The Growth and Volatility of French Exporters*

Antoine Berthou † Vincent Vicard ‡

July 2012

Abstract

This paper provides evidence about the respective impact of age and size on the dynamics of firms in foreign markets, a critical input in models of firms dynamics. The analysis uses a census of French exports by firm-destinations-product over the period 1994-2008 with a monthly frequency. A first result is that the growth of exporters between the first and the second year is biased upwards when the growth rate is computed using calendar years instead of the birth date. Our estimations show that, controlling for size, age is negatively related to net growth of exports for surviving exporters. Controlling for age, the relation between average size and net growth of exports is non-monotonic. Finally, the contribution of entry and exit in foreign markets (products and destinations) to total exports growth by firms is decreasing with age and (sharply) with size.

JEL classification: F02, F10, F14.

Keywords: International trade, Firms' heterogeneity, Firms' dynamics, Intensive and extensive margins.

*This paper has benefited from discussions with seminar participants at the 2011 LETC workshop in Ljubljana, the 2011 Aarhus International Trade workshop, the 2012 Belgian trade workshop in Gand, and the 2012 panel data conference in Paris. We also thank Jonathan Eaton, Lionel Fontagné, and Peter Neary for helpful suggestions. This paper represents the views of the authors and should not be interpreted as reflecting those of Banque de France.

†Banque de France. Email: antoine.berthou@banque-france.fr

‡Banque de France. Email: vincent.vicard@banque-france.fr

1 Introduction

International trade models have emphasized the importance of firm heterogeneity in explaining the cross-sectional distribution of firm size in domestic and foreign markets. Sales and exports are extremely concentrated among a limited number of very large firms, whereas a large number of small exporters ship one product to a single destination (Eaton et al., 2004). This distribution of the size of exporters is influenced by the process of entry and exit, as new exporters tend to be small relative to incumbents, grow faster and have a low rate of survival (Eaton et al., 2007; Freund and Pierola, 2010). Understanding the relative contribution of age and size in firms' performance, i.e. understanding whether we need to think about the age of a firm given its size, is central to the explanation and modeling of firms' dynamics on domestic or foreign markets (Arkolakis, 2011; Luttmer, 2007).

Our objective is to provide a careful analysis of the relative contributions of age and size of individual exporters to their growth in foreign markets. Our methodology is borrowed from several studies in the industrial organization literature that have studied the effects of age and size of firms or establishments on their growth, regardless of the export status (Dunne et al., 1989; Davis and Haltiwanger, 1992; Davis et al., 1996; Sutton, 1997; Haltiwanger et al., 2010). The analysis confirms the importance of considering the age together with the size of exporters to explain the growth of exporters in foreign markets. Conditional on size, age is an important determinant of exporters' dynamics: age is negatively related to net growth of exports of surviving firms. The relation between average size and net growth of exports is non-monotonic.

Thanks to the details on product and destination available in trade data, we go one step further and investigate the behavior of firms on different markets by showing how the growth in continuing markets, and the process of churning in foreign markets (i.e. entry and exit from a destination and/or a product), are related to age and size. Firms indeed tend to modify very frequently the portfolio of products that they sell abroad (Bernard et al., 2010; Iacovone and Javorcik, 2010) and the range of destinations in which they are active (Lawless, 2009). In the aggregate, this churning of products and destinations by exporters has an important contribution to the aggregate growth of exports in the long run (Bernard et al., 2009). Our methodology allows us to quantify the contribution of churning of products and destinations to the growth of firms' exports, in relation to their age and size.

Our empirical analysis makes use of a transaction level dataset of French exporters, that provides information on firm exports by product and destination over the period

1994-2008. The analysis requires dealing with several important statistical issues. First, we provide evidence that the growth rate between the first and second year of export is considerably upwardly biased, because its construction relies on calendar years. Neglecting the month of entry on the export market (birth date) may therefore lead to draw wrong conclusions. A symmetric downward bias arises for exit, because firms export only a few months before the year of exit. Second, Haltiwanger et al. (2010) show that the choice of the measurement of firms' size is an important issue. Our analysis mostly uses the average size of exporters in years t-1 and t, as this measure is less likely to be affected by transitory shocks that could influence our estimates due to regression to the mean effects.

Our main results regarding the effects of the average size and age of exporters on their *expected* growth, decomposed as the probability of survival and the growth of exports conditional on survival, can be summarized as follows. First, the probability of survival is increasing with the average size and the age of exporters. Second, controlling for the age of exporters, we find that the *expected* growth in foreign markets is increasing with the average size. This relationship becomes non-monotonic when the net growth of *surviving* exporters is considered.[1] An important bias is identified in the estimations using the base year size, due to regression to the mean effects. Third, controlling for the average size, the *expected* growth of firm-level exports is increasing with the age of exporters (due to attrition), but decreasing when *surviving* ones are considered.

These results are completed by a series of findings regarding the relation between age/size and the volatility of firm-level exports due to the entry and exit process in foreign markets. Small and, to a lesser extent, young exporters are more volatile in export markets than large or mature ones. The product dimension of the extensive margin is dominant in intra-firm volatility.

Our empirical analysis is related to the industrial organization literature documenting the effects of firms' age and size on their growth performance. Dunne et al. (1989) show that the rate of failure of US manufacturing plants is decreasing with plant size and age. Conditional on survival, the growth rate of employment by plants is also decreasing with age and size. Haltiwanger et al. (2010) however find no clear patterns between size and growth of employment for US firms, once their age is controlled for. They confirm that young firms grow faster and are also more volatile. Foster et al. (2010) show using US plant level data that young firms have lower sales than old firms, but are not less productive, suggesting that demand accumulation (building a customer base) is

[1] Only the largest exporters report better performances.

an important determinant of plants' dynamics.

Evidence regarding export activity has concentrated on the dynamics of new exporters, regardless of size. Most of new exporters do not survive more than a few years. They typically start small, and surviving exporters export much larger volumes by the second year, expand to additional markets or export new products (Eaton et al., 2007; Freund and Pierola, 2010; Albornoz-Crespo et al., 2010; Iacovone and Javorcik, 2010). Our analysis completes these findings by providing a systematic identification of the distinct effects of age and size on the net growth and volatility of exporters in foreign markets, and shows that age explains the growth and volatility of French exporters beyond their average size.

In terms of the theory, two main classes of models have been developed to explain these patterns of firm dynamics: models of learning (Jovanovic, 1982) or persistent productivity shocks (Hopenhayn, 1992). The former class of models emphasizes the importance of heterogeneity of performance by age while the latter's main prediction relates to the size of the firm.[2] Many models of firms dynamics predicts that determinants of size are Markov (Luttmer, 2011; Impullitti et al., 2011; Arkolakis, 2011; Chaney, 2011; Klette and Kortum, 2004), so that the future size of a firms is essentially determined by its current size. On the other side, Ruhl and Willis (2008)'s dynamic model of exporting underline the importance of demand accumulation over time to account for the slow and gradual growth of new exporters. Eaton et al. (2011) develop a search and learning model of exporters' dynamics that is consistent with the large turnover of firms and trading relationships on export markets and the rapid growth of surviving matches. Understanding the relative contribution of age and size to firm net growth is therefore a critical input for these models.

2 Methodology and data

2.1 Data

All the empirical analysis presented in this paper is based on the individual firm-level exports data provided by the French customs. The dataset reports trade flows for individual French exporters at a *monthly* frequency, over the period 1994-2008. Each individual trade flows are reported with firm-product-country dimensions, with products

[2] Cooley and Quadrini (2001) introduces financial frictions in a model where firms face permanent productivity shocks to account for the simultaneous age and size dependence of firms growth. Klepper and Thompson (2006) argue that the number of markets in which the firm is active is positively related with survival but negatively related to growth.

defined at he 6-digits in the Harmonized System (HS).[3]

Each firm can be identified every year using its SIREN number, allowing us to follow them over time.[4] We define the age of each exporter according to its year of entry into export. Each firm is allocated to a cohort. For instance, a firm is considered as a new exporter in 2001 if it exports that year at least one product to one destination, but does not appear in the database between 1994 and 2000. A firm is considered as being part of the cohort of year t if no trade was registered in the preceding years. Firms can then survive as an exporter in each of the following years, or exit. We do not consider multiple spells of export by a firm and remove switchers after their first exit (at least one year) of the export market. Retrieving the information on age for incumbent exporters requires to have as many years backward and forward; we therefore restrict our sample on years 2001-2007 in order to be able to allocate all firms, new as well as incumbent exporters, to an age category. We allocate all French exporters over the 2001-2007 period into 6 groups of new exporters and 1 group of experienced exporters (with more than 6 consecutive years of export experience).

Details regarding the data are provided in Appendix A.

2.2 Measurement of the growth of new exporters

Our analysis of the dynamics of firms' exports relies on growth rates of individual export flows, x_{ijkt}, from firm i to destination country j in product category k and year t. Due to the large number of entries and exits at the firm, destination or product level, we follow Davis and Haltiwanger (1992)[5] and compute the growth rate of each individual export flow x_{ijkt} as:

$$g_{ijkt} = \frac{x_{ijkt} - x_{ijkt-1}}{\frac{1}{2}(x_{ijkt} + x_{ijkt-1})}. \tag{1}$$

g_{ijkt} corresponds to the growth rate of an individual export flow x_{ijkt} between year t and $t-1$. The denominator is defined as the mean of x_{ijk} in t and $t-1$, and ensures that the growth rate can be computed as soon as there exists a positive trade x_{ijk} in t or $t-1$. This growth rate has several properties that makes it very useful in our analysis.

