

Heterogeneous Multinational Firms and Productivity Gains from Falling FDI Barriers

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Introduction

◆ Globalization anxiety

- Declining international barriers to economic activity
- Firms move their factory abroad freely
- Entry of foreign firms drives out domestic firms

◆ Concerns about rising multinational firms

- A few global firms dominate a market
- Displacement of small and medium firms

Introduction

◆ Impacts of FDI globalization

- Critical issues for policy makers
- Key questions:
 - Which firms seize global opportunities?
 - Which firms lose from global competition?
 - Is there any productivity gain?

However,

◆ Quantitative assessment is difficult for:

- Global firms compete multilaterally via FDI
- Individual firms respond to aggregate shocks abroad
- Counterfactual analysis is needed

Introduction

◆ This paper seeks to quantify:

- Individual-firm response to aggregate FDI barriers
- Resulting changes in market-share reallocation
- Aggregate productivity improvements

By:

- Calibrate firm-heterogeneity model of trade to Japanese multinationals
- Validate the estimated model for data
- Use the validated model for counterfactuals

Data for Japanese Multinationals

1. Kigyō Katsudō Kihon Chōsa
 - All firms with over 50 employees or 30 mil. Yen of capital
2. Kaigai Jigyō Katsudō Kihon Chōsa
 - Foreign affiliates owned by Japanese parent firms

Sample for 2006

- ◆ 2032 multinational parents in original data
 - 1656 parent firms have both sales at home and abroad
- ◆ 7626 manufacturing foreign affiliates across 70 countries
- ◆ Average Multinational Parent:
 - 4.6 foreign affiliates
 - 5.7 billion (yen) sales abroad per an affiliate

Table 1. Firm Entry and Exit by Initial Size in 1996 and 2006

Initial Size Interval (percentile)	# All Firms			# Multinationals		
	<u>Year</u>		Change from 1996	<u>Year</u>		Change from 1996
	1996	2006		1996	2006	
0 to 10	1,411	1,376	-35	0	3	3
10 to 20	1,410	1,276	-134	5	13	8
20 to 30	1,411	1,178	-233	3	20	17
30 to 40	1,412	1,229	-183	11	40	29
40 to 50	1,412	1,202	-210	16	36	20
50 to 60	1,414	1,191	-223	27	73	46
60 to 70	1,411	1,299	-112	51	113	62
70 to 80	1,413	1,229	-184	75	185	110
80 to 90	1,412	1,409	-3	184	359	175
90 to 99	1,270	1,309	39	464	677	213
99 to 100	141	157	16	124	137	13
Total	14,117	12,855	-1,262	960	1,656	696

Notes: Percentile bins are determined by parent firms' global sales in 1996; all firms include domestic and multinational firms in manufacturing; we drop firms with *missing* domestic sales.

Source: Basic Survey of Japanese Business Structure and Activities, and Basic Survey of Overseas Business Activities from Japanese METI.

Theoretical Framework

- ◆ Trade model of Eaton, Kortum, Kramarz (2011)
 - Monopolistic competition, N markets (Melitz model)
 - Firm heterogeneity
 - Stochastic firm-level efficiency
 - Stochastic shock to export entry/sales by market

- ◆ To apply EKK model to multinational production
 - Firms draw efficiency, stochastic FDI entry/sales shocks
 - Produce in domestic and/or foreign markets
 - No export choice (future work)

Entry and Sales Conditions

- ◆ Firm enters market n if and only if its unit cost is below threshold unit cost:

$$c_n(j) \leq \bar{c}_{ni}(j)$$

where

$$\bar{c}_{ni}(j) = \left(\eta_n(j) \frac{X_n}{\sigma E_{ni}} \right)^{1/(\sigma-1)} \frac{P_n}{\bar{m}}$$

- ◆ Latent sales conditional upon entry

$$X_{ni}(j) = \frac{\alpha_n(j)}{\eta_n(j)} \sigma E_{ni} \left(\frac{\bar{c}_{ni}(j)}{c_n(j)} \right)^{\sigma-1}$$

