.

Firms can be heterogeneous in their access to foreign financing and this can also be important for their probability of entering remote markets or widening the variety of products they sell abroad. In this regard, the empirical evidence indicates that foreign-owned firms and joint ventures can benefit from their access to internal funding from their parent company and thus exhibit a better export performance relative to domestic firms (Manova et al., 2009). Having access to detailed data about firms' foreign debt and their creditors will allow us to research this issue.

## 2.1 Lending relationships

In frictionless financial markets the interest rate adjust to equate demand and supply. But this is unfortunately a strong assumption. Actually, lenders know very little about borrowers' prospects. Let us suppose that there are two firms, whose projects differ in their risk profile. Optimally, the lender could charge a lower interest rate to the safest project and a higher interest rate to the riskiest one. But lenders usually find hard to distinguish between the two and thus charge the average interest rate. This solution benefits the riskier applicants (the *adverse selection* problem) or induces borrowers to choose riskier projects (the *moral hazard* problem). Thus, lenders may choose to ration the quantity of loans and some firms will be credit constrained.

In this environment, establishing a close relationship with a lender can alleviate the informational problem faced by some firms.

On the one hand, developing a close relationship with financial entities can facilitate the screening and reveal important information, enhancing future credit conditions for firms. With a sample of small US firms Petersen and Rajan (1994) find that establishing close ties with an institutional creditor increases the availability of credit for firms. On the other hand, a reverse argument is that it also gives a monopoly power to the lender who could exploit these informational rents (Schenone, 2009).

Lenders can also deal with the problem of heterogeneous borrowers under imperfect information and offer contracts with different provisions (collateral requirement, charged interest rate, size of the loan) in order to induce borrowers' self-selection (see Freixas and Rochet, 1995). The prediction of these models is that the most productive firms (those whose projects exhibit a high probability of success) will offer banks a higher collateral to reduce their interest rate payments. Thus, for firms that are more opaque (SMEs in general) the percentage of firms' collateralized bank debt could be informative about firms' creditworthiness. It has also been argued that under moral hazard, productivity and collateral can exhibit a negative relationship. In fact, Bebczuk and Sangiácomo (2010) confirm this hypothesis using data on commercial loans to Argentine firms.

While the recent literature on trade and finance has given evidence that credit constraints are an important determinant of global trade patterns, establishing lending relationships could be a crucial device for firms to enter foreign markets (Manova, 2009).

# 3 A first insight into the problem

## 3.1 The data

Our data set comprises information at the firm level for firms producing tradable goods, coming from four different sources: (i) custom data on export values and destination by firm; (ii) data on firms' number of employees coming from the tax agency (AFIP); (iii) the amount and characteristics of firms' debt with domestic banks, coming from the "Central de Deudores" of the BCRA and (iv) information on firms' foreign debt and creditor characteristics (BCRA). Combining these four sources of information we are able to construct a database for 38,207 Argentine firms containing annual information for the period 2001-2006 on: (i) firms' characteristics such as the number of employees and sector (ii) firms' export values by product and destination (iii) the amount and characteristics of firms' debt with domestic banks as well the number of creditors and their institutional characteristics (bank relationship) and (iv) data on firms' foreign debt and foreign creditor characteristics.[1]

Firms' balance sheet data were also collected from the "Central de Deudores", complemented with data from the Stock Exchange for a subset of firms, but a descriptive analysis revealed that this subset of firms is quite biased to the largest firms. Thus we decided to focus on the complete sample.

## 3.2 Descriptive analysis

As a first insight to the problem we conduct descriptive analysis to find the relevant patterns in the data.[2] We clustered firms by their size, measured by the number of employees. We found three groups in the sample which we named $CL1$, $CL2$ and $CL3$.[3] Figure 1 compares the cluster grouping vs. quantile segregation. We note significant differences since in a rough comparison $CL1$ is smaller than quantile 1 ($Q1$), $CL2$ integrates quantile 2 and quantile 3 and $CL3$ combines quantile 4 and quantile 5. We preferred

[1] We provide a detailed description of the information contained in our database in Appendix 1.

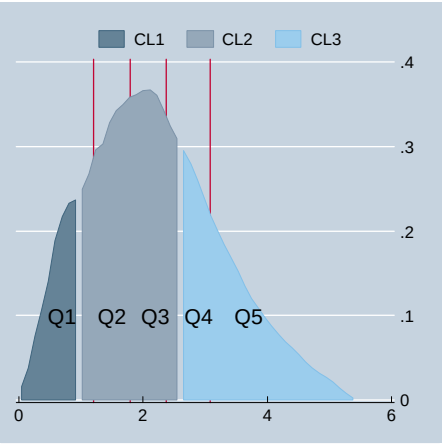
[2] Previous to this, we conducted an extensive preparatory groundwork to overcome drawbacks in the raw information. After this preliminary work, we excluded from the sample those firms whose figures for the number of employees, export values and bank debt where on the 98 percentile of the distribution.

[3] We used the *fastclust* procedure in SAS to find the relevant groups in the data.

to use the cluster grouping, which joints firm by proximity according to a relevant criterion rather than arbitrarily separate then in quantile.

Size is a relevant characteristic of firms in the two dimensions we have focused on: export performance and access to financing. On the one hand, the literature on export behavior provides ample evidence that size positively correlates to firms' productivity and export performance. On the other hand, we know from the literature on financial market imperfections that firms' access to financing positively relates to their size, probably due to the fact that the smallest firms are usually the most opaque.

**Figure 1.** Cluster vs. quantile




Figures 2 to 4 below are quite illustrative in this respect: If we compare between exporters and non-exporters (Figure 2), the portion of exporting firms grows with firm size. If we look within the exporting firms, we find that their permanence in the exporting activity (% years of exporting within the sample period, in Figure 3) also increases with firms' size.

