

# LEVERHULME LECTURE 3

## The Export Behavior of French Firms: Interpreting Four Portraits

University of Nottingham

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Jonathan Eaton

New York University

Based on joint work with Samuel Kortum

University of Minnesota

and

Francis Kramarz

CREST-INSEE

## Portrait 1

Most exporters don't sell very widely.

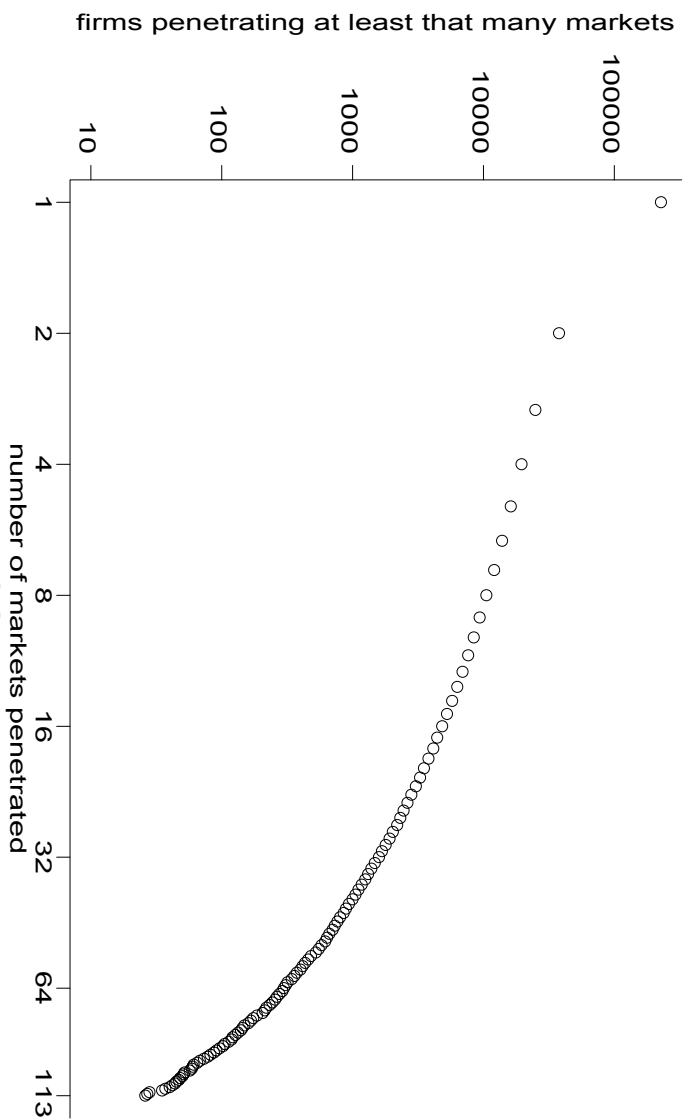


Figure 1: Frequency of Selling in Multiple Markets

## Portrait 2

Exporters who sell widely are systematically larger in France.