Theoretical Implications

- ◆ More productive firms tend to be multinational

- ◆ More productive firms tend to
 - Invest in a larger set of markets
 - Generate more sales per each market
 - Penetrate less attractive markets

- ◆ Weak pecking order
 - Strict pecking order
 - Productivity dictates sorting of firms into international markets
 - Entry and demand shocks allow for deviations from strict form

Empirical Regularities

- ◆ Consistency with the model
 - Empirical regularities of French exporting firms support EKK model
 - Do we find similar regularities for Japanese multinationals?
- ◆ Supporting evidence for the model
 - Market entry and market size
 - Sales distribution
 - Market entry and sales in Japan
 - Multinational production intensity

Calibration

1. Set particular values for structural parameters
2. Simulate artificial firms from entry/sales conditions
3. Calculate moments of artificial firms
 - Moments describe features of their activities
 - Match moments of real and simulated firms
4. Search for optimal parameters by simulated method of moments
 - Repeat until best fit between artificial and real moments

Parameter Estimates

	(1)	(2)	(3)	(4)
Markets	Markets with over 10 affiliates	All Markets	Markets with over 10 affiliates	Markets with over 10 affiliates
Year	2006	2006	2006	1996
Moments	All	All	No Pecking Order String	All
Variable				
size dispersion	1.99	2.12	1.95	2.13
	(0.43)	(0.95)	(0.64)	(0.53)
variance of sales shock	1.64	1.64	1.66	1.36
	(0.07)	(0.10)	(0.08)	(0.11)
variance of entry shock	0.39	0.52	0.34	0.45
	(0.31)	(0.16)	(0.42)	(0.43)
Correlation of sales and entry shocks	-0.62	-0.55	-0.64	-0.99
	(0.34)	(0.25)	(0.51)	(0.56)

Model Validation

- ◆ Predictive accuracy of the model
 - Can model replicate firm activities in various environments?

- ◆ Internal model validation
 - Simulate a new set of firms and compare with JP MNCs in 2006
 - Samples are identical in estimation and validation
 - Useful, but **policy may change an environment**

- ◆ External model validation
 - Use year 2006 parameters to simulate JP MNCs in 1996
 - Simulate MNCs in significantly different environments