[3]Because of the HS revisions in 2002 and 2007, we use concordance tables provided by the United Nations Statistical Division to translate product codes into a single nomenclature for computing growth rate over 2001/02 and 2006/07.

[4]Official changes in SIREN code are recorded but we cannot rule out switches of SIREN code for some firms over time. Our results are robust to the exclusion of firms belonging to a French or foreign group its year of entry into the export market or the top/bottom 1% firms in terms of growth rate (see column (8) in Table C2).

[5]This growth rate has become standard in the analysis of firm and labor market dynamics.

First, new export flows and trade flow disruptions are assigned respectively the values 2 and -2. This pattern enables to take into account the contributions of entry and exit to the growth of firms' exports. Second, it is a good approximation of the log first difference around zero and shares its properties of symmetry. In addition, this growth rate is bounded between the values of entry and exit, 2 and -2.

The contribution of each individual export flow x_{ijk} can be aggregated to compute the net growth of exports of any firm i as follows:

$$G_{it} = \sum_{jkt} \omega_{ijkt} \times g_{ijkt} \quad \text{where} \quad \omega_{ijkt} = \frac{x_{ijkt} + x_{ijkt-1}}{\sum_{jkt} x_{ijkt} + \sum_{jkt-1} x_{ijkt-1}}. \tag{2}$$

ω_{ijkt} is the share of trade flow x_{ijkt} in firm i's value of foreign sales. For any firm i, we can distinguish the contribution of continuing trade relationships (the net intensive margin), and the contribution of the creation (positive extensive margin) and disruption (negative extensive margin) of trade relationships. The growth of the firms' exports can be expressed as the sum of the net contributions of the intensive and extensive margins:

$$G_{it} = G_{it}^{I} + G_{it}^{E+} + G_{it}^{E-} \quad \text{where} \quad \begin{cases} G_{it}^{E+} &= \sum_{jk} \omega_{ijkt} \times g_{ijkt} \quad \text{if } g_{ijkt} = 2 \\ G_{it}^{E-} &= \sum_{jk} \omega_{ijkt} \times g_{ijkt} \quad \text{if } g_{ijkt} = -2 \\ G_{it}^{I} &= \sum_{jk} \omega_{ijkt} \times g_{ijkt} \quad \text{otherwise,} \end{cases} \tag{3}$$

where G_{it} is the net growth of exports of firm i between t and $t-1$, G_{it}^{I} is the net contribution of the intensive margin, G_{it}^{E+} is the gross contribution of the positive extensive margin, and G_{it}^{E-} is the gross contribution of the negative extensive margin. Given the three dimensions of the French Customs trade data, firm (i), destination (j) and product (k), we are able to further decompose the extensive margin into several components listed below:

- entry or exit of exporters (firm-level extensive margin);
- add or drop of product-and-destination, continuing firm (DP);
- add or drop of products, continuing firm and destination (P);
- add or drop of destinations, continuing firm and product (D);
- add or drop of trade relationship, continuing firm, product and destination (Other).

The empirical analysis presented in the paper mainly explains the net growth rate of a firm (G_{it}) by the age of the exporter, the size of the exporter, and additional controls. The analysis is then refined to show the effect of these two variables on the different margins of firms exports.

2.3 Issue of the measurement of the growth of new exporters

One important issue regarding the age of exporters is the bias related to calendar year in the first two years of export. For example, a firm may start exporting in December of the first year, and then export the same amount each month of the second year. Using export reported on a calendar year would therefore bias downward the level of export the first year relative to the second. In this case, the growth rate of exports between the first and the second year would be artificially high. We address this statistical issue by computing the growth rate of new exporters on reconstructed years using the exact month of entry rather than calendar years. So, the monthly frequency in the data is used only to compute properly the yearly growth rate of new exporters.

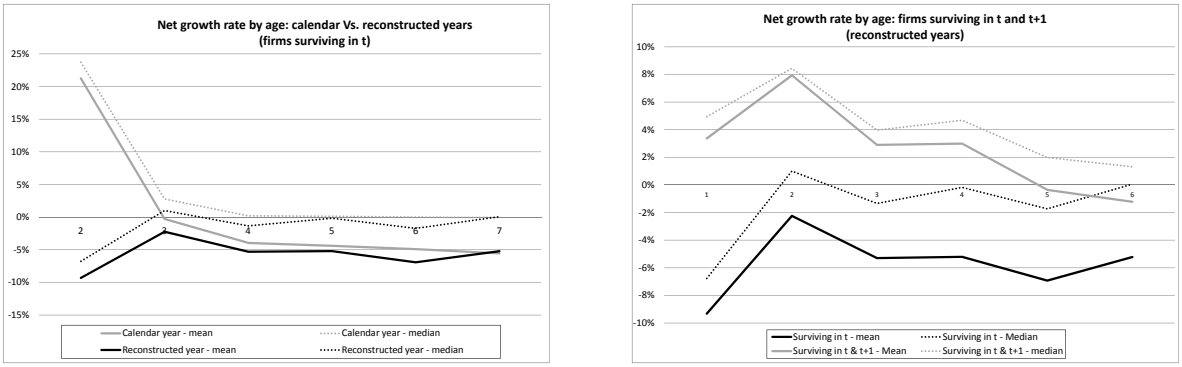
Figure 1 illustrates this statistical bias in the computation of growth rates of firms' exports between years $t-1$ and t, for exporters that survive between the two years. When calendar years are considered, the average growth rate of new exporters between the year of entry and the second year is above +20%; the growth rate then plummets by the third year (black curves). Using the birth month of exporters yields a completely different pattern (left panel of Figure 1). The average growth rate of new exporters, conditional on survival, is negative in the second year and similar to growth rates in subsequent years. The median growth rate of new exporters has a similar shape but is closer to zero. The discrepancy in growth rates due to the calendar year bias amounts to 0.306 in the second year, meaning that average exports revenues of a cohort of new exporters are underestimated by 32% the first year of export when using the calendar year.[6]

The negative growth by the average exporter is explained by the fact that many exporters will exit in the following years, and decline before exit. There is also a second statistical bias due to the fact that firms may actually export only a few months during their year of exit. Given that more firms exit during the first years of export activity, we can expect that this bias is more important when we compute the growth rate for young exporters. Restricting the sample to exporters surviving between $t-1$ and $t+1$ (right

[6]The conventional growth rate g (exports in t minus exports in $t-1$ divided by export in $t-1$) is related to our growth rate as follows: $g = 2G/(2-G)$.

panel of Figure 1), the average growth rate becomes positive in most years, and the relation between age and exports growth becomes more negative (especially due to the larger correction for the exit year among young exporters). In the econometric analysis, we consider this possibility by keeping in-sample only those firms that survive between t-1 and t, or alternatively those surviving between t-1 and t+1.

Figure 1: Net growth rates of exports by age: calendar vs. corrected years



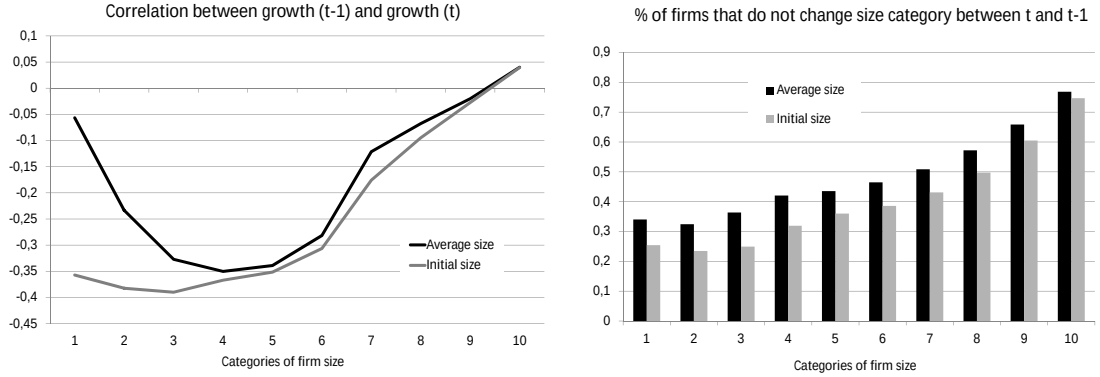
2.4 Issue of the measurement of the size of exporters

The relation between the size and growth of firms is potentially biased due to regression to the mean effects. A firm experiencing a positive transitory shock is likely to report a negative growth rate the following period, leading to a spurious correlation between firm size and growth rate (Davis et al., 1996; Haltiwanger et al., 2010). Consequently, using base year $t-1$ as size criteria is likely to create a negative bias while the opposite is true regarding the use of end year t as a size criteria. To mitigate these potential biases, Davis and Haltiwanger (1992) suggest to measure firm size using the average of firm size over $t-1$ and t. Haltiwanger et al. (2010) report that using this size methodology or a more complex dynamic size classification methodology developed by the US Bureau of Labor Statistics yields similar results.

Our empirical investigation therefore follows the suggestion by Davis and Haltiwanger (1992) that we apply to the case of exporters. Our preferred measure of the size of exporters is computed as the average value of firms' exports in years t and $t-1$. In the empirical analysis though, we provide as an element of comparison the results of additional analysis that uses the initial value of the firms' exports as a proxy for the size

of exporters. Using this measure of size, exporters are clustered into 10 classes of firms' size that reflect the deciles of the distribution, considering all exporters that are active in $t-1$ or t.[7]

Figure 2: Serial correlation in net export growth by firm size category



The left panel of Figure 2 presents the correlation between the growth rate of firms' exports in t and the growth rate in $t-1$ by category of size, when these categories are defined according to the average size of exports or the initial size of exports. The correlation is negative, whatever the methodology that is used to measure the size of exporters. This confirms the existence of a negative serial correlation in firms' exports growth. The serial correlation, however, is less important when the observations are clustered using the average size classes rather than the initial size classes, especially in the case of small firms. This confirms that estimations using the average size categories of exporters are less likely to be affected by regression to the mean effects.

