CHAPTER 6

ECONOMIES OF SCALE, IMPERFECT COMPETITION AND INTERNATIONAL TRADE

(Chapter 7 and Chapter 8 of the textbook)

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Learning goals

- Recognize why international trade often occurs from increasing returns to scale
- Understand the difference between internal and external economies of scale
- Understand the sources of intra-industry trade
- Explain why economists believe that duping should not be singled out as an unfair trade practice, and why the enforcement of antidumping laws leads to protectionism.
- Discuss the role of external economies and knowledge spillovers in shaping comparative advantage and trade pattern.

Introduction

- Reasons for trade in the Ricardian model and Heckscher Ohlin model:
  - Labor productivity
  - Factor endowment

  => Trade is based on comparative advantage - differences between nations
- When defining comparative advantage, both models assume **constant returns to scale**
- But a firm or industry may have **increasing returns to scale** or **economies of scale.**

=> Economies of scale as a reason for trade

Introduction (cont.)

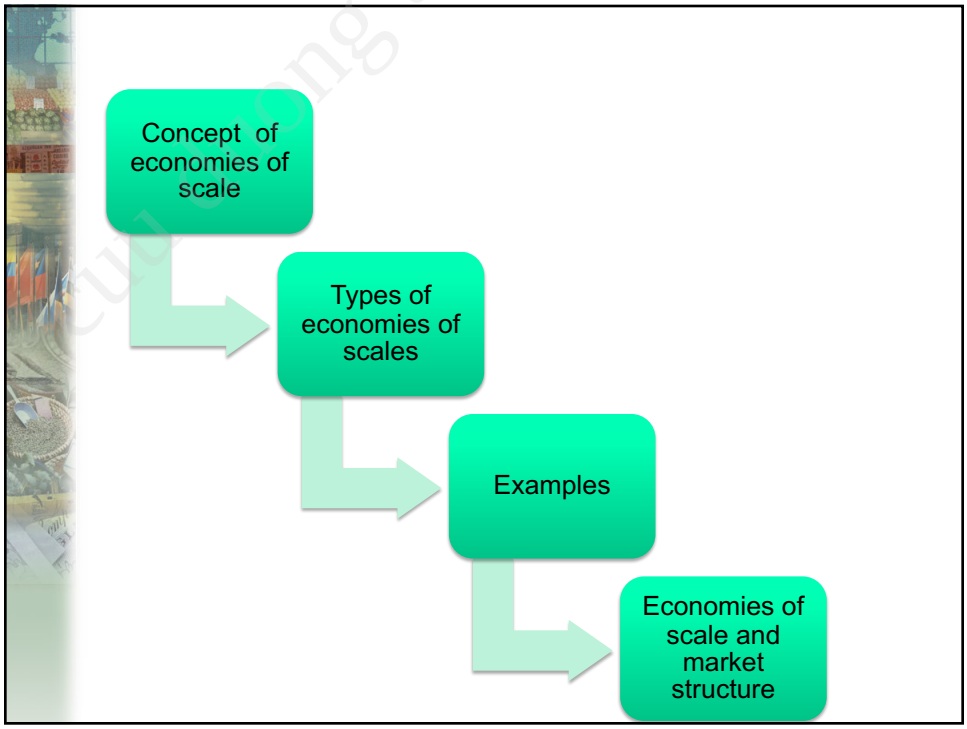
- The Ricardian and Heckscher-Ohlin models also assume : perfect competition
  - no “excess” or monopoly profits exist.
- But when economies of scale exists => markets become imperfectly competitive
  - Large firms may be more efficient than small firms
  - The industry may consist of a monopoly or a few large firms.
  - Production may be imperfectly competitive in the sense that excess or monopoly profits are captured by large firms.

  ⇒ Investigate trade in the context of imperfect competition and economies of scale.

  ⇒ More realistic model

Preview

- Economies of scale and International Trade: an overview
- The theory of imperfect competition
  - Oligopoly and monopoly
  - Monopolistic competition
- Monopolistic competition and trade
- Dumping
- External economies of scale and trade



Concept of economies of scale

TABLE 6-1 Relationship of Input to Output for a Hypothetical Industry

Output	Total Labor Input	Average Labor Input
5	10	2
10	15	1.5
15	20	1.333333
20	25	1.25
25	30	1.2
30	35	1.166667

⇩

Reduction in Average Costs

Concept of economies of scale (cont.)

- Importance of economies of scale to international trade

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Output	Total Labor Input	Average Labor Input
5	10	2
10	15	1.5
15	20	1.333333
20	25	1.25
25	30	1.2
30	35	1.166667

- Two countries: US and UK, producing cars
- In the absence of trade:
  - each nation produces 10 cars =>
  - need 15 labors each nation

Totally: the whole world can produce 20 cars with 30 labors.

