Trade, Firms and Employment

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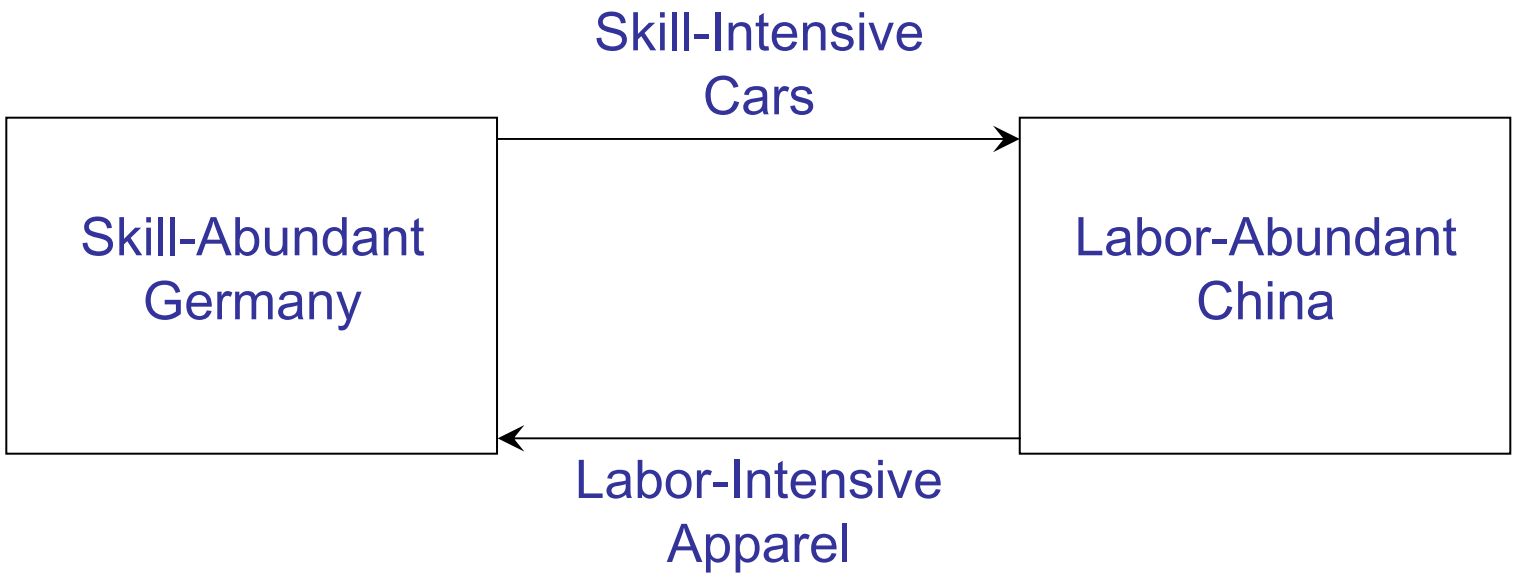
Outline