To complete the diagnosis, the right panel of Figure 2 reports the percentage of firms that do not change size category between $t-1$ and t. This percentage is increasing with the size of firms, confirming that small firms are more subject to idiosyncratic shocks that affect their ranking in terms of size. This is however less the case when the average size is used, as this measure tends to average out these idiosyncratic shocks. This confirms that the average of exports between years $t-1$ and t is a more consistent measure of the size of exporters. We use preferably this measure of size in our empirical analysis.

[7]For exporters that start exporting in t, the initial size in $t-1$ is zero and we use instead the size in t. Firms that exit are also considered in the distribution as the initial and average measures of size remain positive.

3 Econometric analysis of the effects of age and size on exports' growth

3.1 Estimation methodology

We now provide an econometric estimation of the effects of age and size on the expected net growth of exporters in foreign markets (G_{it}). As discussed above, the measure of the growth rate that is used in our analysis summarizes the dynamics of starters, quitters, and continuers. This expected growth can be further decomposed into the probability of survival ($Prob(X_{it} > 0)$, and the growth of continuers conditional on survival ($G_{it}|X_{it} > 0$), with X_{it} being firms' total exports value in year t. All these variables are considered in the set of dependent variables (Ω_{it}) in our estimations.

We use a non-parametric methodology by regressing the dependent variable (Ω_{it}) on firm size classes and age classes. Since firm size and age are likely to vary by industry, we include HS2 sector fixed effects in our regressions.[8] We also include year fixed effects to account for cycles or aggregate shocks likely to hit a particular cohort of exporters.

We estimate Equation 4 below, where the dependent variable (Ω_{it}) is explained by 6 age and 9 size categories (categories age=7 and size=10 are excluded and serve as reference categories in the estimations). γ_k and γ_t are respectively the industry and year dummies; ϵ_{ijkt} is the error term.

$$\Omega_{it} = \sum_{m=1}^{6} \alpha_m age_{mit} + \sum_{n=1}^{9} \beta_n size_{nit} + \gamma_k + \gamma_t + \epsilon_{ijkt}. \quad (4)$$

When the dependent variable is the growth rate of exporters (G_{it}), it takes the value $G_{it} = 2$ in the year of entry (i.e. when Age = 1). In that case the coefficient on the Age = 1 variable reflects the average growth of the reference category (i.e. the value of the coefficient - 2). Appendix Table A1 presents the detailed estimation results when the dependent variable is the probability of survival. Appendix Table A2 presents the estimation results concerning the growth of exporters. Table A3 presents some robustness analysis using the initial size as an alternative measure of size. To facilitate their reading, all results are summarized in figures below. We report the estimated coefficients relative to the unconditional mean of the omitted category (respectively size class 10 or age class 7).[9]

[8] Each firm is allocated into its main HS2 sector according to its export in t and $t-1$.

[9] $\widehat{G}_{it}(Size = n) = \overline{G}_{it}(Size = 10) + \hat{\beta}_n$ and $\widehat{G}_{it}(Age = m) = \overline{G}_{it}(Age >= 7) + \hat{\alpha}_m$.

3.2 Growth by size category

How does the growth of firm-level export changes across size categories? We use the estimation results reported in Appendix Tables A1 and A2 to predict the expected growth of a firm in foreign markets by size category, which can be decomposed into the probability of survival for each category and the net growth conditional on survival. The predicted survival and growth rates are provided using estimations that control or not for the age of the firm as an exporter. This allows us to disentangle the role of these two variables with respect to the dynamics of firms in foreign markets. All results are summarized in Figure 3.

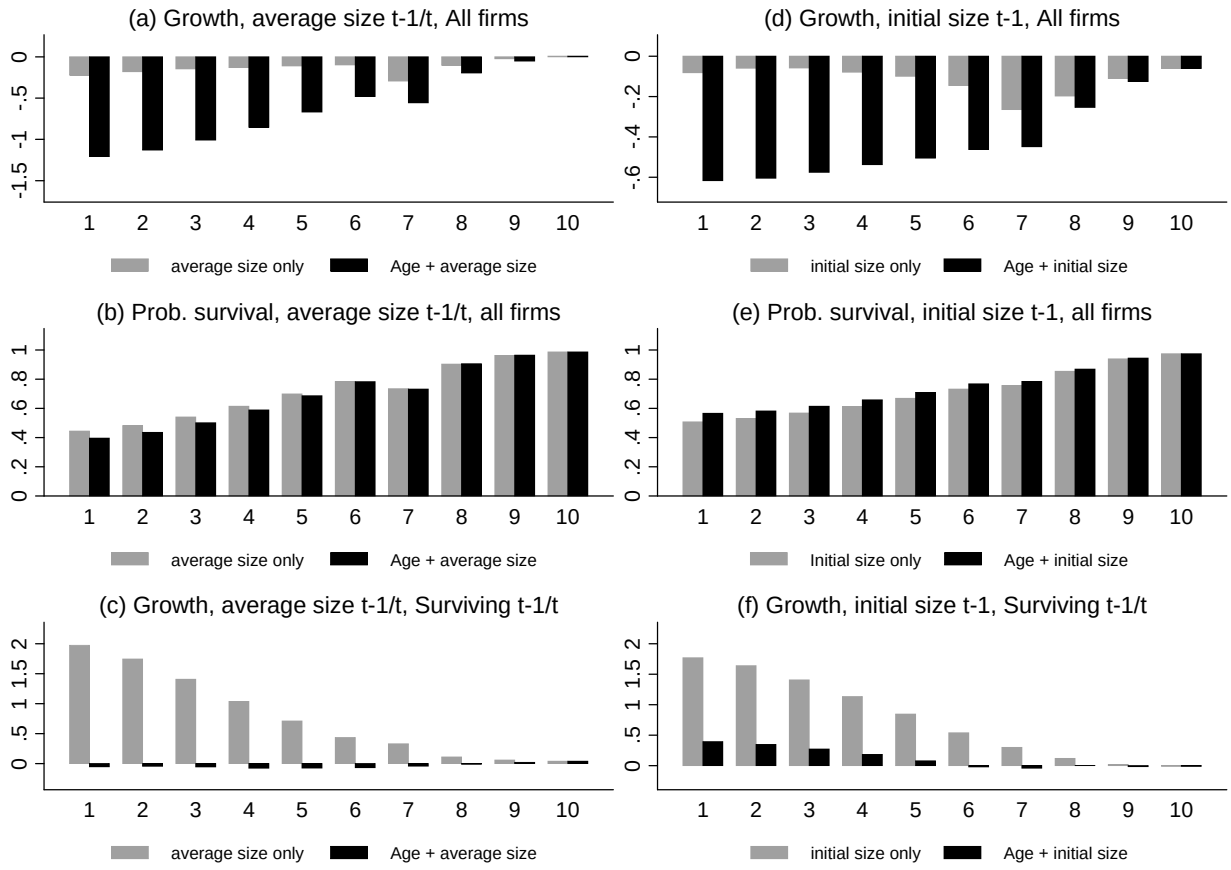
Panels a, b and c of Figure 3 present the results that are obtained from estimations that use the *average size* of exports in t-1 and t to categorize exporters in the different bins. Considering all exporters in Panel (a), a positive relation (although non-monotonic) between the average size and growth can be identified in the estimations that do not control for the age of exporters (grey bars). Most exporters report negative growth rates, especially in small average size categories. Controlling for the age of exporters (black bars), the relation between size and growth becomes even more positive: independently of the age of exporters, the expected growth rate of small exporters tends to be highly negative, whereas the expected growth rate of large exporters is close to zero.

This result is partly explained by the high rate of attrition among small exporters in panel b ($G_{it} = -2$ for exporters that exit): the probability of survival is increasing with the average size of the exporter, starting from a survival probability of around 40% for the first decile of exporters to nearly 100% for the 10th decile. This pattern is not considerably changed when controls for the age of exporters are included in the econometric specification.

The net growth rate of exporters surviving between t-1/t is presented in panel c of Figure 3. When no control for the age of the exporter is included in the estimation, the net growth rate of exports is clearly negatively related to the average size of the exporter. This is explained by the fact that many of the small exporters are new exporters, which explains why the net growth rate conditional on survival is close to $G_{it} = 2$ in small size categories. Controlling for the age of the exporter modifies this pattern, as no clear relationship between the average size of the exporter and its net growth can be identified(this is confirmed when we restrict the sample to exporters surviving between t-1/t+1).

Estimations using the initial size of exporters suggest that regression to the mean

Figure 3: Exports growth and exporter's size



effects are quite strong (Panels d, e and f of Figure 3), consistently with the negative correlation between G_{it} and G_{it-1} illustrated in Figure 2. In the estimation using the whole sample of exporters (Panel d), the results are comparable to what is obtained using the average size in Panel (a), with or without controlling for the age categories. Results for the survival rate in panel (e) are also consistent with what we obtain using the average size. For surviving exporters (Panel f), net growth and initial size are inversely related when the estimation does not control for the age categories, as it was the case with the average size. Controlling for exporter's age however leads to a different relation between size and growth: growth is decreasing with the initial size (Panel f), whereas no clear relationship emerges between the average size and growth (Panel c). This empirical pattern can be explained by regression to the mean effects in the presence of negative serial correlation, which is especially important among small exporters.[10]

As regression to the mean effects clearly affect estimations of the relation between initial size and growth of exports, we keep the average value of exports in t-1 and t as our main measure of exporters' size. Our estimation results provided in Figure 3 tend to confirm the Gibrat's law for surviving exporters, conditional on the age.

