A Search and Learning Model of Export Dynamics

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Two sets of relevant issues

- Aggregate/industry level export dynamics
  - What determines short and long-run responses to macroeconomic shocks?
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- **This paper**: Approach these issues by studying formation, evolution, and dissolution of international buyer-seller relationships.

What we do

1. Chararcterize buyer-seller relationships in decade's worth of data on individual merchandise shipments from Colombia to the United States
2. Develop a (partial equilibrium) dynamic search and learning model motivated by features of the data
3. Fit the model and quantify exporting frictions:
   - costs of finding new buyers
   - costs maintaining relationships with existing ones.
   - learning about product appeal in foreign markets
   - network effects
4. Use our estimated model to analyze the aggregate response to policy shocks such as trade liberalization

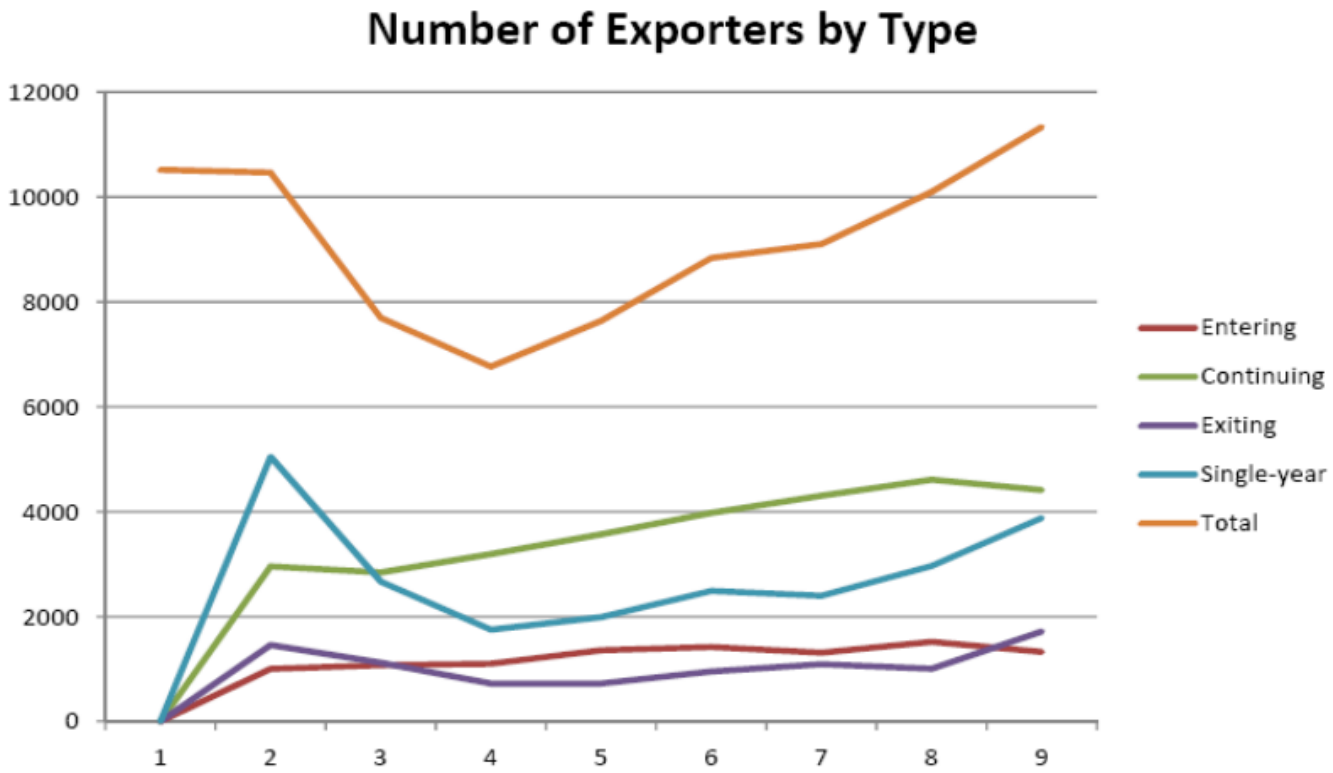
Related literature

- Melitz (2003), etc.
  - More efficient firms more likely to export
  - More efficient firms sell more in any market