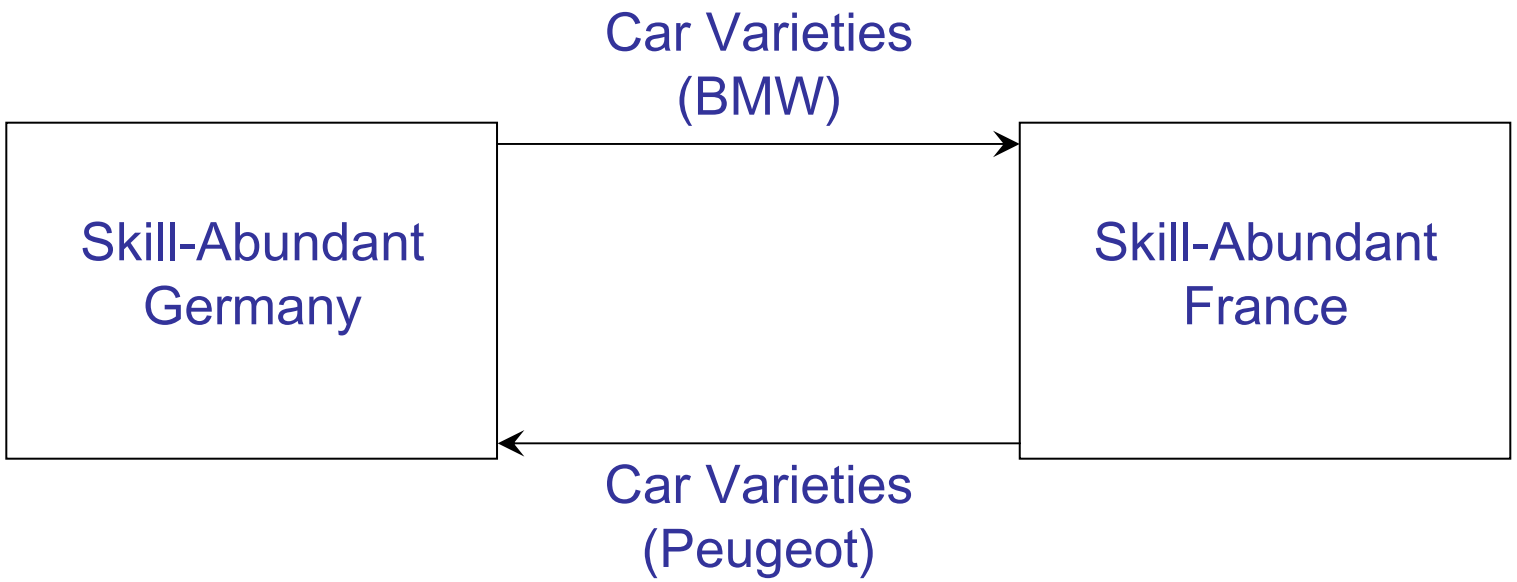
- Traditional models of international trade
- The empirical challenge of “stylized facts” from plant and firm-level data
- Theoretical models to meet this empirical challenge
- Current and future research

Inter-Industry Trade



- Prediction:
  - Countries export some industries, import others
- However:
  - In many industries we see both exporting and importing
  - Within industries, some firms export while many others do not

Intra-Industry Trade



- Prediction:
  - Firms specialize in different varieties which are exported and imported within the same industry
- However:
  - Some firms export and many others do not
  - Some country pairs trade and many others do not

Challenge 1: Producer Heterogeneity

- There is vast heterogeneity across plants and firms
  - Productivity, capital intensity, skill intensity, etc.

- Heterogeneity within industries is often as large as heterogeneity across industries

Plant Heterogeneity

(Bernard, Eaton, Jensen and Kortum 2003)

TABLE 2—PLANT-LEVEL PRODUCTIVITY FACTS

Productivity measure (value added per worker)	Variability (standard deviation of log productivity)	Advantage of exporters (exporter less nonexporter average log productivity, percent)
Unconditional	0.75	33
Within 4-digit industries	0.66	15
Within capital-intensity bins	0.67	20
Within production labor-share bins	0.73	25
Within industries (capital bins)	0.60	9
Within industries (production labor bins)	0.64	11

Notes: The statistics are calculated from all plants in the 1992 Census of Manufactures. The "within" measures subtract the mean value of log productivity for each category. There are 450 4-digit industries, 500 capital-intensity bins (based on total assets per worker), 500 production labor-share bins (based on payments to production workers as a share of total labor cost). When appearing within industries there are 10 capital-intensity bins or 10 production labor-share bins.

Challenge 2: Excess Reallocation

- There is ongoing job creation and job destruction in all industries
- The net change in industry employment is small relative to the total amount of job creation and destruction
- There are reallocations of resources within industries (across firms) as well as between industries

Job Creation and Destruction

Year	Job Creation	Job Destruction	Job Reallocation	Net Employment Growth
1973	11.9	6.1	18.0	5.7
1974	9.0	9.3	18.3	-0.3
1975	6.2	16.5	22.7	-10.3
1976	11.2	9.4	20.6	1.8
1977	11.0	8.6	19.6	2.3
1978	10.9	7.3	18.2	3.6
1979	10.3	7.0	17.4	3.3
1980	8.0	9.1	17.1	-1.1
1981	6.3	11.4	17.7	-5.4
1982	6.8	14.5	21.3	-7.7
1983	8.4	15.6	23.9	-7.2
1984	13.3	7.6	20.9	5.7
1985	7.9	11.1	19.0	-3.2
1986	7.9	12.1	20.1	-4.2
1987	8.4	10.1	18.5	-1.7
1988	8.3	8.3	16.7	0.0