- With trade: Assume the world concentrates production of cars in US
  - US employs 30 labors, it can produce 25 cars (compared to 20 cars)

Concept of economies of scale (cont.)

- Economies of scale:
  - Make it possible for each country to produce a restricted range of goods to take advantage of economies of scale
  - Trade with other nations
  - Without scarifying variety in consumption

Types of Economies of Scale

- Economies of scale could mean either that larger firms or that a larger industry (e.g., one made of more firms) is more efficient.
- Types of economies of scale
  - **External economies of scale**
    - Occur when cost per unit of output depends on the *size of the industry,* not necessarily on the size of any one firm.
    - Larger industry: number of firms increases
  - **Internal economies of scale**
    - Occur when the cost per unit of output depends on the *size of a firm,* not necessariy on the size of the industry.
    - Larger firms: existing firms produce more

In-class exercise and discussion – Problem 1

- For each of the following examples, explain whether this is a case of external or internal economies of scale.
  a. Most musical wind instruments in the United States are produced by more than a dozen factories in Elkhart, India.
  b. All Hondas sold in the US are either imported or produced in Marysville, Ohio
  c. All airframes for Airbus, Europe's only producer of large aircraft, are assembled in Toulouse, France.
  d. Hartford, Connecticut, is the insurance capital of the Northeastern US.

Examples

- Many modern examples of industries that seem to be powerful external economies:
  - In the United States, the semiconductor industry is concentrated in Silicon Valley, investment banking in New York, and the entertainment industry in Hollywood.
  - In developing countries such as China, external economies are pervasive in manufacturing.
    - One town in China produces most of the world's underwear, another nearly all cigarette lighters.

Examples

- External economies played a key role in India's emergence as a major exporter of information services.
  - Indian information services companies are still clustered in Bangalore.
- For a variety of reasons, concentrating production of an industry in one or a few locations can reduce the industry's costs, even if the individual firms in the industry remain small.

Economies of Scale and market structure

- External and internal economies of scale have different implications for market structure (structure of the industry)
- External economies of scale
  - May result when a larger industry allows for more efficient provision of services or equipment to firms in the industry
  - Consists of many small firms that are perfectly competitive.

  => Leads to a perfectly competitive market
- Internal economies of scale
  - Give large firms have a cost advantage over small firms

  ⇒ Leads to an imperfectly competitive market structure.

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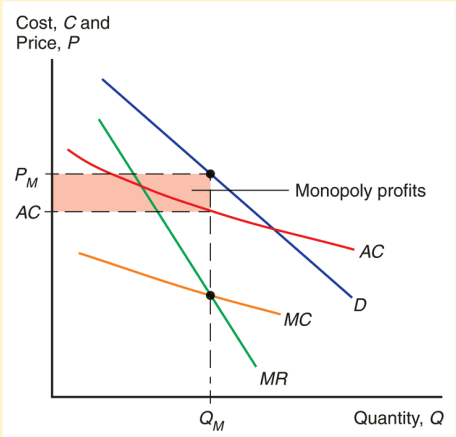
Monopoly

- A **monopoly** is an industry with only one firm.

- At profit maximizing output $MR = MC$ an equilibrium price and quantity (Q_M and P_M)
- When P > AC the monopolist is earning a monopoly profit



Monopolistic Competition

- Pure monopoly is rare in practice.
- An **oligopoly** is an industry with only a few large firms. E.g: cars industry, cell phone industry
- **Oligopoly:** complex and controversial
- **Monopolistic competition:**
  - A special case of oligopoly
  - Easy to analyze.

Assumptions of the model

- Monopolistic competition: a model of an imperfectly competitive industry which assumes that
  1. Each firm can differentiate its product from the product of competitors => competition
  2. Each firm ignores the impact of its own price on the prices competitors => act as a monopolist

  => even though each firm faces competition from other firms, it behaves as if it were a monopolist
  => Hence we have the model's name.

Market equilibrium

- The relationship between the number of firms and average cost of a typical firm
  - Internal economies of scale
  - The larger *n* in the industry => the higher the average cost for each firm.
  - The larger *S* of the industry => the lower the average cost for each firm.
- The relationship between the number of firms and the price each firm charges
  - The larger *n* in the industry, the lower P each firm charges.

