Online Data Appendix for the paper "A Unified Theory of Firm Selection and Growth"*

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Abstract

This online data appendix uses a panel of Brazilian exporting transactions data to test the predictions of the model in the main paper. In particular it looks at i) distribution of firms sales in the US and France ii) the exit rates and growth of surviving exporters iii) the characteristics of exporters that enter and exit exporting markets iv) econometrically tests the exporter growth-size relationship postulated in the main paper.

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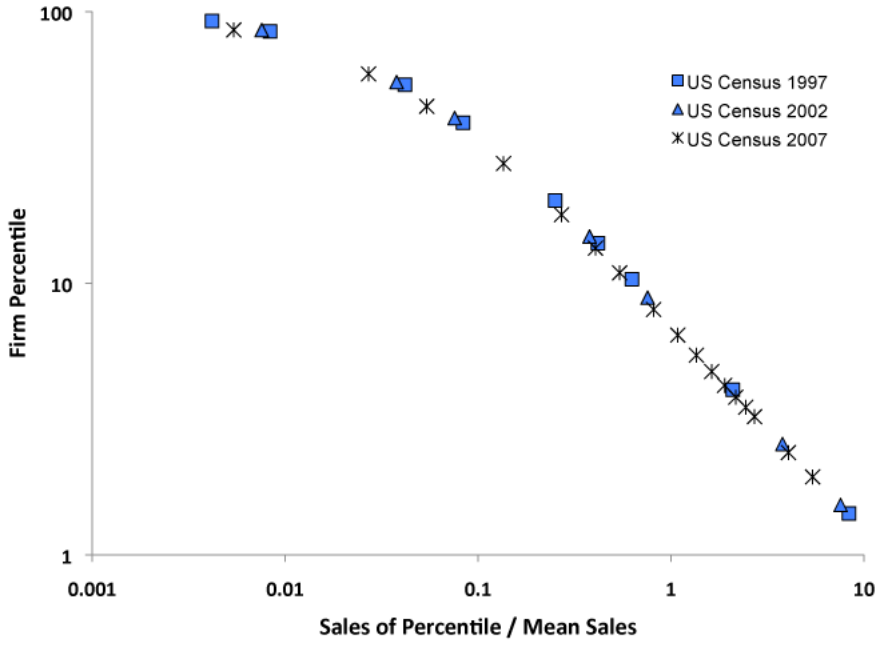
Figure 1: Distribution of total sales of US manufacturing census firms.



Note: See main paper for details on the data.

1 Distribution of Firm Sales

Figure 1 plots the sales of the firms (divided by mean sales) in logarithms in both axes. The Figure, effectively, zooms in the top decile of the firms and indicates that the size distribution of the larger firms is roughly linear in logarithms and thus can be approximated by the Pareto distribution. The distribution of sizes of smaller firms clearly deviates from Pareto in the left tail.

2 Brazilian Data

The Brazilian manufacturing data cover the universe of Brazilian manufacturing exporting transactions from 1990-2001 and are described in Molina and Muendler (2008) and Arkolakis and Muendler (2010). The data report the individual transactions of the firms at the disaggregated product level. I restrict to manufacturing products and thus consider only products at the 6-digit level Harmonized System codes between 100,000 and 970,0000. The data are aggregated at the firm-level and consider the top 50 exporting destinations of Brazilian exporters in terms of total sales over this period. All the statistics presented below are constructed for the sales of firm in each destination. The moments presented here refer to the mean of the statistics across markets weighted by the number of exporters operating in each market, unless otherwise noted.

3 Growth Rates Distributions

The graphs below illustrate the distribution of growth rates as a function of exporter size and age and the distribution of sizes as a function of firm age for the top-5 Brazilian exporting destinations. The graphs correspond to the Figures 5 and 7 in the main paper.