**Figure 2.** Exporters and non-exporters by cluster

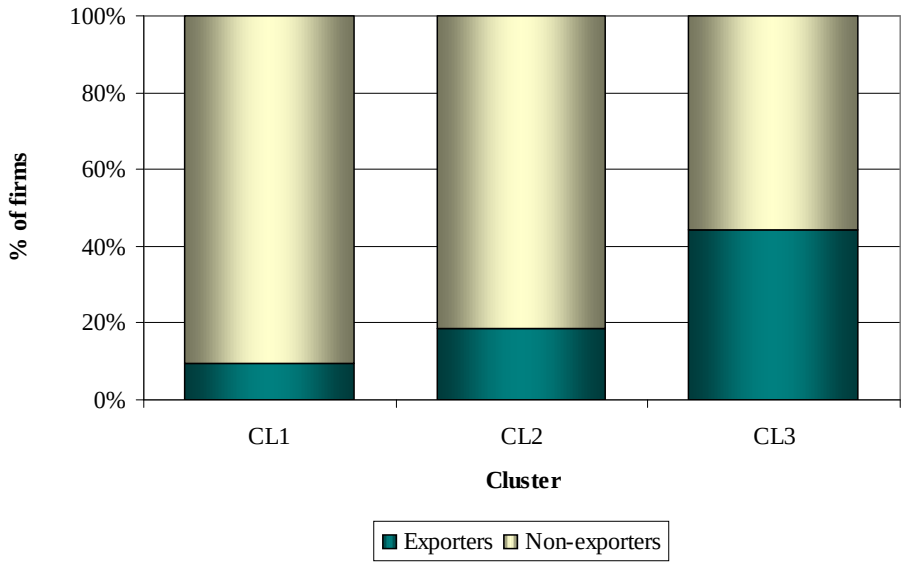
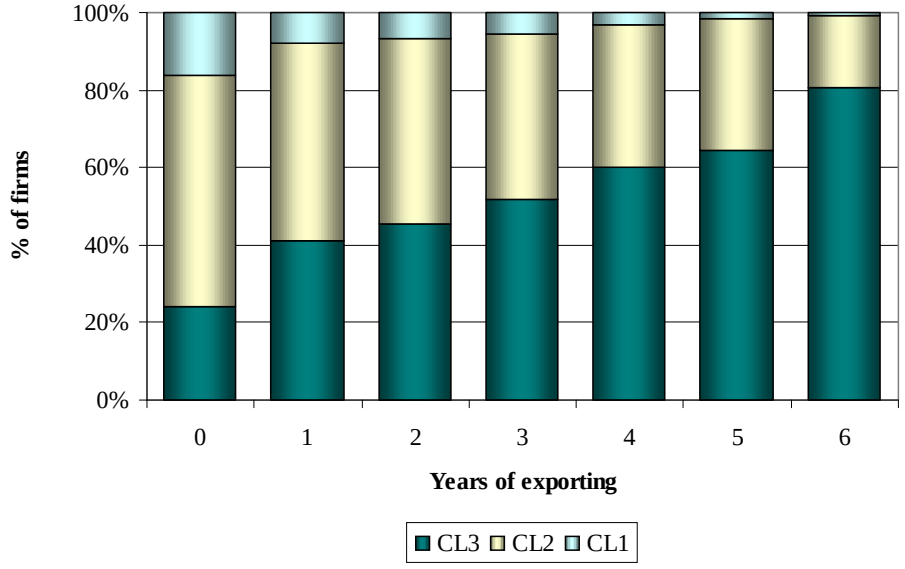
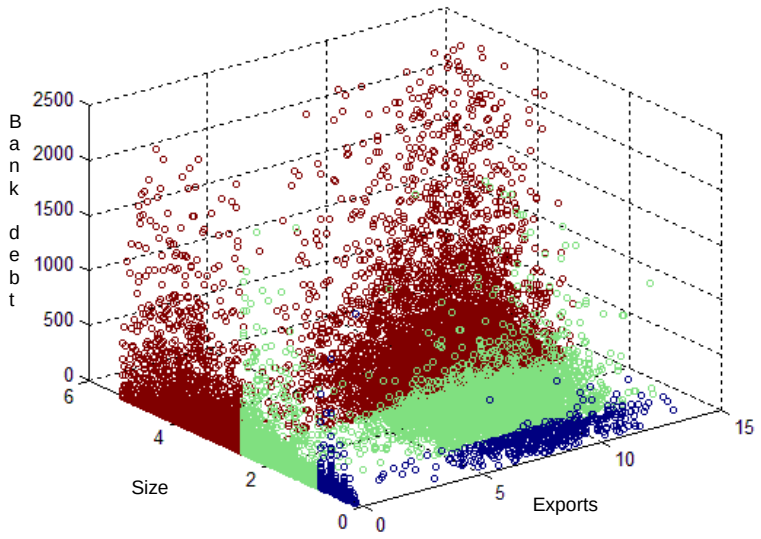



**Figure 3.** Years of exporting by cluster



In Figure 4 the mean values of size, volume of exports and bank debt by exporting firm identified by cluster are depicted ($CL1$: blue; $CL2$: green; $CL3$: red). They clearly indicate that firms' size and bank debt are positively related to export volumes.

**Figure 4**. Firms' characteristics by cluster




A simple way of measuring the strengths of the links of firms with domestic creditors is to look at how concentrated their bank debt is in a few financial institutions, calculating a Herfindhal index on their bank debt by creditor. In Table 1, we look at these figures for the total number of firms in our sample and split them by cluster. In line with the findings in the literature on bank relationship, we find an inverse relation between the concentration of bank debt and firm size. Firms pertaining to cluster 1 (the smallest ones) exhibit a high degree of concentration of their bank debt in very few financial institutions (the Herfindahl index is near to one). Bank debt of firms in cluster 3 is the least concentrated but it's worth mentioning that they rely on a few banks as a source of domestic financing. Finally, firms in cluster 2 are somewhere in between.

**Table 1.** Bank debt Herfindahl index

| Year | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| 2001 | 0.673 | 0.804 | 0.761 | 0.639 |
| 2002 | 0.773 | 0.934 | 0.826 | 0.758 |
| 2003 | 0.802 | 0.964 | 0.877 | 0.779 |
| 2004 | 0.800 | 0.931 | 0.887 | 0.770 |
| 2005 | 0.789 | 0.939 | 0.880 | 0.753 |
| 2006 | 0.783 | 0.918 | 0.866 | 0.744 |

We use information on firms debt with domestic banks and with foreign creditors to construct different measures of the strength of firms' relationship with domestic and foreign entities and their access to domestic and foreign financing. We expect smaller firms to have less access to credit and weaker relationships with domestic and foreign lenders due to their opacity.

