Chapter 6
Economies of Scale, Imperfect Competition, and International Trade

■ **Chapter Organization**

Economic Geography and Interregional Trade

Summary

APPENDIX TO CHAPTER 6: Determining Marginal Revenue

■ Key Themes

In previous chapters trade between nations was motivated by their differences in *factor productivity* or in *relative factor endowments*. The type of trade which occurred, for example of food traded for manufactured goods, is based on comparative advantage and is called *interindustry trade*. This chapter introduces trade based on *economies of scale in production*. Such trade in similar productions is called *intraindustry trade*, and describes, for example, the trading of one type of manufactured good for another type of manufactured good. The chapter shows that trade can occur when there are no technological or endowment differences, but when there are economies of scale or increasing returns in production.

Economies of scale can either take the form of (1) *external economies* whereby the cost per unit depends on the size of the industry but not necessarily on the size of the firm; or (2) *internal economies*, whereby the production cost per unit of output depends on the size of the individual firm but not necessarily on the size of the industry. Internal economies of scale give rise to imperfectly competitive markets: this departs from the assumption of perfectly competitive market structures made in earlier chapters. Forms of imperfect competition include monopoly, oligopoly, and monopolistic competition.

In markets described by *monopolistic competition* a number of firms are in an industry. Each firm produces a "differentiated product" meaning that the product of one firm can be distinguished from the products of rival firms in the industry. Demand for a firm's good depends on the number and prices of other similar products that are available. This type of model is useful for illustrating that trade improves the trade-off between scale and variety available to a country. In an industry described by monopolistic competition, a larger market—such as that which arises through international trade—lowers average price (by increasing production and lowering average costs) and makes available for consumption a greater range of goods.

You should spend some time becoming comfortable with the equilibrium concepts associated with imperfectly competitive markets. The equilibrium conditions relate the average cost of production in a typical firm and the price of a good to the number of firms in the industry. Using the equations presented in the text, you can derive the equilibrium price and number of firms in an industry by setting price equal to average costs. Some of the review questions enable you to practice using these tools.

Given the predictions of models of international trade under imperfectly competitive markets, you can compare the distributional effects of the type of trade that is motivated by comparative advantage, versus the type of trade that is motivated by increasing returns to scale in production. When countries are similar in their factor endowments, and when scale economies and product differentiation are important, the income distributional effects of trade may be small. You should go through the thought exercises suggested in earlier chapters to convince yourself of this point.

Another important issue related to imperfectly competitive markets is the practice of price discrimination, namely charging customers in different markets different prices. One particularly controversial form of price discrimination is *dumping*, whereby a firm charges lower prices for exported goods than for goods sold domestically. This price discrimination can occur only when domestic and foreign markets are segmented (domestic consumers can not easily purchase goods intended for export). The economics of dumping are illustrated in the text using the example of an industry which contains a single monopolistic firm selling in the domestic and foreign markets. Reverse dumping can also occur, whereby a producer sells a product at lower prices in the domestic market than in the foreign market. While there is no good economic justification for the view that dumping is harmful, it is often viewed as an unfair trade practice.

The other type of economies of scale, *external* economies, has very different economic implications than internal economies of scale. Since external economies of scale occur at the industry level rather than the firm level, it is possible for there to be many small competitors in an industry, in contrast to the structure which develops under internal economies of scale. This implies that, while models of imperfect competition may be appropriate for industries with internal economies of scale, the models of perfectly competitive markets may be more appropriate in markets characterized by external economies of scale. Under external economies, trade may not be beneficial to all countries and there may be some justification for protectionism. *Dynamic scale economies*, which arise when unit production costs fall with cumulative production over time, rather than with current levels of production, also provide a potential justification for protectionism. External economies of scale can also be important for explaining interregional trade (trade within a country). While some industries need to be located near a particular factor (e.g., a natural resource), for others, the factors (e.g., skilled labor) are fairly mobile. Historical accidents may help explain the patterns then. This study of the patterns of economic interactions across space—either within or across countries—is known as economic geography.