- Beachhead exporting costs:
  - *Theory*: Dixit (1989), Baldwin and Krugman (1989), Impullitti, Irarrazabal, and Opromolla (2012)
  - *Quantitative*: Roberts and Tybout (1997), Bernard and Jensen (2004), Das, Roberts, and Tybout (2008)
- Marketing costs: Arkolakis (2009, 2010); Drozd and Nozal (2011)
- Networks: Rauch (1999, 2001), Chaney (2011)
- Learning: Rauch and Watson (2002); Albornoz, Calvo-Pardo, Corcos, and Ornelas (2012), Li (2014)

Stylized facts

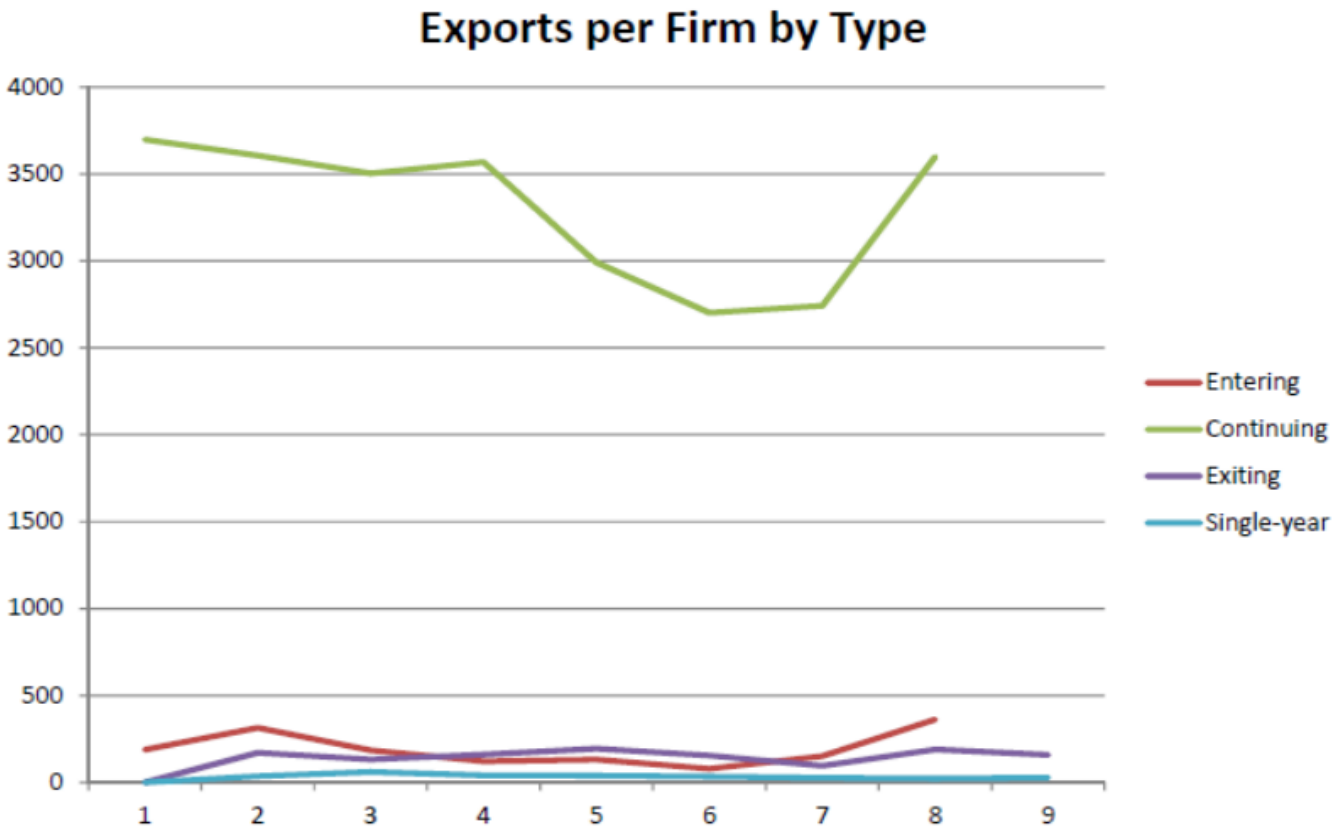
- Evidence from Colombian customs data
  - Population of (legal) Colombian export transactions over the course of a decade (1996-2005).
  - Each transaction has a date, value, product code, firm ID, and destination country.
  - See also: Besedes (2006); Bernard et al (2007); Blum et al (2009); Albornoz, et al (2010)
- Evidence from U.S. customs records
  - Population of (legal) import transactions over the course of a decade (1996-2009).
  - Each transaction has a date, value, product code, affiliated trade indicator, exporter country *and* firm ID, and importer firm ID.
  - See also Blum et al, 2009a, 2009b; Albornoz et al, 2010; Carballo, Ottaviano and Martincus (2013).