3.3 Growth by age cohort

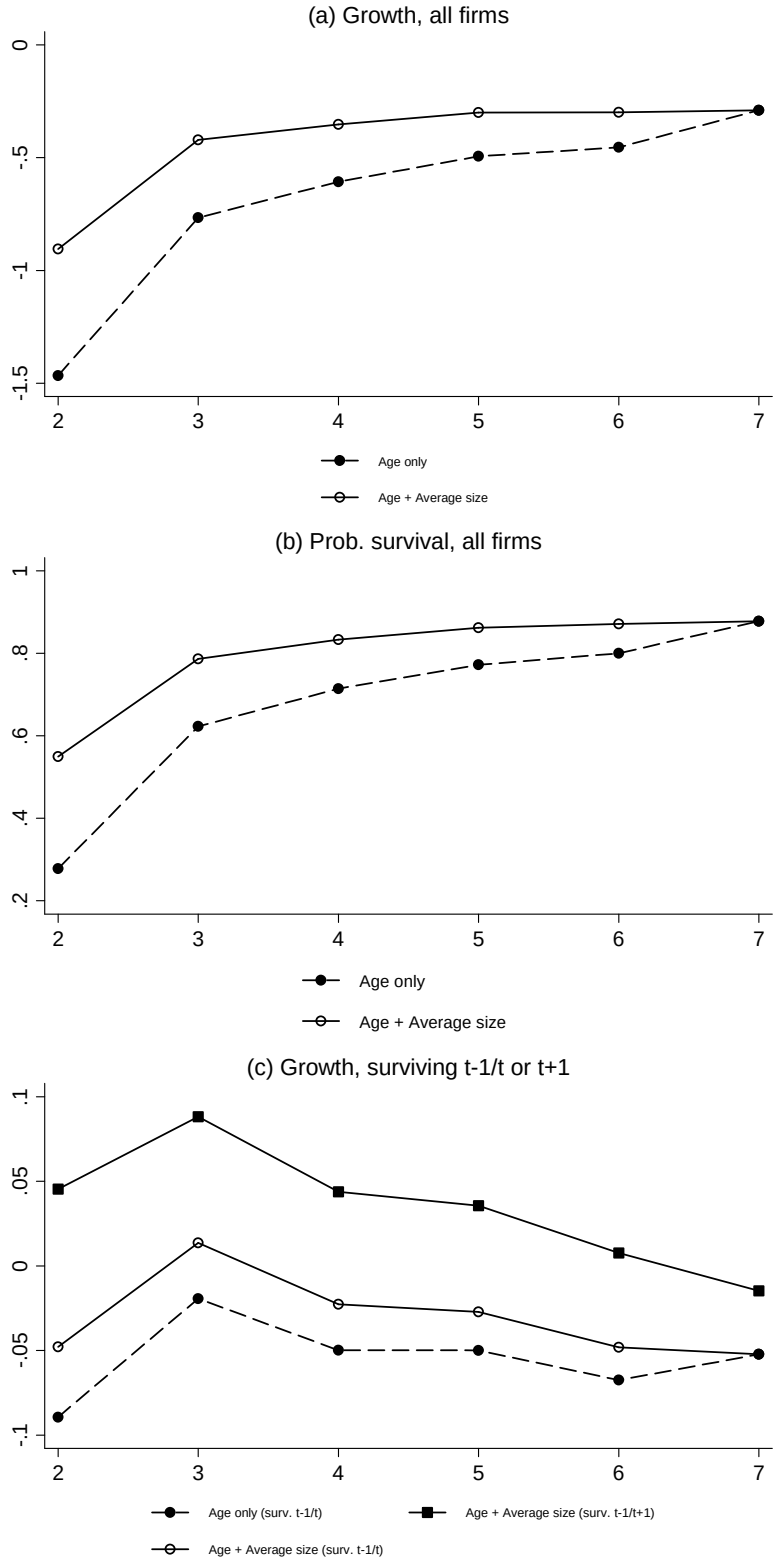
Results regarding the effects of the age of exporters on their growth in foreign markets are summarized in Figure 4.[11] Panel (a) of the Figure reports the relation between firms' age and expected growth when all exporters are considered, including those that exit in year t and have a growth rate $G_{it} = -2$. This growth rate is strictly a positive function of the age of the exporter, and is always negative especially after one year in the export market. This pattern is explained by the high rate of attrition among young exporters that is reported in Panel (b): less than 30% of new exporters survive after one year. As this rate of attrition is also related to the small size of new exporters, which makes them more vulnerable to idiosyncratic shocks, controlling for size increases the rate of survival among them.

Considering the growth rate for surviving exporters in the panel (c) of Figure 4, there is no clear relationship between age and growth when the estimation does not control for the average size of the exporter. Controlling for the average size, we can observe a negative relationship between age and growth by the third year only, conditional on survival in t. Since many of the firms that survive in t will actually exit in t+1, the last

[10] The result obtained by Haltiwanger et al. (2010) regarding employment dynamics by US establishments point to a similar bias using the initial size measure.

[11] The results are reported in Appendix Tables A2 and A3.

Figure 4: Exports growth and exporter's age



year of exports is incomplete and this generates a downward bias in the growth rate. Our results on the restricted sample of exporters surviving between t-1 and t+1 confirm

that the growth rate is higher for all groups of age, but the correction is larger for young exporters, which are more likely to exit. Most importantly, the results show that the growth rate of exports is the largest in year 3 and decreasing with the age of surviving exporters in foreign markets.

Overall, our results show that the high rate of attrition among young exporters creates a positive relationship between the expected growth rate and the experience of firms in foreign market, part of this result being explained by the small size of new exporters. Conditional on survival, new exporters tend to grow more rapidly than experienced ones.

4 Econometric analysis of the effects of age and size on the margins of firms' exports

4.1 Exporters' size and the export margins

The net growth of exports of new cohorts hides important information about the way exporters expand their foreign sales along destinations and products and their volatility on export markets. We now focus the analysis on the contribution of the intensive and (net and gross) extensive margin to the growth of firms' exports (as shown in Equation (3) of the methodology section), starting with the effects of exporters' size on these margins. The extensive margin corresponds to the net contribution of new markets (*destination* × *product*) to the growth of an exporter, and the intensive margin is the contribution of continuing markets. Estimation results are reported in Appendix table C4.

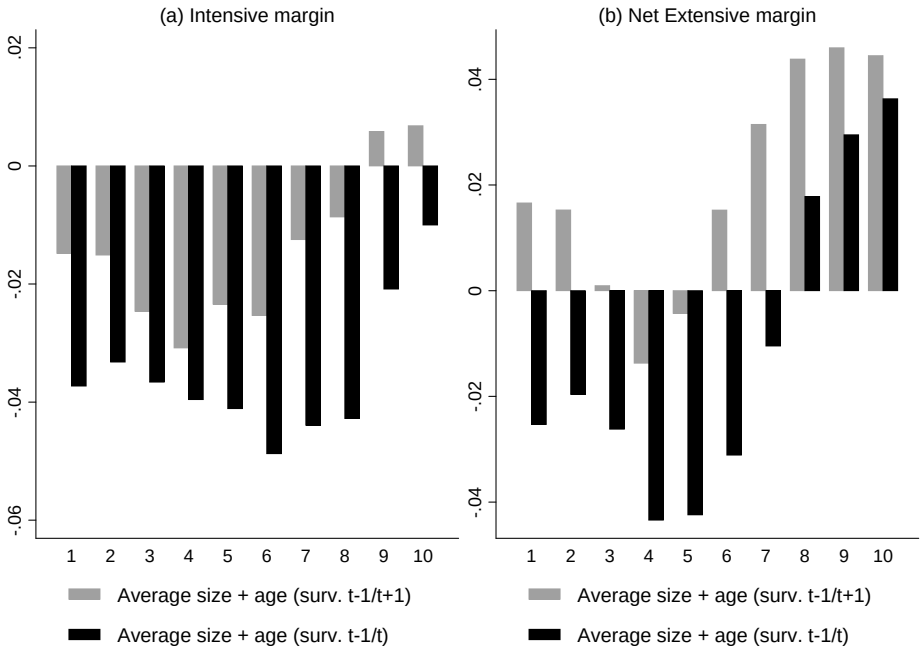
Panel (a) and (b) in Figure 5 shows that, consistently with the results on net growth, size exhibits a non monotonic relationship with both the net intensive and extensive margins. Controlling for age, small firms have better intensive and extensive margin performances than medium firms, but the largest exporters outperform all other firms.

Beyond their net growth performance in foreign markets, our data can be used to assess how volatile French exporters are in foreign markets. The *churning* of exporters in foreign markets can be calculated as the *gross* contribution of the *positive* extensive margin and *negative* extensive margins. Estimations are presented in Table C5.[12]

Results reported in Figure 6 underline that churning on foreign markets (*destination*×

[12]For brevity, we report results using the average size measure on the sample of exporters that survive between t-1 and t.