■ Key Terms

Define the following key terms:

1. Imperfect Competition _____

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2. Intraindustry Trade _____

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3. Internal Economies of Scale _____

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4. Price Discrimination _____

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5.   Infant Industry Argument _____

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6.   External Economies of Scale _____

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7.   Economic Geography _____

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■   **Review Questions**

1.   A downward sloping average cost curve reflects economies of scale since increased output of the firm lowers its unit costs.

a.   Given that the firm's fixed costs are $20 and the marginal cost of production is $2 per unit, how do average costs change as production increases from 5 to 10 to 20 to 40 units?

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b.   Discuss the intuition behind your response to part (a).

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c.   In the figure below, graph the relationship between output, and average and marginal costs.
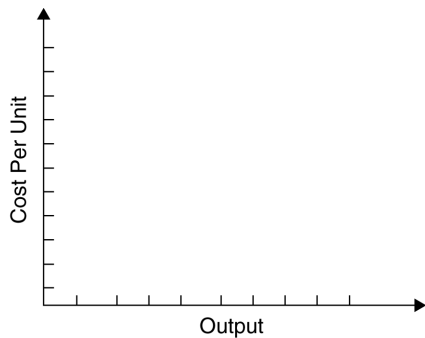
d.   As output gets extremely large, what happens to average cost? Why?

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e.   What is the relationship between average cost and the number of firms in an industry?

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2.   Consider the production decision of a high-end producer of DVD players who behaves as a monopolistic competitor facing a demand curve with parameter $b = 1/1000$. Fixed costs are \$500,000 and the marginal cost of producing a DVD player is \$100. Suppose Home has annual DVD player sales of 50,000 units.

a.   Graph the *PP* and *CC* curves for the Home DVD player industry.
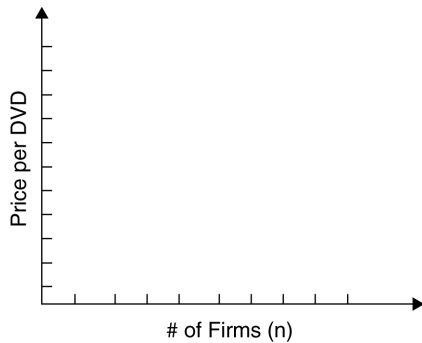
b.   Discuss the significance of the *PP* and *CC* curves.

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c.   In the absence of trade, how many firms will produce DVD players?

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d.   What will be the profit of each of these firms?

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e. What is the economic significance of points to the left of the *PP/CC* intersection?

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3. Assume that the monopolistic competitor produces tractors. He incurs fixed production costs of $120,000,000 and marginal costs of $8,000. The demand parameter is $b = 1/40,000$. The total annual tractor sales in the Home market is 600,000 units.

a. Graph the *PP* and *CC* curves for the Home tractor industry.
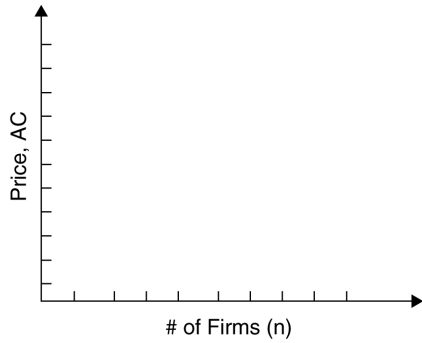
b. How many tractor firms will exist in equilibrium? What will be the equilibrium price of a tractor?

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c. Confirm that this is a long-run equilibrium.

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4. a. What conditions give rise to economies of scale in production?

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b. What is the justification for trade based on economies of scale in production?

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c. Does your response depend on the form of economies of scale in production (i.e., internal or external)?

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d. Why might external economies mean the pattern of trade can be in part determined by historical accident?

