Economies of Scale, Imperfect Competition, and International Trade

Chapter 6
Intermediate International Trade
International Economics, 5th ed., by Krugman and Obstfeld
Overview

• patterns of trade can be explained by:
  (1) differences in resources or technology across countries: Ricardian, Specific factors and Heckscher-Ohlin models
  (2) economies of scale or increasing returns: in this case, it is efficient for countries to produce only a limited set of goods, to take advantage of the increasing returns

• when we study increasing returns, we have to refer to monopolies or oligopolies, and not to perfect competition anymore
Review of imperfect competition

• in a perfectly competitive market, firms are price takers: producers can sell any output at the current price, and cannot affect the price

• in imperfect competition, firms are price setters: they can influence the price, and can sell more only by reducing prices

• two types of imperfect competitive markets: monopoly and monopolistic competition
Imperfect markets

**monopoly**
- only one firm in the market
- in equilibrium the price set by the monopolist is larger than average cost
- there are positive economic profits

**monopolistic competition**
- there are many firms in the same industry
- each firm produces a differentiated good that competes with good produced by other firms
- there are zero economic profits
Monopoly

• a monopolist faces a downward-sloping demand and marginal revenue curves

• marginal revenue $\text{MR}$ is always less than price because to sell an extra unit, the monopolist has to reduce the price of all units

• suppose the demand function is linear:
  \[ Q = a - bP \]

  then, the marginal revenue is also linear:
  \[ \text{MR} = P - Q / b \]
• then:

\[ P - MR = \frac{Q}{b} \]

which implies that the difference between price and marginal revenue depends on sales \( Q \) and the slope of the demand curve \( b \)

• **average cost** \( AC \) is downward slopping due to economies of scale: the larger the output, the lower cost per unit

• suppose the cost function is:

\[ C = f + c Q \]

where \( f \) is the **fixed cost**
The fixed cost in a linear cost function gives rise to economies of scale, because the larger the firm’s output, the less the fixed cost per unit.

- average cost function is then:
  \[ AC = \frac{C}{Q} = \frac{f}{Q} + c \]

- monopolist maximizes profits where marginal revenue equals marginal cost.

- monopolist earns positive economic profits because \( P > AC \) (compare: in perfect competition, producers earn zero economic profits)
Monopolistic competition

• in monopolistic competition there are many firms, each of which produces a *slightly different product* from the others

• demand function for a firm:

\[ Q = \frac{S}{n} - Sb\left(P - \bar{P}\right) \]

Q = firm’s sales  
S = total sales of industry  
n = number of firms in industry  
\( \bar{P} \) = average price charged by competitors
• average cost is again given by:
  \[ \text{AC} = \frac{f}{Q} + c \]

• all firms are symmetric because they have the same demand and cost functions

• this implies that in equilibrium all firms will charge the same price

• we need to determine two things: \( n \) and \( \bar{p} \)

• step 1: since all firms charge the same price, then \( Q = \frac{S}{n} \), and the average cost function is given by:
  \[ \text{AC} = \frac{f}{Q} + c = n \left( \frac{f}{S} \right) + c \]
then, the more firms there are in the industry, the higher the average cost (with more firms, each firm will produce less)

**step 2:** firms maximize profits when marginal revenue equals marginal cost:

\[ MR = P - \frac{Q}{Sb} = c \]

and so the **price function** is:

\[ P = c + \frac{1}{bn} \]

where \( P \) is the price charged by the firm.
then, the more firms there are in the industry, the lower the price each firm will charge
in the monopolistic competitive model, it is the case that the number of firms \( n \) is such that firms earn zero economic profits

**The monopolistic competition model is useful to analyze the role of economies of scale in international trade because when there is trade, the size of the market increases, and so there can be more firms producing, and a larger variety of differentiated goods**
Monopolistic competition and trade

- for a given number $n$ of firms, *trade increases the size of the market* and total sales $S$:

$$AC = n \left( \frac{f}{S} \right) + c$$

and so *average costs are reduced*

- when markets are integrated, there are lower average costs and so countries gain because prices will be lower, and there will be a larger variety of goods in the market
given the benefits of economies of scale, how do we determine patterns of trade?

