Do Falling Iceberg Costs Account for Recent US Export Growth?

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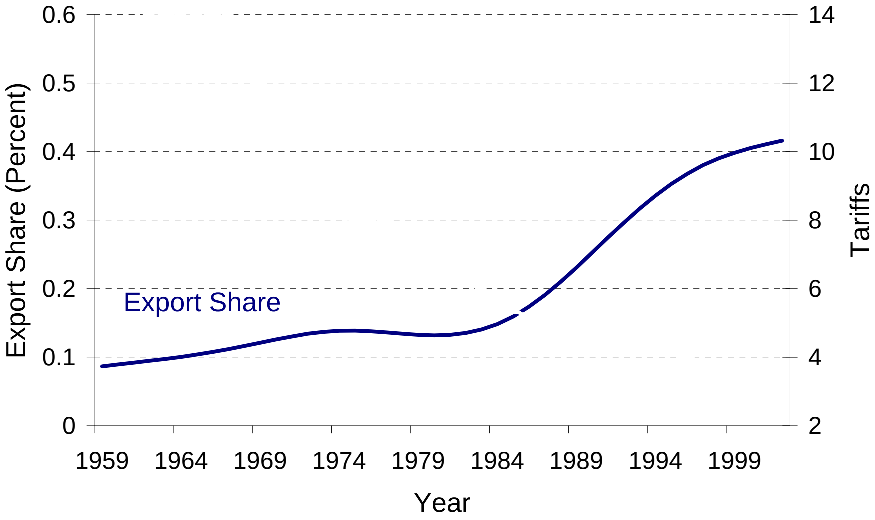
Trend in Export Share of Manufacturing Value Added



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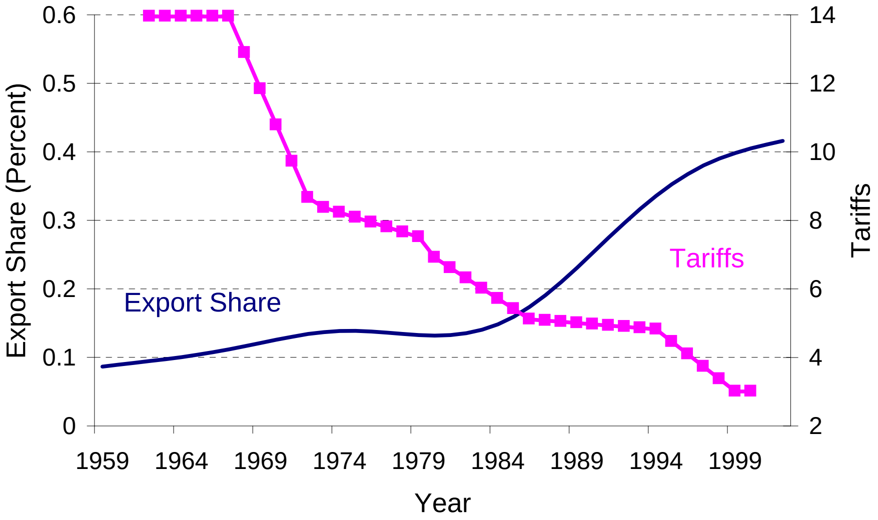

Introduction

Study change in trade costs and trade in puzzling period (87 to 02) through lens of benchmark heterogeneous plant model

- Measure change in iceberge costs $(\Delta\iota)$
- Given $\Delta\iota$ ask: Did US Exports grow too much?

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  Model overpredicts exporting & misses shift to small plants

Outline

1. Accounting for trade growth & iceberg costs
2. Model
3. Calibration
4. Results

Trade Growth - representative plant

Consider monopolist selling d_{it} at home & ex_{it} overseas:

$$ex_{it} = \left[p_{it}^{*}\left(1+\iota_{t}\right)\left(1+\tau_{t}\right)\right]^{-\theta} Y_{t}^{*}$$

$$d_{it} = p_{it}^{-\theta} Y_{t}$$

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$$d_{it} = p_{it}^{-\theta} Y_t$$

With no price discrimination, $p_i = p_i^*$, then over time,

$$\Delta \frac{ex_{it}}{d_{it}} = -\theta\left[\Delta\iota + \Delta\tau\right] + \Delta Y^* - \Delta Y$$

Direct link between trade costs & export growth.

Trade Growth - representative plant

$$\Delta \frac{ex_{it}}{d_{it}} - (\Delta Y^* - \Delta Y) = -\theta (\Delta \iota + \Delta \tau)$$

Penn World Table:

- ROW-US relative real income $(\Delta Y^* - \Delta Y) \approx 8$ percent

Census of Manufacturers:

- From 1987 to 2002, $\Delta ex_{it} / d_{it} \approx 50$ percent

Trade Growth - representative plant

Two approaches to estimate source of trade growth

1. Yi (2003), $\Delta\iota = 0$, measure $\Delta\tau = -2.5$

$$\theta = -\frac{\Delta\frac{ex_{it}}{d_{it}} - (\Delta Y^* - \Delta Y)}{\Delta\tau} \approx \frac{50 - 8}{2.5} \approx 17$$

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Measurement necessary to distinguish explanations.

Trade Growth - plant heterogeneity

Aggregate trade no longer solely determined by trade costs.

Characteristics of plants matter.

1. Number of exporters
2. Size of exporters:
   - Tend to be relatively large

Use changes in these margins to infer Δ trade costs

Trade Growth - plant heterogeneity

Assume N_t plants, n_t exporters w/ same ι_t & $s_{it} = ex_{it} + d_{it}$

$$\frac{\text{Exports}_t}{\text{Sales}_t} = \frac{\sum_{i=1}^{n_t} ex_{it}}{\sum_{i=1}^{N_t} s_{it}} = \frac{\left(1+\iota_t\right)^{-\theta} Y_t^*}{Y_t + \left(1+\iota_t\right)^{-\theta} Y_t^*} \cdot \frac{\sum_{i=1}^{n_t} s_{it}}{n_t} \frac{N_t}{\sum_{i=1}^{N_t} s_{it}} \cdot \frac{n_t}{N_t}$$

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Over time

$$\underbrace{\Delta exy}_{\text{export share}} = \overbrace{\Delta\left(\overline{ex}/\overline{s}^X\right)}^{\text{intensity}} + \overbrace{\Delta\left(\overline{s}^X/\overline{s}\right)}^{\text{premium}} + \overbrace{\Delta\left(n/N\right)}^{\text{participation}}.$$

Direct link between Δ in iceberg costs and export intensity.

Table 1: Export Characteristics and Trade

US Plants with 100+ employees				
	EXY	Intensity	Premium	Participation
1987	0.061	0.100	1.65	0.37
2002	0.097	0.152	1.35	0.47
Log Change	**0.46**	**0.42**	**-0.20**	**0.24**

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- Similar results for all plants
- Changes in intensity affect both premium & participation
- Given small role for $\Delta' s$ in income, attribute all to iceberg costs.

Model

- Baldwin & Krugman (89), Hopenhayn (93), Roberts & Tybout (97), Melitz (03), Das, Roberts, and Tybout (2007)
- ∞-horizon
- 2 symmetric countries $\{H, F\}$
- Final non-traded good made w/ tradable & non-tradable intermediates
- Complete asset markets

Model

- Non-tradables: $N_{N,t}$, $N_{N,t}^{*}$ differentiated H & F intermediates
    - Differ by technology z
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  - Differ by z, export status $m = \{0, 1\}$ & fixed cost $f_m + \kappa$
  - Export costs: start f_0, & continue, f_1 (in labor), iceberg, ι_t.
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  - Measure of establishments: $\psi_{T,t}(z, \kappa, m)$
- Idiosyncratic shocks $\phi(z', \kappa' | z, \kappa)$ & exogenous survival $n_s(z, \kappa)$
- Free Entry: hire f_E workers
- Timing: fixed costs paid 1 period in advance
- All plants owned by domestic agents.

