

# Intra-industry Trade and Firm Level Evidence

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# Traditional trade theory

- Main elements

- Perfect competition
- Constant returns to scale
- Inter-industry trade

- Main theories (comparative advantage)

- Ricardian: differences in technology (exports in relative higher productivity industries)
- Heckscher-Ohlin: differences in factor endowments (exports in sectors using intensively relative abundant factor)

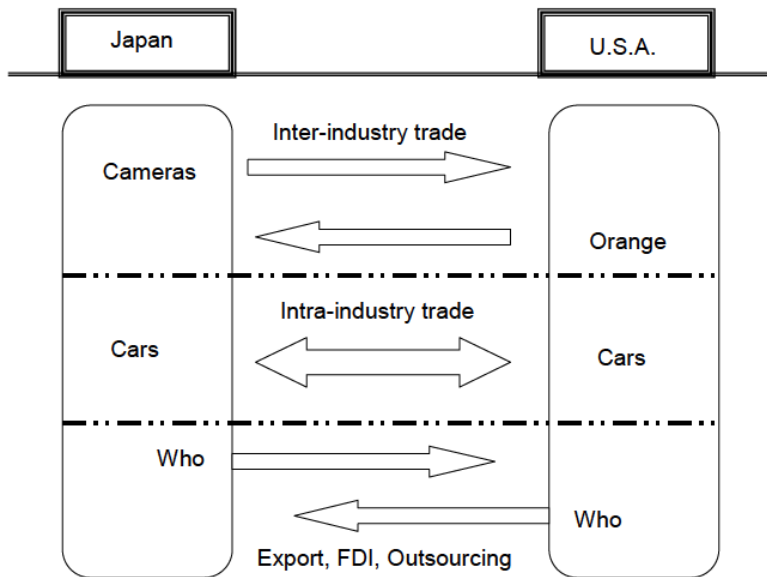
# Patterns of trade: Inter-industry vs Intra-industry

## U.S. Trade With Mexico, 1998

Imports from Mexico	Billions of dollars	Percent
All commodities	94.7	100
Electrical machinery and equipment and related parts	25.8	27
Vehicles, other than railway	16.7	18
Nuclear reactors, boilers, machinery and mechanical	11.6	12
Mineral fuels, mineral oils	5.3	6
Articles of apparel and clothing accessories	3.8	4
Insulated wiring sets for vehicles, ships, and aircraft	3.7	4
Optical, photographic, cinematic, measuring	3.3	3
<b>Total for top seven imports</b>	<b>70.2</b>	<b>74</b>
<b>Exports to Mexico</b>		
All commodities	79.0	100
Electrical machinery and equipment and related parts	18.8	24
Nuclear reactors, boilers, machinery and mechanical	11.2	14
Vehicles, other than railway	8.0	10
Plastics and articles thereof	5.0	6
Optical, photographic, cinematic, measuring	2.3	3
Parts and accessories for vehicles	1.9	2
Paper and paperboard	1.9	2
<b>Total for top seven exports</b>	<b>49.1</b>	<b>61</b>

SOURCE: U.S. Department of Commerce.

# Intra-industry trade - Example



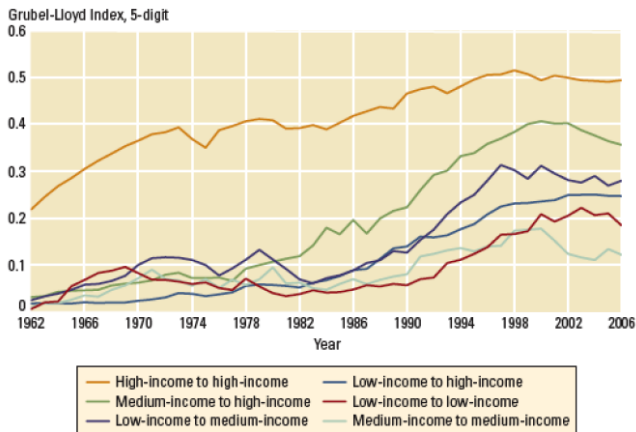
# Measuring intra-industry trade: Grubel-Lloyd index