Out-of-Sample Predictions

Figure 6b. Out-Of-Sample Predictions for 1996

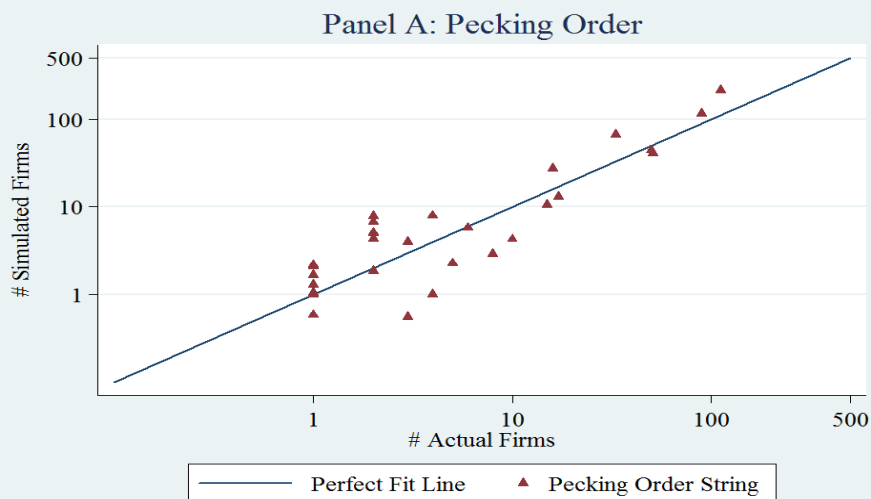