Additionally, we construct three measures of bank relationship: (i) the number of bank credit lines they have in use, (ii) the percentage of bank credit granted that firms effectively use and (iii) the number of banks they operate with. Although (iii) is widely used by the literature on bank relationship lending, its interpretation is not straightforward. While developing close single bank relationships can help lessen information asymmetries between banks and firms, particularly for SMEs that are known to be quite opaque, developing multiple bank relationships can also facilitate information exchange across lenders, helping to reduce the informational problem faced by firms. Given this ambiguity in the interpretation of (iii), we rely more heavily on (i) and (ii) as indicators of firms' opacity.

It is difficult to assess whether a firm is rationed or not, since we only observe equilibria. In our case, given that exporting requires bearing an important delivery and fixed cost, we assume that firms without access to bank financing are rationed.

In Table 2 we look at the differences between exporters and non-exporters ordered by cluster in terms of their size, use of domestic bank financing and opacity. In line with the findings in the literature and with previous studies for Argentina, the data confirm that exporters are larger than non-exporters.[4]

[4]In this regard see, Castagnino (2010).

Approximately half of $CL3$ is composed of exporting firms (44%). Looking at firms access to bank financing and the strength of their relationship with banks, the proportion of rationed firms (not having any relationship with banks) which decreases with firm size, is much lower for exporters. Exporters have larger bank debt and use bank credit more intensively in terms of both the percentage of granted financing they use and the number of credit lines in use. Also, they operate with more banks than non-exporters.

**Table 2.** Exporters vs. Non-exporters

| | **Exporters** | | | **Non-exporters** | | |
|---|---|---|---|---|---|---|
| | CL1 | CL2 | CL3 | CL1 | CL2 | CL3 |
| Number of firms | 477 | 3,898 | 5,432 | 4,553 | 17,048 | 6,799 |
| Exporters (% total) | 9% | 19% | 44% | | | |
| Size | 1.9 | 7.7 | 44.6 | 1.9 | 6.6 | 32.7 |
| Rationed firms | 188 | 921 | 436 | 2,611 | 7,188 | 1,396 |
| Rationed firms (%) | 39% | 24% | 8% | 57% | 42% | 21% |
| Domestic bank credit (log) | 2.604 | 3.297 | 4.574 | 2.263 | 2.785 | 3.788 |
| Number of credit lines | 0.82 | 1.05 | 1.42 | 0.81 | 0.91 | 1.13 |
| Number of financial entities | 0.78 | 1.01 | 1.69 | 0.72 | 0.85 | 1.23 |
| Collateral pledging | 28% | 27% | 25% | 36% | 31% | 29% |

Regarding firms' relationship with foreign lenders, we expect these indicators to be more relevant for firms that have already entered export markets. Manova (2009) points out that the access to foreign credit usually requires having established relationships with domestic banks. Thus, access to domestic bank credit can be particularly important for firms to start exporting but it loses importance once they become exporters.

In Table 3, we focus on exporting firms and compare the figures for exporters to developed markets vs. those for firms not entering these markets. We verify again that export performance improves with size: 46% of cluster 3, the group of the largest firms, export to developed countries. However when we compare the two groups of firms within the same cluster, they are not very different in terms of their domestic bank debt, use of bank credit or

bank relationship. The important differences appear when we look at their access to foreign financing: exporters to developed countries rely more on foreign financing relative to domestic bank credit, they operate with more foreign lenders, they also exhibit a much larger number of operations with them and have a significantly larger amount of foreign credit.

**Table 3.** Exporters entering vs. exporters not entering Developed Countries

| | **Exporters to DC** | | | **Non-exporters to DC** | | |
|---|---|---|---|---|---|---|
| | CL1 | CL2 | CL3 | CL1 | CL2 | CL3 |
| Number of firms | 183 | 1,330 | 2,490 | 294 | 2,568 | 2,942 |
| Exporters to DC (% total) | 38% | 34% | 46% | | | |
| Size | 1.9 | 7.7 | 50.5 | 1.9 | 7.7 | 39.6 |
| Domestic bank credit (log) | 2.567 | 3.359 | 4.683 | 2.629 | 3.265 | 4.479 |
| Number of credit lines | 0.75 | 1.07 | 1.44 | 0.88 | 1.04 | 1.40 |
| Number of financial entities | 0.65 | 0.98 | 1.68 | 0.87 | 1.03 | 1.70 |
| Collateral pledging | 25% | 25% | 25% | 29% | 28% | 26% |
| Foreign debt | 30.9% | 33.3% | 41.3% | 18.1% | 16.9% | 21.8% |
| Foreign transactions | 0.57 | 0.91 | 2.46 | 0.17 | 0.26 | 0.58 |
| Foreign creditors | 0.21 | 0.34 | 0.86 | 0.086 | 0.098 | 0.216 |
| Foreign trade credit (log) | 2.542 | 3.572 | 5.896 | 1.225 | 1.558 | 2.652 |

We find very similar patterns when we compare the figures for exporters to Mercosur with those of firms exporting to other regions (Table 4). The two groups are not very different in terms of firm size and bank debt, but they exhibit large differences in terms of their access to foreign financing: Exporters to remote destinations operate with a much larger number of foreign lenders, they exhibit a large number of operations and their amounts of foreign credit are much higher.

