

- A monopolist often can raise its profits by charging different prices for the same good based on a buyer's willingness to pay. This practice of price discrimination can raise economic welfare by getting the good to some consumers who otherwise would not buy it. In the extreme case of perfect price discrimination, the deadweight loss of monopoly is completely eliminated, and the entire surplus in the market goes to the monopoly producer. More generally, when price discrimination is imperfect, it can either raise or lower welfare compared to the outcome with a single monopoly price.
- Policymakers can respond to the inefficiency of monopoly behavior in four ways. They can use the antitrust laws to try to make the industry more competitive. They can regulate the prices that the monopoly charges. They can turn the monopolist into a government-run enterprise. Or if the market failure is deemed small compared to the inevitable imperfections of policies, they can do nothing at all.

## KEY CONCEPTS

monopoly, p. 300

natural monopoly, p. 302

price discrimination, p. 314

## QUESTIONS FOR REVIEW

1. Define *natural monopoly*. What does the size of a market have to do with whether an industry is a natural monopoly?
2. Give an example of a government-created monopoly. Is creating this monopoly necessarily bad public policy? Explain.
3. Draw the demand, marginal-revenue, average-total-cost, and marginal-cost curves for a monopolist. Show the profit-maximizing level of output, the profit-maximizing price, and the amount of profit.
4. Why is a monopolist's marginal revenue less than the price of its good? Can marginal revenue ever be negative? Explain.
5. Give two examples of price discrimination. In each case, explain why the monopolist chooses to follow this business strategy.
6. In your diagram from the previous question, show the level of output that maximizes total surplus. Show the deadweight loss from the monopoly. Explain your answer.
7. Describe the two problems that arise when regulators tell a natural monopoly that it must set a price equal to marginal cost.
8. What gives the government the power to regulate mergers between firms? From the standpoint of the welfare of society, give a good reason and a bad reason that two firms might want to merge.

## PROBLEMS AND APPLICATIONS

1. A small town is served by many competing supermarkets, which have the same constant marginal cost.
  - a. Using a diagram of the market for groceries, show the consumer surplus, producer surplus, and total surplus.
  - b. Now suppose that the independent supermarkets combine into one chain. Using a new diagram, show the new consumer surplus, producer surplus, and total surplus. Relative to the competitive market, what is the transfer from consumers to producers? What is the deadweight loss?
2. A publisher faces the following demand schedule for the next novel from one of its popular authors:

| Price | Quantity Demanded |
|-------|-------------------|
| \$100 | 0 novels          |
| 90    | 100,000           |
| 80    | 200,000           |
| 70    | 300,000           |
| 60    | 400,000           |
| 50    | 500,000           |
| 40    | 600,000           |
| 30    | 700,000           |
| 20    | 800,000           |
| 10    | 900,000           |
| 0     | 1,000,000         |

The author is paid \$2 million to write the book, and the marginal cost of publishing the book is a constant \$10 per book.



- a. Compute total revenue, total cost, and profit at each quantity. What quantity would a profit-maximizing publisher choose? What price would it charge?
  - b. Compute marginal revenue. (Recall that  $MR = \Delta TR / \Delta Q$ .) How does marginal revenue compare to the price? Explain.
  - c. Graph the marginal-revenue, marginal-cost, and demand curves. At what quantity do the marginal-revenue and marginal-cost curves cross? What does this signify?
  - d. In your graph, shade in the deadweight loss. Explain in words what this means.
  - e. If the author were paid \$3 million instead of \$2 million to write the book, how would this affect the publisher's decision regarding what price to charge? Explain.
  - f. Suppose the publisher was not profit-maximizing but was concerned with maximizing economic efficiency. What price would it charge for the book? How much profit would it make at this price?
3. A company is considering building a bridge across a river. The bridge would cost \$2 million to build and nothing to maintain. The following table shows the company's anticipated demand over the lifetime of the bridge:

| Price per Crossing | Number of Crossings,<br>in Thousands |
|--------------------|--------------------------------------|
| \$8                | 0                                    |
| 7                  | 100                                  |
| 6                  | 200                                  |
| 5                  | 300                                  |
| 4                  | 400                                  |
| 3                  | 500                                  |
| 2                  | 600                                  |
| 1                  | 700                                  |
| 0                  | 800                                  |

- a. If the company were to build the bridge, what would be its profit-maximizing price? Would that be the efficient level of output? Why or why not?
  - b. If the company is interested in maximizing profit, should it build the bridge? What would be its profit or loss?
  - c. If the government were to build the bridge, what price should it charge?
  - d. Should the government build the bridge? Explain.
4. Johnny Rockabilly has just finished recording his latest CD. His record company's marketing

department determines that the demand for the CD is as follows:

| Price | Number of CDs |
|-------|---------------|
| \$24  | 10,000        |
| 22    | 20,000        |
| 20    | 30,000        |
| 18    | 40,000        |
| 16    | 50,000        |
| 14    | 60,000        |

The company can produce the CD with no fixed cost and a variable cost of \$5 per CD.