4 Cohort Exit Rates and Average Sales

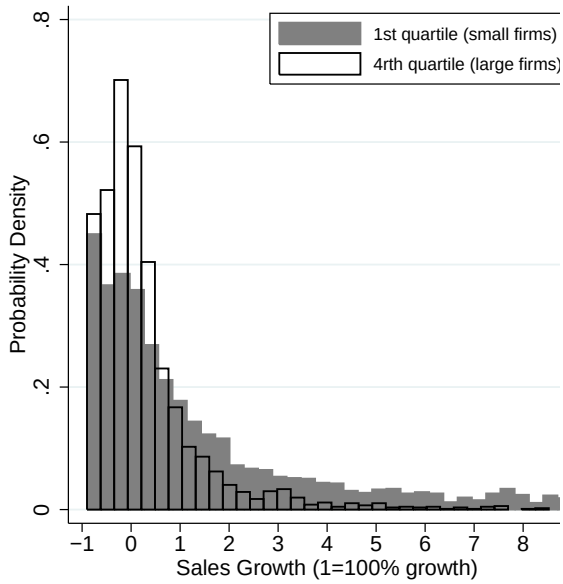
I collect evidence for the exit rate and the growth of exporters across different destinations markets. The approach is motivated by the predictions of the main paper and in particular the inverse size growth relationship of exporters predicted in each destination market.

Following the definitions in the main paper, the term "incumbent cohort" includes all the firms that were in the market at a certain census year (normalized as year 0). The survivors of that cohort at year t are the firms from the cohort which also sell in the market at year t. "Entry cohorts" are the firms that enter the market between the current census and the previous one. Thus, by construction, incumbent cohorts include the surviving firms from all past entry cohorts as well as the firms of the current entry cohort.

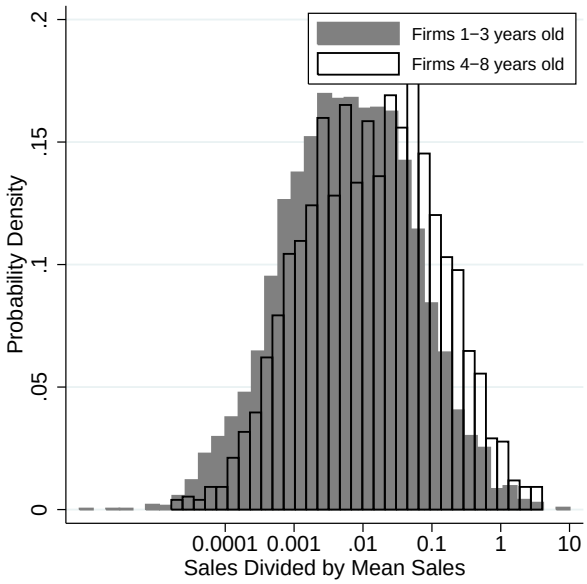
The following empirical tests are performed. First, I compute the exit rates and average sales for the surviving firms by destinations for entry and incumbent cohorts. Second, I compute the probability that exporters are selling again to an exporting destination, conditional on exiting. Finally, empirical tests are performed to explain exporter's growth rates in individual markets as a function of exporter's initial size. Most importantly I test the prediction that exporter's growth in a market depends on the relative size of the exporter in that market.

To organize the data in a manner similar to the one in the main paper I am conducting a three-year census in the Brazilian data. The choice of the number of years is set to make it as close as possible to the 4 and 5-year censuses presented in the paper given the constraint that the sample of years is much smaller for the Brazilian data. As in the main paper, in order to measure entrants and exiters I resemble as closely as possible the Dunne, Roberts, and Samuelson (1988) (henceforth DRS)