The equilibrium numbers of firms

- Equilibrium
  - ♦ No incentive to entry or exit
  - ♦ Zero profit
- The more firms are in the industry
  - ♦ the lower is the price – PP
  - ♦ the less each firm sells and the higher is its average costs - CC
- The equilibrium number of firms: the number at which each firm has *zero profits: price* matches average cost *P = AC*

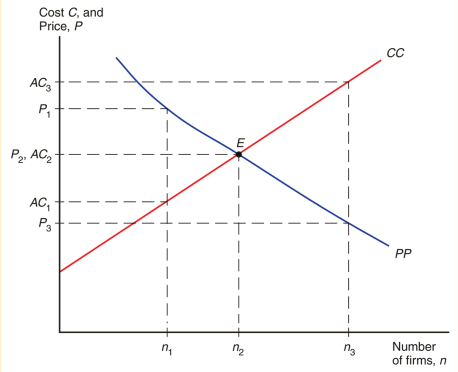


Figure 6-3

Equilibrium in a Monopolistically Competitive Market

The number of firms in a monopolistically competitive market, and the prices they charge, are determined by two relationships. On one side, the more firms there are, the more intensely they compete, and hence the lower is the industry price. This relationship is represented by *PP*. On the other side, the more firms there are, the less each firm sells and therefore the higher is its average cost. This relationship is represented by *CC*. If price exceeds average cost (if the *PP* curve is above the *CC* curve), the industry will be making profits and additional firms will enter the industry; if price is less than average cost, the industry will be incurring losses and firms will leave the industry. The equi-

The equilibrium numbers of firms (cont.)

- If the number of firms is greater than or less than n_2 => not in equilibrium because of presence of an incentive to exit or enter the industry.
  - An incentive to enter the industry when profits are greater than zero (P > AC).
  - An incentive to exit the industry when profits are less than zero (P < AC).

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The effects of increased market size

- Before trade: equilibrium at 1
- Trade increases market size => higher sales/output.
- In monopolistic competition:
  - Trade => increase sales/output => decreases average cost in monopolistic competition
  - CC shift to the right
  - ⇒ Increase in number of firms (and variety of goods)
  - ⇒ Lower the price.

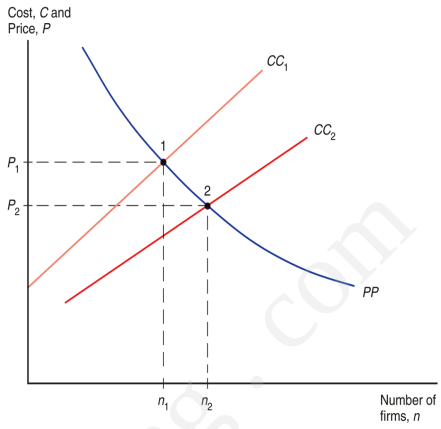


Figure 6-4

Effects of a Larger Market

An increase in the size of the market allows each firm, other things equal, to produce more and thus have lower average cost. This is represented by a downward shift from CC_1 to CC_2. The result is a simultaneous increase in the number of firms (and hence in the variety of goods available) and fall in the price of each.

Gains from an integrated market: A numerical example

- An monopolistically competitively automobile industries.
- Demand curve $Q = S \times [\frac{1}{n} - \left(\frac{1}{30000}\right) \times (P - \overline{P})]$
- Q: number of automobile sold per firm
- F = $750,000,000
- c = $5000
- C = 750,000,000 + 5000 x Q
- AC = 750,000,000/Q+ 5000
- Home: annual sale 900,000 automobiles
- Foreign: annual sale 1.6 million automobiles
- Compare number of firms, sales per firm and price before and after trade.

Gains from an integrated market: A numerical example (cont.)