**Table 4.** Mercosur exporters vs. exporters entering markets other than Mercosur.

| | **Mercosur** | | | **Entering other than Mercosur** | | |
|---|---|---|---|---|---|---|
| | CL1 | CL2 | CL3 | CL1 | CL2 | CL3 |
| Number of firms | 268 | 2,476 | 3,441 | 209 | 1,422 | 1,991 |
| Exporters to Mercosur (% total) | 56% | 64% | 63% | | | |
| Size | 1.9 | 7.8 | 42.8 | 2.0 | 7.5 | 47.6 |
| Domestic bank credit (log) | 2.681 | 3.274 | 4.567 | 2.506 | 3.339 | 4.587 |
| Number of credit lines | 0.85 | 1.05 | 1.42 | 0.80 | 1.05 | 1.41 |
| Number of financial entities | 0.86 | 1.04 | 1.72 | 0.68 | 0.98 | 1.63 |
| Collateral pledging | 28% | 28% | 25% | 27% | 24% | 25% |
| Foreign debt | 21.1% | 20.4% | 27.9% | 26.7% | 26.9% | 36.5% |
| Foreign transactions | 0.19 | 0.35 | 0.79 | 0.50 | 0.70 | 2.57 |
| Foreign creditors | 0.11 | 0.14 | 0.31 | 0.17 | 0.26 | 0.86 |
| Foreign trade credit (log) | 1.497 | 1.996 | 3.594 | 2.030 | 2.678 | 5.081 |

### 3.2.1 Patterns in financing for exporters

Bank credit and foreign debt are not the only sources of financing of firms in Argentina. In fact, some empirical evidence suggests that firms' investment in Argentina heavily relies on self financing.[5] But, as we argue below, there are reasons to believe that exporting is somehow particular in this respect

[5] See in this respect Natke P. (1999), Elosegui et al. (2007), Bebczuk and Garegnani (2007) and Bebczuk et al. (2011).

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and requires firms having bank guarantees and a certain access to foreign financing. In Table 5 we look at the relative importance of bank and foreign debt for exporting firms. The figures indicate that foreign financing is relatively more important than bank credit as a source of financing for exporters. However, the importance of bank credit relative to foreign financing has increased over the sample period, excluding the figures for 2001 and 2002, that are quite atypical due to the external and financial crisis that hit Argentina at that time.

**Table 5.** Domestic bank credit and foreign financing (% of total).

| Year | Bank | Foreign credit |
|---|---|---|
| 2003 | 19.8 | 80.2 |
| 2004 | 26.9 | 73.1 |
| 2005 | 35.1 | 64.9 |
| 2006 | 40.9 | 59.1 |

Focusing on the provision of funds to exporters by domestic banks, we look at the relative importance of banks classified by ownership as suppliers of credit. Due to their global coverage, foreign-owned banks can exhibit some advantages as credit providers for exporters. In Table 6, we split the bank debt of exporting firms by bank ownership. In 2001 and 2002 foreign banks were the main providers of financing to exporters (62%), but this reversed over the subsequent years. Domestic private banks increased their market share and reached 51% in 2006. It is important to point out that the pattern we find in our sample reflects a more general phenomenon, i.e. is the fact that many subsidiaries of international banks were acquired by domestic owners after the crisis.[6]

[6]The market share of foreign-owned banks in the bank credit market declined from 51% in 2001 to 37% in 2006, while domestic private banks increased their share in this market from 19% in 2001 to 35% in 2006. In fact, the banking sector went through a restructuring process after the financial crisis of 2001, under which some local subsidiaries of international banks were acquired by domestically-owned financial institutions.

**Table 6.** % of bank credit to exporting firms by bank ownership.

| Year | State-owned | Domestic Private | Foreign Private | Credit unions |
|---|---|---|---|---|
| 2001 | 13.7 | 23.4 | 62.4 | 0.5 |
| 2002 | 24.1 | 26.3 | 49.2 | 0.4 |
| 2003 | 27.7 | 32.1 | 40.0 | 0.2 |
| 2004 | 24.7 | 42.3 | 32.6 | 0.4 |
| 2005 | 22.1 | 47.3 | 30.4 | 0.3 |
| 2006 | 18.2 | 51.3 | 30.3 | 0.2 |

Table 7 focuses on the composition of foreign financing for exporters by type of creditor. It shows that banks and related companies are the most important foreign providers of funds for exporting firms. According to the evidence in the literature (Manova, 2010), access to credit from their related companies abroad positively impacts the export performance of multinational subsidiaries relative to domestically-owned firms.

**Table 7.** Foreign financing by lender type (in %).

| Year | Financial entity | Related company | Supplier | Client | Other |
|---|---|---|---|---|---|
| 2001 | 38.5 | 38.9 | 5.6 | 3.1 | 13.9 |
| 2002 | 44.6 | 36.0 | 5.8 | 1.7 | 11.8 |
| 2003 | 45.2 | 35.2 | 5.0 | 1.7 | 12.9 |
| 2004 | 45.4 | 32.4 | 7.0 | 2.0 | 13.1 |
| 2005 | 39.6 | 37.3 | 7.2 | 2.0 | 14.0 |
| 2006 | 36.8 | 38.8 | 7.5 | 2.9 | 14.0 |

In Table 8, we show the same information but splitting firms into exporters to non-developed and developed countries. While foreign financing mostly comes from related companies in the case of firms that only export to non-developed countries, foreign financial entities are the main credit providers for exporters to developed countries.

**Table 8**. Foreign credit by lender type: Exporters to non-developed and developed countries (in %).

| | Non-developed | | | | | Developed | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Related company | Client | Supplier | Financial entity | Other | Related company | Client | Supplier | Financial entity | Other |
| 2001 | 45.9 | 1.8 | 5.6 | 26.6 | 20.1 | 36.0 | 3.4 | 5.6 | 43.5 | 11.6 |
| 2002 | 43.5 | 1.2 | 6.1 | 27.0 | 22.2 | 32.7 | 1.8 | 5.6 | 51.4 | 8.5 |
| 2003 | 46.3 | 1.0 | 5.9 | 30.3 | 16.6 | 31.3 | 1.9 | 4.7 | 50.6 | 11.5 |
| 2004 | 36.3 | 1.9 | 11.5 | 29.6 | 20.8 | 28.9 | 2.0 | 5.4 | 53.4 | 10.4 |
| 2005 | 45.4 | 2.2 | 9.8 | 21.4 | 21.2 | 32.0 | 1.8 | 6.0 | 49.1 | 11.1 |
| 2006 | 50.1 | 3.2 | 9.6 | 20.2 | 16.9 | 33.3 | 2.6 | 6.5 | 45.0 | 12.6 |

The splitting of exporters into Mercosur exporters and those exporting to more remote markets (Table 9) reveals a similar pattern. Mercosur exporters mostly rely on foreign financing from related companies, while the main providers of foreign credit to firms exporting to other destinations are financial entities.