Figure 2: Brazilian exporters' growth rates in United States



Density of sizes



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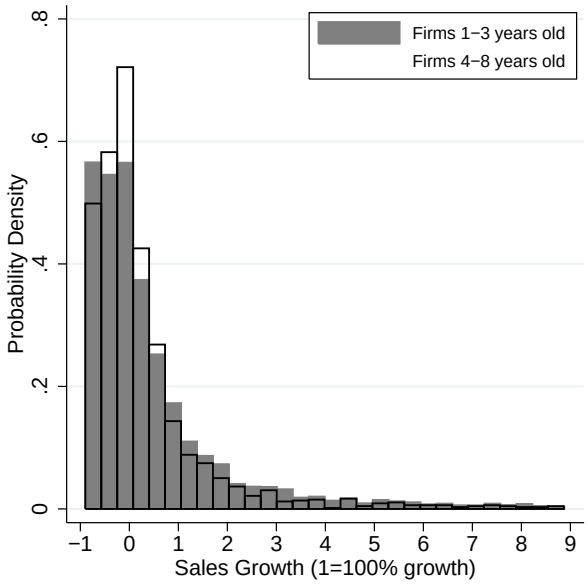
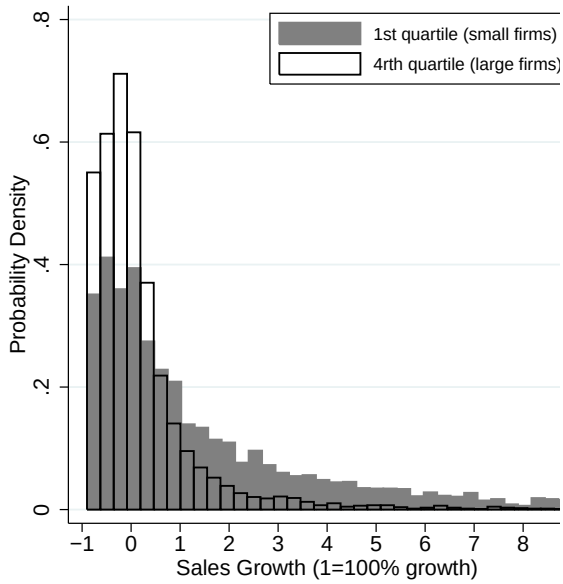


Density of growth rates

Note: The data cover the universe of Brazilian merchandise exporting transactions from 1990-2001. The outlier observations of growth rates of more than 900% or less than -90% are excluded.

Figure 3: Brazilian exporter growth rates in Argentina



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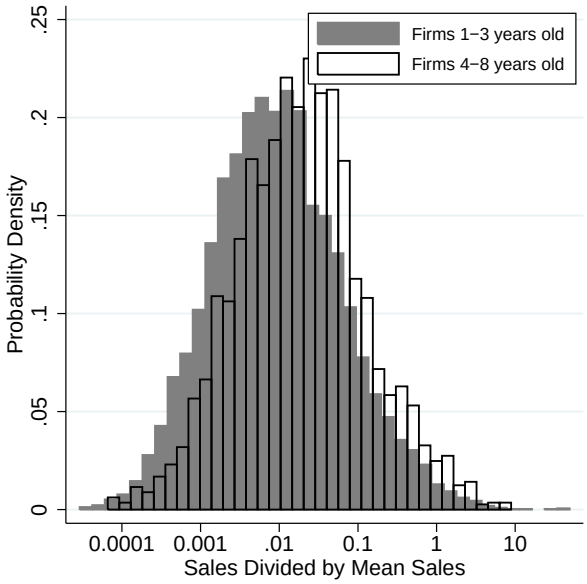