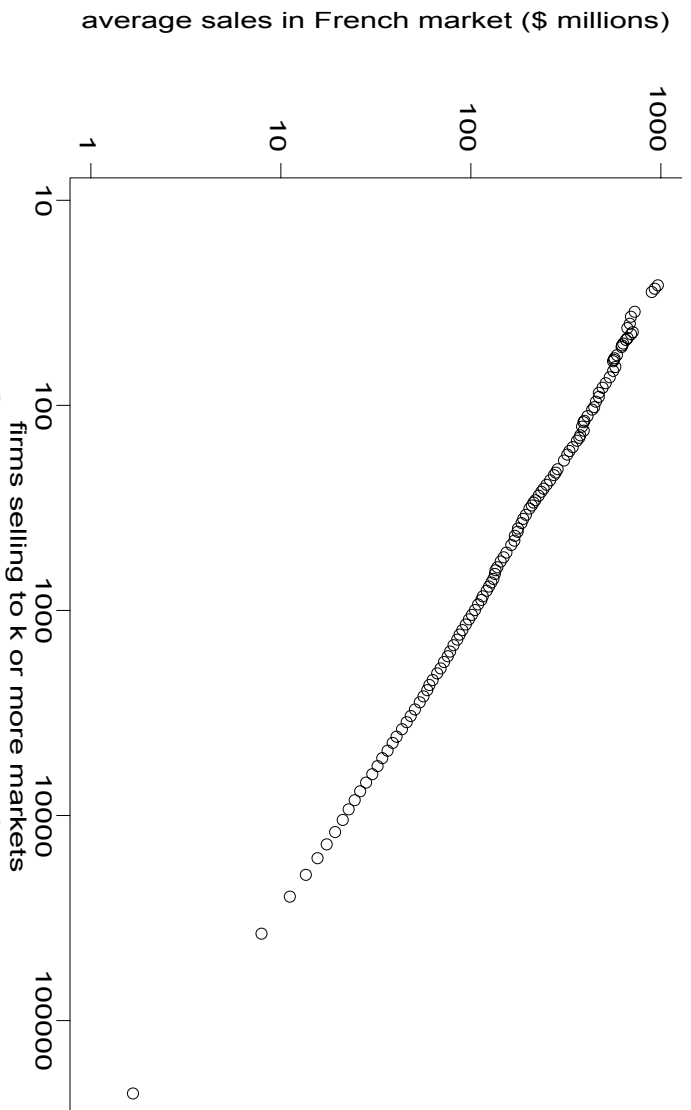


Figure 8: Firm Size and Frequency of Multiple Markets

### Portrait 3

The size distribution of sales is very similar across markets (with France itself not very different).

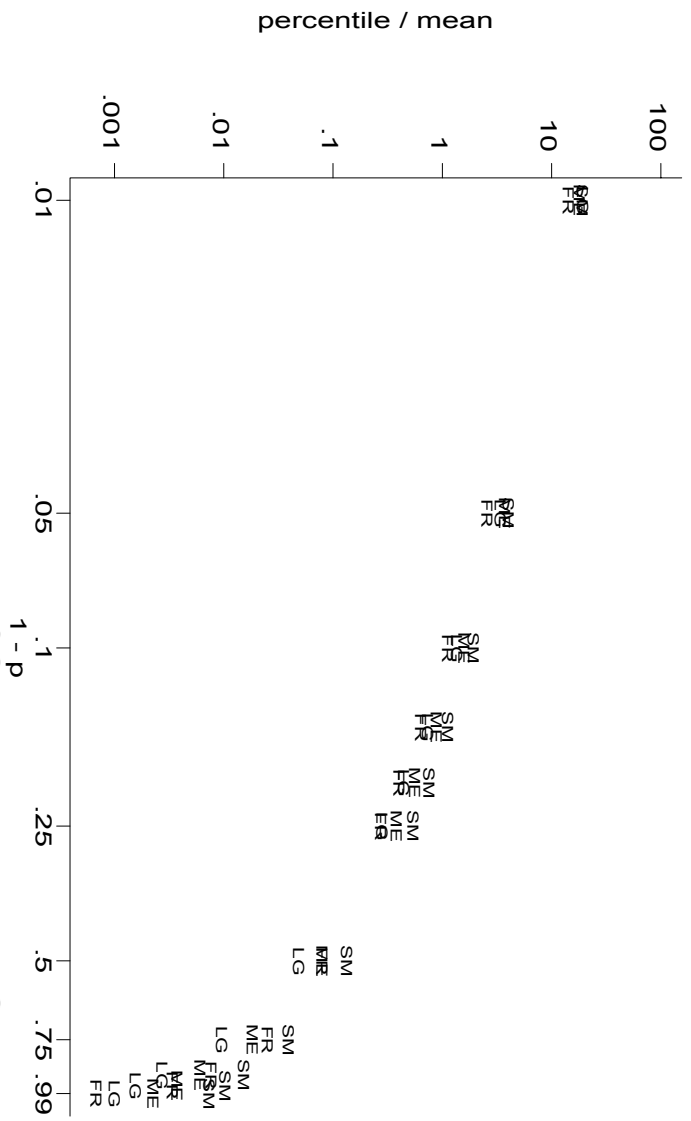


Figure 6: Distribution of Sales, by Market Size

## Portrait 4

The margin of entry. It's mostly the number, not the amount.