**Table 9**. Foreign credit by lender type: Mercosur exporters vs. exporters entering markets other than Mercosur (in %).

| | Entering other than Mercosur | | | | | Mercosur | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Related company | Client | Supplier | Financial entity | Other | Related company | Client | Supplier | Financial entity | Other |
| 2001 | 32.6 | 2.3 | 4.4 | 47.5 | 13.2 | 45.1 | 4.7 | 6.7 | 29.4 | 14.1 |
| 2002 | 33.0 | 1.4 | 4.8 | 52.7 | 8.1 | 39.2 | 2.2 | 6.9 | 34.6 | 17.1 |
| 2003 | 32.5 | 1.8 | 4.1 | 52.1 | 9.6 | 37.8 | 1.3 | 6.2 | 36.9 | 17.8 |
| 2004 | 32.1 | 2.4 | 5.2 | 50.9 | 9.4 | 33.2 | 1.4 | 9.2 | 35.9 | 20.4 |
| 2005 | 35.1 | 2.1 | 6.4 | 44.6 | 11.8 | 40.9 | 1.9 | 8.2 | 30.9 | 18.2 |
| 2006 | 36.9 | 2.7 | 6.9 | 39.9 | 13.6 | 41.2 | 3.1 | 8.2 | 33.0 | 14.5 |

### 3.2.2 Some patterns in export performance

One way of measuring the export performance of Argentine firms consists in analyzing their behavior at the extensive (quantity of markets) and intensive (quantity of products) margins. To provide an insight in this respect, we have classified firms according to the quantity of markets (products) they export to in groups from 1 to 5, with the last one containing six or more[7] (markets / products). Then, we built transition matrices between years taking into account only the firms that export within that period (as our sample ranges from 2001 to 2006 we have 5 different periods), and compute the percentage of firms that improve their situation, i.e., in the current year they export to more markets (products) than in the previous one, as well as the percentage of firms that keep their situation unchanged, and the percentage of firms whose situation worsens.

We present a summary of the results in Table 10. Over 2001 and 2002 the country experienced a major external and financial crisis, the Convertibility was abandoned and there was a sharp depreciation of the currency. As expected, we do not find significant improvements (only about 25% of cases) in these two years. In contrast, we have found that the period 2003-2004 is the best in terms of improvements in both markets (37%) and products (32%).

[7] We chose to group firms in the last tranche because only the top 10% of firms exceeded this quantity of markets (and the top 25% in the case of products).

**Table 10**. Export performance (in %).

| Period | Markets | | | Products | | |
|---|---|---|---|---|---|---|
| | Improve | Unchanged | Worsen | Improve | Unchanged | Worsen |
| 2001-2002 | 25.7 | 46.7 | 27.6 | 24.9 | 47.4 | 27.7 |
| 2002-2003 | 30.2 | 47.2 | 22.7 | 26.8 | 45.9 | 27.3 |
| 2003-2004 | 36.7 | 46.0 | 17.3 | 32.0 | 47.5 | 20.5 |
| 2004-2005 | 27.1 | 51.5 | 21.4 | 25.0 | 51.8 | 23.2 |
| 2005-2006 | 26.1 | 52.7 | 21.1 | 24.3 | 52.8 | 23.0 |

# 4 Econometric analysis

Since the direction of causality between access to financing and export performance is not obvious from a theoretical point of view, econometrically testing this relationship is in general subject to endogeneity problems. In this regard, the exercises developed in this section do not aim at providing empirical evidence of a causal relationship between access to financing and export performance. Rather, they intend to find patterns in this relationship.

According to the models developed by Chaney (2005) and Manova (2006) , credit constrains can limit firms' access to the liquidity required to bear the fixed costs of entering export markets. We can denote by $\Delta\pi_i$ the difference between firm $i$ operating profits when exporting relative to its operating profits when not exporting. This distance can be explained by firm's characteristics such as productivity or size and credit constraints.

$$\Delta\pi_i = \alpha + C_i\beta + Z_i\gamma + \eta_i \tag{1}$$

In (1) the $C_i's$ are different measures of credit constraints, the $Z_i's$ are observed firms' characteristics and $\eta_i$ reflects unobserved firms' characteristics as well as other unobserved factors affecting $\Delta\pi_i$.

Given the differential costs of exporting, firms will be able to enter export markets if $\Delta\pi_i$ is positive.

Thus, the probability of a firm to begin exporting can be written as:

$$prob(export = 1) = prob(\alpha + C_i\beta + Z_i\gamma + \eta_i > 0) = \varphi(\alpha + C_i\beta + Z_i\gamma + \eta_i) \quad (2)$$

We estimate a linear probability model for equation (2) with the dependent variable being a dummy variable that takes the value 1 if firm's $i$ export volume at time $t$ is greater than 0; and 0 otherwise. So, a firm could be treated as exporter in some years and as non-exporter in others. In our case the $C_i's$ are different measures of firms' access to domestic bank financing and strength of bank relationship: the log of bank debt, the % of collateralized bank debt, the number of banks the firms operate with, and the Herfindhal index as a measure of concentration of firms' bank debt in a reduced/large number of financial institutions.[8] The variable controlling for the heterogeneity in firms' characteristics is firms' size, measured by the log of the number of employees. A problem we face when estimating equation (2) is that the $C_i'$ as well a firms' size can be endogenous to firms' productivity, which is unobserved. To alleviate the problem we use lagged values of size and the different measures of access to financing.

We estimated a Fixed Effects Panel Data model for equation (2) for the total sample and the three clusters ($CLi$, with $i = 1, 2, 3$ indicating the respective cluster), as a way to control for unobserved heterogeneity across firms.

Our results (Table 11) confirm that size is positively (and significantly) related to the likelihood of being an exporting firm both, for the full sample and for each of the different clusters. Controlling for size, the results indicate that having more access to (domestic) financial services facilitates the entrance of firms in export markets, except for the smallest firms in the sample belonging to cluster 1. It is worth noting that firms in this cluster are mostly non-exporters.

[8] The different proxies of access to financing and bank relationship were incorporated in all the excercise presented in this section, For the sake of brevity, we only present those estimations for which they were statistically significant.