Key Abstractions

- Asymmetric countries/sectors
  - US may have comparative advantage in small-scale industries or innovation
- Business-cycle fluctuations
  - Export participation is procyclical (Alessandria-Choi 2007)
- Iceberg costs are exogenous, identical across firms
  - No marketing frictions (Arkolakis 2007 Drozd & Nosal 2007)

Consumer's Problem

$$V_{C,0} = \max_{\{C_t, B_t, K_{t+1}\}} \sum_{t=0}^{\infty} \beta^t U(C_t),$$

$$C_t + K_t + Q_t \frac{B_t}{P_t} \leq W_t L_t + R_t K_{t-1} + B_{t-1} + (1-\delta) K_{t-1} + \Pi_t,$$

- P_t, W_t denote price level & real wage,
- Π_t sum of home country profits
- Foreign problem with *

$$Q_t = \beta \frac{U_{C,t+1}}{U_{C,t}} \frac{P_t}{P_{t+1}}, \qquad q_t \equiv \frac{P_t^*}{P_t} = \frac{U_{C,t}^*}{U_{C,t}},$$

Competitive Final Good Producers

- Combine NT & T intermediates to produce final good
- Imports available only from foreign exporters, i.e. $m^* = 1$.

  $\Rightarrow$ Set of available tradables differs across countries.

Competitive Final Good Producers

$$\Pi = \max P \cdot D - \sum_{m=0}^{1} \int_{z \times \kappa} P_H (z, \kappa, m)\, y_H^d (\cdot)\, \psi_T (\cdot)$$

$$- \int_{z \times \kappa} (1 + \iota_t)\, P_F (\cdot)\, y_F^d (\cdot)\, \psi_T^* (z, \kappa, 1) - P_N Y_N,$$

subject to:

1. $D = Y_T^{\gamma} Y_N^{1-\gamma}$

2. $Y_T = \left(\int y_H^d (z, \kappa, m)^{\frac{\theta-1}{\theta}} \psi_T (\cdot) + \int y_F^d (z, \kappa, 1)^{\frac{\theta-1}{\theta}} \psi_T^* (\cdot) \right)^{\frac{\theta}{\theta-1}}$

3. $Y_N = \left(\int y_N^d (z)^{\frac{\theta-1}{\theta}} \psi_N (z) \right)^{\frac{\theta}{\theta-1}}$

Competitive Final Good Producers

$$\Pi = \max P \cdot D - \sum_{m=0}^{1} \int_{z\times\kappa} P_H\left(z,\kappa,m\right) y_H^d\left(\cdot\right) \psi_T\left(\cdot\right)$$

$$- \int_{z\times\kappa} \left(1+\iota_t\right) P_F\left(\cdot\right) y_F^d\left(\cdot\right) \psi_T^*\left(z,\kappa,1\right) - P_N Y_N,$$

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3. $Y_N = \left(\int y_N^d(z)^{\frac{\theta-1}{\theta}} \psi_N\left(z\right)\right)^{\frac{\theta}{\theta-1}}$

$\Rightarrow$

$\Rightarrow$	Input Demand	$y_{H,t}^d(z,\kappa,m), y_{N,t}^d(z,\kappa,m)$ & $y_{F,t}^d(z,\kappa,1)$
	Prices	$P_{N,t}, P_{T,t}, P_t$

Tradable Producer (z,m,k)

- Hires workers, $l(z, m, \kappa)$
- Rents capital $k(z, m, \kappa)$
- Buys intermediates available at home: $x(z, m, \kappa)$
- Determines markets to serve tomorrow, $m'(z, m, \kappa)$

Tradable Producer (z,m,k)

Lag in investing in exporting & ability $\Rightarrow$ seperate decisions:

- For t, given markets, $m \in \{0, 1\}$, max $\Pi_{T,t}(z, \kappa, m)$
- For $t + 1$, invest in exporting, $m' = \{0, 1\}$

Tradable Producer (z,m,k)

For t, given markets, $m = \{0, 1\}$

$$\Pi_{T,t}(\cdot) = \max_{k,l,x} \frac{P_{H,t}(\cdot)\, y_{H,t}(\cdot)}{P_t} + m \frac{P^*_{H,t}(\cdot)\, y^*_{H,t}(\cdot)}{P_t}$$

$$- W_t l_{T,t}(\cdot) - R_t k_{T,t}(\cdot) - P_{T,t} x(\cdot),$$

$$st : y_H + y^*_H = e^z \left[k_T^{\alpha}(\cdot)\, l_T^{1-\alpha}(\cdot) \right]^{1-\alpha_x} x(\cdot)^{\alpha_x}$$

$$\Rightarrow P_{T,t}(\cdot), P^*_{T,t}(\cdot), k_{T,t}(\cdot), l_{T,t}(\cdot), x(\cdot)$$

Tradable Producer (z,m,k) - Export Decision

$$V_{T,t}(z,\kappa,m) = \Pi_{T,t}(z,\kappa,m) + \max\left\{V_t^1(z,\kappa,m), V_t^0(z,\kappa,m)\right\}$$

$$V_t^1(z,\kappa,m) = -W_t(\kappa + f_m) + n_s(z)\, EQ_t V_{T,t+1}\left(z',\kappa',1|z,\kappa\right)$$

$$V_t^0(z,\kappa,m) = n_s(z)\, EQ_t V_{T,t+1}\left(z',\kappa',0|z,\kappa\right)$$

$$\Rightarrow m_t'(z,\kappa,m) = 1 \text{ iff}$$

$$W_t(f_m + \kappa) \leq n_s(z)\, EQ_t\left[V_{T,t+1}\left(z',\kappa,1|\cdot\right) - V_{T,t+1}\left(z',\kappa,0|\cdot\right)\right]$$

Non-tradable Producer (z)

$$\Pi_{N,t}(z) = \max_{l,k} \frac{P_{N,t}(z)\, y_{N,t}(z)}{P_t} - W_t l_{N,t}(z) - R_t k_{N,t}(z),$$