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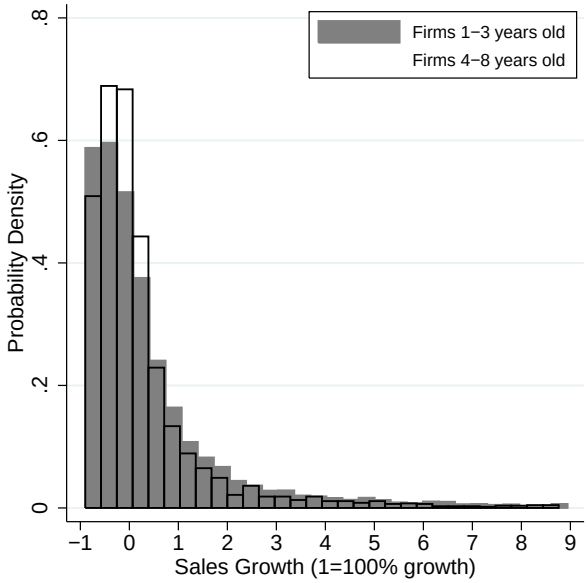
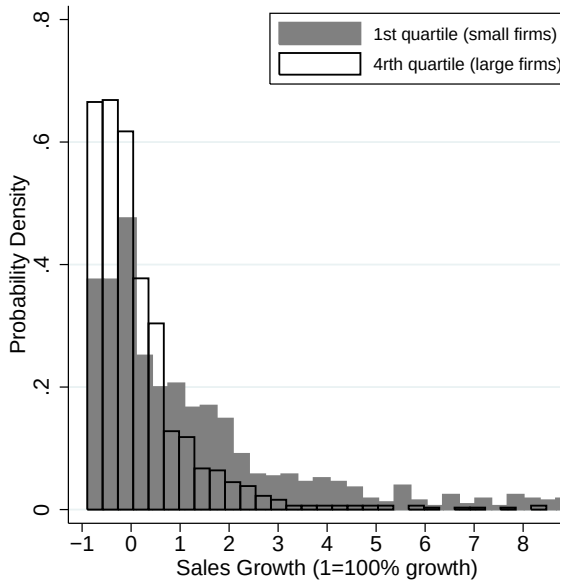


Density of growth rates

Note: The data cover the universe of Brazilian merchandise exporting transactions from 1990-2001. The outlier observations of growth rates of more than 900% or less than -90% are excluded.

Figure 4: Brazilian exporters in the Netherlands



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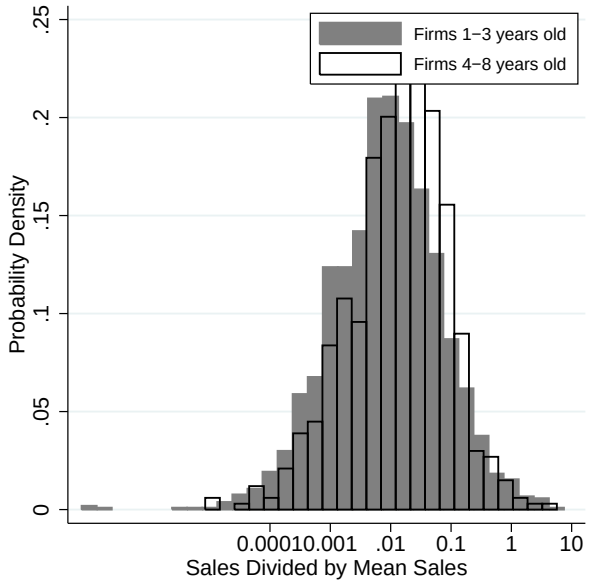

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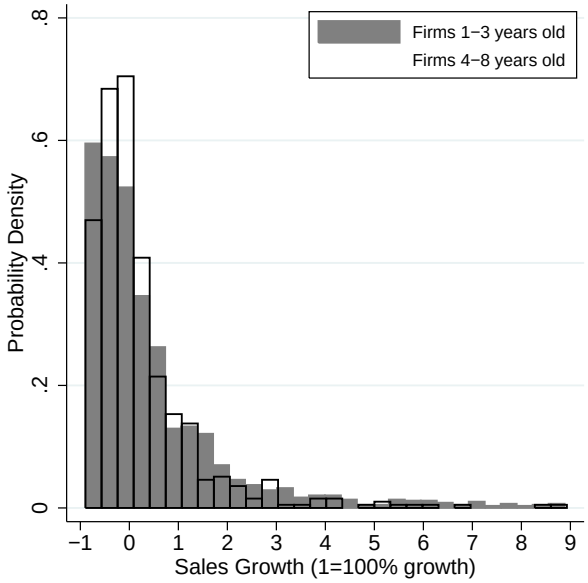
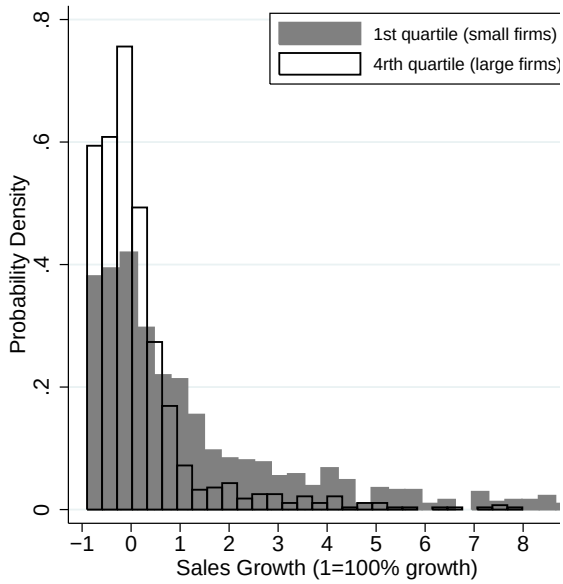