**Table 11.** Exporters vs. non-exporters.

| Dummy Export | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | 0.0396*** | 0.0112* | 0.0310*** | 0.0477*** |
| | [0.00217] | [0.00615] | [0.00282] | [0.00382] |
| Domestic bank credit $_{(t-1)}$ | 0.00170*** | -0.00511** | 0.00224** | 0.00202** |
| | [0.000607] | [0.00216] | [0.000915] | [0.000935] |
| Constant | 0.0617*** | 0.0317*** | 0.0296*** | 0.125*** |
| | [0.00520] | [0.00730] | [0.00563] | [0.0128] |
| Observations | 139,844 | 15,238 | 73,672 | 50,934 |
| Number of firms | 37,718 | 4,930 | 20,694 | 12,094 |
| $R^2$ | 0.011 | 0.003 | 0.009 | 0.016 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets
*** Significant at 1%, ** at 5%, * at 10%.

Second, we focus on firms' performance in export markets in terms of destinations, export volumes and product diversity, depending on their access to domestic and foreign financing. Our guess is that once firms enter foreign markets, access to domestic banks services and financing becomes less relevant and it is the availability of foreign financing what matters to explain differences in performance across firms.[9] Thus, to research the issue, we keep only the exporting firms (those for which the export dummy variable equals 1). In this case the dependent variables are different measures of export performance: the number of destinations, exports' volume and the number of products exported.

We find that except for the smallest firms in the sample (those in cluster 1) size positively relates to the number of destinations firms export to, i.e. the largest firms export to a higher number of destinations. Also, having controlled by firm size, the amount of foreign financing is positively related to the number of destinations firms export to (Table 12).

[9] Altough we do not report these results for the sake of brevity, the level of bank debt (Access to bank financial services) becomes insignificant once we restrict the sample to exporting firms.

**Table 12.** Number of destinations.

| Detinations' number | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | 0.445*** | -0.0329 | 0.393*** | 0.473*** |
| | [0.0384] | [0.224] | [0.0577] | [0.0497] |
| Foreign credit $_{(t-1)}$ | 0.0358*** | -0.000688 | 0.0254*** | 0.0386*** |
| | [0.00330] | [0.0201] | [0.00554] | [0.00409] |
| Constant | 0.924*** | 1.476*** | 0.994*** | 0.871*** |
| | [0.114] | [0.268] | [0.118] | [0.175] |
| Observations | 25,221 | 721 | 8,073 | 16,427 |
| Number of firms | 8,724 | 368 | 3,357 | 4,999 |
| $R^2$ | 0.086 | 0.017 | 0.067 | 0.095 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets

*** Significant at 1%, ** at 5%, * at 10%.

The same happens when we look at the volume of exports. Having controlled by size, the amount of foreign credit positively relates to the volumes that firms export, except for firms in cluster 1 (Table 13).

**Table 13.** Volume of exports.

| Exports' volume | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | 0.296*** | -0.0874 | 0.247*** | 0.323*** |
| | [0.0309] | [0.233] | [0.0569] | [0.0374] |
| Foreign credit $_{(t-1)}$ | 0.0143*** | -0.0309 | 0.0120** | 0.0152*** |
| | [0.00266] | [0.0209] | [0.00546] | [0.00308] |
| Constant | 9.186*** | 9.360*** | 9.019*** | 9.251*** |
| | [0.0918] | [0.278] | [0.117] | [0.132] |
| Observations | 25,221 | 721 | 8,073 | 16,427 |
| Number of firms | 8,724 | 368 | 3,357 | 4,999 |
| $R^2$ | 0.095 | 0.053 | 0.067 | 0.110 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets

*** Significant at 1%, ** at 5%, * at 10%.

Finally, after controlling for size, firms with a larger amount of foreign financing export a higher number of products (Table 14). Note that again the coefficient of foreign financing is not significant for the smallest firms in the sample.

**Table 14.** Number of products.

| Products' number | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | 1.279*** | 0.645 | 0.734*** | 1.525*** |
| | [0.127] | [0.993] | [0.161] | [0.169] |
| Foreign credit $_{(t-1)}$ | 0.0511*** | 0.00710 | 0.0257* | 0.0579*** |
| | [0.0109] | [0.0888] | [0.0155] | [0.0139] |
| Constant | 0.972*** | 2.812** | 1.996*** | 0.130 |
| | [0.376] | [1.185] | [0.330] | [0.595] |
| Observations | 25,221 | 721 | 8,073 | 16,427 |
| Number of firms | 8,724 | 368 | 3,357 | 4,999 |
| $R^2$ | 0.020 | 0.008 | 0.013 | 0.023 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets

*** Significant at 1%, ** at 5%, * at 10%.

We also analyze if the ability of firms to export to more developed and remote markets is related to their access to foreign financing by estimating linear probability models. For this purpose, we use two dummy variables taking value 1 if: (i) a firm exports to a developed country –NAFTA (exc. Mexico) and EU-15- or; (ii) a firm exports exclusively to a Mercosur country or Chile and zero otherwise.

Results indicate that firms entering developed and more remote destinations, once we control for firm size, are those with larger amounts of foreign financing (Table 15 and Table 16, respectively). Again these relationships are not significant for the smallest firms in the sample.

**Table 15.** Developed countries.

| Developed country | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | 0.0285*** | -0.0577 | 0.0341** | 0.0273*** |
| | [0.00816] | [0.0610] | [0.0136] | [0.0102] |
| Foreign credit $_{(t-1)}$ | 0.000557 | -0.00648 | -0.00213 | 0.00157* |
| | [0.000701] | [0.00546] | [0.00130] | [0.000843] |
| Constant | 0.223*** | 0.389*** | 0.210*** | 0.224*** |
| | [0.0242] | [0.0728] | [0.0278] | [0.0361] |
| Observations | 25,221 | 721 | 8,073 | 16,427 |
| Number of firms | 8,724 | 368 | 3,357 | 4,999 |
| $R^2$ | 0.002 | 0.010 | 0.003 | 0.003 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets
*** Significant at 1%, ** at 5%, * at 10%.