$$st : y_N(z) = e^z k_N^{\alpha}(z)\, l_N^{1-\alpha}(z)$$

$$\Rightarrow P_{N,t}(z), k_{N,t}(z), l_{N,t}(z)$$

$$V_{N,t}(z) = \Pi_{N,t}(z) + EQ_t V_{N,t+1}\left(z'|z\right),$$

Free Entry

- Hire f_E workers
- Draw technology $\phi_E(z)$, produce in $t+1$

$$V^E_{T,t} = -W_t f_E + Q_t E V_{T,t+1}(z,\kappa,0)\,\phi_E(z,\kappa) \leq 0$$

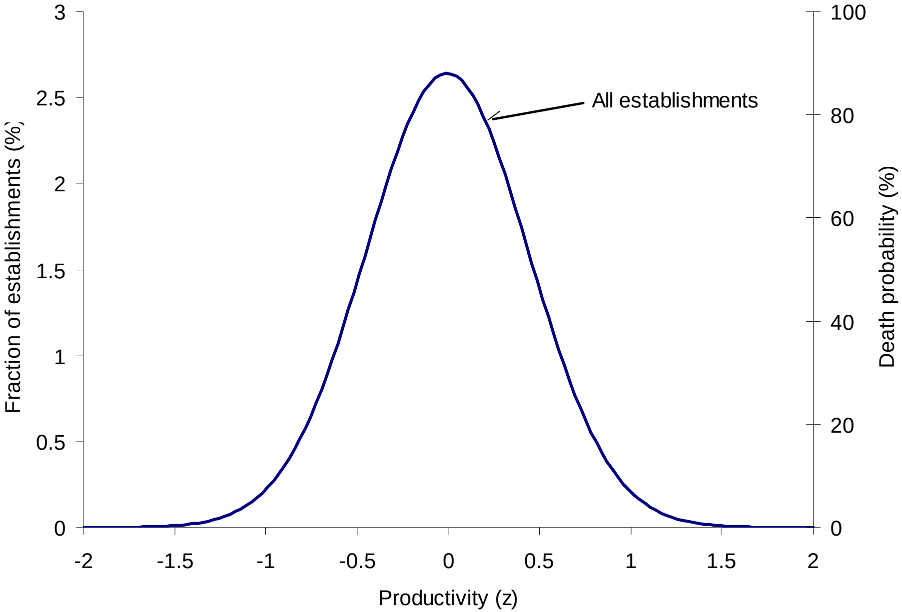
$$V^E_{N,t} = -W_t f_E + Q_t E V_{N,t+1}(z)\,\phi_E(z) \leq 0$$

$\Rightarrow N^E_{N,t}, N^E_{T,t}$, establishments enter.

Summary of Export Participation Decision

Assume no shocks to fixed cost ($\kappa = 0$)

Figure 1: Establishment Distribution



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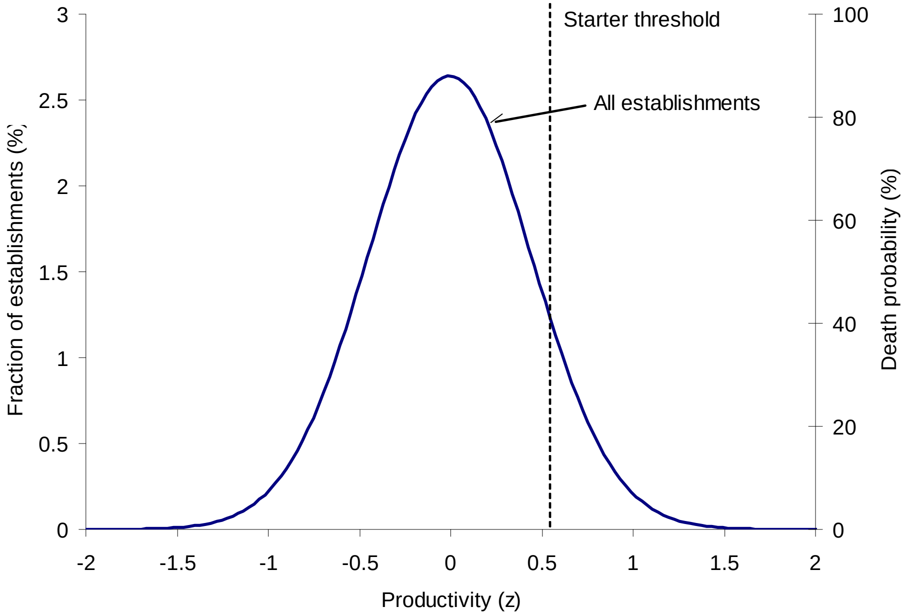

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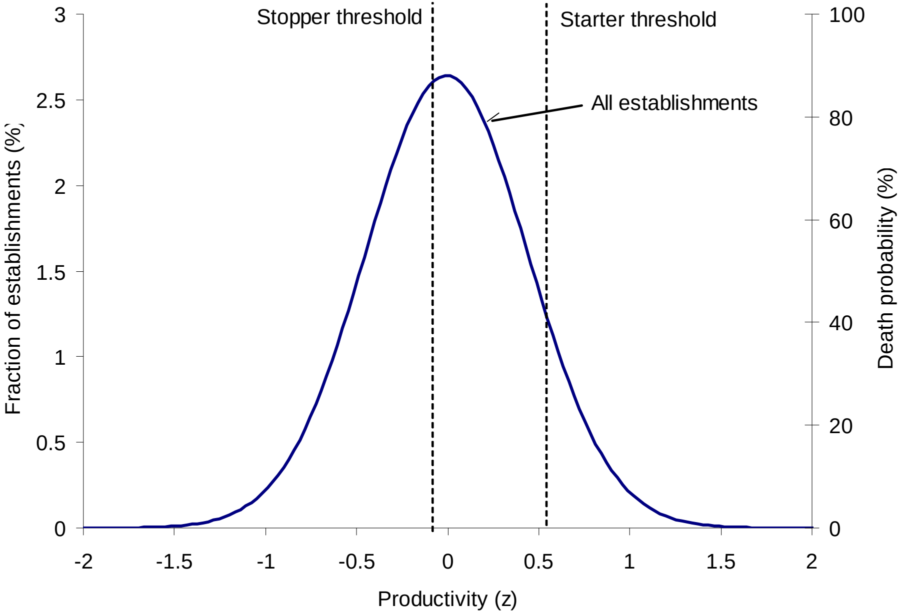

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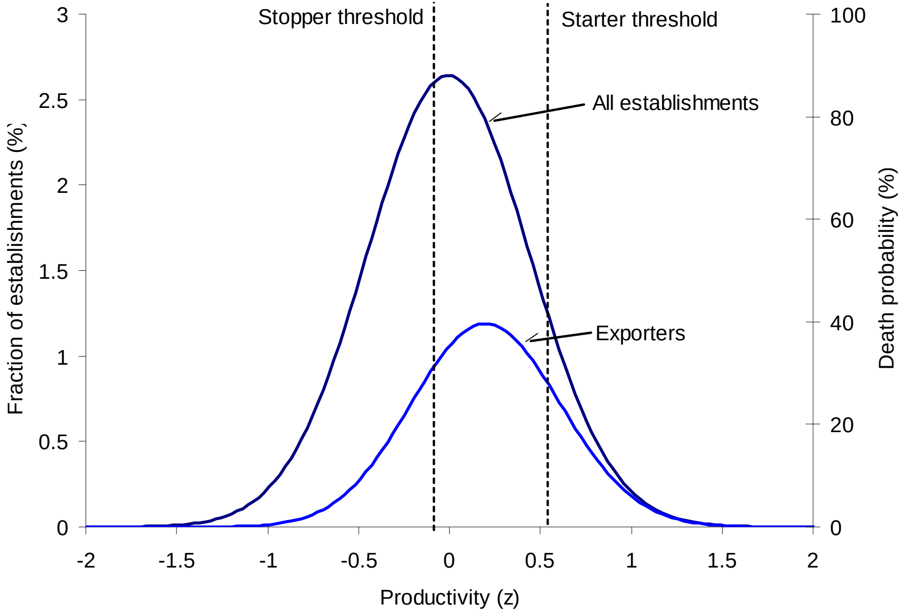