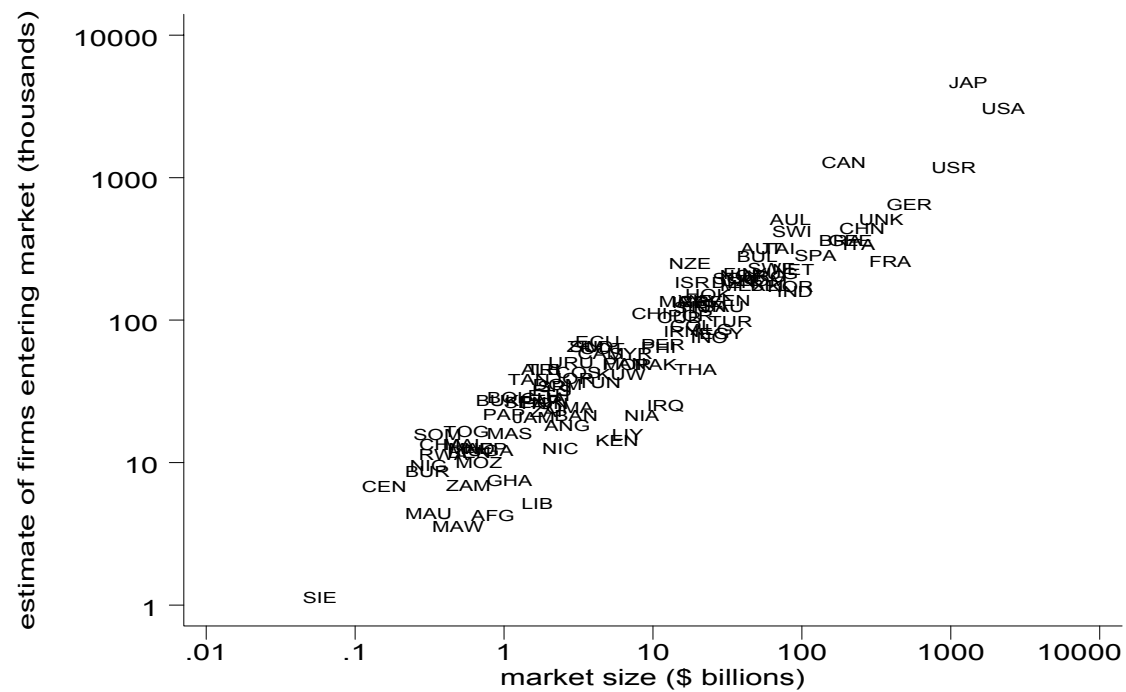


Figure 5: Entry and Market Size

## Toward a Theoretical Interpretation

- Earlier work: Generalization of BEJK (2003) to incorporate fixed cost
- Here, a variation of Mark Melitz (2003). See also Thomas Chaney (2004).
- EK (2005) makes the connection

## The Basics

- Dixit-Stiglitz preferences and Monopolistic Competition (Melitz, Chaney)
- Pareto distribution of potential producer efficiencies (HMY, 2004, Chaney)
- Fixed cost of entry per market (Chaney).

## I. Countries as Destinations:

- Countries as markets:  $n = 1, \dots, N$
- (Endogenous) continuum of available goods  $J_n$
- Expenditures in country  $n$ :

$$X_n(j) = \alpha(j) X_n \left[ \frac{p_n(j)}{P_n} \right]^{1-\sigma} \quad \sigma > 1$$

where  $E[\alpha] = 1$ .

- Price  $p_n(j)$ .

- Price index:

$$P_n = \left[ \int_0^{J_n} \alpha(j) p_n(j)^{1-\sigma} dj \right]^{1/(1-\sigma)}$$

## II. Countries as Sources

- Countries as sources:  $i = 1, \dots, N$ .
- Wage  $w_i$
- Measure of potential producers with efficiency  $Z \geq z$  (Helpman, Melitz, and Yeaple, 2004):

$$\mu_Z[Z \geq z] = T_i z^{-\theta}$$

independent of  $\alpha$ .

- Measure of firms that can produce at unit cost  $C \leq c$ :

$$\mu_C[C \leq c] = \mu_Z[Z \geq \frac{w_i}{c}] = T_i w_i^{-\theta} c^\theta$$

### III. Linking Sources and Destinations

- Iceberg unit transport costs: Delivering 1 unit to destination  $n$  requires shipping  $d_{ni} \geq 1$  from  $i$ , with  $d_{ii} = 1$ .
- Measure of firms from  $i$  that can sell to  $n$  at unit cost  $C \leq c$ :

$$J_{ni} = T_i(w_i d_{ni})^{-\theta} c^\theta$$

- Total measure of firms that can sell in  $n$  at cost  $C \leq c$ :

$$J_n = \sum_{i=1}^N J_{ni} = \Phi_n c^\theta$$

where:

$$\Phi_n = \sum_{i=1}^N T_i (w_i d_{ni})^{-\theta}.$$

- Each firm supplying good  $j$  to country  $n$  incurs a fixed entry cost  $E_n(j)$ .