**Table 16.** Mercosur plus Chile.

| Mercosur + Chile | Total | CL1 | CL2 | CL3 |
|---|---|---|---|---|
| Size $_{(t-1)}$ | -0.0395*** | 0.0791 | -0.0361** | -0.0428*** |
| | [0.00877] | [0.0685] | [0.0157] | [0.0107] |
| Foreign credit $_{(t-1)}$ | -0.00156** | 0.00797 | 0.00157 | -0.00273*** |
| | [0.000754] | [0.00613] | [0.00151] | [0.000882] |
| Constant | 0.596*** | 0.423*** | 0.596*** | 0.607*** |
| | [0.0260] | [0.0818] | [0.0322] | [0.0377] |
| Observations | 25,221 | 721 | 8,073 | 16,427 |
| Number of firms | 8,724 | 368 | 3,357 | 4,999 |
| $R^2$ | 0.010 | 0.016 | 0.011 | 0.011 |
| Individual effects | YES | YES | YES | YES |
| Time effects | YES | YES | YES | YES |

Standard errors in brackets
*** Significant at 1%, ** at 5%, * at 10%.

# 5 Exports duration

In this section we look at the survival of firms in export markets. To this end we resort to duration analysis, a suitable tool to study the determinants of firms' long-term permanence in export markets. The variable of interest is the survival or duration time, in our case measured in spells of consecutive years of exporting. Since a firm may be a permanent or a sporadic exporter, we can observe more than one spell by firm in our sample of six years. In fact there are 11,663 spells[10] and 9,807 exporting firms.

In Table 17, we present some summary results by firm size. As we converted the firm-year pair into spells, the interpretation of the figures on this table requires a previous explanation. First, the percentages shown are in terms of total spells (11,663). Second, when analyzing the data, we distinguished three possible cases (number of spells from 1 to 3) with different alternatives: (i) when a firm has a number of spells equal to one, the number of years it remained as exporter is unequivocally the spell length. (ii) when a firm had a number of spells greater than one (two or three) we have combinations in which the sum of the years of exporting activity cannot exceed 5 (simply because one firm that exported for 6 years has just one spell of length six).

First, we note from Table 17 that there is a prevalence of sporadic exporters among the firms in the sample, although the distribution of duration by firm has fat tails: almost 25% of the firms are very sporadic exporters, having exported for one spell of length one, while 17% of them can be considered as permanent exporters, since they have exported over the six years of the sample (which are mostly concentrated in cluster 3 –13.6% out of total of 16.9%-). Being less restrictive we can say that nearly 65% of cases represent quite sporadic exporters if we consider those having exported up to three years in one spell or no more than four years but in different spells. Some examples of this are the following: i) two spells of two years; ii) one spell of three years and one spell of one year; iii) three spells, one of two years and two of one year. Finally, keeping the exporter condition seems to be a hard task, according to the inverse relationship between the length of the spell and the percentage of cases observed in spells 2 to 5, which concentrate 40% of the cases (last column of the table).

[10] Obviously, a spell equal to one does not imply two consecutive years but as there are a lot of cases where a firm exports in a specific year but does not export in the following one, we decided to show all possible results.

**Table 17.** Exports duration by firm size (in %).

| Spell length | CL1 | | | CL2 | | | CL3 | | | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Number of spells* | | | *Number of spells* | | | *Number of spells* | | | |
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | |
| 1 | 2.0 | 0.6 | 0.1 | 12.6 | 6.4 | 1.4 | 10.2 | 8.4 | 1.3 | **42.9** |
| 2 | 0.8 | 0.2 | 0.0 | 5.3 | 2.2 | 0.2 | 4.6 | 3.5 | 0.3 | **17.1** |
| 3 | 0.4 | 0.1 | | 3.3 | 1.6 | | 4.0 | 2.6 | | **12.0** |
| 4 | 0.2 | 0.0 | | 1.9 | 0.7 | | 3.0 | 1.0 | | **6.7** |
| 5 | 0.1 | | | 1.3 | | | 3.0 | | | **4.4** |
| 6 | 0.2 | | | 3.1 | | | 13.6 | | | **16.9** |
| **Total** | **3.6** | **0.9** | **0.2** | **27.4** | **10.9** | **1.6** | **38.3** | **15.5** | **1.6** | **100** |

## 5.1 Estimation of survival functions using the non-parametric Kaplan-Meier survival estimator

As pointed out before, the variable of interest in duration analysis is the survival time $T$, considered as a random variable. The survivor function, defined as the probability of surviving to time $t$ or beyond, can be written in discrete time as:

$$S(t) = P(T \geq t) \; t = 1, 2, .... \tag{3}$$

Another quantity of interest is the hazard rate, defined as the probability that a firm stops exporting after $t$ periods, given that it has not yet experienced the event of interest (failed), given by:

$$h(t) = P(T = t/T \geq t) \tag{4}$$

The survivor function (3) can be estimated using the non-parametric Kaplan-Meyer estimator, which at time $t$ is given by:

$$\widehat{S}(t) = \prod_{t_i \leq t} [n_i - d_i/n_i] \tag{5}$$

where $t_i, i = 1, 2, ...$ is the ordered failure time, $n_i$ is the number of individuals (spells) alive at $t_i$ and $d_i$ is the number of failures at time $t_i$.

To characterize the patterns in duration by firm size, in Figure 5 we present estimates of the survival function for the three clusters of exporters in our sample. Since our interest is in firms survival rather than in spells, to estimate the survival function we have assigned each firm its longest spell. As it can be noted from Figure 5 (and Table 18), firms' survival in export markets increases with their size. In particular, the survival function of the largest firms (belonging to cluster 3) is much higher than that of the small and medium sized firms in clusters 1 and 2.[11] Note also the differences in dynamics: notably, the probability of survival of a firm in clusters 1 or 2 decreases more rapidly than that of firms in cluster 3, conditional on having exported 1 to 3 years. After having survived for more than 3 years, the probability of survival decreases at rather the same rate for firms in the three groups. These results suggest that permanence in export markets matters for firms to succeed as exporters, and that their probability of survival becomes less dependent on their size once they become more regular exporters. What explains that firms become regular exporters is something that needs to be further researched. In this regard survival analysis appears to be a suitable tool to study firms' dynamics in export markets in a multivariate context, i.e., introducing financial and other factors as covariates to estimate survival probabilities. We leave this task for future research.