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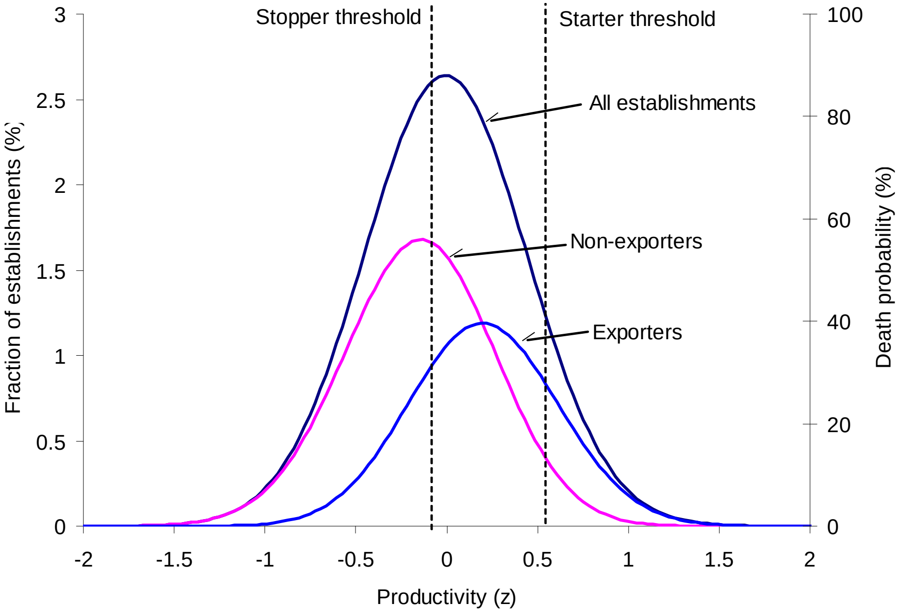

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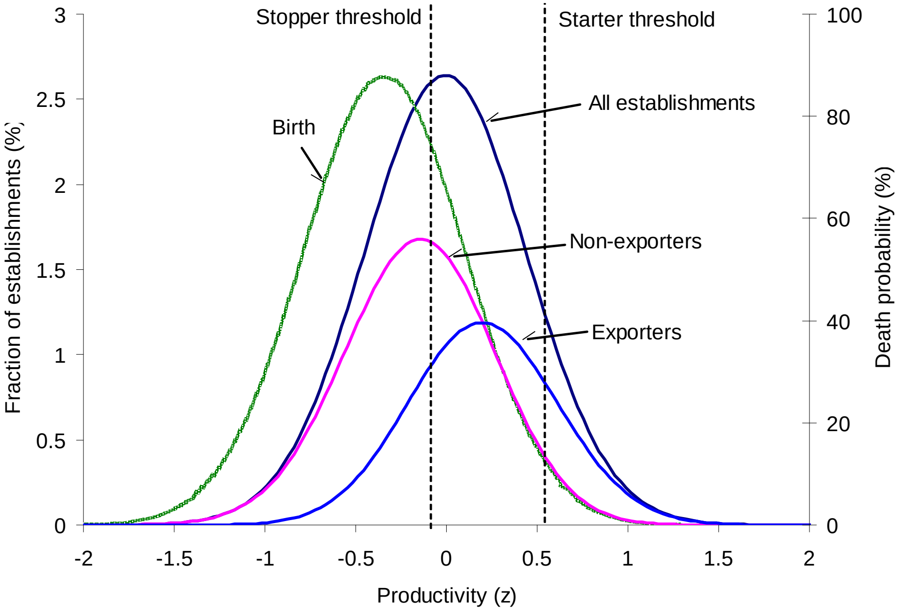

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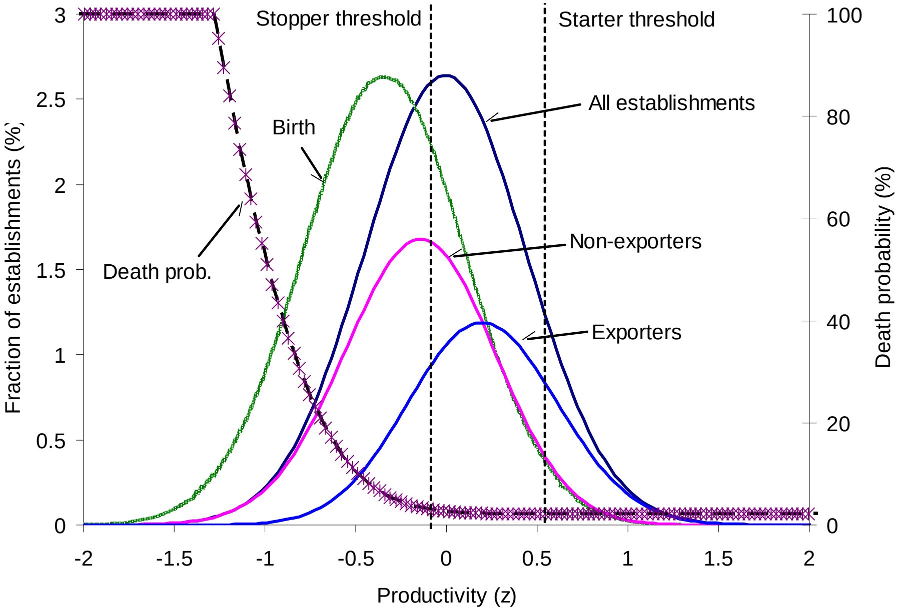


Calibration

Target 1987 economy

1. Trade costs in 2002
2. Exporter characteristics & dynamics
3. Establishment characteristics & dynamics

Calibration - trade costs and export intensity

$$\frac{i_t}{1-i_t} = (1+\iota)^{-\theta}$$

=> Given θ & export intensity i_t, can infer ι in 1987 & 2002

- $\iota_{87} = 0.54$ and $\iota_{02} = 0.41$
- Anderson & Van Wincoop (04) find $\iota \approx 0.65$, include fixed costs
- Division of trade costs into transport vs. tariffs matters mostly for welfare

Calibration - Targets

		1987
1	Participation of plants w/ 100+ employees	0.37
2	Exporter Stopper Rate 87-92, ASM	0.17
3	Entrant 5-year exit rate	0.362
4	Employment share of births	0.015
5	Employment share of deaths	0.023
6	Export Participation distribution	
7	Employment distributions	

Two stages:

- Given $\rho_\kappa, \rho_\varepsilon, \sigma_\varepsilon$, pick f_0, f_1, λ, n_{d0}, μ_E, match 1 to 5 observations
- Choose $\rho_\kappa, \rho_\varepsilon, \sigma_\varepsilon$ to match 6 & 7 (minimize distance)

Calibration - Parameters

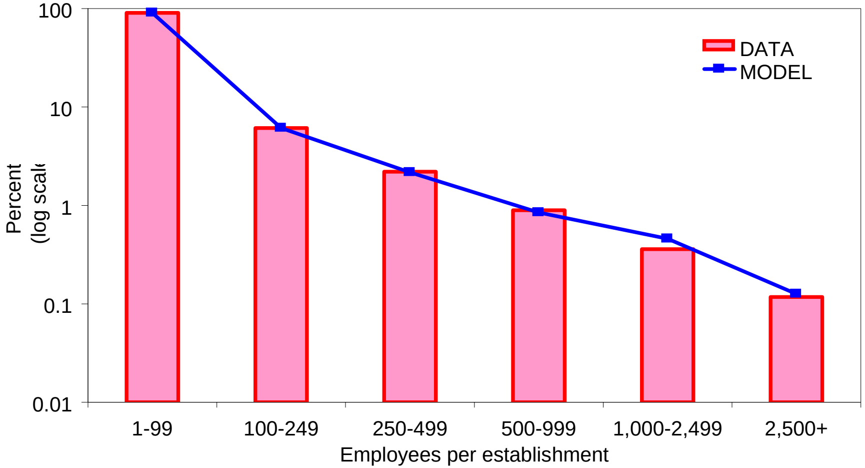
		Sunk
θ	Elasticity of Substitution	5
ρ	Persistence of Idiosyncratic shock	0.69
σ_ε^2	Variance of Idiosyncratic shock	0.33^2
λ	Exit shock	2.02
n_{d0}	Constant exit rate	2.25
μ_E	Productivity disadvantage young firms	0.335
ρ_κ	Probability of no fixed cost	0.94
f_E	Entry Cost	2.25
f_0	Startup export cost	0.219
f_1	Continuation cost	0.028