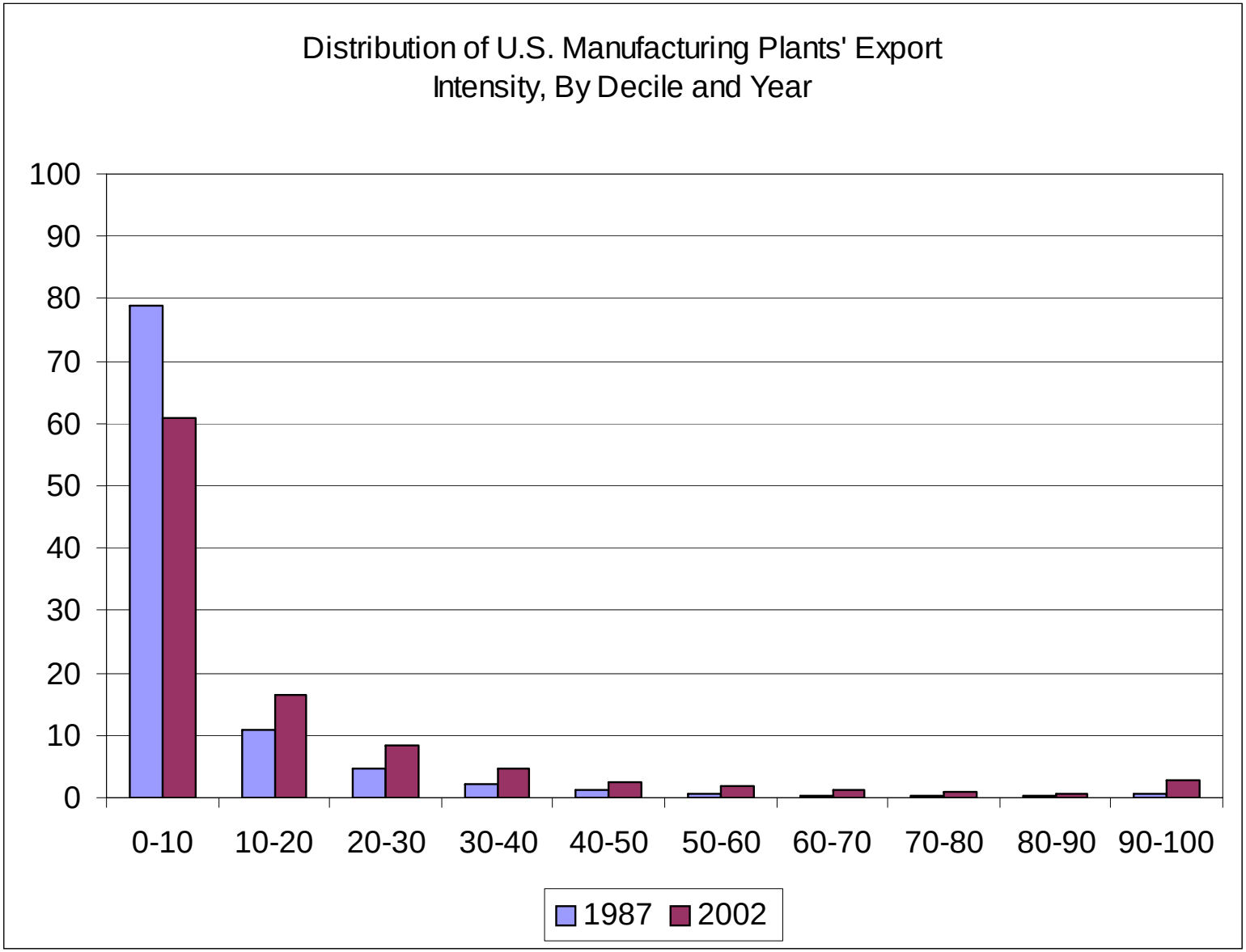
Source: Davis, Haltiwanger and Schuh (1996)

Challenge 3: Trading is Rare

- Within industries, some firms export and many others do not
  - True for *both* net exporting and net importing industries
- Within industries, exporters are different
  - Larger, more productive, pay higher wages, etc.
- Multinationals are also larger and more productive than firms that serve only the domestic market

Exporting is Rare

(Bernard, Jensen, Redding and Schott 2007)



Exporter Frequency and Size, 2002

(Bernard, Jensen, Redding and Schott 2007)