Density of growth rates

Note: The data cover the universe of Brazilian merchandise exporting transactions from 1990-2001. The outlier observations of growth rates of more than 900% or less than -90% are excluded.

Figure 5: Brazilian exporters in Germany



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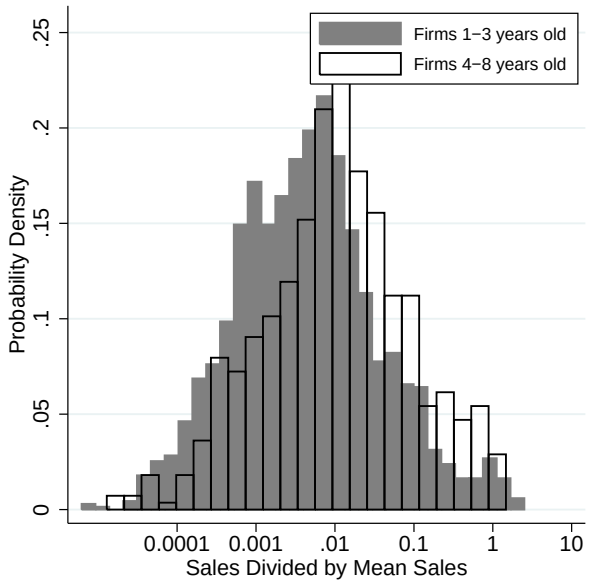

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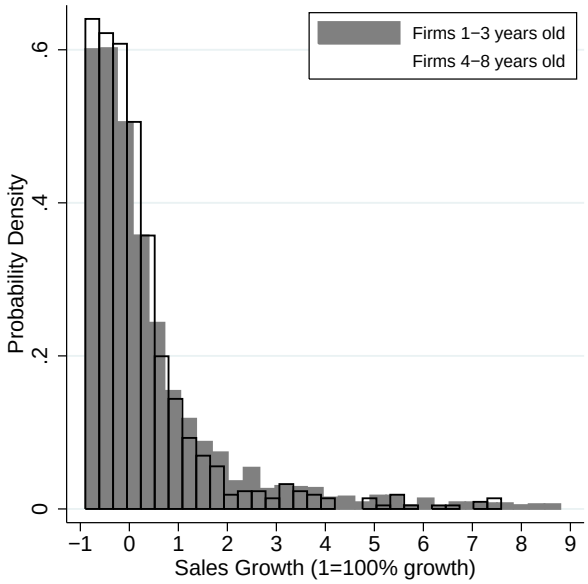
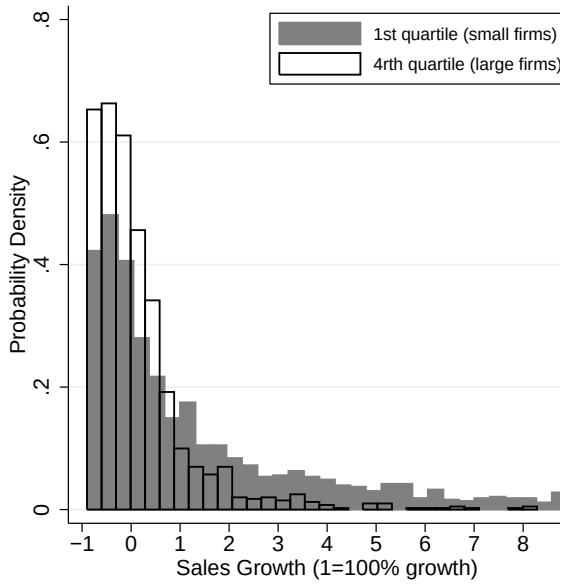