Figure 5: Average size and the net margins of firm-level exports



product) contributes to a large share of the growth of exports of small and medium firms. The importance of churning declines sharply for large exporters. Small and medium exporters therefore simultaneously enter and exit foreign markets, and these new flows represents a large share of their exports every year. The portfolio of markets and products of large exporters is much more stable.

Together Figure 5 and 6 show different dynamics of net and gross extensive margins. Large exporters have low (positive and negative) gross extensive margins but a positive contribution of the net extensive margin to the growth of their export. On the contrary, smaller exporters are more volatile on foreign markets but the net contribution of entry and exit is lower than large exporters.

4.2 Exporters' age and the export margins

Is the age of exporters related to the trade margins beyond size? Figure 7 reports the results regarding the net margins of export and exporters' age, controlling for their average size. Consistent with results on net growth, the contributions of both the intensive and net extensive margins increase between year 2 and year 3 in the export market, and then decreases with the experience of the exporter. Controlling for size, the age of exporters can explain their behavior on existing market as well as their decisions to enter/exit markets.

Figure 6: Average size and the gross margins of firm-level exports

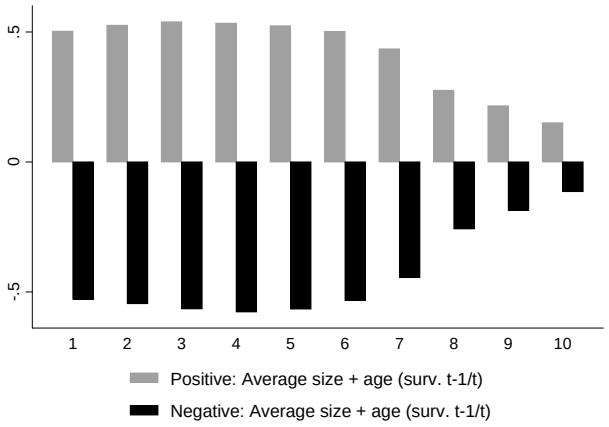
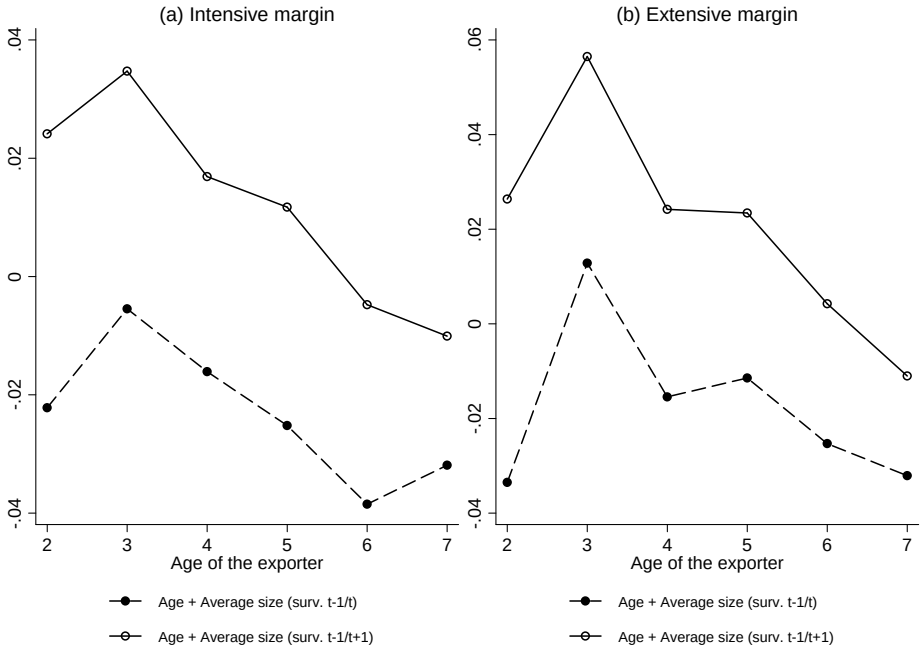


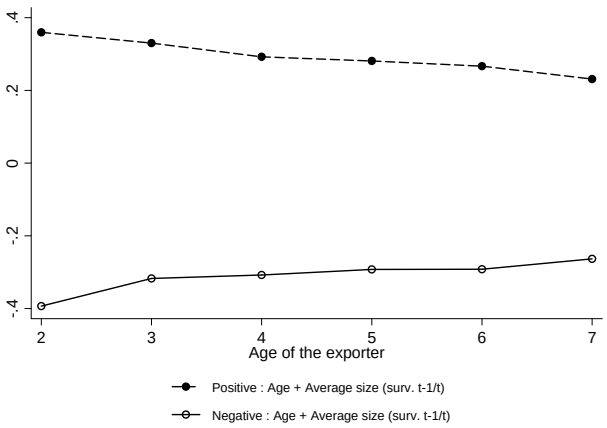
Figure 8 presents the gross contributions of the positive and negative extensive margins: both of them tend to decline progressively with the experience on the export market. Young surviving exporters enter and exit more foreign markets than mature ones, and this contributes significantly to their exports. The portfolio of product and destination market stabilizes progressively over time. The gross contributions of entry and exit remain however significant for mature exporters, which contrasts with the results for size.

Figure 7: Contributions of the intensive and extensive margins by age



To summarize the results, small and, to a lesser extent, young exporters therefore con-

Figure 8: Age and the gross margins of firm-level exports



tribute disproportionably to the volatility of trade flows for two reasons: their turnover on the export market is larger, and surviving firms change a larger share of their portfolio of product and destinations every year.

4.3 The components of the extensive margins: churning of products, destinations or both?

Figures 9 and 10 present the detailed components of the extensive margin of surviving exporters, decomposing into all four dimensions: add/drop product-and-destination (DP), add/drop a product on a continuing destination (P), add/drop a destination for a continuing product (D), and add/drop a trade relationship for a continuing product and destination (Other).

The main component of the gross extensive margin is the churning of products. Firms change their portfolio of markets mainly through changes in their portfolio of products, either on new markets or on markets they already serve. The significant contribution of the destination-and-product (DP, panel (a) in Figures 9 and 10) extensive margin suggest that firms are likely to serve new destinations with new products, and that a product often stops being exported when the firm leaves the country. The large churning of the portfolio of exported products within firms suggests a rich product cycle dynamic on each specific export market and changing core products over space and time.

The smaller gross contribution of the extensive margins for large mature exporters is mainly accounted for by lower product and destination-and-product gross margins. Product churning is not much important for large exporters, which are more stable in terms of export markets. On the other en of the spectrum, small and, to a lesser extent,

young exporters account for a large share of the volatility of trade flows, through their churning of products.

Figure 9: Average size and the detailed margins of firm-level exports

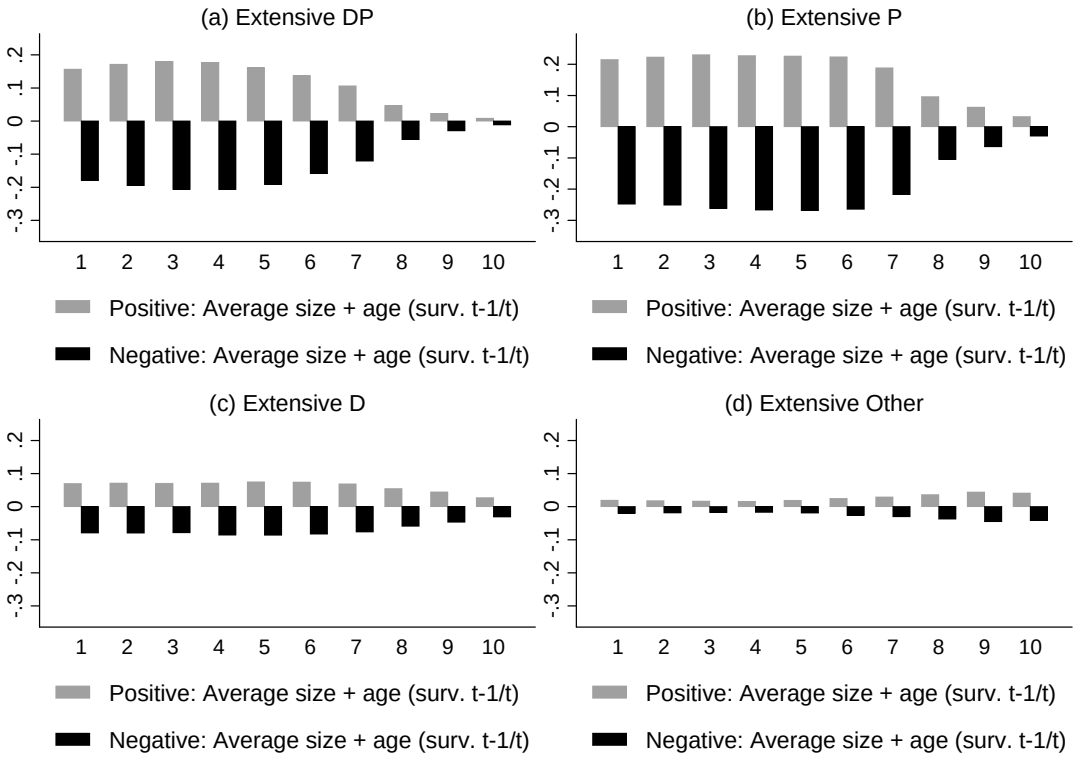
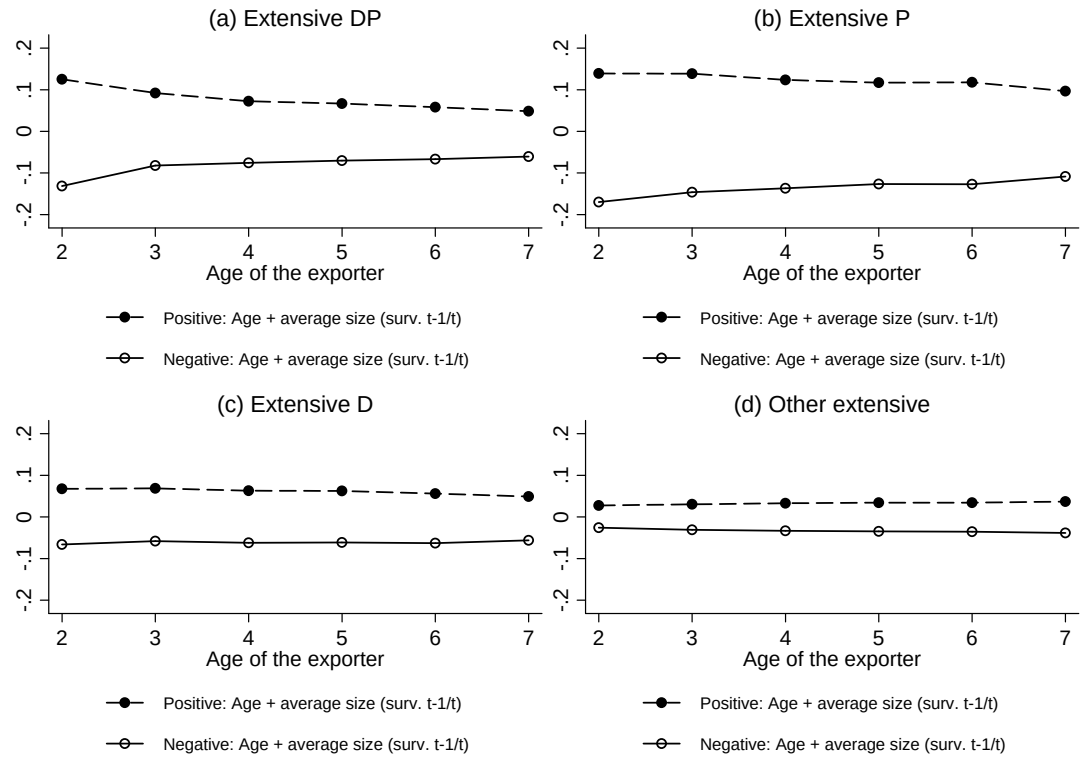