## IV. Entry

- Profit in market  $n$ :

$$\pi_{ni}(j) = \frac{\alpha(j)X_n}{\sigma} \left( \frac{\bar{m}c_{ni}(j)}{P_n} \right)^{1-\sigma} - E_n(j)$$

Entry if  $c_{ni}(j) \leq \bar{c}_n(j)$  where  $\bar{c}_n(j)$  solves:

$$E_n(j) = \frac{\alpha(j)X_n}{\sigma} \left( \frac{\bar{m}\bar{c}_n(j)}{P_n} \right)^{1-\sigma}$$

- Assume that:

$$E_n(j) = e_n \alpha(j)$$

and that  $\alpha$  and  $c$  are independent. Then:

$$\bar{c}_n(j) = \bar{c}_n = \frac{P_n}{\bar{m}} \left( \frac{X_n}{\sigma e_n} \right)^{1/(\sigma-1)}$$

and

$$P_n = \left[ \int_0^{\bar{c}_n} (\bar{m}c)^{1-\sigma} dJ_n(c) \right]^{1/(1-\sigma)}$$

- Solving:

$$P_n = \bar{m}(1 - 1/\tilde{\theta})^{1/\theta} \Phi_n^{-1/\theta} \left( \frac{X_n}{\sigma e_n} \right)^{-[1-1/\tilde{\theta}]/(\sigma-1)}$$

$$\bar{c}_n = (1 - 1/\tilde{\theta})^{1/\theta} \Phi_n^{-1/\theta} \left( \frac{X_n}{\sigma e_n} \right)^{1/\theta}$$

$$J_n = (1 - 1/\tilde{\theta}) \left( \frac{X_n}{\sigma e_n} \right)$$

where  $\tilde{\theta} = \theta/(\sigma - 1)$

## Some Implications

- Fraction of active sellers in  $n$  from  $i$ :

$$\pi_{ni} = J_{ni}(\bar{c}_n) / J_n(\bar{c}_n) = \frac{T_i(w_i d_{ni})^{-\theta}}{\Phi_n}$$

- Fraction with cost  $C \leq c$ :

$$J_n(c) / J_n(\bar{c}_n) = \left( \frac{c}{\bar{c}_n} \right)^\theta$$

- Among firms  $j$  with  $\alpha(j) = \alpha$ , fraction selling  $X \geq x$  (Pareto with parameter  $\tilde{\theta}$ ):

$$1 - F(x) = \left( \frac{x}{\sigma \alpha e_n} \right)^{-\tilde{\theta}}$$

- Mean sales in  $n$ :

$$\bar{x}_n = \frac{\sigma e_n}{1 - 1/\tilde{\theta}}.$$

## Results on Firms per Market

- Share of sales

$$X_{ni}/X_n = \pi_{ni}$$

- Number of firms from country  $i$  selling in country  $n$ :

$$\frac{J_{ni}}{J_n} = \pi_{ni}$$

- Since  $X_n = \bar{x}_n J_n$ :

$$J_{ni} = \pi_{ni} \frac{X_n}{\bar{x}_n} = \pi_{ni} \left(1 - 1/\tilde{\theta}\right) \frac{X_n}{\sigma e_n}$$

- Posit:

$$e_n = \eta X_n^\phi$$

so that;

$$J_{ni} = \pi_{ni} \frac{X_n}{\bar{x}_n} = \pi_{ni} \left(1 - 1/\tilde{\theta}\right) \frac{X_n^{1-\phi}}{\eta\sigma}$$

- Set  $i = F$ : Implications for entry and market size:  $\phi = .36$  (Portrait 4).