Exporters by durability



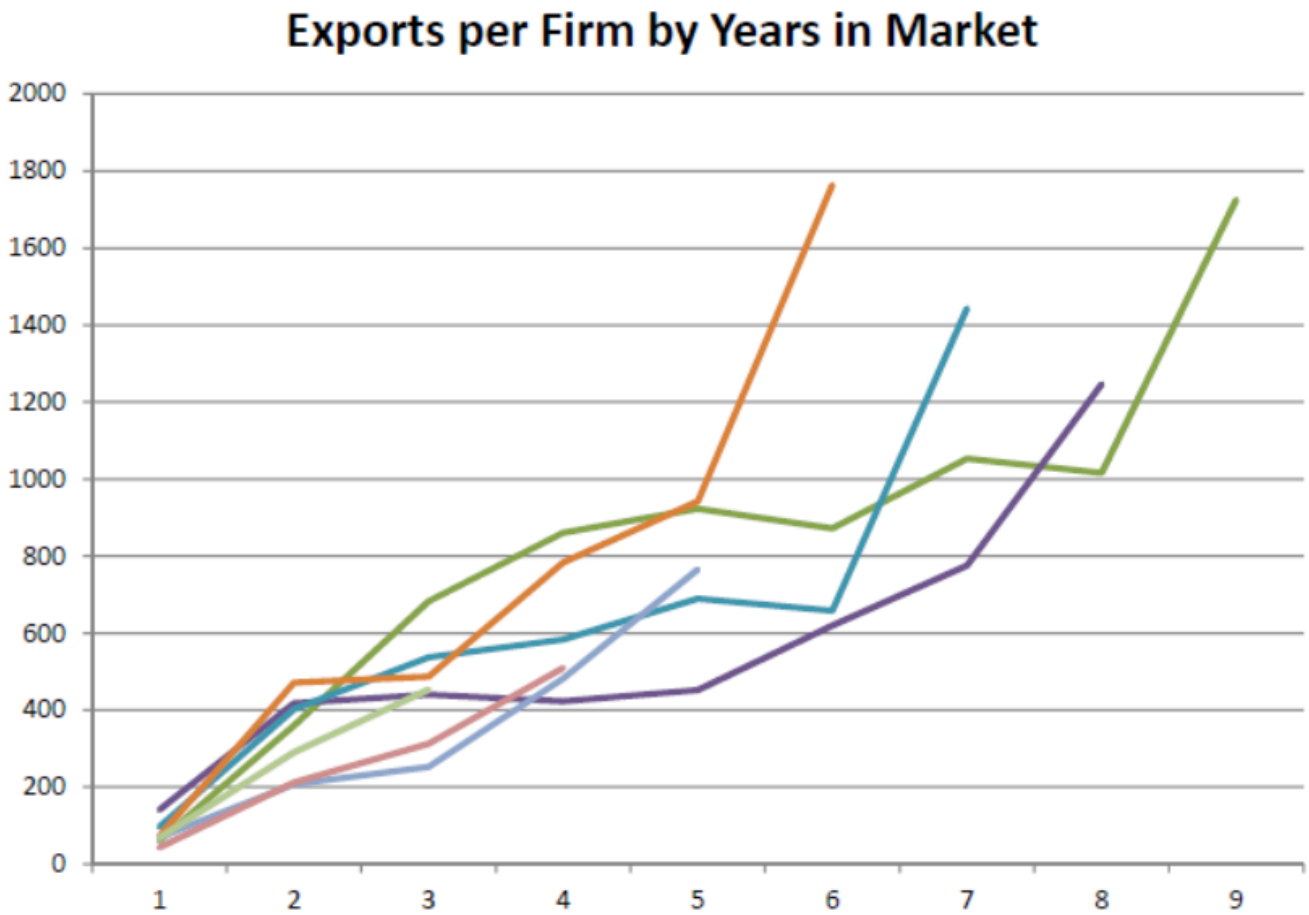
- As a fraction of total exporters, firms that enter a market and immediately exit are important.