Density of growth rates

Note: The data cover the universe of Brazilian merchandise exporting transactions from 1990-2001. The outlier observations of growth rates of more than 900% or less than -90% are excluded.

Figure 6: Brazilian exporters in Japan



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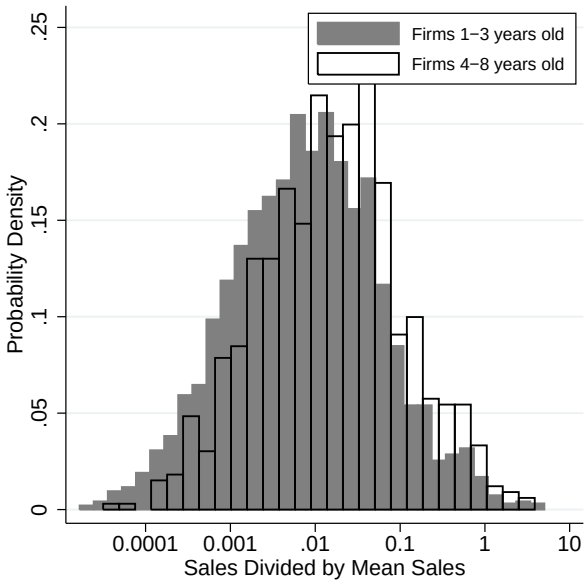

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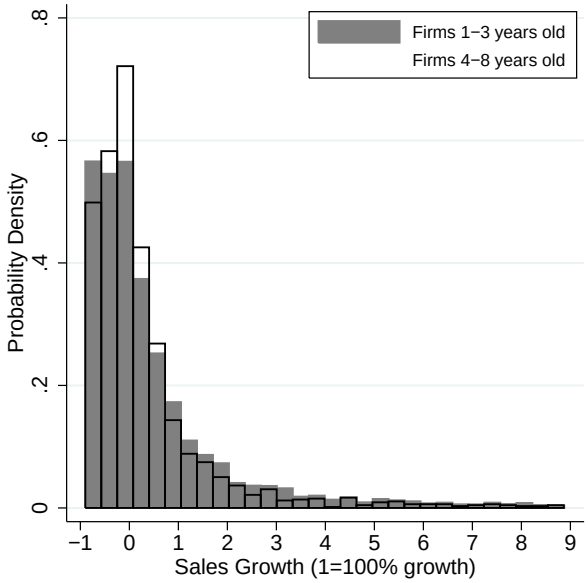

Density of growth rates

Note: The data cover the universe of Brazilian merchandise exporting transactions from 1990-2001. The outlier observations of growth rates of more than 900% or less than -90% are excluded.

methodology and classify an exporter that exits in a census-year and re-enters in a later census as an exiter when it leaves and as an entrant when it re-enters. I will discuss the possibility of re-entry of exporters later on in the text.