NAICS	Industry	Percent of All Plants	Percent of Plants that Export	Mean Exports / Shipments (%)	Mean Capital Intensity ($000)	Mean Skill Intensity (%)
311	Food Manufacturing	8	15	15	87	33
312	Beverage and Tobacco Product	1	21	9	183	48
313	Textile Mills	1	27	14	92	21
314	Textile Product Mills	2	14	11	25	25
315	Apparel Manufacturing	3	8	14	16	21
316	Leather and Allied Product	0	24	15	23	23
321	Wood Product Manufacturing	5	10	17	58	20
322	Paper Manufacturing	2	28	9	142	26
323	Printing and Related Support	10	6	13	47	31
324	Petroleum and Coal Products	1	12	13	357	28
325	Chemical Manufacturing	4	35	16	322	39
326	Plastics and Rubber Products	5	30	11	78	24
327	Nonmetallic Mineral Product	6	9	13	113	23
331	Primary Metal Manufacturing	2	33	11	121	24
332	Fabricated Metal Product	18	16	12	56	27
333	Machinery Manufacturing	9	36	16	59	36
334	Computer and Electronic Product	5	40	23	64	47
335	Electrical Equipment, Appliance,	2	41	13	55	34
336	Transportation Equipment	4	34	14	71	26
337	Furniture and Related Product	5	8	9	25	24
339	Miscellaneous Manufacturing	8	2	15	32	33
Aggregate Manufacturing		100	20	15	77	29

Exporter Premia, 2002

(Bernard, Jensen, Redding and Schott 2007)

	(1)	(2)	(3)
Log Employment	1.20	0.91	.
Log Shipments	1.53	1.05	0.11
Log Value Added per Worker	0.28	0.14	0.13
Log TFP	0.02	0.03	0.04
Log Wagebill	1.38	0.98	0.06
Log Capital per Worker	0.41	0.20	0.13
Log Skill per Worker	0.13	0.08	0.17
Additional Covariates	None	Industry Fixed Effects	Industry Fixed Effects, Employment

E.g., Exporters' TFP is on average 4 percent higher within industries after controlling for firm size

Challenge 4: Exporting → Productivity?

- Why are exporters more productive?
  - High productivity → Exporting?
  - Exporting → High Productivity?

- Strong evidence that good firm performance leads to exporting (selection)
    - US : Bernard and Jensen (1999)
    - Taiwan : Aw, Chen and Roberts (2001)

- Mixed evidence on exporting leading to better firm performance (learning by exporting)
    - Columbia, Mexico and Morocco : Clerides, Lach and Tybout (1998) find little evidence

Challenge 5: Liberalization and Reallocation

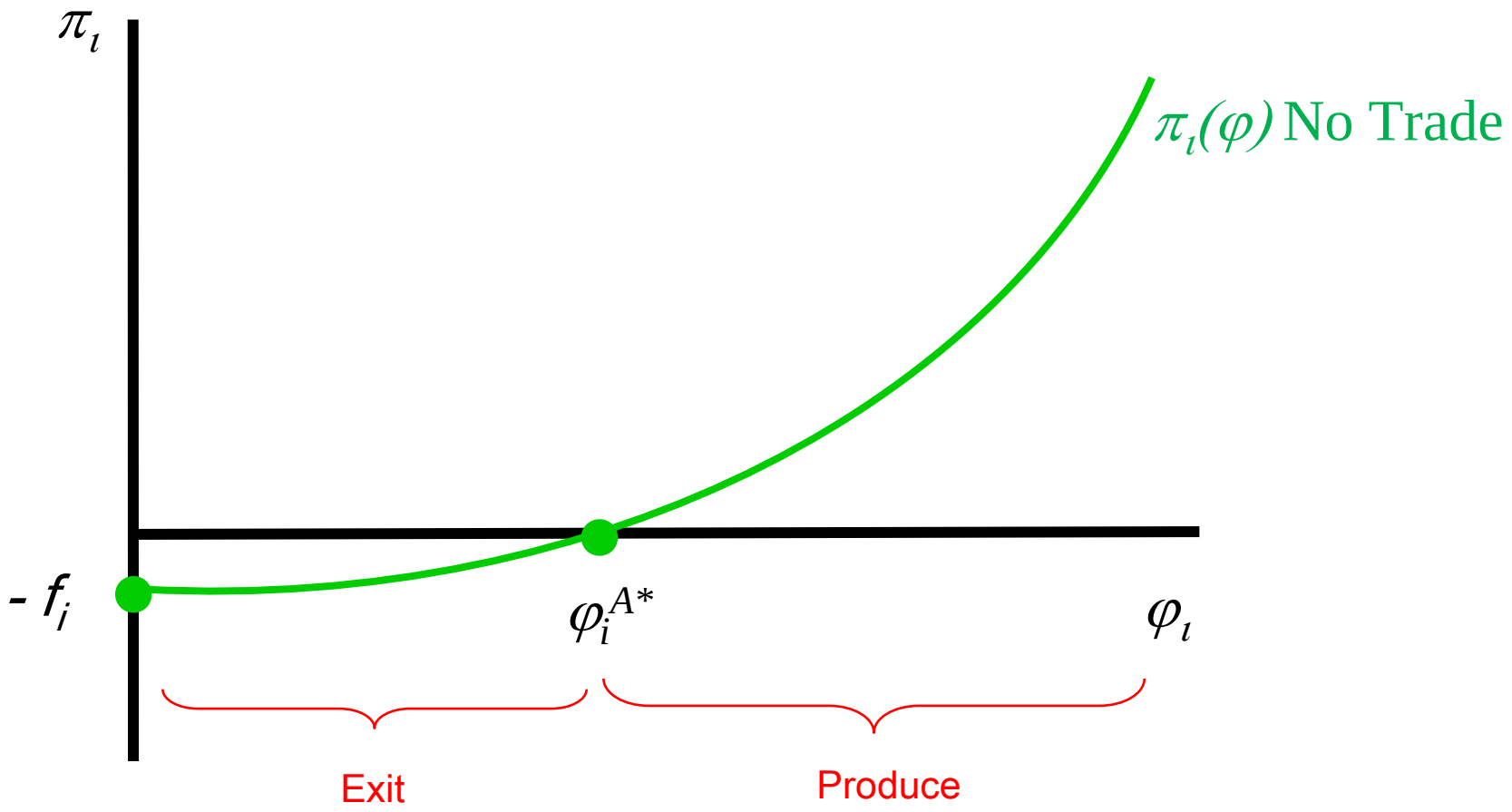
- Trade liberalization results in exit by low-productivity firms and changes in industry composition as high-productivity firms expand to enter export markets