Measuring intra-industry trade: let  $X$  be exports,  $M$  imports,  $i \in \{1, \dots, N\}$  be the industry; then

$$Index = 1 - \frac{1}{N} \sum_i \frac{|X_i - M_i|}{(X_i + M_i)}$$

- If an industry that is an exporter is never an importer (or vice-versa) then:  
 $Index = 0$ 
  - This is a full inter-industry trade case
- If an industry that is an exporter is also an importer (or vice-versa) then:  
 $Index = 1$ 
  - This is a full intra-industry trade case

# Trends in intra-industry trade (I)

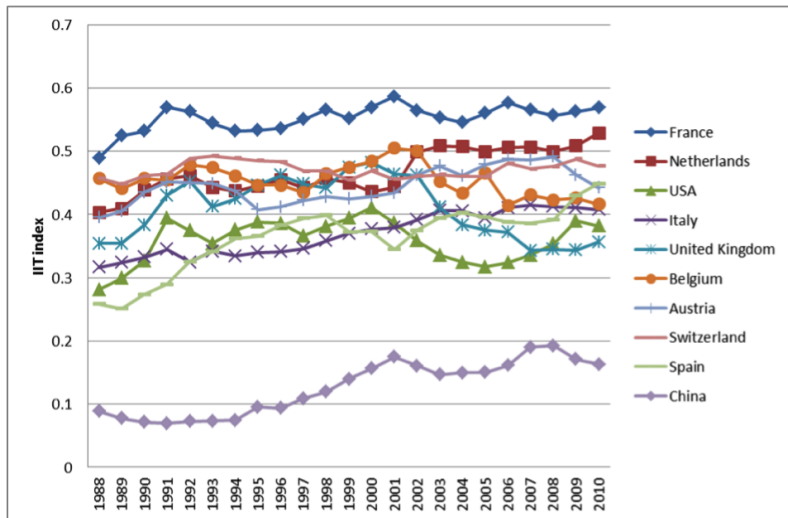


Source: Brühlhart 2008 for this Report.

Note: The Grubel-Lloyd index is the fraction of total trade that is accounted for by intraindustry trade.

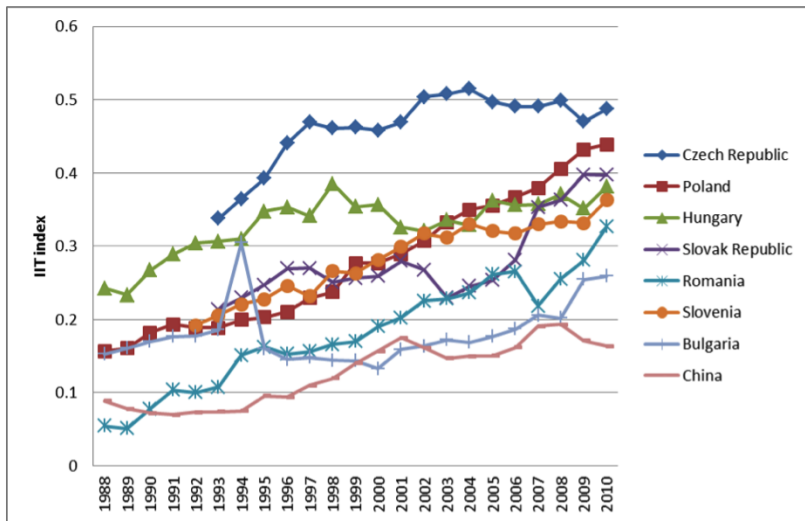
# Trends in intra-industry trade (II)

Figure 1: Germany's IIT index with the ten largest trade partners



# Trends in intra-industry trade (III)

Figure 2: Germany's IIT index with Eastern European countries and China





# Why is do we observe intraindustry trade?

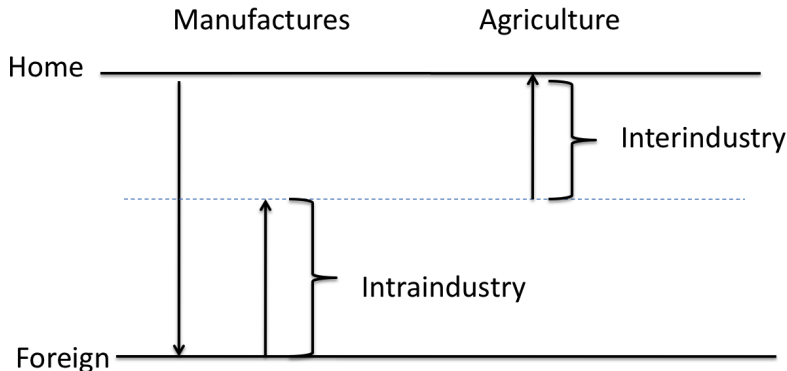
- Bad classification; an “industry”, as defined by govt statisticians, may contain goods with very different technology or factor content
  - intra-industry falls when using a finer industrial sectoral classification (higher industry-level digit)
- Economies of scale (new-trade theory, Krugman 1980s). Countries produce different, differentiated products because costs are reduced by producing only a limited range
  - Develop an industry that has economies of scale
  - Produce great quantities at low average unit costs
  - Trade those low-cost goods to other nations

# Intra-industry and Inter-industry trade (I)

- 1 Gains from inter-industry trade reflect comparative advantage
- 2 Gains from intra-industry trade can reflect economies of scale (lower costs) and wider consumer choices
  - 1 Labor pooling; knowledge spillovers; fixed costs of producing; etc
- 3 The monopolistic competition model does not predict in which country firms locate, but a comparative advantage in producing the differentiated good will likely cause a country to export more of that good than it imports.
- 4 The relative importance of intra-industry trade depend on how similar countries are.
  - 1 Countries with similar relative amounts of factors of production are predicted to have intra-industry trade
  - 2 Countries with different relative amounts of factors of production are predicted to have inter-industry trade

# Intra-industry and Inter-industry trade (II)

Note that the combination of increasing returns and comparative advantage provided a compelling explanation of trade patterns:



# How to deal with intra-industry trade

- Shift the analysis from the country/sectoral level to the firm level
- Hallak and Levinsohn (2005): “Countries don’t trade. Firms trade.”
- Two main theoretical ingredients:
  - consumer love for varieties of goods
  - increasing returns to scale
    - inconsistent with perfect competition
    - consistent with monopoly
- Are exporting firms different from all the other?

# Trade Theories and Their Ability to Explain Facts about Trade (Bernard, Jensen, Redding, Schott, 2007)

<i>Facts</i>	<i>"Old" trade theory</i>	<i>"New" trade theory</i>	<i>Integrated model</i>	<i>Heterogeneous firms model</i>	<i>"Integrated" heterogeneous firms model</i>
	<i>Ricardo (1817), Heckscher (1919), Ohlin (1933)</i>	<i>Krugman (1980)</i>	<i>Helpman and Krugman (1985)</i>	<i>Melitz (2003), Bernard et al. (2003)</i>	<i>Bernard, Redding, and Schott (2007)</i>
<b>Trade</b>					
Interindustry trade	Yes	No	Yes	No	Yes
Intra-industry trade	No	Yes	Yes	Yes	Yes
Exporters and nonexporters within industries	No	No	No	Yes	Yes
<b>Trade and productivity</b>					
Exporters are more productive than nonexporters within industries	No	No	No	Yes	Yes
Trade liberalization raises industry productivity through reallocation	No	No	No	Yes	Yes
<b>Trade and labor markets</b>					
Net changes in employment across industries following trade liberalization	Yes	No	Yes	No	Yes
Simultaneous gross job creation and destruction within industries following trade liberalization	No	No	No	Yes	Yes
Trade liberalization affects relative factor rewards (income distribution)	Yes	No	Yes	No	Yes

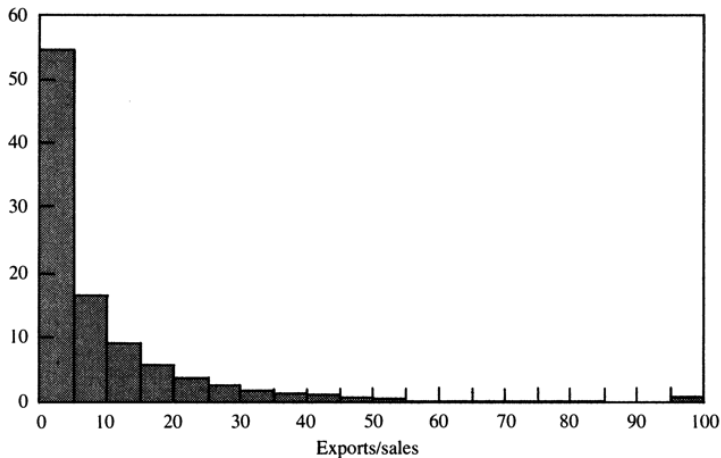
# Some empirical facts about exporting firms

- Exporting is rare.
- Exporters are different:
  - They are larger
  - They are more productive
  - They use factors differently
  - They pay higher wages

# Exporters are rare (Bernard, Jensen, and Lawrence, 1995)

**Figure 1. Distribution of Exports as a Percentage of Sales, 1987**

Percent of plants



Source: Authors' calculations based on 1987 Census of Manufactures.

# Exporters are different (Bernard, Jensen, and Lawrence, 1995)

**Table 4. Plant Characteristics, 1987**

Dollars unless otherwise indicated

<i>Characteristic</i>	<i>Exporters</i>	<i>Nonexporters</i>
Total employment (workers)	254	58
Total value of shipments	44,180,000	6,814,640
Wage per worker	24,370	20,420
Wage per production worker	20,670	18,020
Wage per nonproduction worker	33,270	29,050
Benefits per worker	5,720	4,310
Total value of shipments per worker	146,230	107,000
Value added per worker	71,540	51,530
Capital per worker	40,840	27,630
Investment per worker	3,480	2,310
Nonproduction workers as a share of total workers (percentage)	33	26
Multiplant establishment (percentage)	61	31

Source: Authors' calculations based on the 1987 Census of Manufactures. Values represent plant means.



# Exporters are different (Bernard, Jensen, Redding, Schott, 2007)

Table 3

**Exporter Premia in U.S. Manufacturing, 2002**

	<i>Exporter premia</i>		
	(1)	(2)	(3)
Log employment	1.19	0.97	
Log shipments	1.48	1.08	0.08
Log value-added per worker	0.26	0.11	0.10
Log TFP	0.02	0.03	0.05
Log wage	0.17	0.06	0.06
Log capital per worker	0.32	0.12	0.04
Log skill per worker	0.19	0.11	0.19
Additional covariates	None	Industry fixed effects	Industry fixed effects, log employment

# “Gravity” also affects exporting firms (Bernard, Jensen, and Lawrence, 1995)

*Table 6*  
**Gravity and Aggregate U.S. Exports, 2000**

	<i>Log of total exports value</i>	<i>Log of number of exporting firms</i>	<i>Log of number of exported products</i>	<i>Log of export value per product per firm</i>
Log of GDP	0.98 (0.04)	0.71 (0.04)	0.52 (0.03)	−0.25 (0.04)
Log of distance	−1.36 (0.17)	−1.14 (0.16)	−1.06 (0.15)	0.84 (0.19)
<i>Observations</i>	175	175	175	175
<i>R</i> <sup>2</sup>	0.82	0.74	0.64	0.25

*Sources:* Data are from the 2000 Linked-Longitudinal Firm Trade Transaction Database (LFTTD).

*Notes:* Each column reports the results of a country-level ordinary least squares regression of the dependent variable noted at the top of each column on the covariates noted in the first column. Results for the constant are suppressed. Standard errors are noted below each coefficient. Products are defined as ten-digit Harmonized System categories. All results are statistically significant at the 1 percent level.

- Why do we observe an exporter premia?
  - does the causation goes from: large firm  $\rightarrow$  exporter (ex: larger firms can pay fixed costs hence select into exporting markets)
  - does the causation goes from: exporter  $\rightarrow$  large firm (ex: learning by exporting, 'core competency' products, etc.)
- Other explanations for intra-industry trade / exporting firms being different