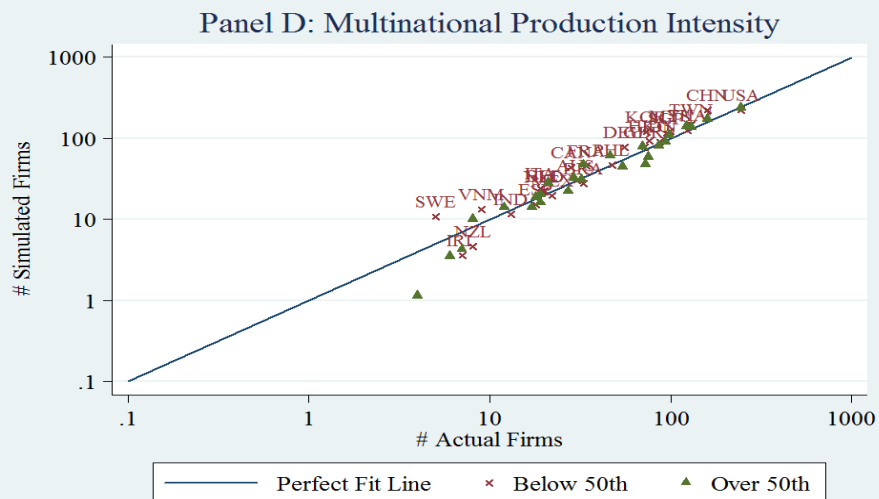
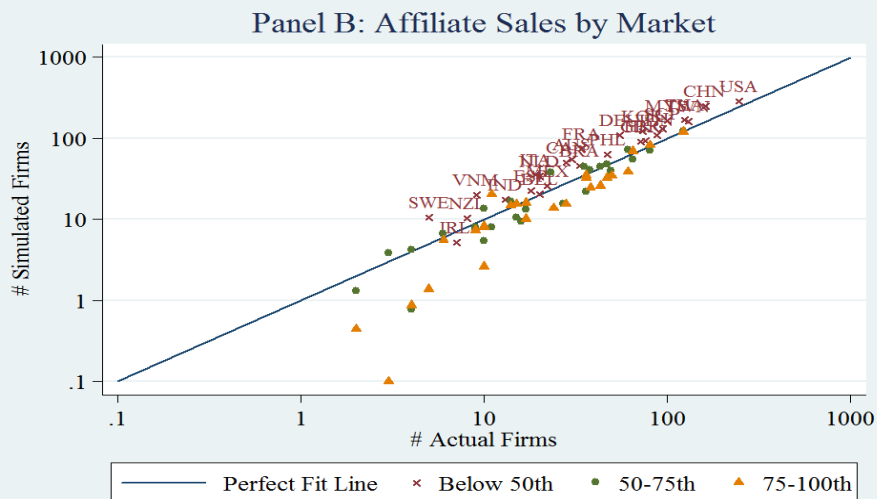
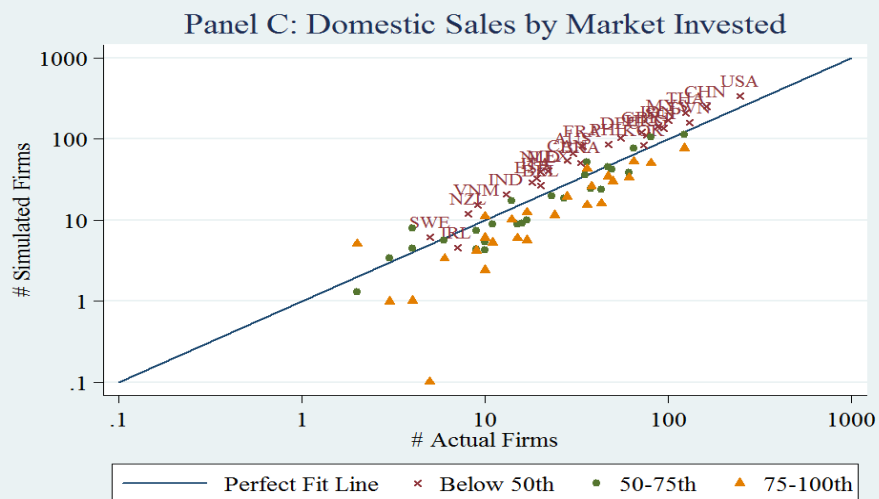