- E.g., Pavcnik (2002): 19.3 percent productivity growth in Chilean manufacturing during 1979-1986
    - o 6.6 percent from increased productivity within plants
    - o 12.7 percent from reallocation of resources from less to more efficient producers

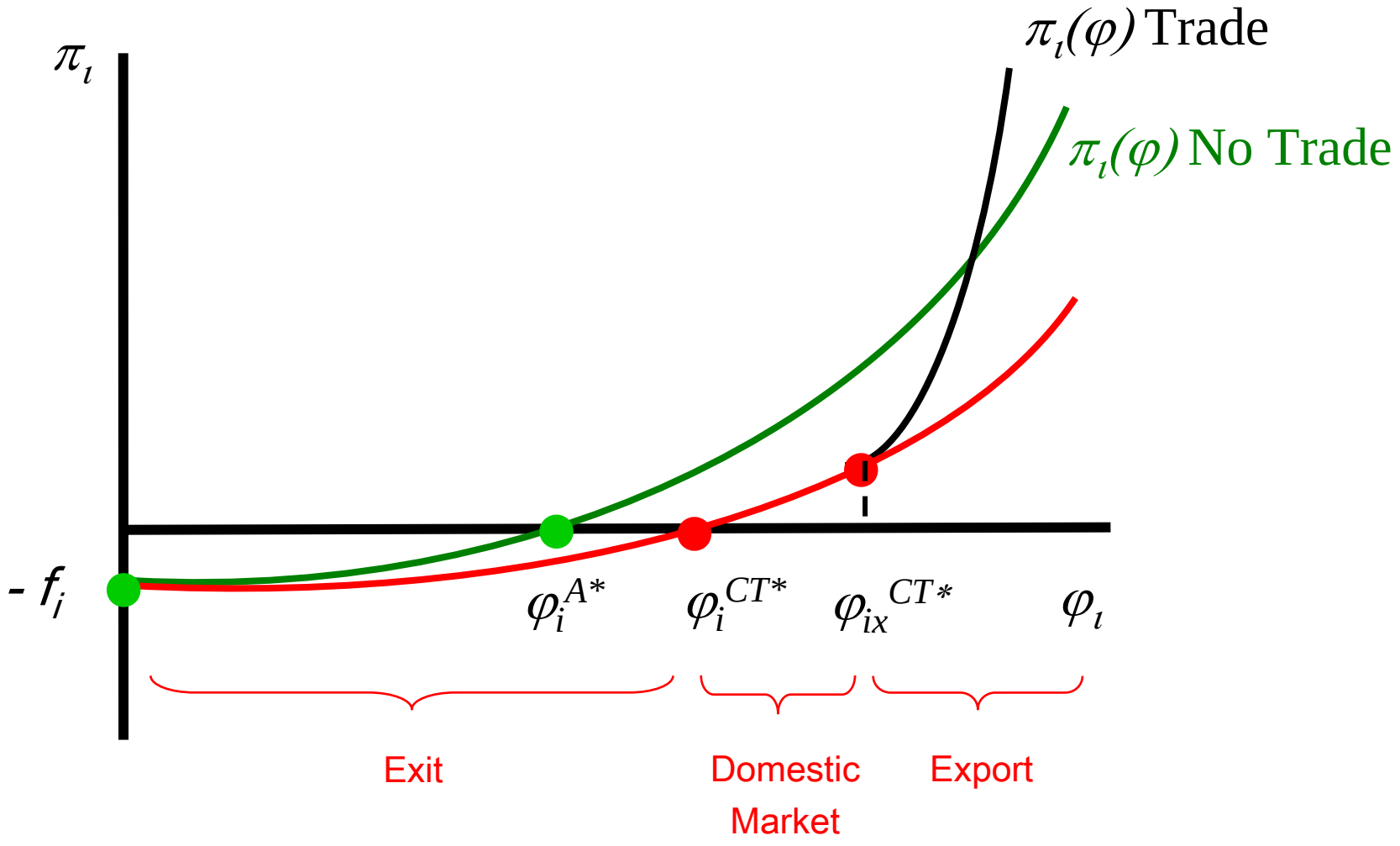
Outline of the Melitz (2003) Model

- Firms use labor to produce varieties of manufacturing good
- Firms enter a market by paying a sunk entry cost
- Firms observe their productivity j from a distribution $g(\varphi)$
- There is a fixed cost of producing and a fixed cost of exporting
- Firms decide whether to produce or exit the industry
- If firms produce, they decide whether to serve only the domestic market or also to export
- Exogenous probability of firm death

Profits and Productivity with no Trade



Trade Liberalization in the Melitz Model



Where are we now?

- The Melitz (2003) model meets many empirical challenges
  - Firm heterogeneity
  - Ongoing entry and exit of firms
  - Selection of the most productive firms into export markets
  - Increases in average industry productivity following trade liberalization due to exit by low productivity firms and expansion into export markets by high productivity firms

- But more needs to be done
  - Introduction of inter-industry trade?
  - Reallocation within firms (e.g. across products)?
  - Richer description of labor market?

Reallocation Within Firms

(Bernard, Jensen, Redding and Schott 2007)

Share of Exporting Firms