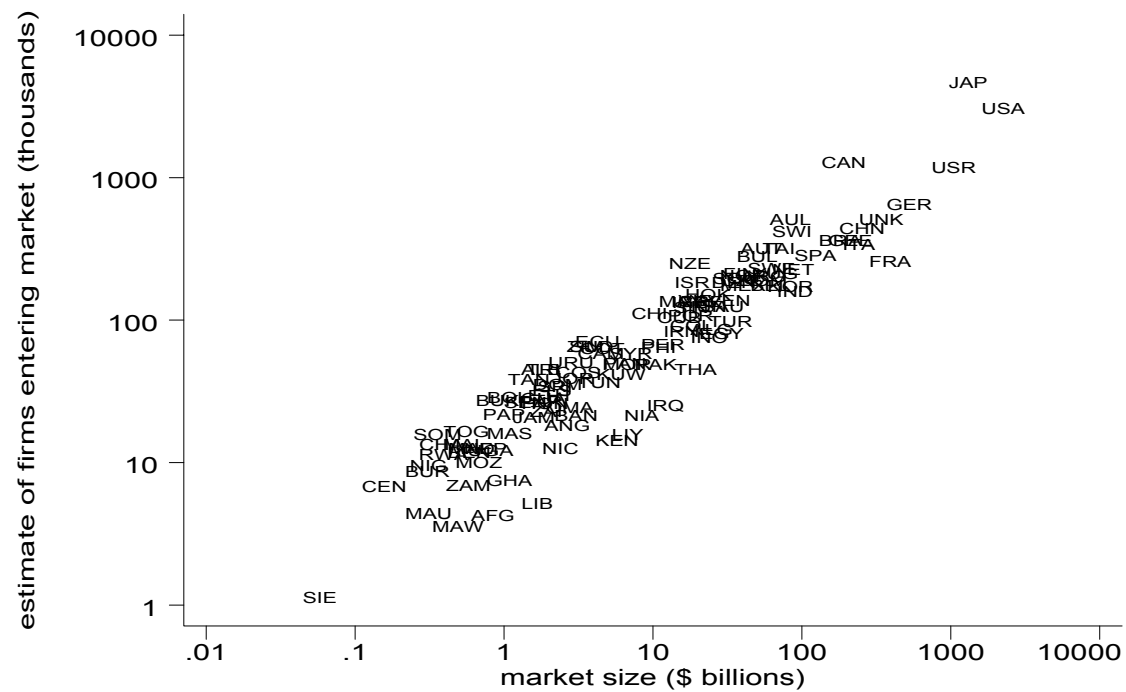


Figure 5: Entry and Market Size

## Markets per Firm

- An Implication of Monopolistic Competition is Market Hierarchy: All firms that enter market  $n$  enter markets  $n'$  with  $J_{n'F} \geq J_{nF}$ . Denote by  $J_F^{(k)}$  the number of French firms selling to  $k$  or more markets:

$$J_F^{(1)} \geq J_F^{(2)} \geq J_F^{(3)} \geq \dots \geq J_F^{(N)}.$$

As  $k$  rises firms in  $J_F^{(k)}$  have lower costs.

- From above, given  $\alpha$ :

$$\ln [1 - F(x)] = -\tilde{\theta} \ln \left( \frac{x}{\sigma \alpha e_n} \right)$$

:

$$\ln \frac{\bar{x}_F^{(k)}}{\bar{x}_F^{(1)}} = -\frac{1}{\tilde{\theta}} \ln \left( \frac{J_F^{(k)}}{J_F} \right)$$

- $1/\tilde{\theta} = .65$ . (Portraits 1 and 2)

