

INTERNATIONAL ECONOMICS

Lecture 6 — December 8, 2020

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Organization

- Evaluation: Please participate!

Last week (and before)

- Ricardo: better **technology** → comparative advantage
- Heckscher Ohlin: **factor abundance** → comparative advantage

...but where's the intra-industry trade?

Today

- measuring trade flows
 - **intra- vs. inter-industry** trade
- returns to scale
 - **external vs. internal** returns to scale
- imperfect competition
 - monopoly and **monopolistic competition**

INTRA-INDUSTRY TRADE

Inter- vs Intra-industry trade

- **Inter-industry trade:** trade *between* industries, e.g., exporting computers and importing bananas, mainly between very different countries
- **Intra-industry trade:** trade *within* industries, e.g., exports and imports of cars, mainly between similar countries

Measuring Inter- & Intra-industry trade

Grubel & Lloyd (1975) indicator: measures inter- vs intra-industry trade

$$GL_i = \frac{X_i + M_i - |X_i - M_i|}{X_i + M_i} = 1 - \frac{|X_i - M_i|}{X_i + M_i}$$

with imports M_i and exports X_i of good i .

- $GL_i = 0 \Rightarrow$ One-way trade
- $GL_i = 1 \Rightarrow$ Two-way trade: Intra-industry trade
 - \rightarrow results depend on the aggregation level!

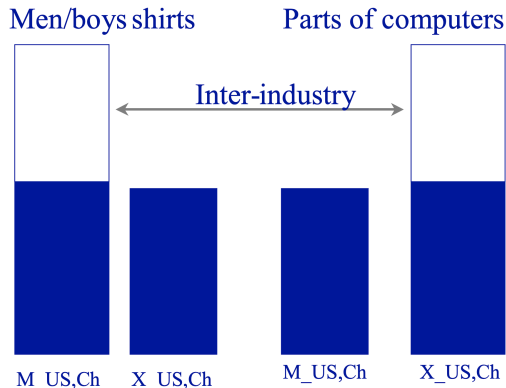
Industry classification

Example: NAICS 2007 classification (North American Industry Classification System)

Sector	31-33	Manufacturing
Subsector	311	Food Manufacturing
Industry Group	3113	Sugar and Confectionery Product
Industry	31135	Chocolate and Confectionery
National Industry	311351	Chocolate and Confectionery Manufacturing from Cacao Beans



Grubel & Lloyd in practice



$M_{US,Ch}$: Value of US imports from China

$X_{US,Ch}$: Value of US exports to China

- gains from inter-industry trade: correspond to comparative advantage
- gains from intra-industry trade: economies of scale (lower production costs) and provide to consumers access to more varieties

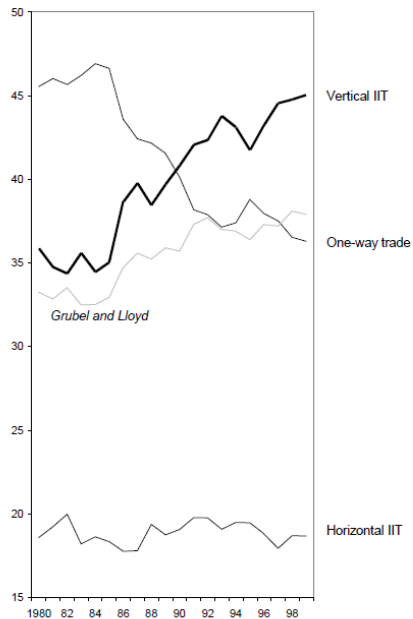
Figure: Fontagné et al. 2006

Intra-industry trade

Further decomposition of IIT:

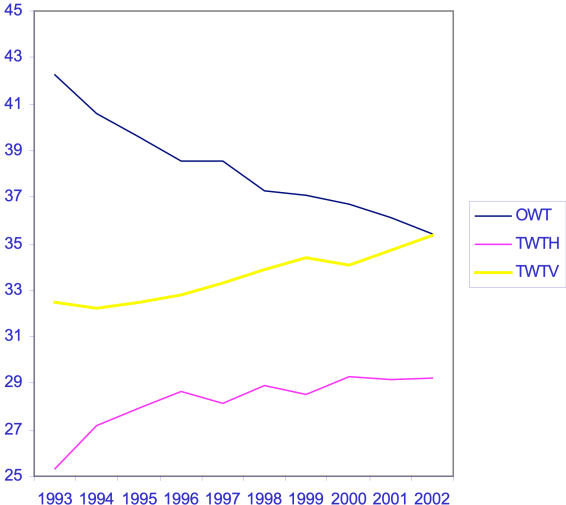
- **Horizontal** - different varieties of similar products
- **Vertical** - products of the same category but of different quality

Figure 1 - Trade types in intra-EU12 trade, 1980-99 (%)



Intra-industry trade: EU

Intra-EU trade



RETURNS TO SCALE

Returns to scale

- **Ricardo** and **HO** assume constant returns to scale (CRS)

$$f(\lambda K, \lambda L) = \lambda f(K, L)$$

→ realistic?

- firm or industry might have increasing returns to scale (IRS)

→ double input gives more than double output

→ larger firm more efficient

Returns to scale: Market structure

- Ricardo and HO assume perfect competition
 - all income paid to owners of factors, no monopoly profits
- With IRS, fewer large firms more efficient than many small firms
 - imperfect competition, monopoly profits!

Increasing returns to scale

Types of increasing returns:

- **Internal:** production within a firm increases more than proportionally as more input are used
 - fixed costs for machinery, R&D,...
- **External:** production within a firm increases proportionally with inputs, but more than proportionally within industry
 - Access to specialized equipment or services, Labor pooling, Knowledge spillovers

External returns to scale

Typology of external returns to scale:

- **Marshallian specialization externalities** (Marshall 1890)
 - spillovers from industry concentration (e.g., Silicon Valley)
- **Jacobian diversification externalities** (Jacobs 1969)
 - variety and diversity of activities as motor of knowledge spillovers, cross-industry spillovers

Gains from specialization

Returns to scale: sector specific, often also due to “**historical accidents**”

- sectors with higher returns to scale: **higher productivity**
- larger gains from **specialization** (and hence from trade)
- argument in favor of protectionism: “**infant industries**”
- corresponding trade policies: **clusters**

Clusters

Example: **pôles de compétitivité** in France

pôles de compétitivité

pôle de compétitivité - un rassemblement, sur un territoire bien identifié et sur une thématique ciblée, d'entreprises petites et grandes, de laboratoires de recherche et d'établissements de formation

→ Currently 71 clusters

Clusters

Map of Competitiveness clusters

(April 2013)

For more information about Competitiveness clusters : www.competitivite.gouv.fr/en



MONOPOLISTIC COMPETITION

Monopolistic competition



Paul R. Krugman

Nobel Prize in 2008

Increasing returns, monopolistic competition, and international trade, *Journal of International Economics*, 1979:

“This paper develops a simple, general equilibrium model of non-comparative advantage trade. Trade is driven by economies of scale, which are internal to firms. (...) Gains from trade will occur even between countries with identical tastes, technology, and factor endowments”

Monopolistic competition - preview

Model features:

- (Internal) returns to scale
 - fixed costs of production
- Supply side: **differentiated varieties**
 - each producer has monopoly over its varieties
- Demand side: **love for variety**

Monopolistic competition - preview

After opening to trade:

- Intra-industry trade
- Gains in variety
- Pro-competitive effects
- Rationalization effects

Refresher IO

- monopoly: one firm
 - marginal revenue = marginal cost
 - profits = price – average cost
- oligopoly: few firms
 - “between” monopoly and competitive market

Monopoly pricing

As monopolist I want to maximize profits:

$$\max \pi = p(q)q - c(q)$$

First order condition:

$$\begin{aligned}\frac{\partial \pi}{\partial q} &= 0 \\ \frac{\partial p(q)}{\partial q}q + p(q) - \frac{\partial c(q)}{\partial q} &= 0 \\ \frac{\partial p(q)}{\partial q}q + p(q) &= \frac{\partial c(q)}{\partial q}\end{aligned}$$

→ marginal revenue equal to marginal cost

Monopoly pricing: Marginal revenue

Assume linear demand function

$$q = a - b \cdot p$$
$$\Leftrightarrow p = \frac{a}{b} - \frac{q}{b}$$

Revenue is then

$$R = p \cdot q = \frac{a}{b} \cdot q - \frac{q^2}{b}$$

Marginal revenue is then

$$MR = \frac{\partial R}{\partial q} = \frac{a}{b} - 2 \frac{q}{b} = p - \frac{q}{b}$$

Monopoly pricing: Marginal cost

Assume linear cost function

$$C = F + c \cdot q$$

where F is fixed cost and c variable (marginal) cost per additional unit of q .

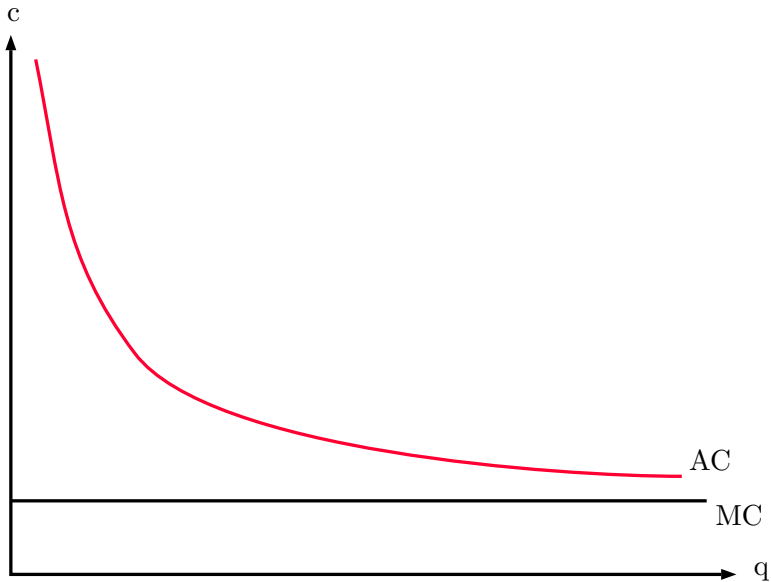
Average cost is then

$$AC = \frac{C}{q} = \frac{F}{q} + c$$

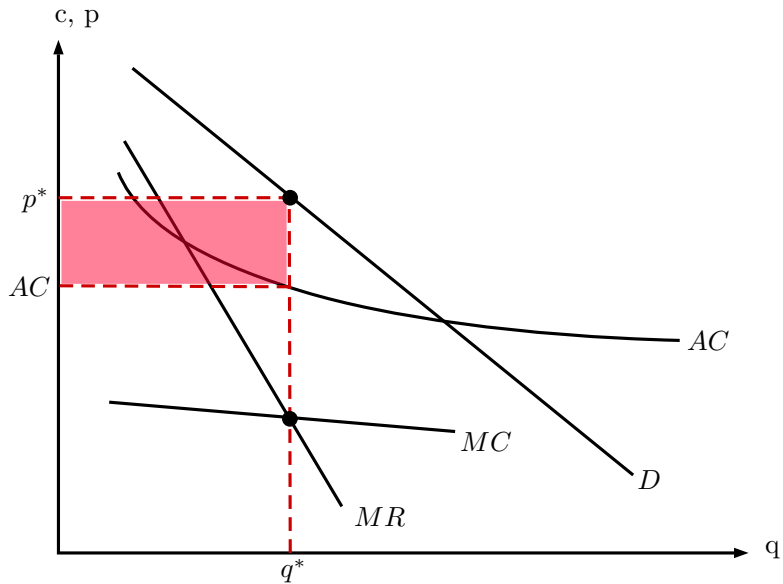
and marginal cost is

$$\frac{\partial C}{\partial q} = c$$

Monopoly pricing: Average vs. marginal cost



Monopoly pricing



Monopolistic competition

Monopolistic competition:

- imperfectly competitive industry
- each firm produces unique product, behaves like monopolist
- but: all products (imperfect) substitutes
- then: sell more the larger market, the higher competitors' prices
- sell less, the larger the number of competitors, the higher own price

Monopolistic competition

Express a firm's sales as:

$$q = S \left(\frac{1}{n} - \beta \cdot (p - \bar{p}) \right)$$

where

- S is the total sales of the industry
- n the number of firms in the industry
- β a constant term of responsiveness of firms sales to price
- p price charged by the firm
- \bar{p} average industry price

Monopolistic competition

Assume all firms share identical demand and cost functions. Then in equilibrium

- price equal average industry price: $p = \bar{p}$
- quantity sold: $q = \frac{S}{n}$

Monopolistic competition

Average costs in monopolistic competition:

$$\begin{aligned} AC &= \frac{C}{q} \\ &= \frac{F}{q} + c \\ &= F \cdot \frac{n}{S} + c \end{aligned}$$

- the more firms, the higher the average cost
 - individual firm produces less
- the larger total industry sales, the lower average cost
 - individual firm produces more

Monopolistic competition

Quantity sold by a firm:

$$\begin{aligned}q &= S \left(\frac{1}{n} - \beta \cdot (p - \bar{p}) \right) \\ &= \frac{S}{n} + S \cdot \beta \cdot \bar{p} - S \cdot \beta \cdot p \\ &= a - b \cdot p\end{aligned}$$

where $a = \frac{S}{n} + S \cdot \beta \cdot \bar{p}$ and $b = S \cdot \beta$

→ essentially all given parameters for a firm

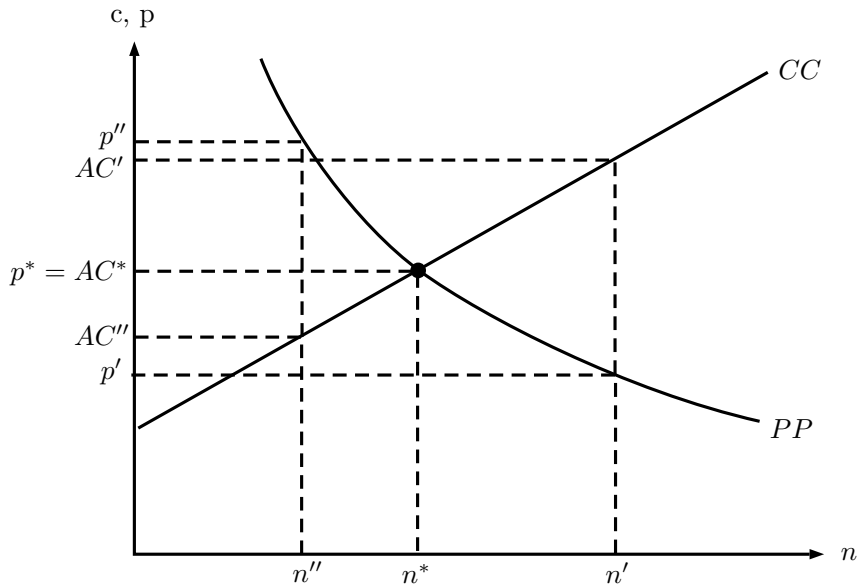
Monopolistic competition

Then from monopolistic pricing we know that

$$\begin{aligned}c &= p - \frac{q}{b} \\ \Leftrightarrow c &= p - \frac{q}{S \cdot \beta} \\ \Leftrightarrow p &= c + \frac{S/n}{S \cdot \beta} \\ \Leftrightarrow p &= c + \frac{1}{n \cdot \beta}\end{aligned}$$

- the more firms, the lower the price charged by each firm
- at some number of firms, price equals average cost
 - price decreases in n , average costs increases in n
- zero profits in equilibrium for n^* firms with price p^*

Monopolistic competition: Autarky



Monopolistic competition: Trade

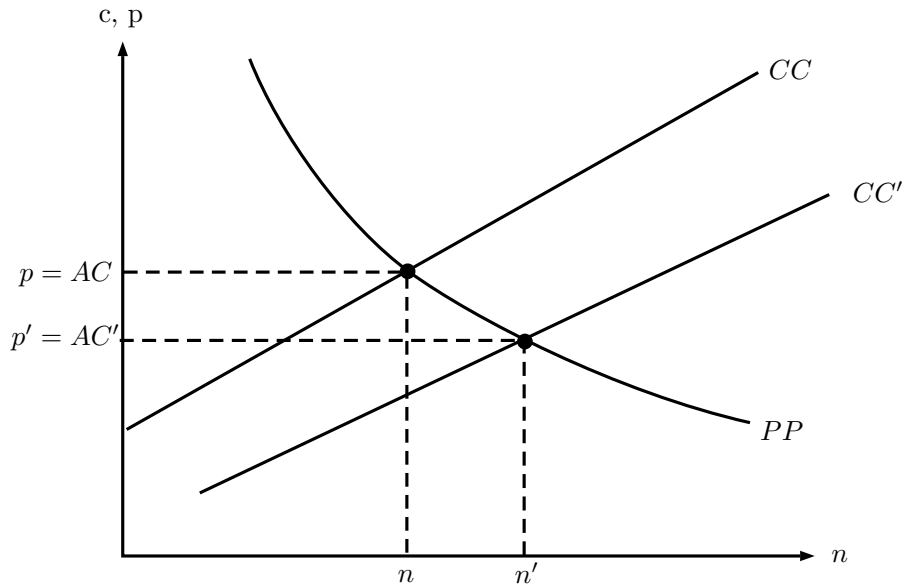
When economy opens to trade

- market size increases for firm, S goes up, decrease of average cost

$$AC = F \cdot \frac{n}{S} + c$$

- average costs decrease, p decreases, consumers wins
- consumer welfare also improves because of "love of variety"

Monopolistic competition: Trade



CONCLUSION

Old vs. New theories

Traditional neoclassical theories (Ricardo & Heckscher-Ohline)

Assumptions:

- perfect competition & constant returns to scale
- countries differ in PPF \Rightarrow trade based on differences
- homogenous goods

Outcomes:

- *inter-industry* trade between countries with different endowments/technologies (North-South trade)
- no *intra-industry* trade

New trade theories (Krugman and following):

Assumptions:

- increasing returns to scale (from fixed cost)
 \Rightarrow imperfect competition
- differentiated products
- love for variety

Outcomes:

- *intra-industry* trade between similar countries
- pro-competitive effects
- rationalization effect

Next week

- Next class: Trade Policy
- Read: Chapter on Monopolistic Competition and Firms
- Questions? Schedule office hour meeting or e-mail me