Model Fit by Employment Size

Squared sum of residuals (%)	
Establishments	5.2
Employment share	4.2
Export participation	0.4

Figure 2: Plant Characteristics by Employment Size

(a) Establishment Share



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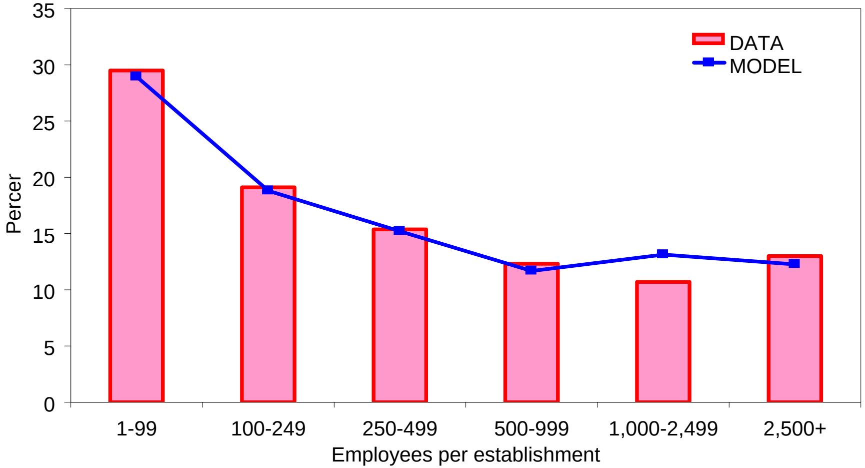
(b) Employment Share



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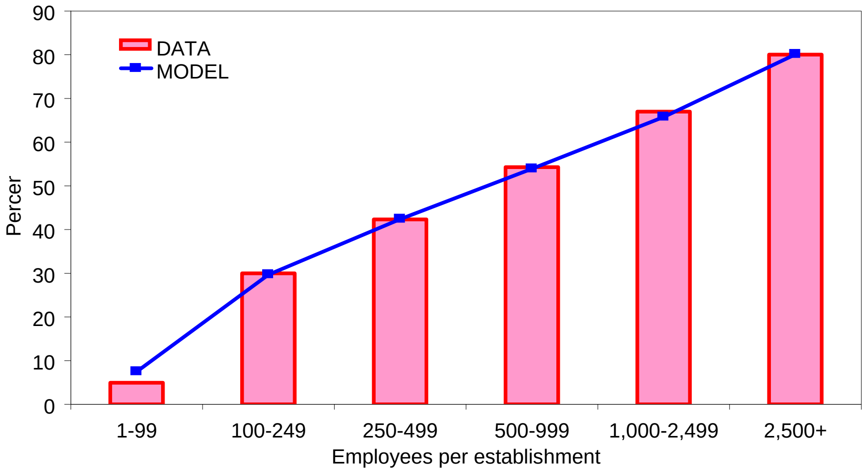
(c) Export Participation



Change iceberg costs to match intensity

1. Steady State
2. Dynamics

Table 4: Change in Export Characteristics and Trade

	Export Share	Intens.	Prem	$\frac{n}{N}$	N	L	s^{2500+}	s$^{<99}$
Data	**0.46**	0.42	-0.20	**0.24**	-2.0	-17.0	-5.4	2.9
Model	**0.80**	0.42	-0.22	**0.59**	-3.3	-0.5	0.1	-1.0

- Overpredicts exports and export participation

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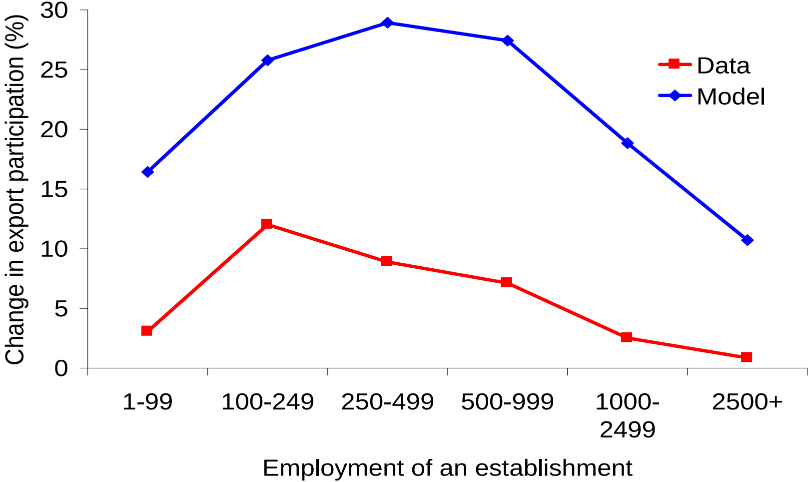

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- Overpredicts exports and export participation
- Predicts shift away from small plants

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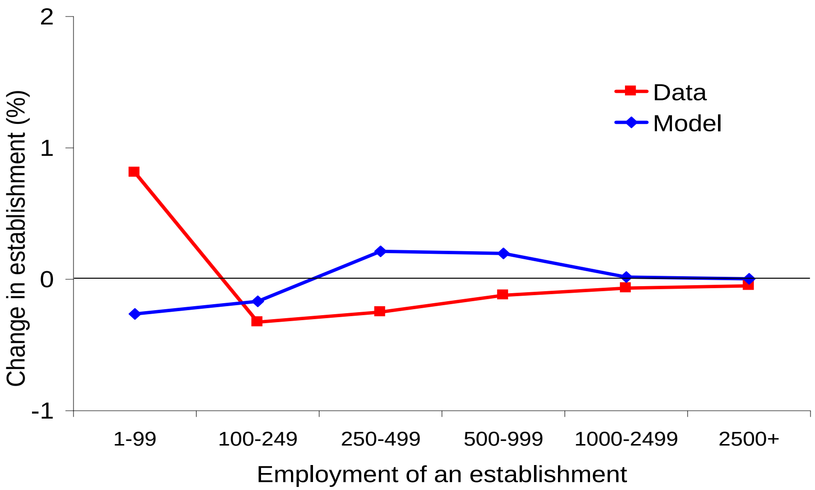

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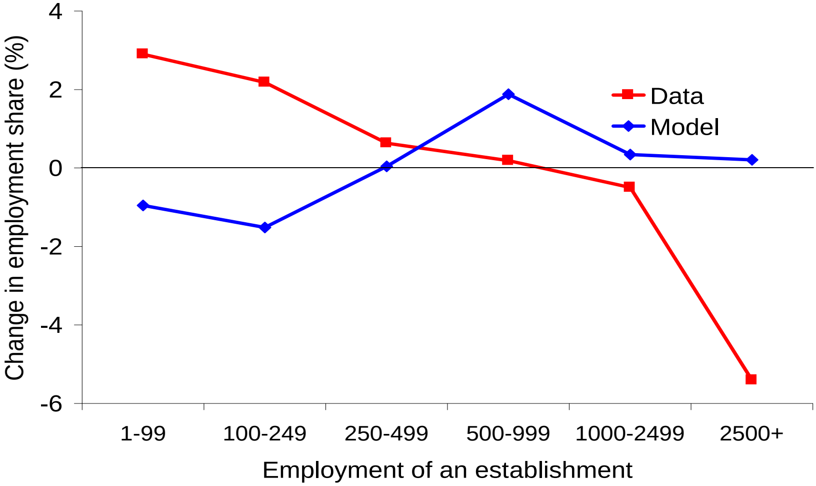