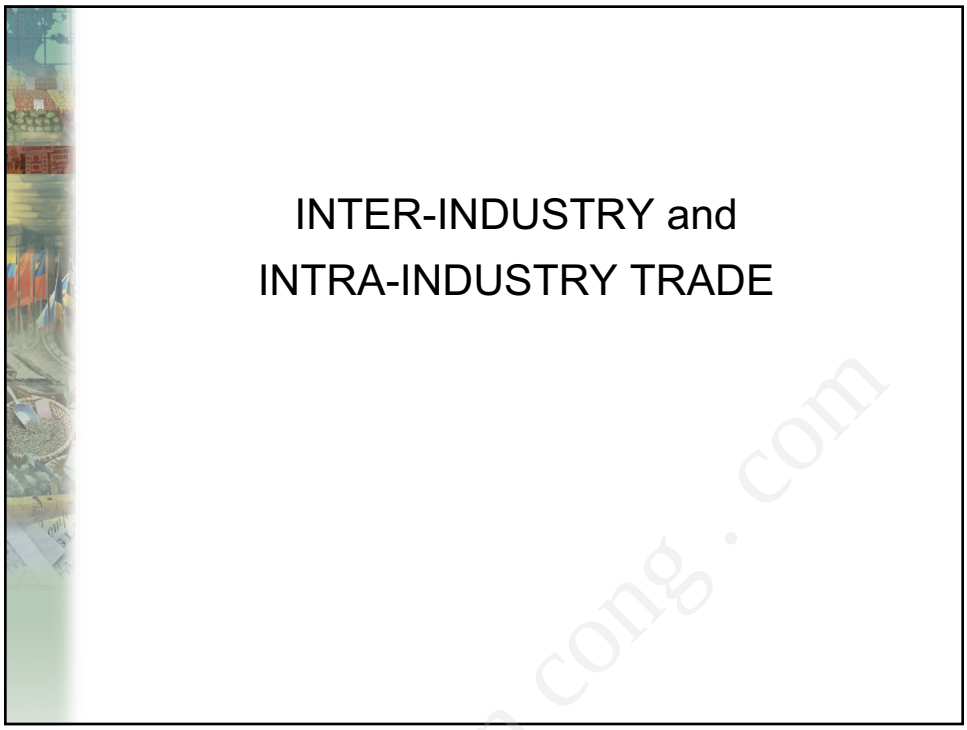
Hypothetical example of gains from trade in an industry with monopolistic competition			
	Domestic market before trade	Foreign market before trade	Integrated market after trade
Industry sales	900,000	1,600,000	2,500,000
Number of firms	6	8	10
Sales per firm	150,000	200,000	250,000
Average cost	10,000	8,750	8,000
Price	10,000	8,750	8,000

Gains from an integrated market: A numerical example: A numerical example (cont.)

- The integrated market: each firm produces at a larger scale => selling at a lower price.
- **Every one is better off** as a result of integration.
  - Consumers have a wider range of choices
  - Each firm produce more and is therefore able to offer its products at a lower price.

=> To realize gains from trade, the countries must engage in international trade.

- To achieve economics of scale, each firm must concentrate its production in one country – either H or F. Yet it must sell its output to consumers in both markets.
- However, the model does not allow to know where automobiles will be produced: in Home or Foreign (pattern of trade).



Inter-industry Trade

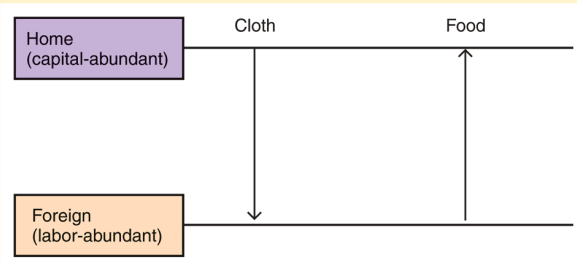
- A Heckscher-Ohlin model suppose that:
  - The capital abundant domestic economy specializes in the production of capital intensive cloth
  - The labor abundant foreign economy specializes in the production of labor intensive food
  - Home: capital abundant and Cloth is capital intensive => Home exports Cloth and import Food

Inter-industry Trade (cont.)

Figure 6-6

Trade in a World Without Increasing Returns

In a world without economies of scale, there would be a simple exchange of cloth for food.



+ Assume: - All cloth and food produced are homogenous
- Market are perfectly competitive

+ In a world without economies of scale, there would be a simple exchange of cloth for food

Intra-industry Trade

- The food industry is described by perfectly competitive model
- The global cloth industry is described by the monopolistic competition model.
- In food industry: The trade in the food industry continues to be determined by comparative advantage. Home: capital abundant; Foreign: labor abundant; Food: labor intensive; Cloth: capital intensive)
  - Home imports food
  - Foreign exports food

Intra-industry Trade (cont.)

- The global cloth industry is described by the monopolistic competition model with economics of scale
  - Each country produces different types of cloth.
  - Neither country is able to produce the full range of cloth products by itself.
  - the foreign country exports some cloth and the domestic country exports some cloth.
- Home: capital abundant and cloth: capital intensive, it still has a comparative advantage in cloth.
  - Home: both exports and imports cloth
  - It should therefore export more cloth than it imports.
- Trade occurs *within* the cloth industry: **intra-industry trade**

Intra-industry Trade (cont.)