Figure 10: Average size and the detailed margins of firm-level exports



5 Conclusion

This paper aims at providing a new set of stylized facts regarding the growth and within-firm volatility of exporters in relation to their age and to their size. Many models of firms' dynamics on export markets exhibit size Markov processes. Assessing empirically whether current or average size is sufficient to assess future size, or age should not be disregarded, is therefore important in particular for modeling purpose. Our empirical analysis is based on a detailed transaction level dataset of French exporters. We find that net growth of surviving firms is negatively related to the age of the firm on the export market, while the impact of size is non-monotonic. The significance of firm age on export market, beyond the effect of size, points to the existence of learning and demand side determinants on foreign markets. In addition, we find that small and, to a lesser extent, young exporters contribute disproportionably to export volatility through both firm turnover on export market and churning (entry and exit) of product and destination markets.

Our empirical analysis also points to several important statistical issues when studying the dynamics of exporters. Our results show a distinct role for age and size of exporters. First, since young exporters are also small; considering jointly age and size is important to disentangle the contribution of each to growth patterns. Second, we confirm that the choice of measurement of exporters' size is important. Finally, since exporters are likely to start exporting in the course of a year, using calendar year biases downwards export revenues in the first year of export, and artificially magnifies the growth between the first and second years. This bias is large and amounts to an underestimation of new exporter's revenue of 32% on average. Using reconstructed years, we do not find any large, one-shot, increase in exports the second year.

References

Albornoz-Crespo, F., Calvo Pardo, H. F., Corcos, G., and Ornelas, E. (2010). Sequential exporting. CEPR Discussion Papers 8103, C.E.P.R. Discussion Papers.

Arkolakis, C. (2011). A unified theory of firm selection and growth. NBER Working Papers 17553.

Bernard, A. B., Jensen, J. B., Redding, S. J., and Schott, P. K. (2009). The margins of us trade. *American Economic Review Papers and Proceedings*, 2(99):487–93.

Bernard, A. B., Redding, S. J., and Schott, P. K. (2010). Multiple-product firms and product switching. *American Economic Review*, 100(1):70–97.

Chaney, T. (2011). The network structure of international trade. NBER WP 16753.

Cooley, T. F. and Quadrini, V. (2001). Financial markets and firm dynamics. *American Economic Review*, 91(5):1286–1310.

Davis, S. J., Haltiwanger, J., and Schuh, S. (1996). *Job creation and destruction*. MIT Press, Cambridge.

Davis, S. J. and Haltiwanger, J. C. (1992). Gross job creation, gross job destruction, and employment reallocation. *The Quarterly Journal of Economics*, 107(3):819–63.

Dunne, T., Roberts, M. J., and Samuelson, L. (1989). The growth and failure of us manufacturing plants. *Quarterly Journal of Economics*, pages 671–698.

Eaton, J., Eslava, M., Kugler, M., and Tybout, J. (2007). Export dynamics in colombia: Firm-level evidence. BANCO DE LA REPÚBLICA WP 003957.

Eaton, J., Eslava, M., Kugler, M., and Tybout, J. (2011). A search and learning model of export dynamics. mimeo.

Eaton, J., Kortum, S., and Kramarz, F. (2004). Dissecting trade: Firms, industries, and export destinations. *American Economic Review*, 94(2):150–154.

Foster, L., Haltiwanger, J., and Syverson, C. (2010). The slow growth of new plants: Learning about demand? mimeo.

Freund, C. and Pierola, M. D. (2010). Export entrepreneurs : evidence from peru. World Bank Policy Research Working Paper Series 5407.

Haltiwanger, J. C., Jarmin, R. S., and Miranda, J. (2010). Who creates jobs? small vs. large vs. young. NBER Working Paper N.16300.

Hopenhayn, H. A. (1992). Entry, exit, and firm dynamics in long run equilibrium. *Econometrica*, 60(5):1127–50.

Iacovone, L. and Javorcik, B. (2010). Multi-product exporters: Product churning, uncertainty and export discoveries. *Economic Journal*, 120(544):481–499.

Impullitti, G., Irarrazabal, A., and Opromolla, L. (2011). A theory of entry into and exit from export markets.

Jovanovic, B. (1982). Selection and the evolution of industry. *Econometrica*, 50(3):649–70.

Klepper, S. and Thompson, P. (2006). Submarkets and the evolution of market structure. *The RAND Journal of Economics*, 37(4):861–886.

Klette, T. J. and Kortum, S. (2004). Innovating firms and aggregate innovation. *Journal of Political Economy*, 112(5):986–1018.

Lawless, M. (2009). Firm export dynamics and the geography of trade. *Journal of International Economics*, 77(2):245–254.

Luttmer, E. G. J. (2007). Selection, growth, and the size distribution of firms. *The Quarterly Journal of Economics*, 122(3):1103–1144.

Luttmer, E. G. J. (2011). On the mechanics of firm growth. *The Review of Economic Studies*, 78(2):1042–1068.

Ruhl, K. J. and Willis, J. L. (2008). New Exporter Dynamics. Mimeo NYU Stern School of Business.

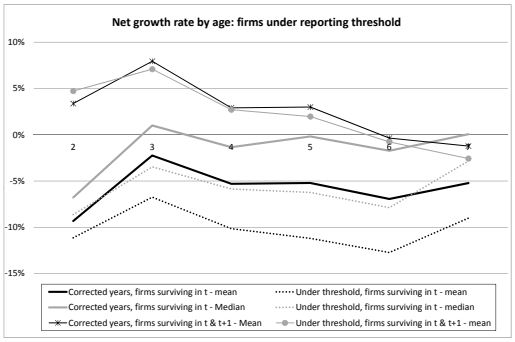
Sutton, J. (1997). Gibrat's legacy. *Journal of Economics Literature*, 35(1):40–59.

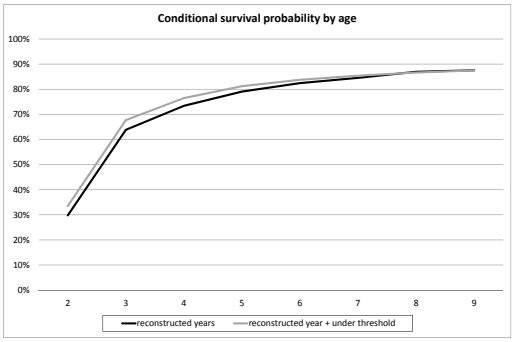
Appendix A: reporting thresholds in the French customs data

Two different thresholds apply for individual firms when declaring their exports. When exporting to a non-EU country, the threshold is 1,000 euros. When exporting to a Member state, the declaration is compulsory if the yearly cumulated value of exports to all other EU Member states is larger than 150,000 euros. This threshold has however changed since 1995, as well as the composition of the EU: we thus reapply this threshold to individual firms' exports to the 26 EU Member states over the full period. Exporters under the EU threshold however fill a simplified declaration without product or destination details. We use this information to compute individual firms' age on the export market.