Exporters by durability



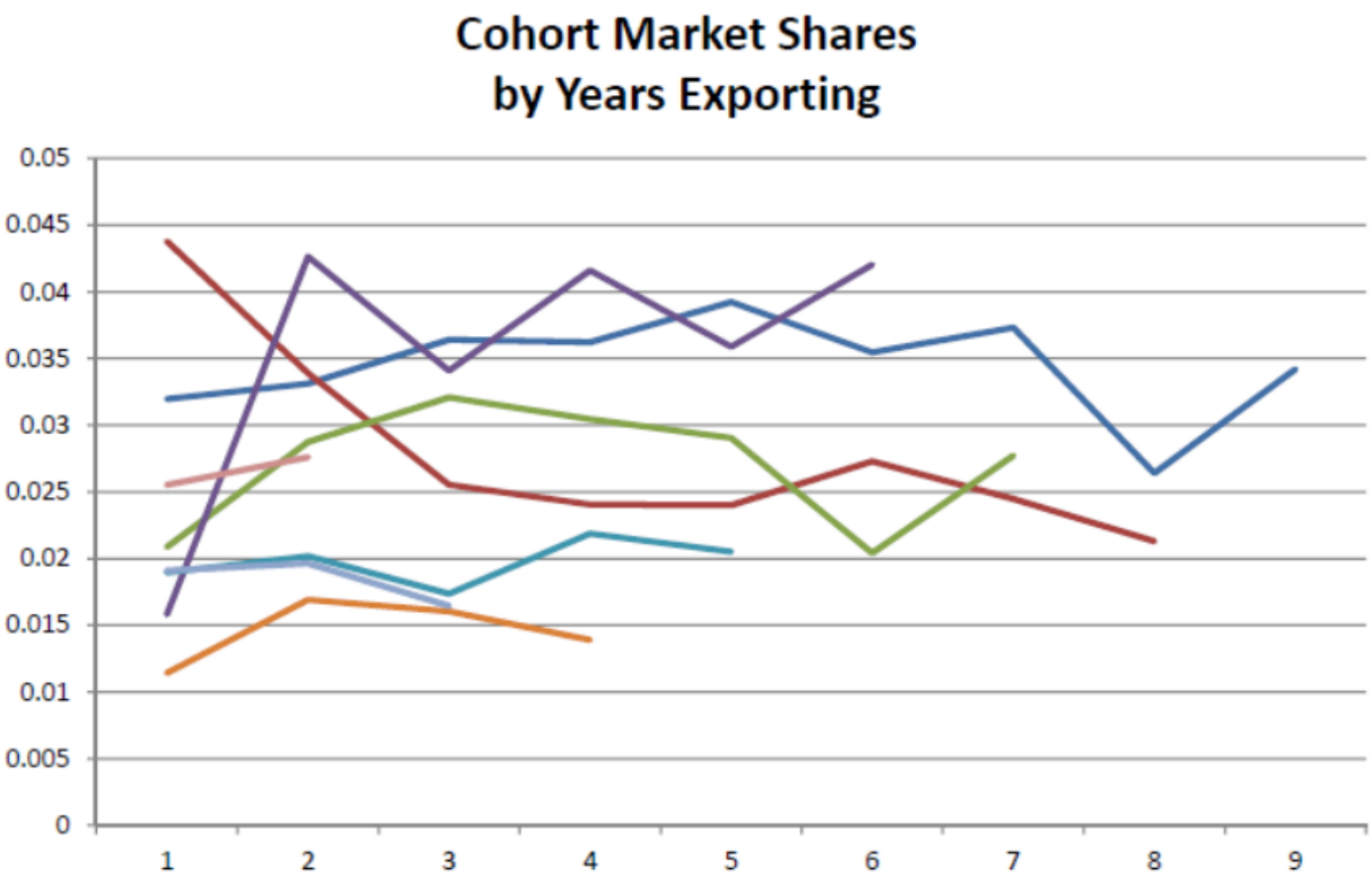
- But as a fraction of total export revenue, brand new exporters don't account for much.