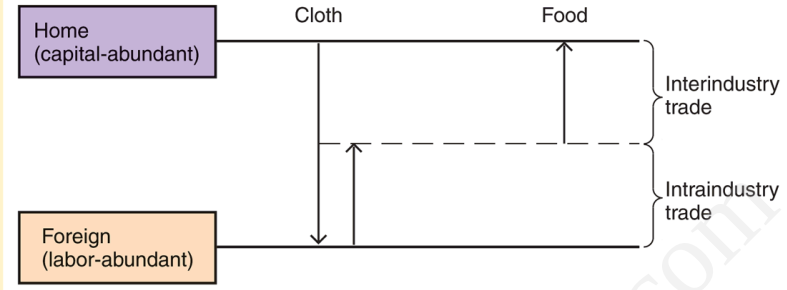


Figure 6-7

- Thinks of world trade in a monopolistic competition model as consisting of two parts: inter – and intra – trade.
- exchange of cloth for cloth – intra-industry trade
- exchange of cloth for food – inter-industry trade

Inter-industry and Intra-industry Trade

1. Gains from inter-industry trade reflect comparative advantage.
2. Gains from intra-industry trade reflect economies of scale (lower costs) and wider consumer choices.
3. The pattern of intra-industry trade is unpredictable.
4. The relative importance of intra-industry trade depend on how similar countries are.
   - Countries with *similar* relative amounts of factors of production are predicted to have *intra-industry trade*.
   - Countries with *different* relative amounts of factors of production are predicted to have *inter-industry trade*.

Inter-industry and Intra-industry Trade (cont.)

- About 25% of world trade is intra-industry trade according to standard industrial classifications.
  - But some industries have more intra-industry trade than others: those industries requiring relatively large amounts of skilled labor, technology and physical capital exhibit intra-industry trade for the US.
  - Countries with similar relative amounts of skilled labor, technology and physical capital engage in a large amount of intra-industry trade with the US.

Inter-industry and Intra-industry Trade (cont.)

TABLE 6-3 Indexes of Intraindustry Trade for U.S. Industries, 1993

Inorganic chemicals	0.99
Power-generating machinery	0.97
Electrical machinery	0.96
Organic chemicals	0.91
Medical and pharmaceutical	0.86
Office machinery	0.81
Telecommunications equipment	0.69
Road vehicles	0.65
Iron and steel	0.43
Clothing and apparel	0.27
Footwear	0.00

Note: an index of 1 means that all trade is intra-industry trade.
An index of 0 means that all trade is inter-industry trade.

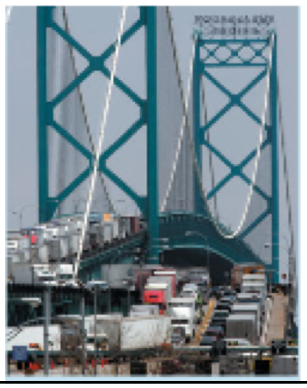
Inter-industry and Intra-industry Trade (cont.)

TABLE 8-2	Indexes of Intra-Industry Trade for U.S. Industries, 2009
Metalworking Machinery	0.97
Inorganic Chemicals	0.97
Power-Generating Machines	0.86
Medical and Pharmaceutical Products	0.85
Scientific Equipment	0.84
Organic Chemicals	0.79
Iron and Steel	0.76
Road Vehicles	0.70
Office Machines	0.58
Telecommunications Equipment	0.46
Furniture	0.30
Clothing and Apparel	0.11
Footwear	0.10

Note: an index of 1 means that all trade is intra-industry trade.
An index of 0 means that all trade is inter-industry trade.

Case study
Intra-Industry Trade in Action: The North American Auto Pact of 1964

- Role of economies of scale in generating beneficial international trade: automotive trade between the United States and Canada during the second half of the 1960s.



The Ambassador Bridge connects Detroit in US to Windsor in Canada. On a typical day, $250 million worth of car and car parts crosses this bridge.

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Consequences of imperfect competition

- The monopolistic competition :
  - Explains how increasing returns to scale promote international trade.
  - Recognizes that imperfect competition is a necessary consequence of economies of scale
  - Does not focus on consequences of imperfect competition for international trade.
  - Dumping: one important consequence

Concept of dumping

- **Dumping:** charging a lower price for exported goods than for goods sold domestically.
- Dumping: price discrimination => controversial: unfair
- Dumping is nothing more than an example of **price discrimination**. There are a lot of examples of price discrimination: transport ticket discounts for children, price reduction in museums for students, ...
- Price discrimination and dumping may occur only if
  - *imperfect competition*
  - *markets are segmented*

Dumping-profit maximizing strategy

- Dumping may be a profit maximizing strategy because of differences in foreign and domestic markets.
- E.g:
  - a firm currently sells 1000 units of goods at home and 100 units abroad.
  - Selling the good at $20 per unit domestically and 15$ per unit on export sales.
  - Given: expand sales by one unit, in either market, would require reducing the price by 0.01 $.
  - Whether or not are additional domestic sales much more profitable than additional exports?
- Increase domestic sales by one unit of produce
  - Adding 19.99$ in revenue,
  - Reducing the receipts on the 1000 units that would have sold at 20$ by 10$.
  - MR from the extra unit sold is only 9.99 USD.

Dumping – profit maximizing strategy (cont.)

- E.g:
  - a firm currently sells 1000 units of goods at home and 100 units abroad.
  - Selling the good at $20 per unit domestically and 15$ per unit on export sales.
  - Whether or not are additional domestic sales much more profitable than additional exports?
  - Given: expand sales by one unit, in either market, would require reducing the price by 0.01 $.
- Increase foreign sales by one unit of produce
  - adding 14.99$ in revenue,
  - Reducing the receipts on the 100 units that would have sold in the foreign market at 15$ by 1$.
  - MR from the extra unit sold is13.99 USD.

  ⇒ more profitable to expand exports rather than domestic sales, even though the price received on exports is lower.

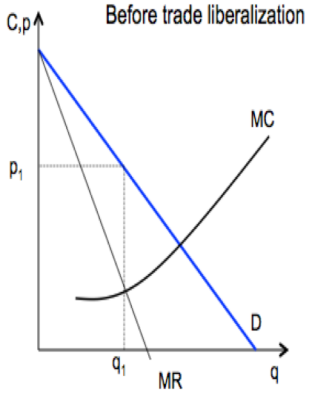
  ⇒ **Dumping will be a profit-maximizing strategy**

Dumping (cont.)

- Domestic firms usually have a larger share of the domestic market than they do of foreign markets.
- In home market: monopolistic producers
- In foreign market: competitive producers => market is perfect competition
- We draw a diagram of how dumping occurs when a firm is a monopolist in the domestic market but a small competitive firm in foreign markets.

Dumping (cont.)

- Consider that the firm also wants to export



In the domestic market there is only one firm (monopoly).

If the firm doesn't export, it equates MR and MC, and sells q_1 at price p_1.

Dumping (cont.)

- Firm is a monopolist in Home
  - The domestic market demand curve is downward sloping,
  - MR curve lies below that demand curve.
- Firm is a small competitive firm in Foreign,
  - the foreign market demand curve is horizontal,
  - representing the fact that exports are very responsive to small price changes.
  - MR curve is demand curve
  - MC is for total output

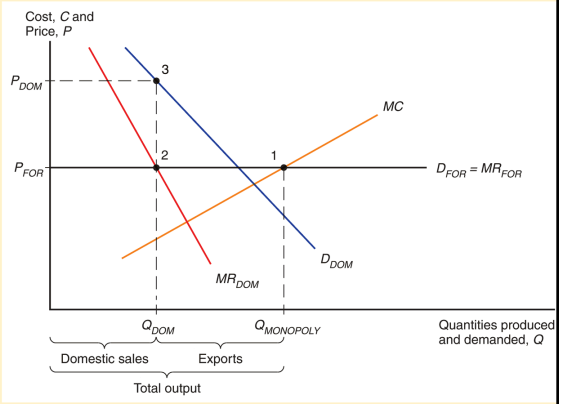


Figure 6-8

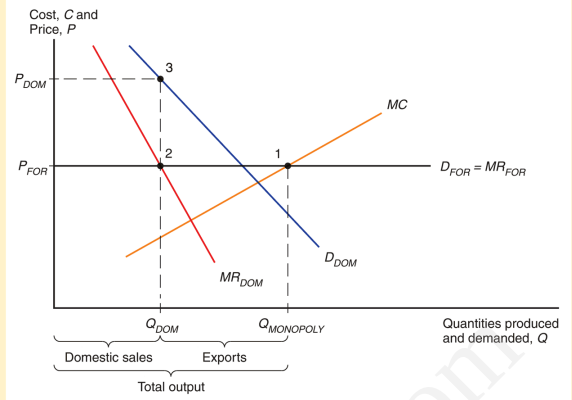
Dumping

The figure shows a monopolist that faces a demand curve D_{DOM} for domestic sales, but which can als sell as much as it likes at the export price P_{FOR}. Since an additional unit can always be sold at P_{FOR}, th firm increases output until the marginal cost equals P_{FOR}; this profit-maximizing output is shown as $Q_{MONOPOLY}$. Since the firm's marginal cost at $Q_{MONOPOLY}$ is P_{FOR}, it sells output on the domestic market u to the point where marginal revenue equals P_{FOR}; this profit-maximizing level of domestic sales is shown as Q_{DOM}. The rest of its output, $Q_{MONOPOLY} - Q_{DOM}$, is exported.