Some 91396 firms export on average each year in our dataset, of which on average 35046 are under the EU threshold of declaration. Figure 11 show that excluding firms under the threshold biases slightly downwards the conditional survival probability of new exporters. Regarding net growth rate (left panel of Figure 11), excluding exporters under the EU threshold biases upwards the level of growth rates, but does not affect the profile of mean or median growth over time. This bias is smoothed out when restricting the sample to firms that survive between $t-1$ and $t+1$.

Figure 11: Net growth rates and survival of exporters by age: threshold effects





Appendix B: Decomposition of the growth of aggregate exports

The methodology presented in the paper can be modified to measure the contribution of each trade flow to the growth of French exports. The aggregate the variations of French exports is computed as the weighted sum of the growth of individual trade flows, where each weight reflects the contribution of each individual flow to the value of aggregate exports in t and t-1. The aggregate growth can then be decomposed into the contributions of the intensive and net/gross extensive margin (and its components).

The contributions are reported in Table 1. Annual French exports increased at an average rate of 4.2% over the period 1998-2008. About 60% of the yearly growth is due to a net expansion in the value of continuing trade relationships (the intensive margin), while new firms contribute to less than 30% of this growth. About 10% of the yearly expansion of aggregate French exports is due to the net introduction of new products and destinations. The gross contribution of entry and exit in different markets (destination and/or products) is however larger.

Table 1: Contribution of the intensive and extensive margin to the growth of French exports (1998-08)

	Yearly variations (Mean 1998-08)	**Long run growth (1998 to 2008)**
Intensive positive	21.7%	28.5%
Intensive negative	-19.3%	-14.3%
Net intensive	**2.5%**	**14.2%**
Firm entry	2.4%	34.2%
Firm exit	-1.2%	-17.7%
Net firm	**1.2%**	**16.5%**
Add destination-product	0.9%	6.2%
Drop destination-product	-0.9%	-6.8%
Net destination-product	**0.1%**	**-0.5%**
Add destination	2.5%	9.7%
Drop destination	-2.4%	-5.3%
Net destination	**0.1%**	**4.3%**
Add product	2.2%	12.9%
Drop product	-2.0%	-9.8%
Net product	**0.2%**	**3.1%**
Add other	3.8%	9.7%
Drop other	-3.6%	-5.8%
Net other	**0.2%**	**3.9%**
Net extensive	**1.8%**	**27.3%**
Total	**4.2%**	**41.5%**

The second column of Table 1 reports the contributions of each margin to the growth of French export, considering a 10 year period (1998-2008). In doing so, the contribution of the intensive margin is computed on the basis of continuing trade relationships (i.e. those with a positive value of exports in 1998 and 2008). The net contribution of the extensive margin is based on trade relationships that were not observed in 1998, and for which we can register a positive trade value in 2008.

As compared to the previous column, the relative contributions of the intensive and net extensive margin are modified. During the period 1998-2008, French exports increased by 41.5%. Less than 35% of this growth is due to continuing trade relationships, whereas 40% can be attributed to firms that were not exporting in 1998 and entered at some point over a period of 10 years. The gross contributions of the extensive margin of incumbent exporters are also predominant in the medium run. The larger contribution of the net extensive margin over a period of 10 years can be explained by the fact that most trade relations are short lived (we present below the rate of survival of new exporters). Besides, we also show below that the growth of new exporters is negatively related to their size. This increases as well the relative contribution of the net extensive margin when considering a longer time period.

Appendix C: regression results

Table C1. Effects of age and size on the probability of survival

	(1)	(2)	(3)	(4)	(5)
Dep. Variable			$Prob(X_{it} > 0)$		
Measure of size		Average (t-1/t)	Average (t-1/t)	Initial (t-1)	Initial (t-1)
Sample	All	All	All	All	All
Age exporter=1	0.135^a		0.422^a		0.314^a
	(0.001)		(0.002)		(0.001)
Age exporter=2	-0.600^a		-0.328^a		-0.421^a
	(0.002)		(0.002)		(0.002)
Age exporter=3	-0.255^a		-0.092^a		-0.134^a
	(0.003)		(0.002)		(0.003)
Age exporter=4	-0.164^a		-0.045^a		-0.072^a
	(0.003)		(0.003)		(0.003)
Age exporter=5	-0.106^a		-0.016^a		-0.034^a
	(0.003)		(0.003)		(0.003)
Age exporter=6	-0.078^a		-0.007^b		-0.020^a
	(0.003)		(0.003)		(0.003)
Size exporter =1		-0.542^a	-0.590^a	-0.467^a	-0.408^a
		(0.002)	(0.002)	(0.003)	(0.002)
Size exporter =2		-0.504^a	-0.551^a	-0.444^a	-0.393^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =3		-0.445^a	-0.485^a	-0.406^a	-0.360^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =4		-0.371^a	-0.397^a	-0.362^a	-0.317^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =5		-0.287^a	-0.300^a	-0.306^a	-0.266^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =6		-0.202^a	-0.204^a	-0.243^a	-0.207^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =7		-0.252^a	-0.254^a	-0.218^a	-0.190^a
		(0.002)	(0.002)	(0.002)	(0.002)
Size exporter =8		-0.083^a	-0.080^a	-0.121^a	-0.106^a
		(0.001)	(0.002)	(0.002)	(0.002)
Size exporter =9		-0.023^a	-0.022^a	-0.036^a	-0.030^a
		(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.898^a	0.981^a	0.973^a	0.974^a	0.974^a
	(0.005)	(0.006)	(0.005)	(0.006)	(0.005)
Observations	527,305	527,305	527,305	527,305	527,305
R-squared	0.392	0.172	0.508	0.125	0.448
Sector FE	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes

Table C2. Effects of age and size on firms' growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable		G_{it}				$G_{it}\|X_{it}>0$		
Measure of size		Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)
Sample	All	All	All	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t+1	Surv. t-1/t Groups excl.
Age exporter=1	2.319^a		2.910^a	2.057^a		2.106^a	2.063^a	2.109^a
	(0.002)		(0.004)	(0.002)		(0.003)	(0.003)	(0.004)
Age exporter=2	-1.176^a		-0.615^a	-0.037^a		0.004	0.060^a	-0.004
	(0.004)		(0.005)	(0.006)		(0.006)	(0.007)	(0.007)
Age exporter=3	-0.476^a		-0.131^a	0.033^a		0.066^a	0.103^a	0.067^a
	(0.006)		(0.006)	(0.006)		(0.006)	(0.007)	(0.007)
Age exporter=4	-0.317^a		-0.063^a	0.002		0.030^a	0.059^a	0.035^a
	(0.007)		(0.007)	(0.006)		(0.007)	(0.007)	(0.008)
Age exporter=5	-0.204^a		-0.010	0.002		0.025^a	0.050^a	0.028^a
	(0.008)		(0.007)	(0.007)		(0.007)	(0.007)	(0.008)
Age exporter=6	-0.164^a		-0.009	-0.015^b		0.004	0.022^a	0.004
	(0.008)		(0.008)	(0.007)		(0.007)	(0.007)	(0.008)
Size exporter =1		-0.230^a	-1.217^a		1.934^a	-0.092^a	-0.054^a	-0.093^a
		(0.009)	(0.005)		(0.003)	(0.004)	(0.004)	(0.004)
Size exporter =2		-0.187^a	-1.138^a		1.706^a	-0.083^a	-0.055^a	-0.084^a
		(0.009)	(0.005)		(0.005)	(0.004)	(0.005)	(0.004)
Size exporter =3		-0.155^a	-1.016^a		1.369^a	-0.093^a	-0.078^a	-0.094^a
		(0.009)	(0.005)		(0.007)	(0.005)	(0.006)	(0.005)
Size exporter =4		-0.138^a	-0.862^a		0.998^a	-0.113^a	-0.098^a	-0.114^a
		(0.008)	(0.006)		(0.007)	(0.005)	(0.007)	(0.006)
Size exporter =5		-0.118^a	-0.677^a		0.671^a	-0.112^a	-0.081^a	-0.113^a
		(0.008)	(0.006)		(0.007)	(0.005)	(0.006)	(0.006)
Size exporter =6		-0.106^a	-0.489^a		0.397^a	-0.106^a	-0.063^a	-0.104^a
		(0.007)	(0.006)		(0.007)	(0.005)	(0.006)	(0.005)
Size exporter =7		-0.301^a	-0.565^a		0.291^a	-0.080^a	-0.036^a	-0.080^a
		(0.007)	(0.006)		(0.007)	(0.005)	(0.006)	(0.006)
Size exporter =8		-0.111^a	-0.203^a		0.071^a	-0.049^a	-0.017^a	-0.051^a
		(0.005)	(0.005)		(0.005)	(0.004)	(0.004)	(0.004)
Size exporter =9		-0.031^a	-0.060^a		0.021^a	-0.018^a	-0.002	-0.019^a
		(0.004)	(0.004)		(0.004)	(0.003)	(0.003)	(0.003)
Constant	-0.237^a	0.065^a	-0.060^a	-0.036^a	0.097^a	-0.005	0.014	-0.004
	(0.013)	(0.021)	(0.012)	(0.009)	(0.015)	(0.009)	(0.010)	(0.009)
Observations	527,305	527,305	527,305	380,687	380,687	380,687	263,357	336,635
R-squared	0.682	0.004	0.723	0.707	0.310	0.708	0.584	0.715
Sector FE	yes	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes	yes

Table C3. Effects of age and size on firms' growth - robustness estimations with Initial size