- **two countries:** home and foreign
- **two factors:** labor and capital
- assume that home is the capital-abundant country
- **two industries:** manufactures and food
- assume that manufactures are capital-intensive
- assume that manufactures is a monopolistically competitive industry: *both countries produce manufactures, but they produce slightly different things*
• if manufactures were perfectly competitive then by Heckscher-Ohlin home would export manufactures and import food

• if manufactures are monopolistically competitive, then home will still be a net exporter of manufactures, but home will both export and import varieties of manufactured goods

Monopolistic competition in manufactures implies that there are two types of trade:
(1) **intraindustry trade**: exchange of manufactures for manufactures (of different type)
(2) **interindustry trade**: exchange of manufactures for goods
Important remarks

(1) interindustry trade reflects comparative advantage, while intraindustry trade doesn’t

(2) since economies of scale prevent a country from producing the full range of manufactures by itself, *economies of scale are a source of international trade*

(3) the pattern of intraindustry trade is unpredictable: we only know that “some” firms will be located in one country, and “others” in another country

(4) if two countries are similar in their capital-labor ratios, then interindustry trade will be small, and intraindustry trade dominates

(5) if two countries have very different capital-labor ratios, then they will specialize, and there will be no intraindustry trade
Comparative advantage is a better theory of trade among countries with very different factor abundance, while economies of scale would be a better theory of trade among countries with similar factor abundance.

Some empirical facts:
- About 25% of world trade is intranindustry trade.
- Intraindustiy trade is large in manufactured goods among advanced industrial nations, which accounts for most of world trade.
A note on income distribution

• intraindustry trade produces gains, to add to those from comparative advantage, because *consumers benefit from a larger variety of products*

• interindustry trade has effects on income distribution through changes in relative prices

• if intraindustry trade dominates, then income distribution effects of trade are small and there are substantial *extra gains from trade*
Dumping

• in imperfectly competitive markets, firms practice **price discrimination**: they charge one price when the good is exported, and a different price when the good is sold in the domestic market

• **dumping** is a pricing practice where a firm charges a lower price for exported goods than for the same good sold domestically

• dumping requires **market segmentation**: domestic residents cannot purchase goods intended for export
• **why to dump?** because there is a difference in the response of sales to changes in prices in the export and domestic markets:

  (1) if the demand curve in the foreign market is completely elastic, then the firm can increase sales at the same price

  (2) since the demand curve in the domestic market is downward-sloping, to increase sales, the price will have to decline

• a number of countries consider dumping an unfair practice, and they impose tariffs to avoid the practice
How can dumping give rise to international trade?

two countries: home and foreign
one good: produce by a monopoly in each country
pretrade prices are identical, so there is no incentive to trade

**how can trade start?**
- the monopolist at home dumps in the foreign country, by selling the good at a lower price (but still higher than marginal cost) in the foreign country and capturing the market
- there can be *reciprocal dumping* if the foreign monopolists responds by dumping in the home country

**is this beneficial?**
although there is now competition between the two monopolies, there is waste in transportation costs of shipping the goods between countries
External economies

• so far we have only considered internal economies of scale:
  (1) they occur at the level of the individual firm, and they imply an increase in the size of the firm
  (2) they give rise to imperfect competition
• we now consider external economies of scale:
  (1) they occur at the level of the industry (a set of firms producing the same type of good)
  (2) they do not affect the size of the firm and do not lead to imperfect competition
  (3) they affect the size of the industry, which will consist of many small firms in perfect competition
• one consequence of external economies of scale is that industries will be geographically concentrated in **clusters of firms**, to reduce industry’s costs
• **why are clusters of firms efficient?**
  
  (1) **specialized suppliers**: a cluster of firms can attract suppliers of inputs needed by firms, because it provides a larger market for these suppliers
  
  (2) **labor market pooling**: specialized labor will be concentrated around the cluster, and this benefits both producers and workers
  
  (3) **knowledge spillover**: when specialized workers are concentrated in an area, there is more flow of ideas about technical issues
External economies and trade

• when external economies are important, a country with a *large industry* will be more efficient in that industry, than a country with a *small industry*

• if due to external economies, the larger the industry, the lower the costs, then the industry will have a **forward-falling supply curve**

• the forward-falling supply curve has *negative slope*: the larger the industry’s output, the lower the price, due to the lower costs
• one implication of external economies is that patterns of trade can be explained by historical accidents:

   *If home is the first country in history establishing a large industry to produce certain good, it will continue to do so, even if later on other countries could produce at a lower cost*

• trade based on external economies does not necessarily produce gains:

   *Trade based on external economies can make a country worse off, if this country could potentially produce the good at a lower cost*

• external economies can potentially justify protectionism in the form of the **infant industry argument**: “protect industries until they gain experience”
Dynamic increasing returns

(1) through the accumulation of knowledge and experience, firms can reduce their cost of production

(2) one way of measuring this accumulation of experience is by using cumulative production

(3) the learning curve relates unit cost to cumulative output, and is downward slopping

(4) dynamic increasing returns refers to the type of external economy in which industry costs fall with the cumulative production over time

(5) dynamic external economies can also define patterns of trade depending on history, by giving advantage to the starting country