[11] We test for differences in survival estimates between clusters performing three different test (*log-rank*, *Wilcoxon* and *Tarone-Ware*) with alternative groupings (altogether and in pairs –1 vs. 2; 1 vs. 3 and 2 vs. 3-). In each case, we can confidently reject the null hypothesis of equality in survival functions ($H_0 : S_i(t) = S_j(t)$ *vs.* $H_1 : S_i(t) \neq S_j(t)$).

**Figure 5.** Survival functions estimates by cluster

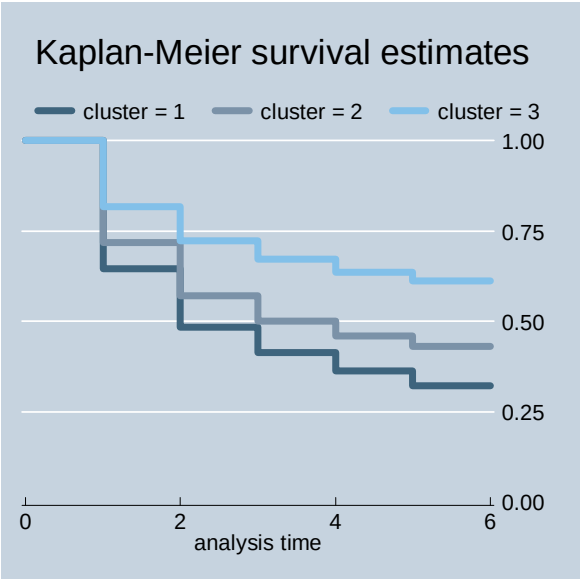

**Table 18.** Survival functions estimates by cluster

| Time | Begin Total | Fail | Net Lost | Survivor Function | Standard Error | [95% Confidence Interval] | |
|---|---|---|---|---|---|---|---|
| | | | | **Cluster 1** | | | |
| 1 | 477 | 169 | 80 | 0.6457 | 0.0219 | 0.6010 | 0.6868 |
| 2 | 228 | 57 | 61 | 0.4843 | 0.0248 | 0.4350 | 0.5318 |
| 3 | 110 | 16 | 45 | 0.4138 | 0.0267 | 0.3612 | 0.4656 |
| 4 | 49 | 6 | 17 | 0.3632 | 0.0304 | 0.3039 | 0.4226 |
| 5 | 26 | 3 | 5 | 0.3213 | 0.0352 | 0.2536 | 0.3907 |
| 6 | 18 | 0 | 18 | 0.3213 | 0.0352 | 0.2536 | 0.3907 |
| | | | | **Cluster 2** | | | |
| 1 | 3,898 | 1,095 | 616 | 0.7191 | 0.0072 | 0.7047 | 0.7329 |
| 2 | 2,187 | 449 | 352 | 0.5715 | 0.0084 | 0.5547 | 0.5878 |
| 3 | 1,386 | 171 | 405 | 0.5010 | 0.0090 | 0.4833 | 0.5184 |
| 4 | 810 | 66 | 229 | 0.4601 | 0.0095 | 0.4413 | 0.4787 |
| 5 | 515 | 33 | 121 | 0.4306 | 0.0102 | 0.4106 | 0.4506 |
| 6 | 361 | 0 | 361 | 0.4306 | 0.0102 | 0.4106 | 0.4506 |
| | | | | **Cluster 3** | | | |
| 1 | 5,432 | 989 | 458 | 0.8179 | 0.0052 | 0.8074 | 0.8279 |
| 2 | 3,985 | 465 | 353 | 0.7225 | 0.0062 | 0.7101 | 0.7345 |
| 3 | 3,167 | 216 | 552 | 0.6732 | 0.0066 | 0.6600 | 0.6860 |
| 4 | 2,399 | 129 | 332 | 0.6370 | 0.0070 | 0.6231 | 0.6506 |
| 5 | 1,938 | 73 | 276 | 0.6130 | 0.0073 | 0.5986 | 0.6271 |
| 6 | 1,589 | 0 | 1,589 | 0.6130 | 0.0073 | 0.5986 | 0.6271 |

# 6 Conclusions

Using a microeconomic data set that comprises data on Argentine firms' export volumes and destinations, as well as detailed information of their access to domestic bank and foreign financing, we are able to trace a rich characterization of the financing patterns of exporting firms and the way this patterns relate to their performance in export markets.

Our results indicate that it is more likely for firms that have a larger domestic bank debt to become exporters, except for the smallest ones which are, in a high percentage, non-exporters.

When we focus on exporters, our results suggest that once firms have entered international markets, domestic bank financing does not relate to their performance onwards, and it is the access to foreign financing what helps to explain their success in foreign markets. Exporting to developed and more distant markets is more likely for firms that have more access to foreign financing. Also, firms having more access to foreign financing exhibit a better performance in terms of the number of products they sell abroad and the number of destinations they export to.

Finally, we also provide an insight into the dynamics of firms' exports through the use of duration analysis. We find that while only 17% of the firms in the sample are regular exporters, a high portion of firms in Argentina only export sporadically. The patterns in duration in export markets are very clear: permanent exporters are mostly the largest firms, while small and medium sized firms are predominantly sporadic exporters. In fact, estimations of survival probabilities by firm size give clear evidence that firms' permanence in export markets increases with their size. The largest firms in the sample exhibit a much higher survival probability than small and medium sized ones. Finally, size matters less for firms' permanence in export markets once they have become more regular exporters.

We leave for future research to go deeper into some of the findings in this first overview on trade and financial restrictions in Argentina through the use of multivariate analysis. An issue of particular interest in this regard is the role of financial restrictions in explaining the long-term presence of firms in international markets.

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# Appendix I. Variables description

| Firms' characteristics | Variable | Definition |
|---|---|---|
| Size | Size | Natural logarithm of workforce |
| Domestic financial relationships | Domestic bank credit | Natural logarithm of bank debt stock |
| | Number of credit lines | Number of credit lines granted to the firm |
| | Number of financial entities | Number of financial entities granting credit to the firm |
| | Rationed firms | Firms without access to bank debt |
| | Collateral pledging | Collateralized debt (% of total bank debt) |
| Foreign financial relationships | Foreign debt | Foreign debt (% total debt) |
| | Foreign transactions | Transactions' number with foreign creditor |
| | Foreign creditors | Foreign creditors' number |
| | Foreign trade credit | Natural logarithm of foreign trade credit |