Number of Products	Number of Countries					
	1	2	3	4	5+	All
1	38.2	2.1	0.6	0.3	0.5	41.6
2	7.5	6.7	1.2	0.5	0.8	16.7
3	2.9	2.8	2.0	0.7	1.0	9.4
4	1.5	1.3	1.2	0.9	1.2	6.1
5+	4.0	2.8	2.6	2.5	14.2	26.2
All	54.2	15.7	7.7	4.8	17.7	100

Share of Export Value

Number of Products	Number of Countries					
	1	2	3	4	5+	All
1	0.2	0.1	0.0	0.0	0.2	0.5
2	0.2	0.2	0.0	0.1	0.2	0.7
3	0.1	0.1	0.1	0.1	0.3	0.7
4	0.1	0.1	0.1	0.1	0.4	0.7
5+	2.2	1.4	1.1	0.9	91.8	97.4
All	2.7	1.8	1.3	1.2	92.9	100

- Most exporting firms export relatively few products to relatively few countries
- Firms exporting many products to many destinations dominate U.S. exports
- Across firms, the number of products exported and the number of destination markets are positively correlated

Within-Firm Reallocation During Liberalization

(Bernard, Redding and Schott 2009)

- U.S. manufacturing firms experiencing above-median Canadian tariff reductions reduce the number of goods they produce relative to firms experiencing below-median reductions (Bernard, Redding and Schott 2009)

- Similar response among Canadian manufacturers (Baldwin and Gu 2009)

Labor Markets

- Melitz's (2003) labor market is highly stylized
  - Firms pay workers with the same characteristics the same wage irrespective of their productivity
  - To the extent that wages differ across firms, reallocations across firms within industries provide a new channel for the opening of trade to affect the distribution of income across workers