Cohort maturation



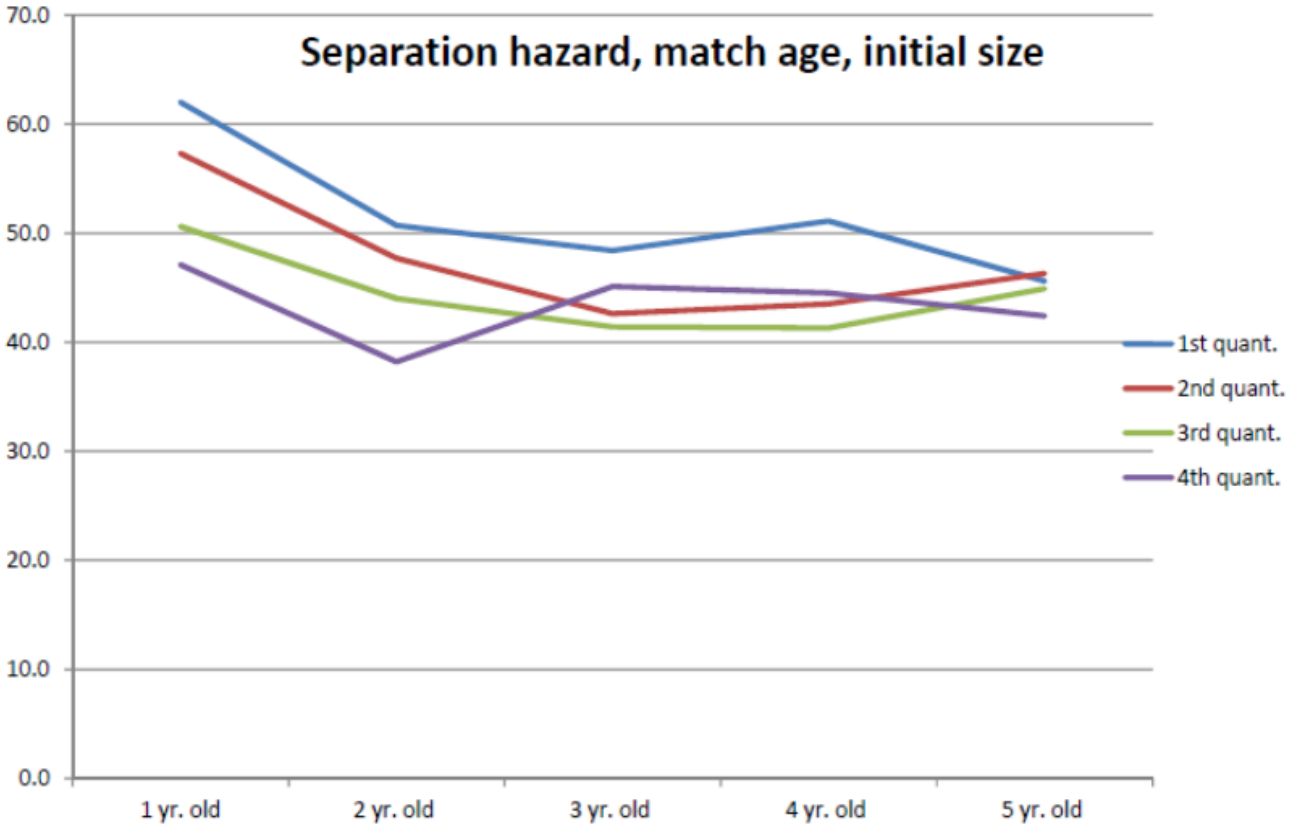
- The firms that survive their first year grow exceptionally rapidly (see also Ruhl and Willis, 2008).