Cohort Exit

Figure 6 illustrates the fraction of exiting exporters from incumbent and entry cohorts at subsequent censuses. The fraction of exiters is by construction 0% in year 0 of a cohort and increases as more exporters exit the market. The two features that emerge in Figure 1 in the main paper are also prevalent here. First, the exit rates in the exporting data are very large. Within 6 years only around one fifth of the entry cohort firms and one third of the incumbent cohort firms are still active. These exit rates are higher than the ones reported by DRS, by around 15 percentage points, but the qualitative features of the data are similar. Second, the exit rates of entry cohorts are consistently higher than that of the incumbent cohorts, a qualitative feature that is consistent with the US manufacturing census data. Since the incumbent cohorts include firms from the current entry cohorts, exit rates of the entry cohorts account for a large part of the overall incumbent cohort exit.

An additional robust feature of the data is that the average size of entering and exiting exporters is very similar (again consistent with what is observed in the US census data for firms). In Table 1 I report the average size of entering and exiting exporters for a triennial sample in the years 1990, 1993, 1996, 1999 compared to the average size of all firms in the market in the current year. The size of entering and exiting firms is practically the same, a finding very similar to the one reported by Eaton, Eslava, Kugler, and Tybout (2008).

Cohort Average Sales

I now illustrate the average size of incumbent and new cohorts in Figure 6. The average size of incumbent cohort firms increases to around 2.3 times the size of all

firms in the span of 6 years. Upon entry, the average size of entry cohorts firms is only about one half of the average size of all firms, a little bit higher than the number for US manufacturing firms (one third). However, 6 years later the average size of surviving entrants has reached almost the average size of the firms in the economy. The increase in sales of both incumbents and entrants is faster than what is observed in the US manufacturing data. Arguably, much of this difference can be attributed to selection and in particular in the higher exit rates of exporters into individual markets.

5 Re-entry Probability

Another statistic that can be computed using the trade data is the probability that an exporter returns to a destination after an immediate exit, where exit is defined as a year of inactivity after (at least) a year of activity in a certain destination market. The probability to be computed is the probability that an exporter who was exporting in a destination and exits from that destination in a year returns to the same destination, at least once, in the next few years. I compute this probability of "re-entry" for the next 3 years from the year following an exporter's "exit". The average of this probability for each exit year that I can consider (1991-1998) is 27.9% (note again that all numbers are also averages across the top-50 destinations). Thus, the evidence implies that there is a very large chance that an exporter that does not sell in a destination a certain year will return to that destination some time in the near future.

6 Growth Rates Conditional on Size

I now offer a direct test for the model predictions and in particular the fact that exporter's growth rate in each destination are inversely related to its size there. I regress the ratio of firm sales in a destination at period $t+1$ to t, on its percentile of sales at that destination at time t, destination and year fixed effects, and a firm fixed effect. The theory implies that the coefficient on the firm percentile in the destination is negative. I present the empirical results in Table 2 with the different empirical specifications. In all the empirical specification the coefficient on firm percentile is positive and significant with a small standard error. When I add firm fixed effects in the regression (column C) the coefficient becomes even more negative indicating some positive correlation in the growth of firms across markets that cannot be explained by firm's percentile. Notice that the standard error of the coefficient is very small even if I cluster the errors at the firm-year level (standard error .006 instead of .004).

References

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Dunne, T., M. J. Roberts, and L. Samuelson (1988): "Patterns of Firm Entry and Exit in US Manufacturing Industries," *The RAND Journal of Economics*, 19(4), 495–515.

Eaton, J., M. Eslava, M. Kugler, and J. Tybout (2008): "The Margins of Entry Into Export Markets: Evidence from Colombia," in *Globalization and the Organization of Firms and Markets*, ed. by E. Helpman, D. Marina, and T. Verdier. Harvard University Press, Massachusetts.

Molina, D., and M.-A. Muendler (2008): "Preparing to Export," Manuscript, University of California-San Diego.