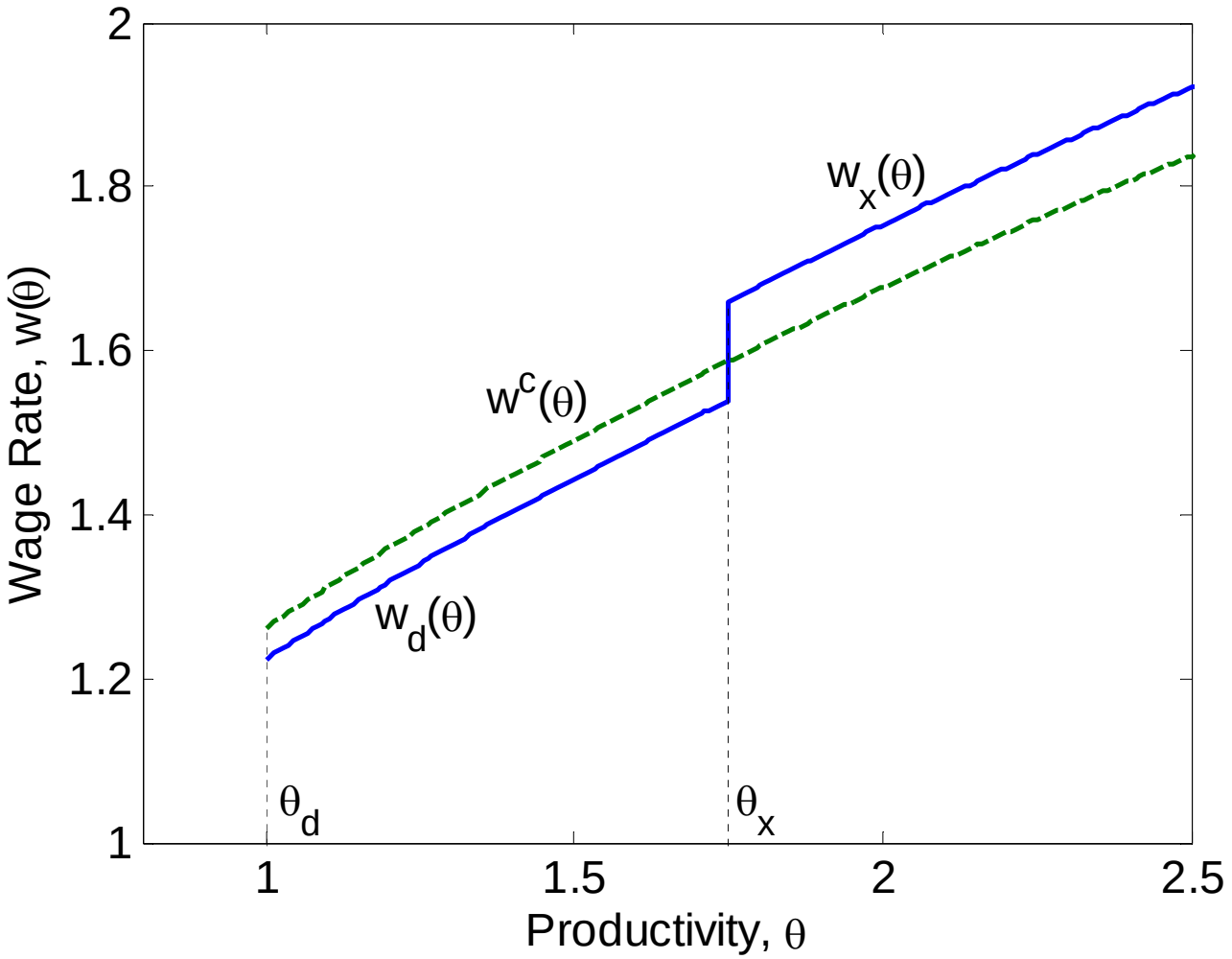
- In fact
  - Wage dispersion across firms within industries is linked to productivity dispersion (e.g. Davis and Haltiwanger 1991)
  - Exporters and non-exporters pay different wages within industries (e.g., Bernard and Jensen 1995, 1997)
  - Wage premia are linked to workforce composition (Kaplan and Verhoogen 2006, Munch and Skaksen 2008, Schank, Schnabel and Wagner 2007)
  - Labor market frictions lead to unemployment (Petrongolo and Pissarides 2001)

Helpman, Itskhoki and Redding (2009)