Cohort maturation

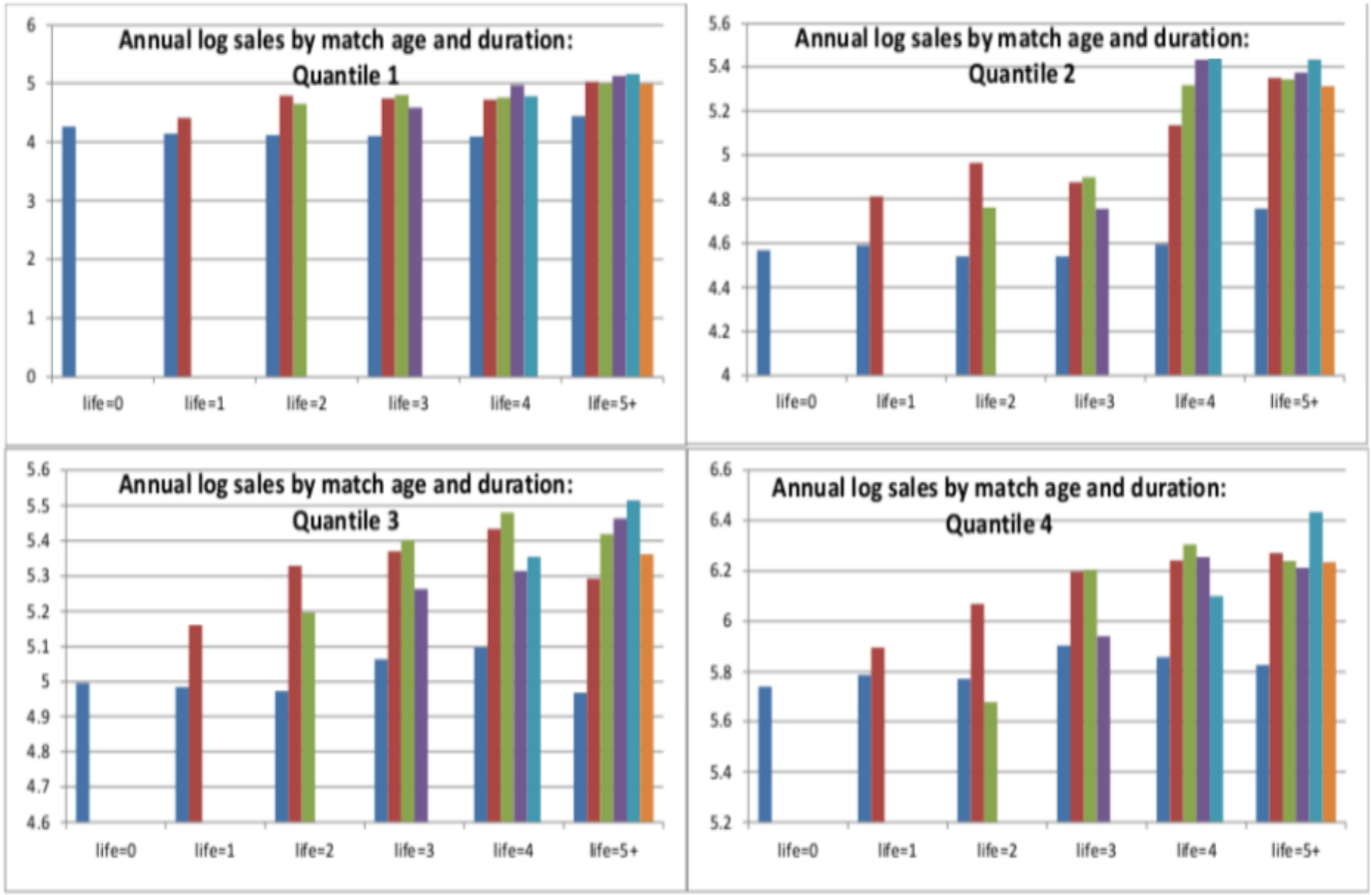


- Hence young cohorts typically gain market share despite rapid attrition.
- Post-1996 entrants account for about half of cumulative export expansion by 2005.

Cohort maturation



- Most new matches fail within a year, but
  - Chances of survival are higher for matches with large initial sales
  - Survival rates improve and converge for all matches after the first year.
  - To sustain or increase exports, firms must continually replenish their foreign clientele.



- Matches that start small tend to stay small.
- After a match's first year, there is no systematic tendency for its annual sales to grow.

Power-law distributions

- A distribution $G(x)$ is **power law** if its right-tail is distributed Pareto:

$$F_{\text{Pareto}}(x) = 1 - x^{-\theta}$$

- More formally, for some $\theta > 0$:

$$\lim_{x \to \infty} \frac{G(x)}{F_{\text{Pareto}}(x)} = 1$$

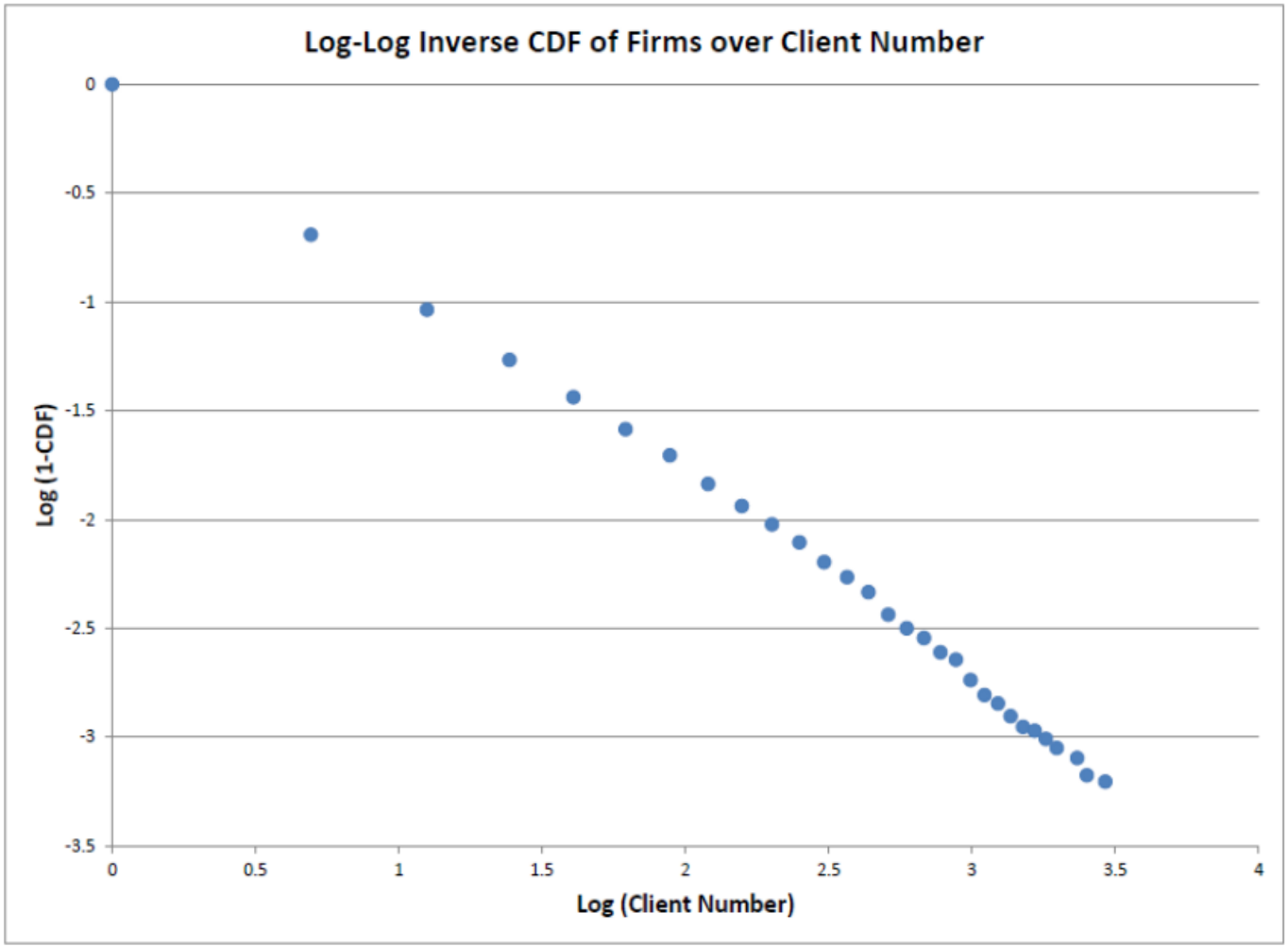
- The log of $1 - F_{\text{Pareto}}$ is a linear function of $\log x$:

$$\log\left(1 - F_{\text{Pareto}}(x)\right) = -\theta \log x$$

- If data are distributed power law, a scatter plot of the log empirical inverse CDF and log of the data will be linear in the tail

A seriously Pareto client distribution

- Most firms have a single buyer, but the distribution of client counts across exporters is fat-tailed.



Year-to-year transitions in numbers of clients

Table 3: Transition Probabilities, Number of Clients

t\t+1	exit	texit	1	2	3	4	5	6-10	11+
enter	0.000	0.000	0.947	0.044	0.007	0.002	0.001	0.001	0.000
texit	0.000	.	0.896	0.086	0.014	0.004	.	.	0.000
1	0.533	0.081	0.332	0.043	0.008	0.002	0.001	.	.
2	0.180	0.081	0.375	0.249	0.077	0.026	0.007	0.005	0.000
3	0.074	0.043	0.225	0.282	0.206	0.093	0.047	.	.
4	0.045	.	0.112	0.226	0.259	0.162	0.097	0.078	.
5	.	.	0.103	0.184	0.197	0.184	0.094	0.197	.
6-10	.	.	.	0.070	0.082	0.114	0.149	0.465	0.066
11+	0.000	0.000	0.000	0.000	0.000	.	.	0.440	0.460

Key model features

- Firms engage in costly **search** to meet potential buyers at home and (possibly) abroad.
- Firms new to the foreign market don't know what fraction of buyers there will be willing to do business with them.
- As they encounter potential buyers, firms gradually learn the scope of the market for their particular products, and they adjust their search intensities accordingly (**learning**).
- Search costs fall as firms accumulate successful business relationships **(reputation effects**).
- Maintaining a relationship with a buyer is costly, so a relationship that yields meager profits is dropped.
- Three types of shocks: marketwide, firm-specific, match-specific