The price at which domestic consumers demand Q_{DOM} is P_{DOM}. Since $P_{DOM} > P_{FOR}$, the firm sells exports at a lower price than it charges domestic consumers.

Dumping (cont.)

- To maximize profits, the firm must set MR equal to MC in each market.
- MR is equal across markets.



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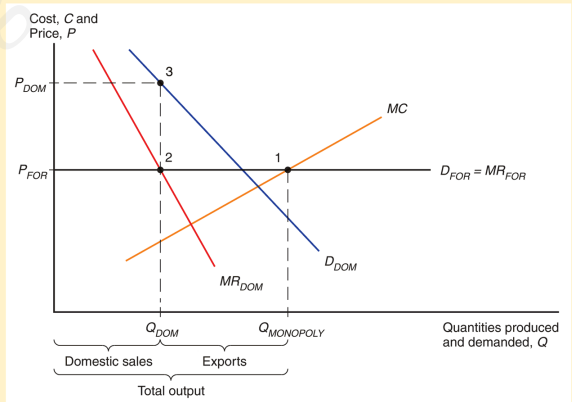
Dumping (cont.)

- The nation will sell a low amount in the domestic market at a high price P_{DOM} , but sell in foreign markets at a low price P_{FOR}.
- In this case, dumping is a profit-maximizing strategy.



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Protectionism and Dumping

- Dumping (as well as price discrimination in domestic markets) is widely regarded as unfair.
- A US firm may appeal to the Commerce Department to investigate if dumping by foreign firms has injured the US firm.
  - The Commerce Department may impose an “anti-dumping duty”, or tax, as a precaution against possible injury.
  - This tax equals the difference between the actual and “fair” price of imports, where “fair” means “price the product is normally sold at in the manufacturer's domestic market ”.

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Examples

- Internal economies of scale
  - In the monopolistic competition model: economics of scale that give rise to trade occur at the level of individual firms => imperfect competition => dumping.
- Not all economics of scale apply at the level of the individual firms.
- Concentrating production of an industry in one or a few location reduces the industry's costs, even if individual firms remain small.

$\Rightarrow$ external economics of scale.

- Industries exhibiting external economics of scale
  - The semiconductor industry, concentrated in California's famous Silicon Valley
  - Investment banking industry concentrated in New York
  - Entertainment industry concentrated in Hollywood

Reasons for external economics of scale

- Why a cluster of firms may be more efficient that individual firms in isolation
  - Specialized suppliers
  - Labor – market pooling
  - Knowledge spillover

Reasons for external economics of scale (cont.)

1. **Specialized equipment or services** may be needed for the industry, but are only supplied by other firms if the industry is large and concentrated.
   - For example, Silicon Valley in California has a large concentration silicon chip companies, which are serviced by companies that make special machines for manufacturing silicon chips.
   - These machines are cheaper and more easily available for Silicon Valley firms than for firms elsewhere.

External Economies of Scale (cont.)

2. **Labor pooling**: a large and concentrated industry may attract a pool of workers, reducing employee search and hiring costs for each firm.
3. **Knowledge spillovers**: workers from different firms may more easily share ideas that benefit each firm when a large and concentrated industry exists.

External Economies of Scale and Pattern of Trade

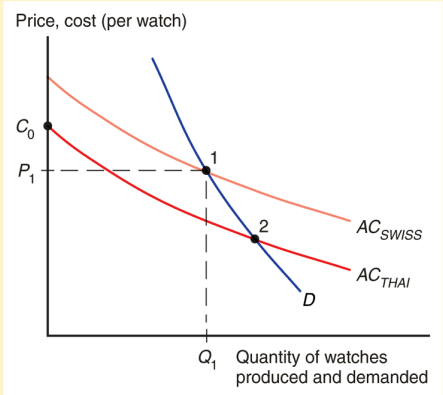
- If external economies of scale exists, the pattern of trade may be due to historical accidents:
  - countries that start out as large producers in certain industries tend to remain large producers even if some other country could potentially produce the goods more cheaply.

External Economies of Scale and Pattern of Trade (cont.)