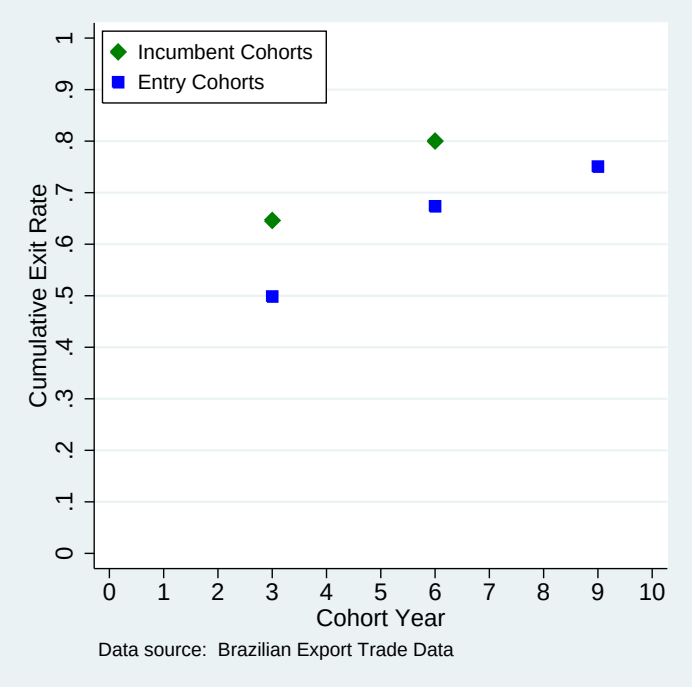
Statistics/Census Year	1990	1993	1996	1999	mean
Entrants Relative Size	-	.456	.445	.465	.455
Exitors Relative Size	.522	.436	.449	-	.469

Table 1: Size of Firms Entering and Exiting Relative to All Firms Source: Numbers calculated using market shares (Table 2) and exit rates (Table 8) from DRS

	A	B	C
Firm Percentile in market d	$-.620$	$-.638$	$-.979$
	(.003)	(.003)	(.004)
Year Fixed-Effects (FE)	N	Y	Y
Destination FE	N	Y	Y
Firm FE	N	N	Y
Observations	332,559	332,559	332,559

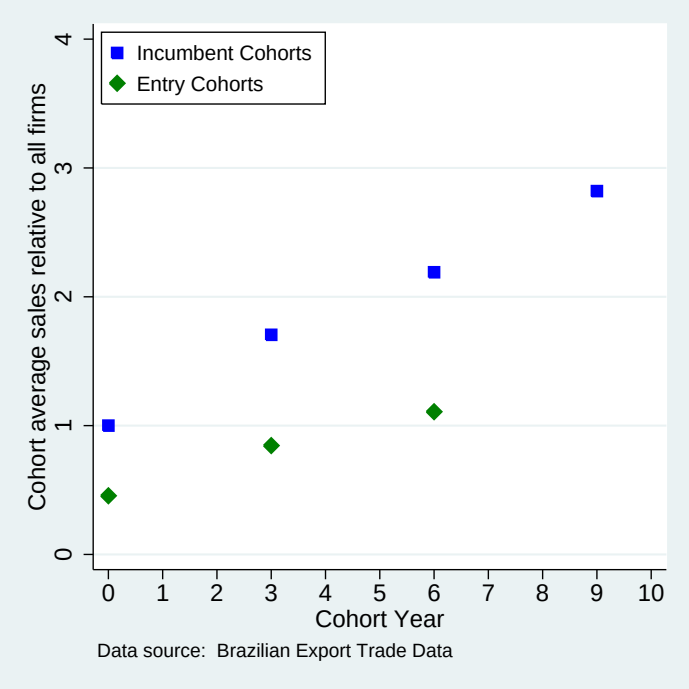
Table 2: Regressions on Exporter's Ratio of Sales Source: Brazilian Exporting Transactions data, 1990-2001, top 50 destinations

Figure 7: Cumulative Exit in the Brazilian Exporting Data



Note: The data are aggregated at the firm-level and consider the top 50 exporting destinations of Brazilian exporters in terms of total sales over 1990-2001.

Figure 8: Cumulative Exit in the Brazilian Exporting Data



Note: The data are aggregated at the firm-level and consider the top 50 exporting destinations of Brazilian exporters in terms of total sales over 1990-2001.