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■ Answers to Odd-Numbered Textbook Problems

1. Cases *a* and *d* reflect external economies of scale since concentration of the production of an industry in a few locations reduces the industry's costs even when the scale of operation of individual firms remains small. External economies need not lead to imperfect competition. The benefits of geographical concentration may include a greater variety of specialized services to support industry operations and larger labor markets or thicker input markets. Cases *b* and *c* reflect internal economies of scale and occur at the level of the individual firm. The larger the output of a product by a particular firm, the lower its average costs. This leads to imperfect competition as in petrochemicals, aircraft, and autos.

3. By concentrating the production of each good with economies of scale in one country rather than spreading the production over several countries, the world economy will use the same amount of labor to produce more output. In the monopolistic competition model, such a concentration of labor benefits the host country, which can also capture some monopoly rents, while it may hurt the rest of the world which could then face higher prices on its consumption goods. In the external economies case, such monopolistic pricing behavior is less likely since imperfectly competitive markets are less likely.

5. a. $17,000 + 150/n = 5,000,000,000n/S + 17,000$. With $S_{US} = 300$ million, the number of automakers equals 3. With $S_E = 533$ million, the number of automakers equals 4.

   b. $P_{US} = 17,000 + 150/3$, $P_{US} = \$17,050$. $P_E = 17,000 + 150/4$, $P_{US} = \$17,037.50$.

   c. $17,000 + 150/n = 5,000,000,000n/S + 17,000$. With $S_{US + E} = 833$ million, the number of total automakers now equals 5. This helps to explain some of the consolidation that has happened in the industry since trade has become more free in recent decades, for example. Ford acquiring Jaguar, Daimler-Benz acquiring Chrysler, etc.

    d.   Prices fall in the United States as well as Europe to $17,030. Also, variety increases in both markets: in the United States consumers were able to choose between three brands before free trade, now they can choose between five. In Europe consumers were able to choose between four brands before free trade, now they can also choose between five brands.

7. a.   The relatively few locations for production suggest external economies of scale in production. If these operations are large, there may also be large internal economies of scale in production.

    b.   Since economies of scale are significant in airplane production, it tends to be done by a small number of (imperfectly competitive) firms at a limited number of locations. One such location is Seattle, where Boeing produces.

    c.   Since external economies of scale are significant in semiconductor production, semiconductor industries tend to be concentrated in certain geographic locations. If, for some historical reason, a semiconductor is established in a specific location, the export of semiconductors by that country is due to economies of scale and not comparative advantage.

    d.   "True" scotch whiskey can only come from Scotland. The production of scotch whiskey requires a technique known to skilled distillers who are concentrated in the region. Also, soil and climactic conditions are favorable for grains used in local scotch production. This reflects comparative advantage.

    e.   France has a particular blend of climactic conditions and land that is difficult to reproduce elsewhere. This generates a comparative advantage in wine production.

9. a.   Suppose two countries that can produce a good are subject to forward-falling supply curves and are identical countries with identical curves. If one country starts out as a producer of a good, that is, it has a head start even as a matter of historical accident, then all production will occur in that particular country and it will export to the rest of the world.

    b.   Consumers in both countries will pay a lower price for this good when external economies are maximized through trade and all production is located in a single market. In the present example, no single country has a natural cost advantage or is worse off than it would be under autarky.

11. a.   i. very likely due to the need to have a common pool of labor with such skills
          ii. somewhat likely due to the need for continual innovation and learning

    b.   i. unlikely since it is difficult to see how the costs of a single firm would fall if other firms are present in the asphalt industry
          ii. unlikely because they are industries in which technology is more stable than in other industries such as software services or cancer research

    c.   i. highly likely because having a great number of support firms and an available pool of skilled labor in filmmaking are critical to film production
          ii. highly likely because filmmaking is an industry in which learning is important

    d.   i. somewhat likely in that it may be advantageous to have other researchers nearby
          ii. highly likely because such research builds on itself through a learning-by-doing process

    e.   i. unlikely because it is difficult to see how the existence of another timber firm with lower costs to another timber firm
          ii. unlikely due to the relatively stable technology involved in timber harvesting