	(1)	(2)	(3)	(4)	(5)
Dep. Variable	G_{it}		$G_{it}\|X_{it}>0$		
Measure of size	Initial t-1	Initial t-1	Initial t-1	Initial t-1	Initial t-1
Sample	All	All	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t+1
Age exporter=1		2.564^{a}		1.888^{a}	1.866^{a}
		(0.004)		(0.003)	(0.003)
Age exporter=2		-0.931^{a}		-0.126^{a}	-0.065^{a}
		(0.005)		(0.006)	(0.006)
Age exporter=3		-0.300^{a}		-0.026^{a}	0.013^{b}
		(0.007)		(0.006)	(0.006)
Age exporter=4		-0.177^{a}		-0.037^{a}	-0.006
		(0.007)		(0.006)	(0.007)
Age exporter=5		-0.092^{a}		-0.027^{a}	-0.001
		(0.008)		(0.007)	(0.007)
Age exporter=6		-0.070^{a}		-0.037^{a}	-0.017^{b}
		(0.008)		(0.007)	(0.007)
Size exporter =1	-0.021^{b}	-0.556^{a}	1.779^{a}	0.402^{a}	0.616^{a}
	(0.010)	(0.006)	(0.005)	(0.005)	(0.009)
Size exporter =2	0.001	-0.544^{a}	1.647^{a}	0.356^{a}	0.522^{a}
	(0.009)	(0.006)	(0.005)	(0.005)	(0.008)
Size exporter =3	0.003	-0.515^{a}	1.414^{a}	0.282^{a}	0.368^{a}
	(0.009)	(0.006)	(0.006)	(0.005)	(0.007)
Size exporter =4	-0.018^{b}	-0.477^{a}	1.141^{a}	0.193^{a}	0.237^{a}
	(0.008)	(0.006)	(0.007)	(0.005)	(0.007)
Size exporter =5	-0.038^{a}	-0.444^{a}	0.853^{a}	0.086^{a}	0.107^{a}
	(0.008)	(0.005)	(0.007)	(0.005)	(0.006)
Size exporter =6	-0.085^{a}	-0.402^{a}	0.548^{a}	-0.011^{b}	-0.003
	(0.007)	(0.005)	(0.007)	(0.005)	(0.005)
Size exporter =7	-0.203^{a}	-0.388^{a}	0.308^{a}	-0.031^{a}	-0.008^{c}
	(0.007)	(0.005)	(0.006)	(0.004)	(0.005)
Size exporter =8	-0.137^{a}	-0.193^{a}	0.128^{a}	0.013^{a}	0.037^{a}
	(0.006)	(0.005)	(0.005)	(0.004)	(0.003)
Size exporter =9	-0.049^{a}	-0.064^{a}	0.028^{a}	-0.006^{b}	0.009^{a}
	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)
Constant	0.016	-0.092^{a}	0.062^{a}	-0.038^{a}	-0.011
	(0.021)	(0.012)	(0.016)	(0.009)	(0.010)
Observations	527,305	527,305	380,687	380,687	263,357
R-squared	0.003	0.691	0.290	0.718	0.603
Sector FE	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes

Table C4. Effects of age and size on firms' net export margins

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Variable	G^I_{it}				G^E_{it}			
Measure of size	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)
Sample	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t+1	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t+1
Age exporter=1	0.035^a		0.044^a	0.032^a	2.035^a		2.072^a	2.039^a
	(0.001)		(0.002)	(0.002)	(0.001)		(0.003)	(0.003)
Age exporter=2	-0.000		0.010^b	0.034^a	-0.032^a		-0.001	0.037^a
	(0.004)		(0.004)	(0.005)	(0.005)		(0.005)	(0.006)
Age exporter=3	0.017^a		0.026^a	0.045^a	0.022^a		0.045^a	0.068^a
	(0.004)		(0.005)	(0.005)	(0.005)		(0.005)	(0.005)
Age exporter=4	0.008		0.016^a	0.027^a	-0.002		0.017^a	0.035^a
	(0.005)		(0.005)	(0.005)	(0.005)		(0.005)	(0.006)
Age exporter=5	-0.000		0.007	0.022^a	0.005		0.021^a	0.034^a
	(0.005)		(0.005)	(0.006)	(0.005)		(0.005)	(0.006)
Age exporter=6	-0.013^b		-0.007	0.005	-0.006		0.007	0.015^a
	(0.005)		(0.005)	(0.006)	(0.006)		(0.006)	(0.006)
Size exporter t/t-1=1		0.013^a	-0.027^a	-0.022^a		1.933^a	-0.062^a	-0.028^a
		(0.002)	(0.003)	(0.003)		(0.003)	(0.003)	(0.003)
Size exporter t/t-1=2		0.014^a	-0.023^a	-0.022^a		1.704^a	-0.056^a	-0.029^a
		(0.002)	(0.003)	(0.003)		(0.005)	(0.003)	(0.004)
Size exporter t/t-1=3		0.005^b	-0.027^a	-0.031^a		1.375^a	-0.063^a	-0.044^a
		(0.002)	(0.003)	(0.004)		(0.006)	(0.004)	(0.006)
Size exporter t/t-1=4		-0.004	-0.030^a	-0.038^a		1.012^a	-0.080^a	-0.058^a
		(0.003)	(0.003)	(0.004)		(0.007)	(0.004)	(0.006)
Size exporter t/t-1=5		-0.012^a	-0.031^a	-0.030^a		0.689^a	-0.079^a	-0.049^a
		(0.003)	(0.004)	(0.004)		(0.007)	(0.004)	(0.005)
Size exporter t/t-1=6		-0.025^a	-0.039^a	-0.032^a		0.425^a	-0.067^a	-0.029^a
		(0.003)	(0.004)	(0.004)		(0.006)	(0.004)	(0.005)
Size exporter t/t-1=7		-0.023^a	-0.034^a	-0.019^a		0.316^a	-0.047^a	-0.013^a
		(0.004)	(0.004)	(0.005)		(0.006)	(0.004)	(0.004)
Size exporter t/t-1=8		-0.028^a	-0.033^a	-0.015^a		0.098^a	-0.018^a	-0.001
		(0.003)	(0.003)	(0.003)		(0.004)	(0.003)	(0.003)
Size exporter t/t-1=9		-0.009^a	-0.011^a	-0.001		0.030^a	-0.007^a	0.001
		(0.003)	(0.003)	(0.003)		(0.003)	(0.002)	(0.002)
Constant	-0.028^a	-0.009	-0.013	0.007	-0.012^b	0.103^a	0.003	0.005
	(0.009)	(0.009)	(0.009)	(0.010)	(0.005)	(0.013)	(0.005)	(0.006)
Observations	380,687	380,687	380,687	263,357	380,687	380,687	380,687	263,357
R-squared	0.003	0.002	0.003	0.003	0.781	0.345	0.781	0.684
Sector FE	yes	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes	yes

Table C5. Effects of age and size on firms' gross extensive margins

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Variable		$G^E_{it}+$			$G^E_{it}-$	
Measure of size	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)	Average (t-1/t)
Sample	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t	Surv. t-1/t
Age exporter=1	1.738^a		1.533^a	0.297^a		0.540^a
	(0.001)		(0.002)	(0.001)		(0.002)
Age exporter=2	0.280^a		0.129^a	-0.312^a		-0.130^a
	(0.003)		(0.003)	(0.003)		(0.003)
Age exporter=3	0.216^a		0.099^a	-0.194^a		-0.054^a
	(0.004)		(0.003)	(0.004)		(0.004)
Age exporter=4	0.157^a		0.061^a	-0.159^a		-0.044^a
	(0.004)		(0.004)	(0.004)		(0.004)
Age exporter=5	0.128^a		0.050^a	-0.123^a		-0.029^a
	(0.004)		(0.004)	(0.004)		(0.004)
Age exporter=6	0.102^a		0.035^a	-0.108^a		-0.029^a
	(0.004)		(0.004)	(0.004)		(0.004)
Size exporter =1		1.817^a	0.352^a		0.115^a	-0.414^a
		(0.002)	(0.002)		(0.001)	(0.002)
Size exporter =2		1.676^a	0.375^a		0.028^a	-0.431^a
		(0.004)	(0.003)		(0.002)	(0.003)
Size exporter =3		1.460^a	0.388^a		-0.086^a	-0.451^a
		(0.004)	(0.003)		(0.003)	(0.003)
Size exporter =4		1.208^a	0.383^a		-0.195^a	-0.463^a
		(0.005)	(0.003)		(0.003)	(0.003)
Size exporter =5		0.963^a	0.373^a		-0.273^a	-0.452^a
		(0.005)	(0.003)		(0.003)	(0.003)
Size exporter =6		0.738^a	0.351^a		-0.313^a	-0.418^a
		(0.004)	(0.003)		(0.003)	(0.003)
Size exporter =7		0.571^a	0.284^a		-0.255^a	-0.331^a
		(0.004)	(0.003)		(0.003)	(0.003)
Size exporter =8		0.221^a	0.125^a		-0.123^a	-0.143^a
		(0.003)	(0.002)		(0.002)	(0.002)
Size exporter =9		0.096^a	0.065^a		-0.066^a	-0.072^a
		(0.002)	(0.001)		(0.002)	(0.002)
Constant	0.080^a	0.067^a	-0.015^a	-0.092^a	0.036^a	0.019^a
	(0.004)	(0.012)	(0.005)	(0.005)	(0.005)	(0.005)
Observations	380,687	380,687	380,687	380,687	380,687	380,687
R-squared	0.831	0.506	0.848	0.229	0.110	0.323
Sector FE	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes