

# INTERNATIONAL ECONOMICS

**Lecture 8 — December 20, 2022**

Julian Hinz  
Bielefeld University



## 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!

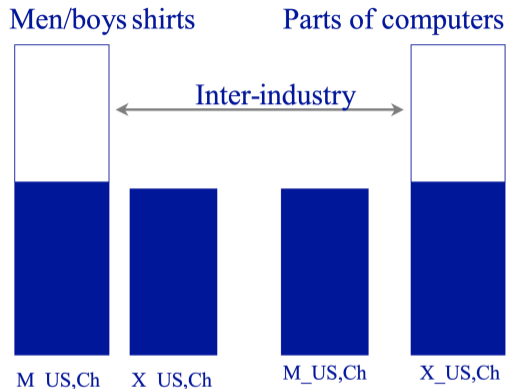
# Industry classification

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

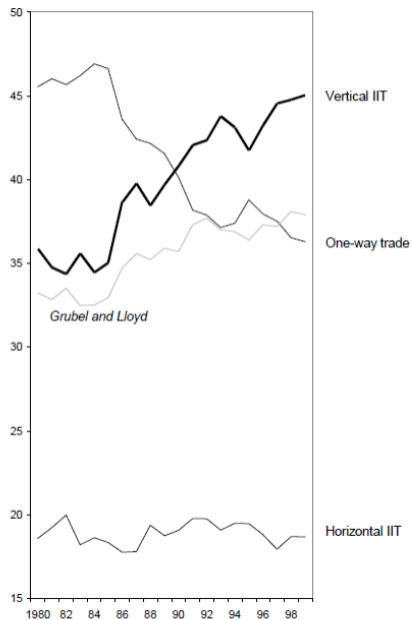


# Intra-industry trade

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 (%)



# 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

# 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**

# Refresher IO

- monopoly: one firm
  - marginal revenue = marginal cost
  - profits = price – average cost
- perfect competition: many firms
  - price = marginal cost
  - profits = 0
- 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  $q$ .