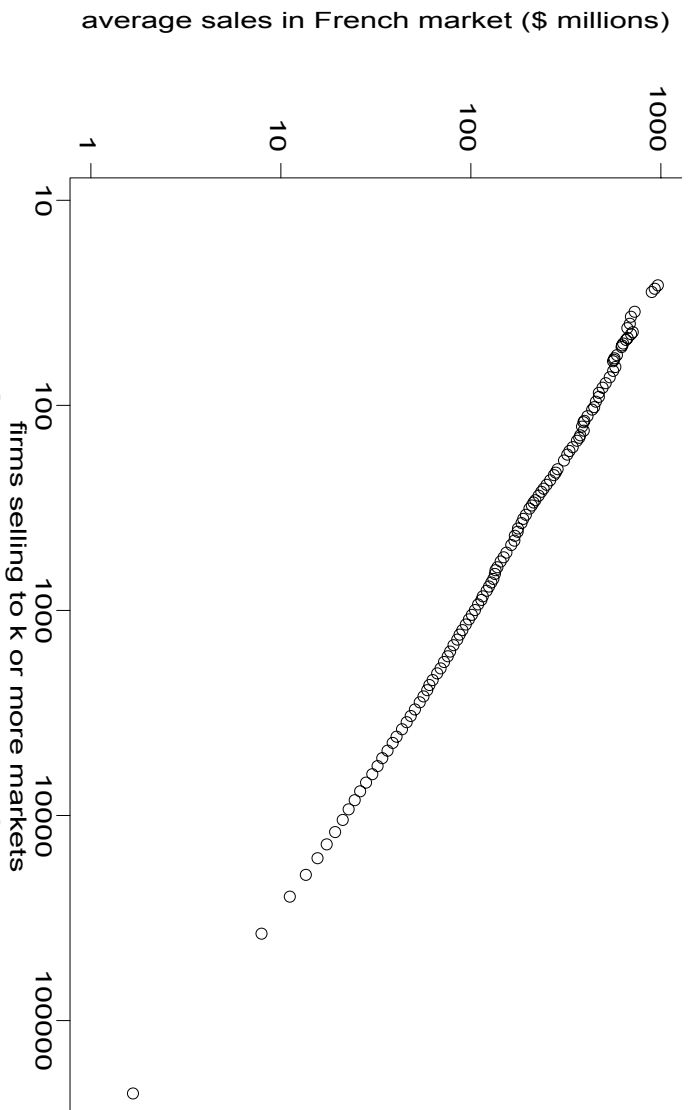
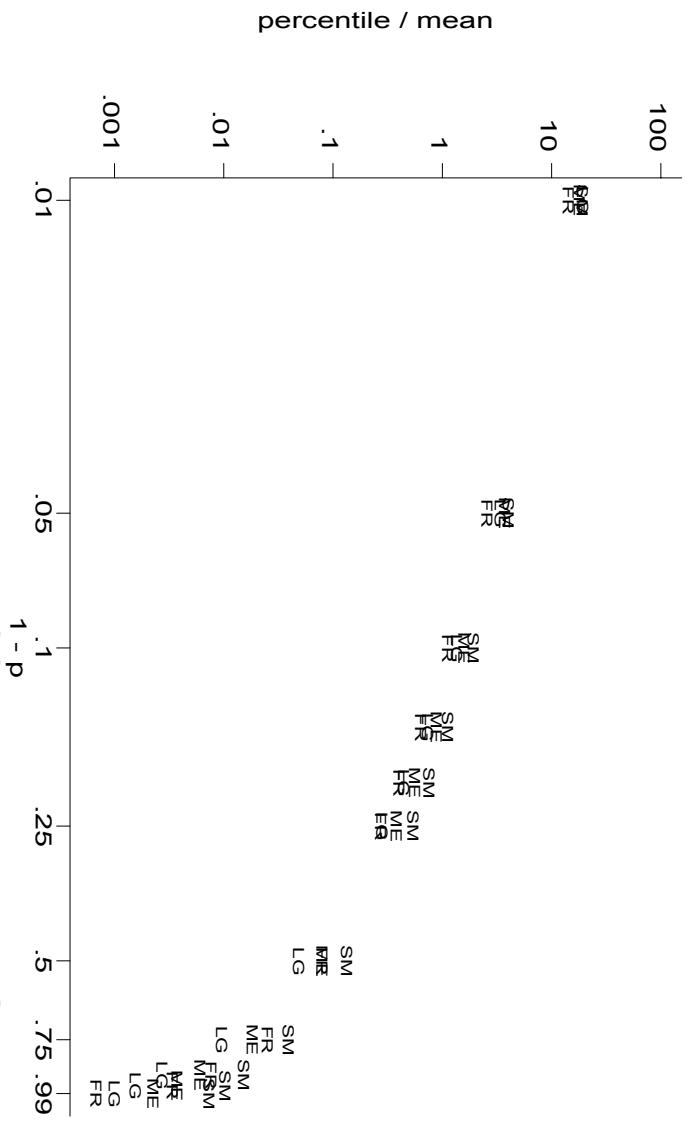


Figure 8: Firm Size and Frequency of Multiple Markets

## Other Implications

- What about the distribution of sales across markets (Portrait 3)?
- A Fréchet Distribution for  $\alpha$  (and  $E$ ) with parameter just above 1 can capture the size distribution quite well.
- Producers then have two independent sources of heterogeneity  $\alpha$  (and  $E$ ) and  $c$ . Only  $c$  matters for market entry.
- Hierarchies: Market popularity vs. ranking. Belgium is the most popular foreign destination, but nearly half of exporters don't sell to Belgium.