Figure 6c. Out-Of-Sample Predictions for 1996



Counterfactual Analysis

- ◆ Step 1: Baseline
 - Simulate artificial multinationals

- ◆ Step 2: Counterfactuals
 - Set counterfactual scenarios
 - **Global 20% drop in FDI costs**
 - Simulate aggregate changes (global general equilibrium)
 - Simulate firm-level changes given aggregate changes

- ◆ Step 3: Analysis
 - Compare baseline and counterfactuals

Changes in Aggregate FDI Barriers

	Host Country 1	Host Country 2	Host Country 3
Home Country 1	0%	-20% (B)	-20% (B)
Home Country 2	-20% (A)	0%	-20% (C)
Home Country 3	-20% (A)	-20% (C)	0%

- ◆ Effects on firms in home country 1 (Japan)
 - (A) increased inward FDI
 - (B) increased outward FDI
 - (C) increased FDI competition abroad

Aggregate Results for JP Firms

Variable	Baseline	Counterfactual Change from Baseline	% Change from Baseline
Number of Firms:			
All	13,123	-350	-2.67
Multinationals	1,511	1,004	66.4
Aggregate Production: (Trillion Yen)			
Domestic	394.3	-13.6	-3.45
Foreign	99.8	107.1	107.3
Total	494.1	93.5	18.9

Results for Extensive Margin

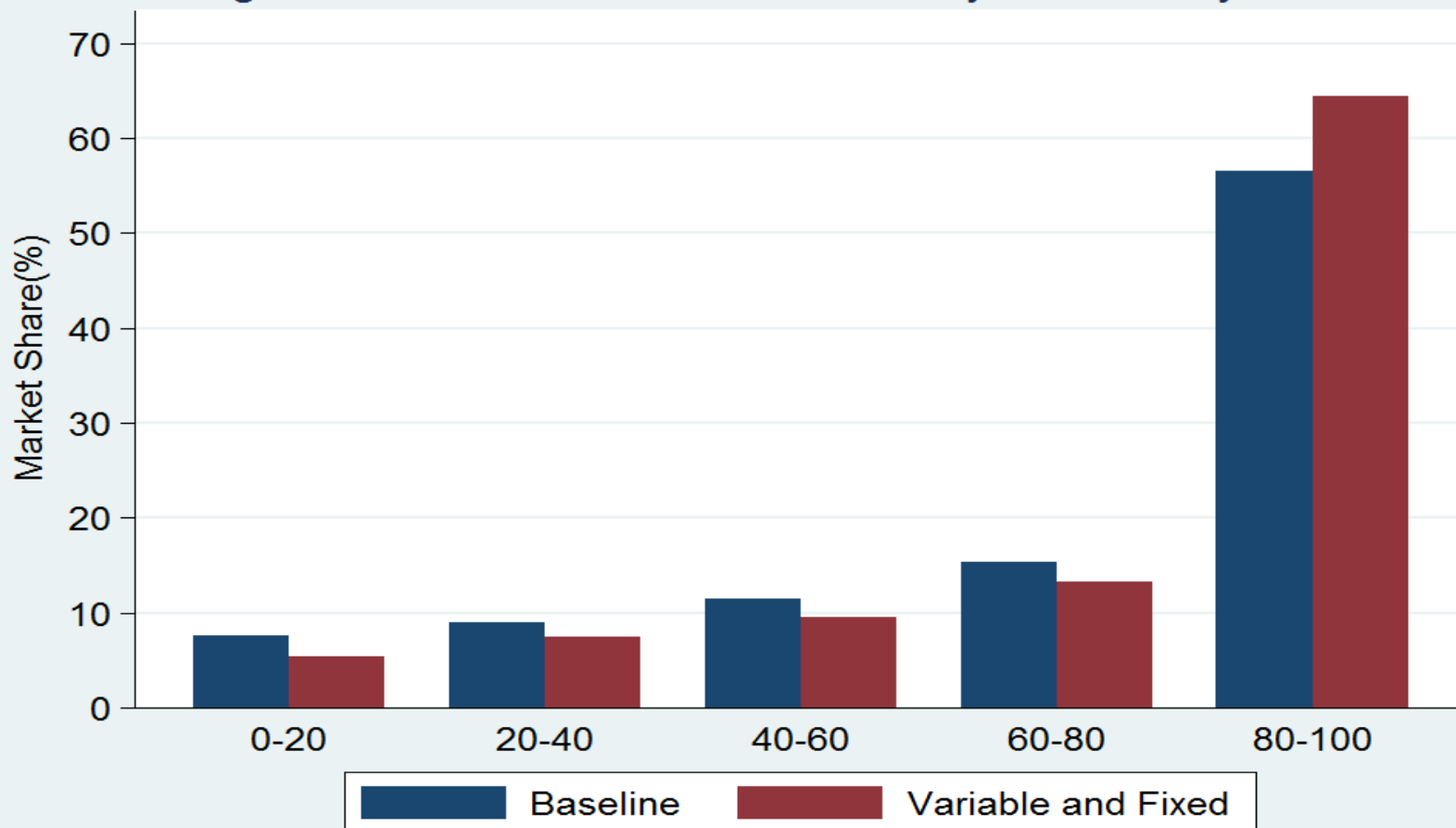
Initial Productivity Group (percentile)	# Multinational		# All Firms	
	Baseline	Counterfactual Change from Baseline	Baseline	Counterfactual Change from Baseline
0-10	0	6	1,313	-345
10-20	0	21	1,312	-2
20-30	0	34	1,313	-1
30-40	2	53	1,312	-1
40-50	22	62	1,312	-1
50-60	45	82	1,312	0
60-70	79	118	1,312	0
70-80	146	177	1,313	0
80-90	322	259	1,312	0
90-99	766	191	1,181	0
99-10	130	0	130	0
Total	1,511	1,004	13,123	-350