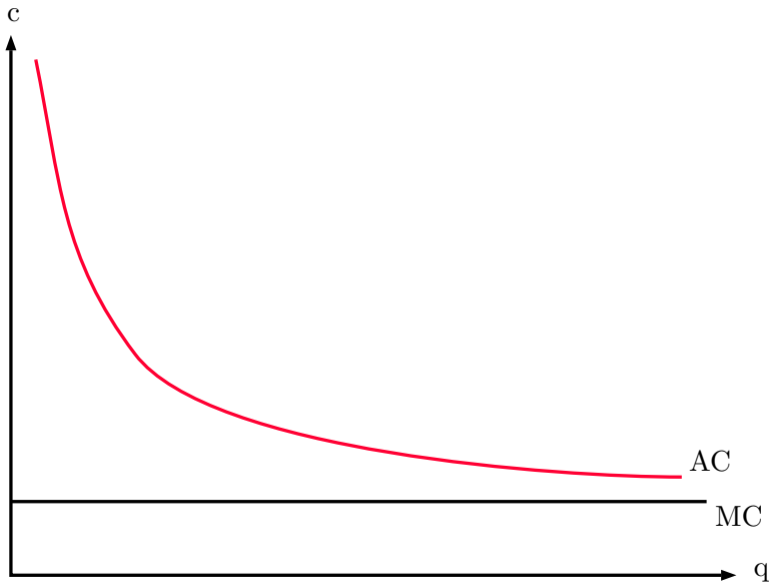
Average cost is then

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

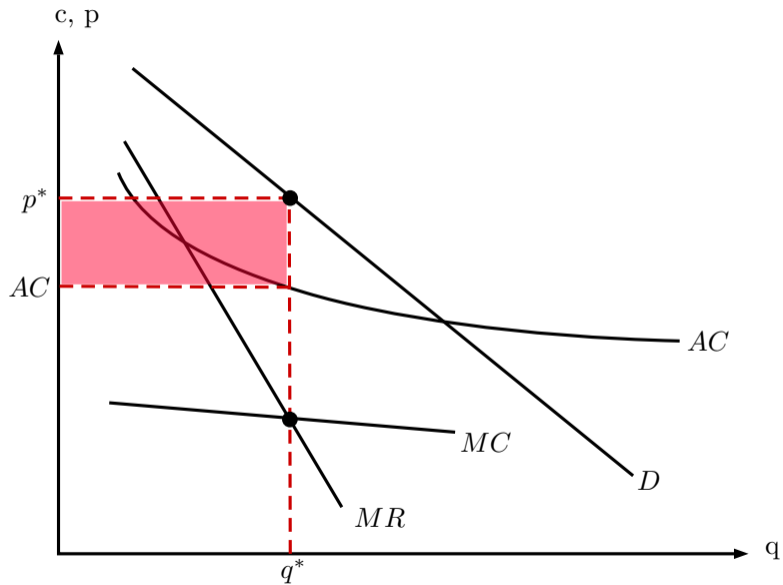
and marginal cost is

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

# 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
- $\beta$  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

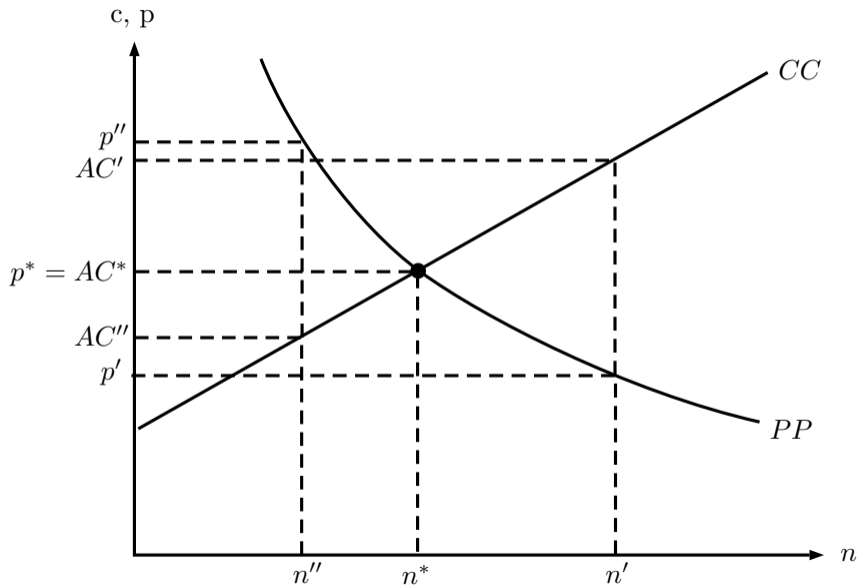
# Monopolistic competition

Then from monopolistic pricing we know that

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

- 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

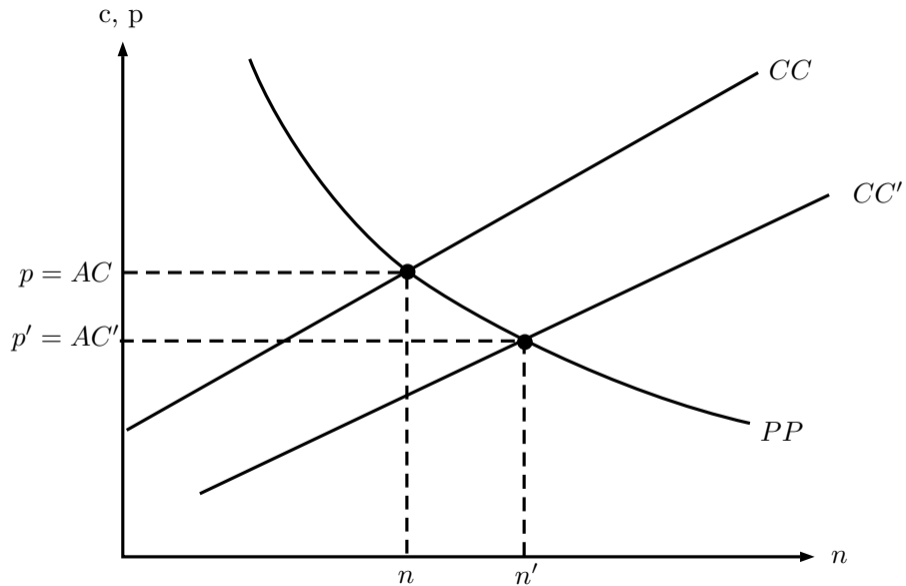
When economy opens to trade

- 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





**WRAP UP**

# 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: Firms
- Read: Chapter on Monopolistic Competition and Firms
- Questions? Schedule office hour meeting or e-mail me