- Asymmetric countries
- One heterogeneous factor of production: labor
- Melitz-type differentiated sector(s)
- Workers choose a sector to search for a job
- Worker are matched with firms
  - Diamond-Mortensen-Pissarides search and matching frictions
- Workers draw an unobserved match-specific productivity
- Firms screen workers to obtain information about match-specific ability
- Firms bargain with hired workers
- More productive firms
  - Screen more intensively to exclude low-ability workers
  - Have workforces of higher average ability
  - Pay higher wages
- Exporters pay higher wages than non-exporters for given productivity
  - Exporter wage premium

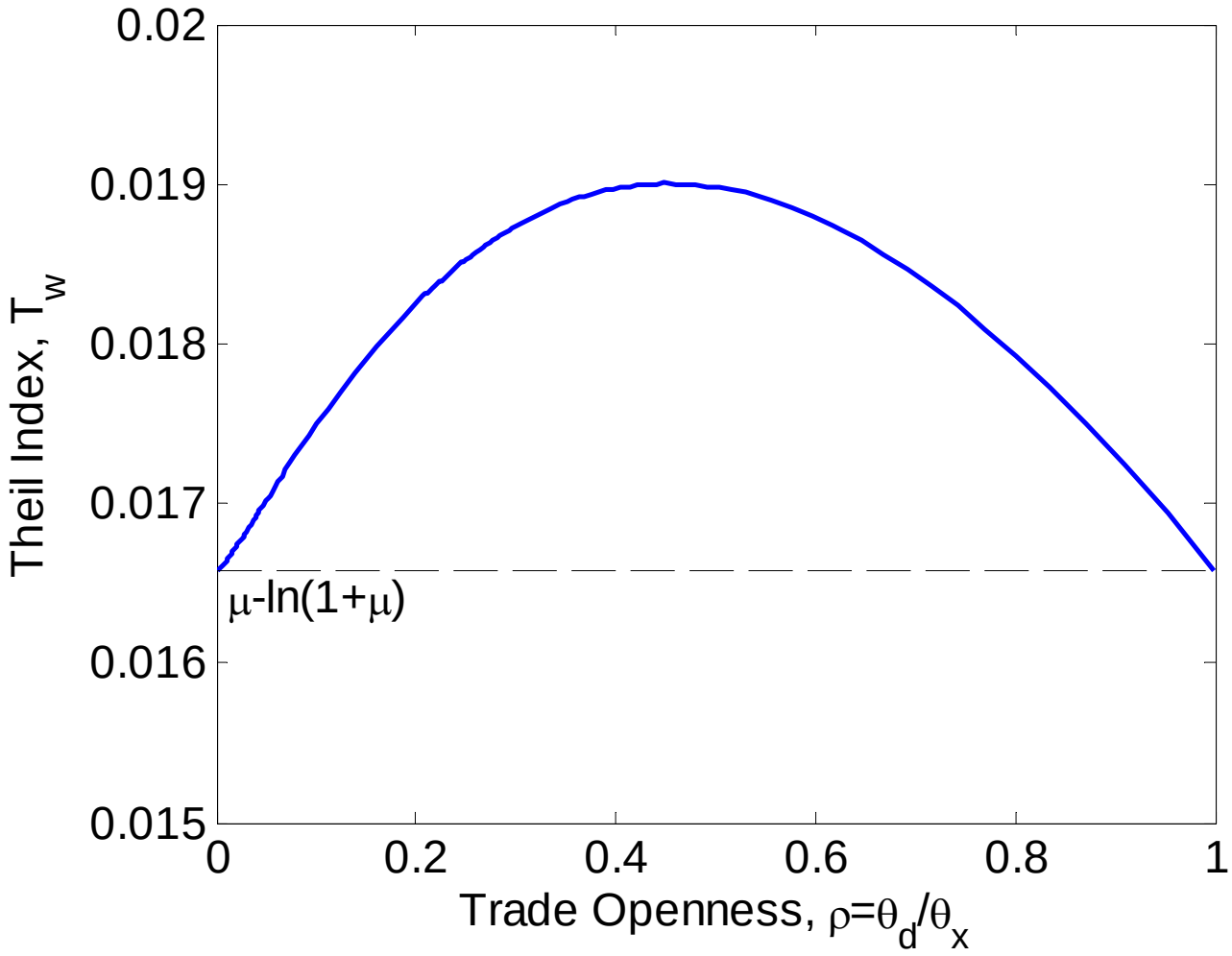
Wage Profiles Across Firms

- Open Economy Versus Autarky



Trade Raises Wage Inequality

- Non-monotonic relationship between trade and wage inequality



Thank You

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