Results for Intensive Margin

Initial Productivity Group (percentile)	Foreign Production per Multinational		Total Production per Firm	
	Baseline	Counterfactual Change from Baseline	Baseline	Counterfactual Change from Baseline
0-10	0.00	1.34	13.7	-0.13
10-20	0.00	1.27	14.6	-0.35
20-30	0.00	1.54	16.0	-0.38
30-40	0.69	0.90	17.9	-0.45
40-50	0.75	1.31	19.5	-0.36
50-60	1.04	1.50	22.0	-0.29
60-70	1.58	1.92	26.2	-0.24
70-80	2.36	3.14	31.7	0.42
80-90	5.01	6.16	42.6	2.84
90-99	32.0	31.44	97.3	29.1
99-100	563.2	486.7	855.4	481.3
All	66.1	16.22	37.7	8.4

Market-Share Reallocation

Figure 6. Market-Share Reallocation by Productivity Quintile



Aggregate Productivity Growth

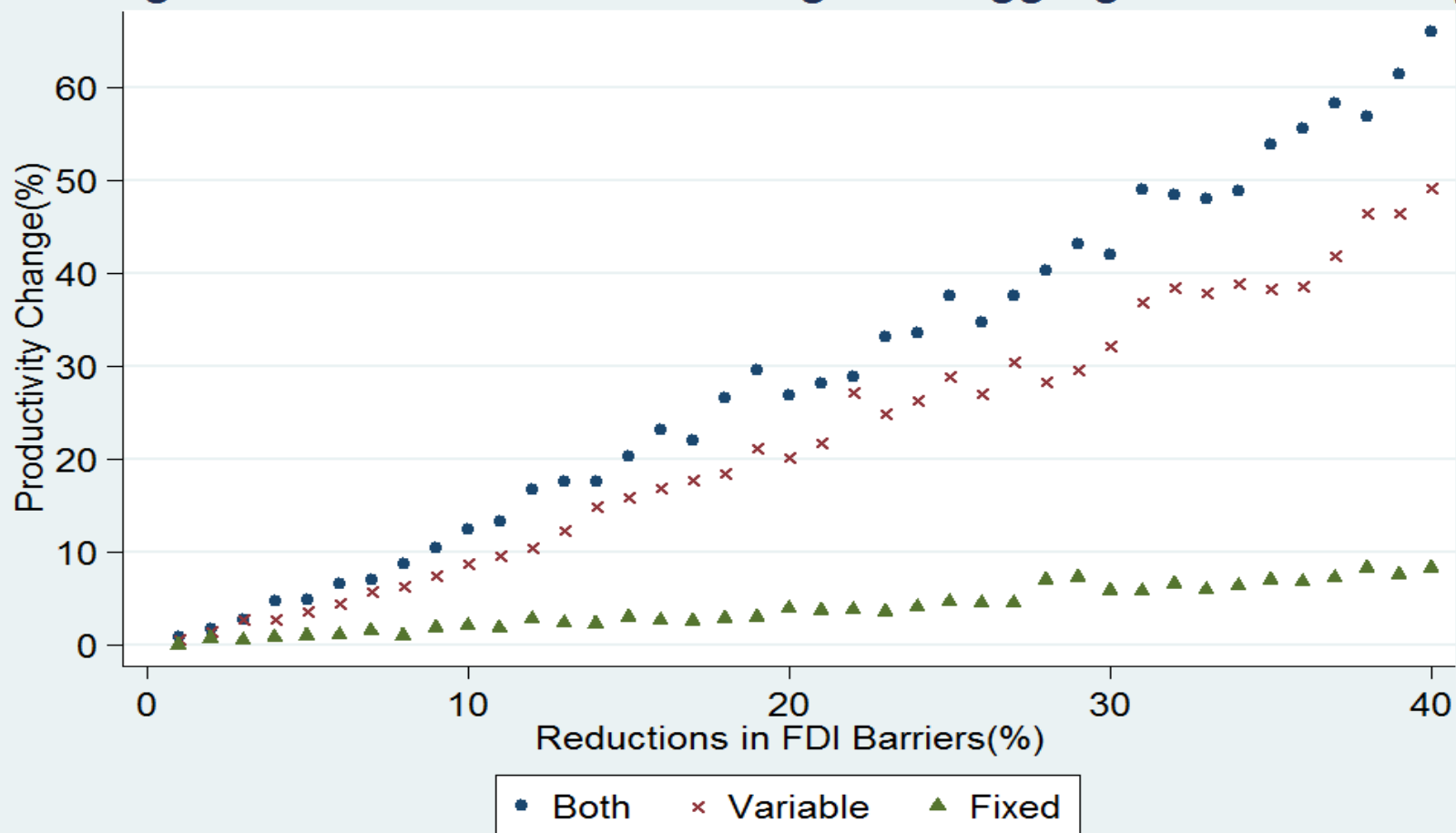
- ◆ Decomposition of aggregate productivity changes
 1. **No** within-firm effects: firm-level efficiency is held constant
 2. **No** entry effects: no firm enters the market
 3. **Reallocation effects** in market share:
 - Expansion of high productive firms
 - Contraction of low productive firms
 4. **Exit effects**
 - Exit of low productive firms

- ◆ Results

Total effects	30.7%
Reallocation effects	29.6%
Exit effects	1.2%

Aggregate Productivity Growth

Figure 8. Counterfactual Changes in Aggregate Productivity



Concluding Remarks

- ◆ Impacts of FDI globalization
 - Falling FDI barriers cause large market-share reallocation
 - Large gains for aggregate productivity
 - Largest firms grow at the expense of small firms

- ◆ Future agenda
 - Exporting and FDI
 - Multinationals in service sector