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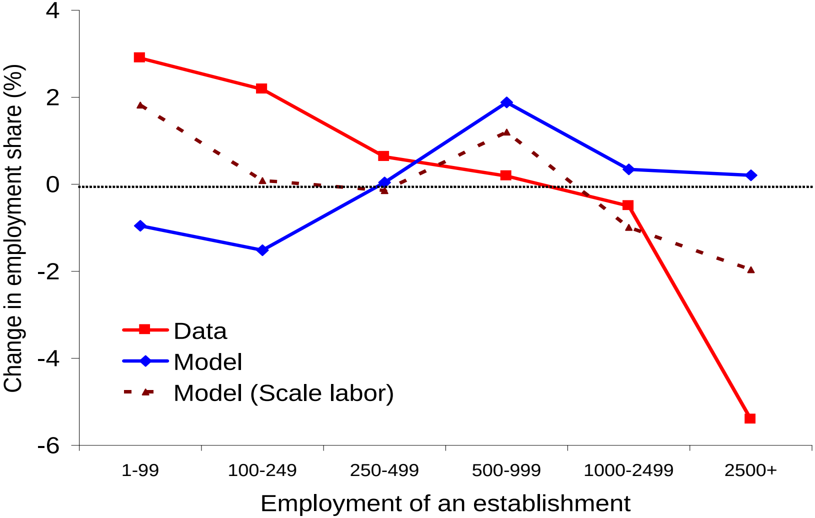
- Overpredicts exports and export participation
- Predicts shift away from small plants
- Underpredicts fall in manufacturing employment and plant size
  - Plant size fell 15% in data, but in model increase 2.8 %

Missing out on average plant size

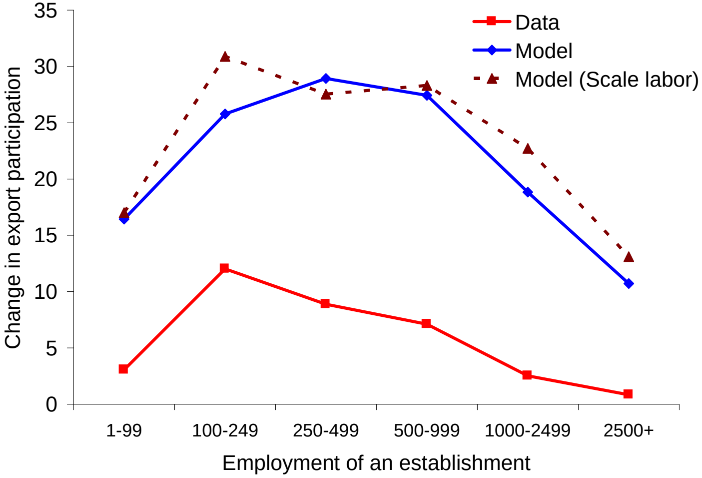
- Model misses out on change in plant size (+ 2.8 vs - 15.0)
- Rescale model to match data, keep export decision constant

(b) Employment Share (Exogenous Shift)



Helps in tails, but not center, doesn't affect export participation

(b) Export Participation (Exogenous Shift)



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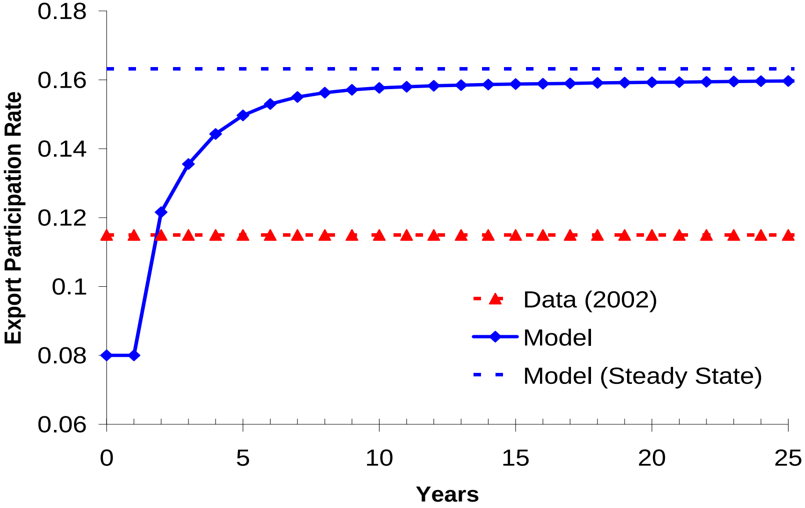
Exporter Dynamics

- Explore whether steady state comparisons may overstate results
- Suppose, unanticipated drop from ι_{87} to ι_{02}
  - Note that exporter intensity rose only 0.3 percent from 97 to 02.

(b) Exporter Dynamics



Transition dynamics very fast in export participation

Conclusions

From Δ in exporter characteristic & participation, we infer:

1. Iceberg costs fell 25%, from 55% to 41%.
2. Δ in Iceberg costs accounts for 175 percent of export growth, $\Rightarrow$ Puzzle is that trade didn't grow more
3. Changing structure of manufacturing drag on trade growth
   - Change in size distribution contradicts theory.

Calibration

Annual: $\beta = 0.96, \delta = 0.1,$

$u(c) = \frac{c^{1-\sigma}}{1-\sigma}$ $\sigma = 2$

$y(z) = e^z \left(k^\alpha l^{1-\alpha}\right)^{1-\alpha_x} x_m^{\alpha_x}$ $\alpha = 0.26,$

$\alpha_x = 0.80 \Rightarrow$ gross output $=$ 2.8 * value added

$D = Y_T^\gamma Y_N^{1-\gamma}$ $\gamma = 0.21 \Rightarrow$ mfr VA of 21%

Calibration - establishment heterogeneity

Shocks to z and κ independent

$$\phi\left(z'|z\right): z' = \rho_{\varepsilon} z + \varepsilon, \varepsilon \sim N\left(0, \sigma_{\varepsilon}^2\right)$$

$$\phi_E\left(z\right): z' = -\mu_E + \varepsilon_E, \varepsilon_E \sim N\left(0, \frac{\sigma_{\varepsilon}^2}{1-\rho^2}\right)$$

$$n_d\left(z\right): 1 - n_s\left(z\right) = \max\left\{0, \min\left\{\lambda e^{-\lambda e^z} + n_{d0}, 1\right\}\right\}$$

$\phi_{\kappa}\left(\kappa\right)$: two states $\kappa = \{0, \infty\}$, $\rho_{\kappa}^L = 1 - \rho_{\kappa}^H = \rho_{\kappa}$
- initial cost drawn from ergodic distribution

$\Rightarrow$ 8 parameters $\{f_0, f_1, \lambda, n_{d0}, \mu_E, \rho_{\varepsilon}, \sigma_{\varepsilon}, \rho_{\kappa}\}$

Preview of Results

Using Melitz model, we find:

1. Iceberg costs fell by $1/4$, from 55 percent to 41 percent.
2. Fall in iceberg costs should have increased trade 75 percent more
   - Puzzle is that trade grew so slowly!
3. Slow export growth result of a shift towards smaller plants
   - With smaller plants $\Rightarrow$ fewer exporters
   - Contradicts key prediction of Melitz model
4. Reallocation of labor from traded to non-traded less than data.