Figure 6-9

External Economics and Specialization

The average cost curve for Thailand, AC_{THAI}, lies below the average cost curve for Switzerland, AC_{SWISS}. Thus Thailand could potentially supply the world market more cheaply than Switzerland. If the Swiss industry gets established first, however, it may be able to sell watches at the price P_1, which is below the cost C_0 that an individual Thai firm would face if it began production on its own. So a pattern of specialization established by historical accident may persist even



External economics of scale give a strong role to historical accident in determining who produces what

Trade and Welfare with external Economies of Scale

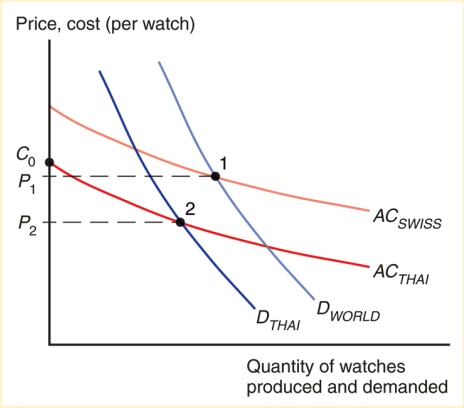
- Trade based on external economies has an ambiguous effect on national welfare.
  - There may be gains to the *world* economy by concentrating production of industries with external economies.
  - But there is no guarantee that the right country will produce a good subject to external economies (Thailand and Switzerland in watch).
  - It is even possible that a country is worse off with trade than it would have been without trade: a country may better off if it produces everything for its domestic market rather than pay for imports (Thailand and Switzerland in watch).

External Economies of Scale and Trade (cont.)

Figure 6-10

External Economics and Losses from Trade

When there are external economies, trade can potentially leave a country worse off than it would be in the absence of trade. In this example, Thailand imports watches from Switzerland, which is able to supply the world market (D_{WORLD}) at a price (P_1) low enough to block entry by Thai producers who must initially produce the watches at cost C_0. Yet if Thailand were to block all trade in watches, it would be able to supply its domestic market (D_{THAI}) at the lower price P_2.



Dynamic external economics of scale

- We have considered cases where external economies depend on the amount of *current output* at a point in time.
- But external economies may also depend on the amount of *cumulative output over time*.
- **Dynamic external economies of scale** (dynamic increasing returns to scale) exist if average costs fall as cumulative output over time rises.

Dynamic external economics of scale (cont.)

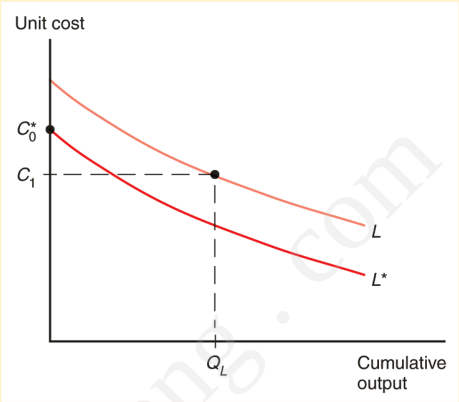
- Dynamic increasing returns to scale could arise if the cost of production depends on the **accumulation of knowledge and experience, which depend on the production process over time.**
- A graphical representation of dynamic increasing returns to scale is called a **learning curve**.

External Economies of Scale and Trade (cont.)

Figure 6-11

The Learning Curve

The learning curve shows that unit cost is lower the greater the cumulative output of a country's industry to date. A country that has extensive experience in an industry (L) may have lower unit cost than another country with little or no experience, even if the second country's learning curve (L^*) is lower, for example, because of lower wages.



External Economies of Scale and Trade (cont.)

- Like external economies of scale at a point in time, dynamic increasing returns to scale can lock in an initial advantage or head start in an industry.
- Like external economies of scale at a point in time, dynamic increasing returns to scale **can be used to justify protectionism.**
  - Temporary protection of industries enables them to gain experience: infant industry argument.
  - But temporary is often for a long time, and it is hard to identify when external economies of scale really exist.

Summary

1. Economies of scale imply that more output at the firm or industry level causes average cost to fall.
   - External economies of scale refer to the amount of output by an industry.
   - Internal economies of scale refer to the amount of output by a firm.
2. With monopolistic competition, each firm has some monopoly power due to product differentiation but must compete with other firms whose prices are believed to be unaffected by each firm's actions.

Summary (cont.)

3. Monopolistic competition allows for gains from trade through lower costs and prices, as well as through wider consumer choice.
4. Monopolistic competition predicts intra-industry trade, and does not predict changes in income distribution within a country.
5. Location of firms under monopolistic competition is unpredictable, but countries with similar relative factors are predicted to engage in intra-industry trade.

Summary (cont.)

6. Dumping may be a profitable strategy when a firm faces little competition in its domestic market and faces heavy competition in foreign markets.
7. Trade based on external economies of scale may increase or decrease national welfare, and countries may benefit from temporary protectionism if their industries exhibit external economies of scale either at a point in time or over time.

END OF CHAPTER 6