## Future Work

- Hierarchies: Would a Ricardian framework, similar to BEJK, do better?
- Dynamics of entry.(Erzo Luttmer).
- Foreign Direct Investment (Stephen Ross Yeaple)

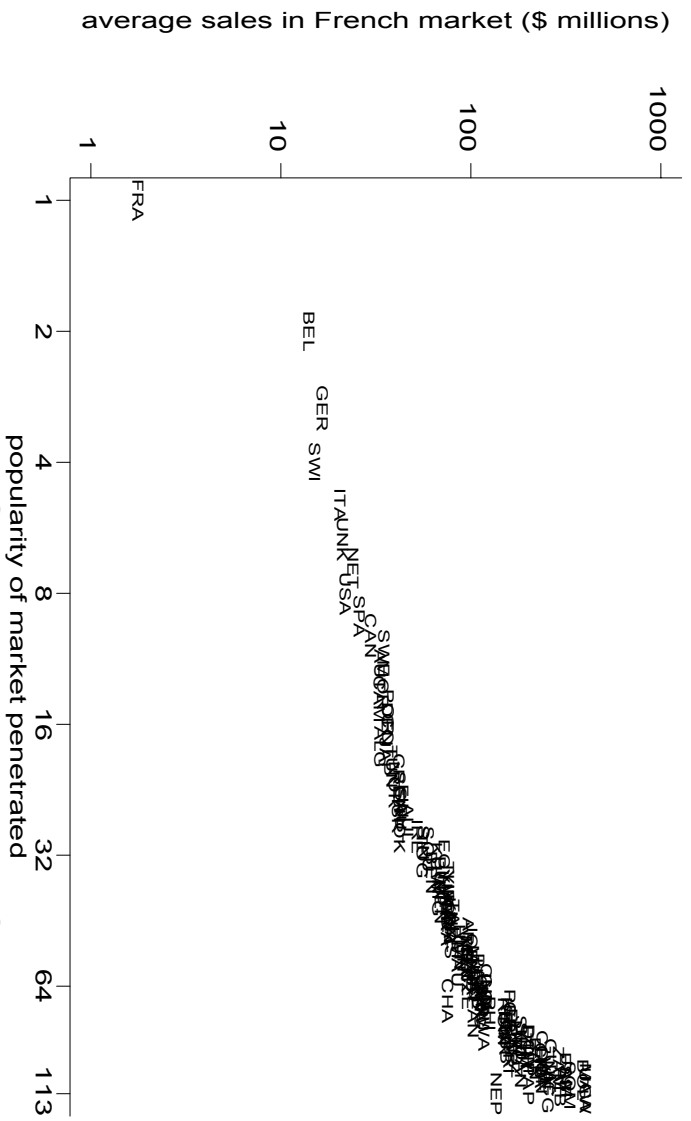


Figure 2b: Firm Size and Popularity of Market

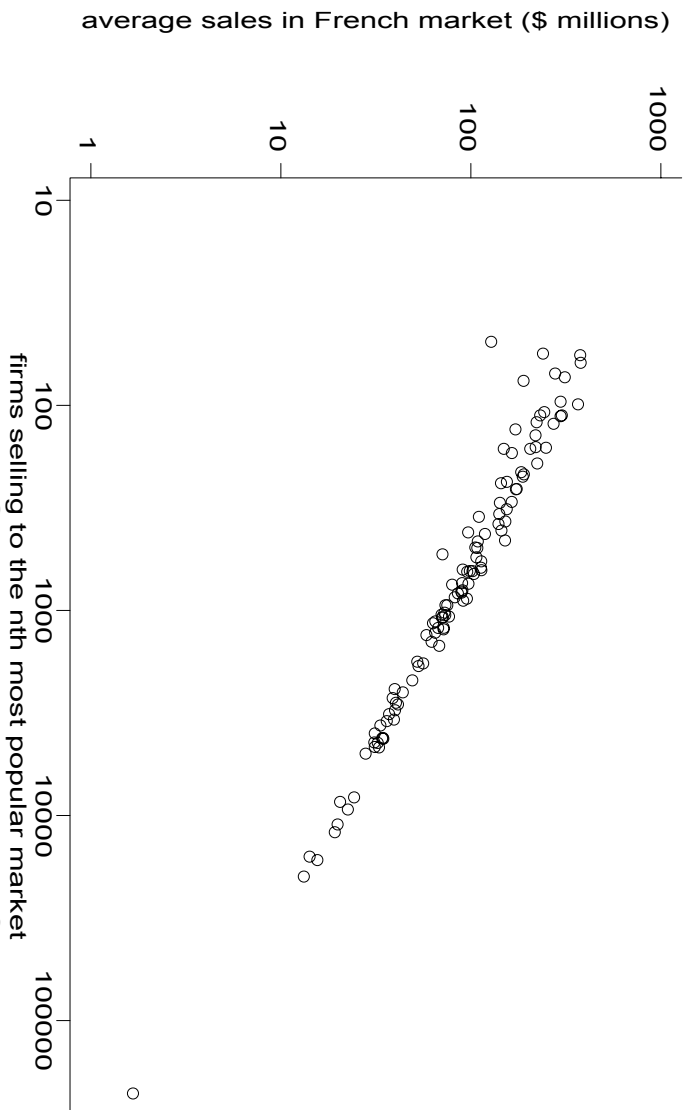


Figure 8b: Firm Size and Popularity of Market

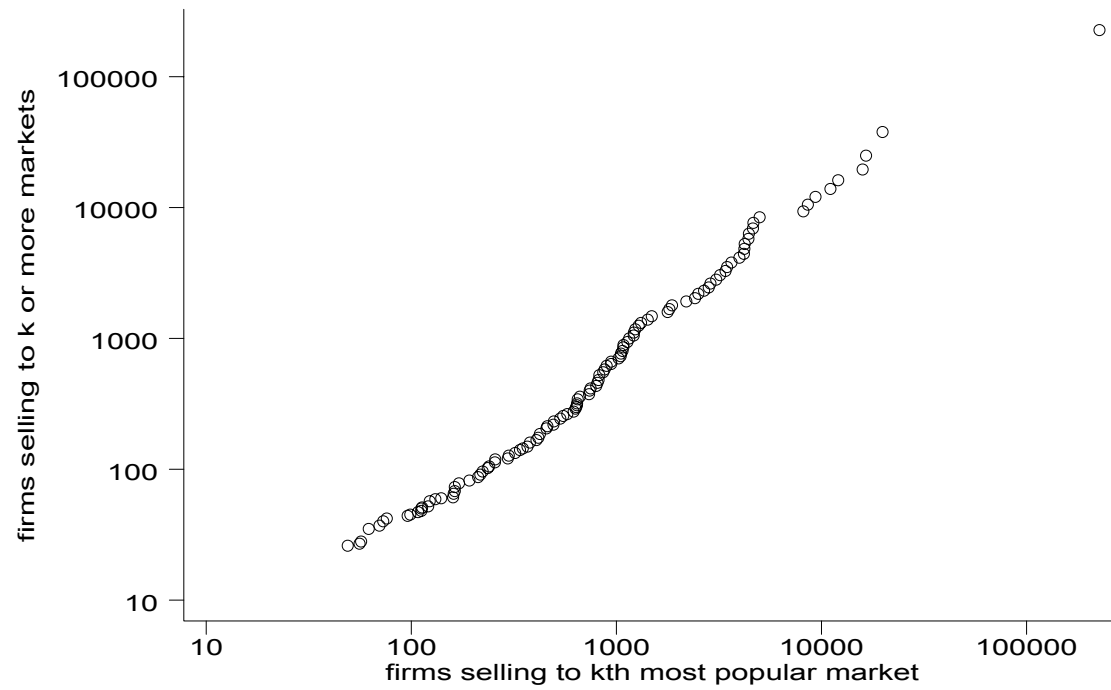


Figure 7: Market Hierarchy for French Firms

## The State of the Research

- Empirical investigators are assembling a wide array of data on producer level behavior in international trade.
- These investigations have yielded stylized facts that have forced trade economists to amplify and revise theories of international trade.
- We are making progress toward developing a structural framework that can accommodate these basic facts.