Related Literature - Trade Growth

1. Empirical:
   - Baier & Bergstrand (01) - 75% tariffs, 25% transport costs
   - Bernard & Jensen (05) - important role of entry & intensity US exports from 87 to 92.
   - Hummels (06) - documents drop in air/ocean freight charges.
   - Bernard, Jensen, Schott (07) - falling trade costs increase likelihood of exporting
2. Theoretical
   - Yi (03) - more back-forth trade of intermediates
   - Melitz (03), Ruhl (03) - # of exporters rose w/ drop in tariffs

Table 1: Export Characteristics and Trade

	EXY	Intensity	Premium	Participation
1987	0.051	0.100	6.42	0.085
2002	0.084	0.151	4.82	0.115
Log Change	**0.49**	**0.42**	**-0.29**	**0.36**
Based on Census of Manufacturers				

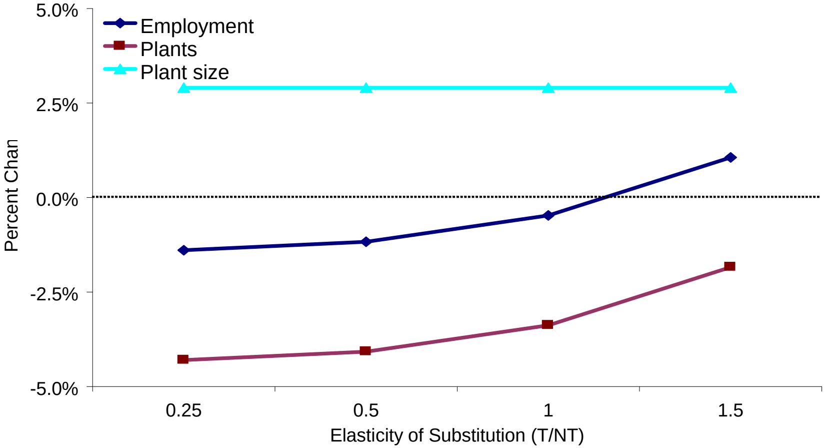
Sensitivity - elasticity of substitution T/NT

$$D = \left[a D_T^{\frac{\gamma-1}{\gamma}} + (1-a) D_N^{\frac{\gamma-1}{\gamma}} \right]^{\frac{\gamma}{\gamma-1}}$$

Lowering γ

- Lowers tradable employment & # plants, but less than data
- But, no impact on plant size distribution.
- Suggests globalization has small impact on decline in mfring.

Figure 5: Tradable Sector and Elasticity of Subsitution



Evolution of establishment distribution

- $\Psi_t = (\psi_t, \psi_t^*)$
- Given entry & export decision $m_t'(z, \kappa, m)$, $m_t^{*\prime}(z, \kappa, m)$, idiosyncratic shocks ϕ :

$$\Psi_{t+1} = T\left(\Psi_t, N_t^E, N_t^{E*}\right)$$

Labor used in production

$$L_{P,t} = \int_{z \times m} l_t(z, m) \, .$$

Figure 2: Export Intensity by Employment Size (1987)

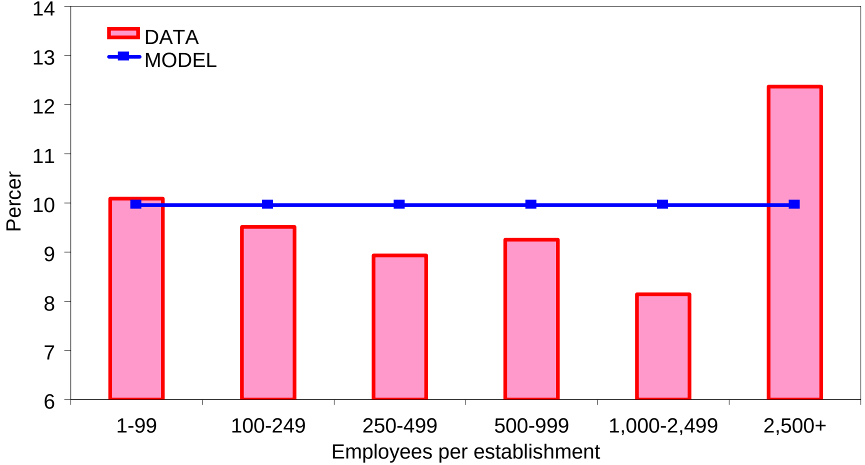
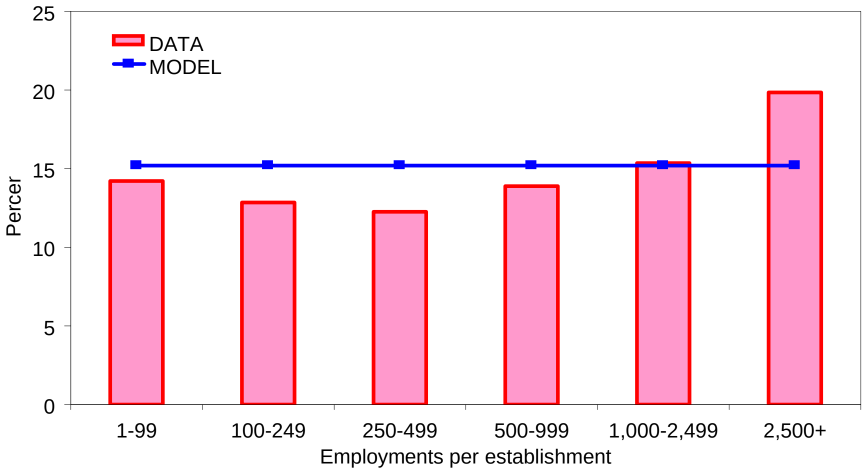
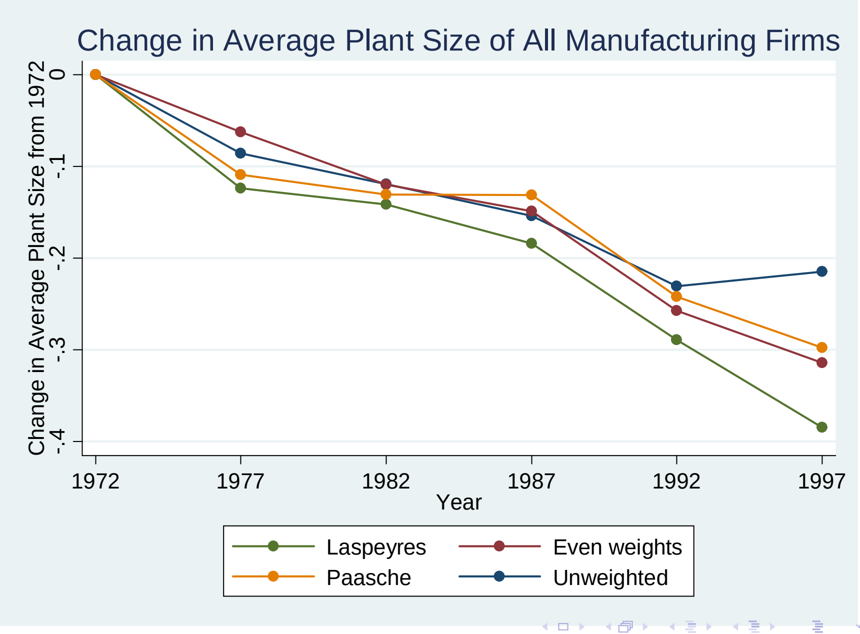


Figure 2: Export Intensity by Employment Size (2002)



Missing out on average plant size

- Model misses out on change in plant size (+ 2.9 vs - 15.0)
- Rescale model to match data, keep export decision constant


Change in Average Plant Size of All Manufacturing Firms
Change in Average Plant Size from 1972
0
-.1
-.2
-.3
-.4
1972
1977
1982
1987
1992
1997
Year
Laspeyres
Even weights
Paasche
Unweighted

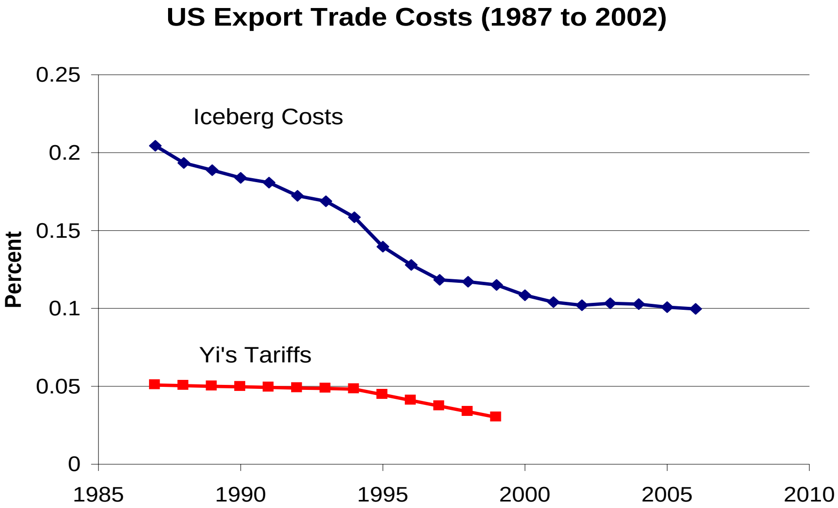
How much have trade costs declined?

Estimate trade costs using Feenstra data.

$$\text{Trade costs}_t = \sum_{i=1}^{N} \alpha_i \left(\tau_{it} + \iota_{it}\right)$$

α_i - country i export weight in 2000/01
τ_{it} - Ng/World Bank study of tariffs
ι_{it} - Country fixed effect based on cif/fob import data (SITC)

Drops of about 10.2 points vs. 13.6 points from exporter data.


US Export Trade Costs (1987 to 2002)
Percent
0.25
0.2
0.15
0.1
0.05
0
1985
1990
1995
2000
2005
2010
Iceberg Costs
Yi's Tariffs

Slide 1: Title Thanks for having me in to visit.
This is joint work with Horag Choi at the University of Auckland.
Our main focus is on trying to better understand how the US has become more integrated with the ROW through international trade. A picture may help to explain.
Slide 2: Here I've plotted the trend in share of manufacturing output exported relative to manufacturing value added over the 40 year period from 1959 to 1999. You can see that US exports have grown a lot - from less than 10 percent of sectoral value added to over 40 percent. This growth has been a bit uneven. It seemed to accelerate in the mid to late 80s. One possible explanation for this growth is that it reflects a decline trade costs, making trade relatively cheaper. Indeed we see that there has been a fairly large drop in tariffs (these are from Yi 2003). However, the timing of the growth in trade doesnt really match up. Trade costs fell a lot in the early period, but trade didnt really take off until much later. Yi has argued that this poses a challenge for standard representative agent models since it implies that the elasticity of trade with respect to trade costs has accelerated.

Slide 3: So, growing integration in goods is a key characteristic of post war economic growth, yet the relation between trade and some observed measures of trade costs seems puzzling.
So in this paper we want to revisit the question of what are the barriers to trade and how are they changing?
Some aspects of trade costs are determined by policy, so understanding the impact of these policies is central to evaluating them. Doing so, also allows us to evaluate models of trade
So, in this paper we revisit trade through the Melitz model of international trade. This is a model of heteregeneous monopolistically competitive producers facing fixed costs of exporting. We focus on the puzzling period of high trade growth and small decline in oberved tariffs. In part because its a puzzle and in part becuase this is the only period for which we have data on exporter characteristics to discipline the model.
Slide 4 - preview of results A) Using this model, we can infer the change in marginal trade costs, iceberg costs, these are the cost of trade that are proportional to the value of the goods being exported. Find they fell by a quarter from about 55 percent to 41 percent. B) Find in this model, trade

Slide 6: Obviously, there are other people who have done work measuring trade costs and/or relating them to the growth in trade. Probably most closely related is the paper by Kei-Mu Yi. As I already hinted at, he argues that standard models can not explain trade growth and thus we need to consider a framework with trade in intermediates that cross borders multiple times to explain the growth in world trade. What the standard model in international trade is has changed, and so we're going to essentially revisit his analysis and come up the opposite conclusion.
Slide 7: I find it useful to start by presenting a simple framework to relate trade costs to trade flows. First, lets consider the old representative plant framework. Think of there being many identical plants each selling at home and overseas facing similar demand functions in each market. The only difference is that goods shipped overseas incur tariffs and trade costs. With no price discrimination, over time the change in the ratio of exports to domestic sales will be determined by the change in trade costs and relative income.
Slide 8: So there is a very direct link between a change in trade costs and trade flows which we can take to the data. Now, its easy to measure

Slide 9: Now, with this information and a measure of the change in trade costs we can figure out what the elasticity of trade is. This is the approach that Yi takes in his article. He observes that tariffs fell about 2.5 percentage points and assumes that iceberge costs were constant. Thus, he finds an elasticity of trade flows with respect to tariffs of about 17.5, which is much higher than existing estimates of the elasticity of demand. For this reason he argues we need a new model of trade.
An alternate approach, consistent with that of Anderson and Van Wincoop is to take to the elasticity as given and use it to back out the change in trade costs. Doing this we find that trade costs fell by about 8.5 points. Without better measurement, we can not distinguish between trade costs falling a little or a lot and consequently we cant evaluate our models of trade.
Slide 10: So, we want to take an alternate approach in which there is no longer just a one to one relation between trade costs and trade flows. So, we turn to models with plant heteroegeneity. In these models the characteristics of plants determine aggregate trade flows. Since not all plants export and exporters are much larger than non exporters. So, we

For plants with technology in this range, export participation will depend on the history of shocks and hence past investments in export capacity.

Can we use the BLS mass layoff data to identify a change in the exit rate of big firms?
Is the rise in export intensity by big firms consistent with fixed cost model.
The 1997 Economic Census contains a table showing the industries removed from the Census of Manufactures and the industries added (based on the transition from SIC to NAICS). The industries added are organized around small establishments with average employment of 7 per establishment (22839 and 153628) such as retail bakeries, furniture stores and dental labs. The industries dropped averaged about 25 employees per establishment (36870 and 822958) and were primrily organized around printing/publishing.
It will probably be easier to try to adjust the 1997 and 2002 data rather than make the 1987 and 1992 data better. This means we need to subtract the added industries (which is easy to do since there are industry reports - http://www.census.gov/prod/www/abs/manu-ind2002.html).
Adding the subtracted guys might be tougher though.