- a. Find total revenue for quantity equal to 10,000, 20,000, and so on. What is the marginal revenue for each 10,000 increase in the quantity sold?
  - b. What quantity of CDs would maximize profit? What would the price be? What would the profit be?
  - c. If you were Johnny's agent, what recording fee would you advise Johnny to demand from the record company? Why?
5. The residents of the town Ectenia all love economics, and the mayor proposes building an economics museum. The museum has a fixed cost of \$2,400,000 and no variable costs. There are 100,000 town residents, and each has the same demand for museum visits:  $Q^D = 10 - P$ , where  $P$  is the price of admission.
- a. Graph the museum's average-total-cost curve and its marginal-cost curve. What kind of market would describe the museum?
  - b. The mayor proposes financing the museum with a lump-sum tax of \$24 and then opening the museum free to the public. How many times would each person visit? Calculate the benefit each person would get from the museum, measured as consumer surplus minus the new tax.
  - c. The mayor's anti-tax opponent says the museum should finance itself by charging an admission fee. What is the lowest price the museum can charge without incurring losses? (Hint: Find the number of visits and museum profits for prices of \$2, \$3, \$4, and \$5.)
  - d. For the break-even price you found in part (c), calculate each resident's consumer surplus. Compared with the mayor's plan, who is better off with this admission fee, and who is worse off? Explain.



- e. What real-world considerations absent in the above problem might argue in favor of an admission fee?
6. Larry, Curly, and Moe run the only saloon in town. Larry wants to sell as many drinks as possible without losing money. Curly wants the saloon to bring in as much revenue as possible. Moe wants to make the largest possible profits. Using a single diagram of the saloon's demand curve and its cost curves, show the price and quantity combinations favored by each of the three partners. Explain.
7. Consider the relationship between monopoly pricing and price elasticity of demand:
- Explain why a monopolist will never produce a quantity at which the demand curve is inelastic. (Hint: If demand is inelastic and the firm raises its price, what happens to total revenue and total costs?)
  - Draw a diagram for a monopolist, precisely labeling the portion of the demand curve that is inelastic. (Hint: The answer is related to the marginal-revenue curve.)
  - On your diagram, show the quantity and price that maximizes total revenue.
8. For many years, AT&T was a regulated monopoly, providing both local and long-distance telephone service.
- Explain why long-distance phone service was originally a natural monopoly.
  - Over the past two decades, many companies have launched communication satellites, each of which can transmit a limited number of calls. How did the growing role of satellites change the cost structure of long-distance phone service?

After a lengthy legal battle with the government, AT&T agreed to compete with other companies in the long-distance market. It also agreed to spin off its local phone service into the "Baby Bells," which remain highly regulated.

- Why might it be efficient to have competition in long-distance phone service and regulated monopolies in local phone service?
9. You live in a town with 300 adults and 200 children, and you are thinking about putting on a play to entertain your neighbors and make some money. A play has a fixed cost of \$2,000, but selling an extra ticket has zero marginal cost. Here are the demand schedules for your two types of customer:

| Price | Adults | Children |
|-------|--------|----------|
| \$10  | 0      | 0        |
| 9     | 100    | 0        |
| 8     | 200    | 0        |
| 7     | 300    | 0        |
| 6     | 300    | 0        |
| 5     | 300    | 100      |
| 4     | 300    | 200      |
| 3     | 300    | 200      |
| 2     | 300    | 200      |
| 1     | 300    | 200      |
| 0     | 300    | 200      |

- To maximize profit, what price would you charge for an adult ticket? For a child's ticket? How much profit do you make?
  - The city council passes a law prohibiting you from charging different prices to different customers. What price do you set for a ticket now? How much profit do you make?
  - Who is worse off because of the law prohibiting price discrimination? Who is better off? (If you can, quantify the changes in welfare.)
  - If the fixed cost of the play were \$2,500 rather than \$2,000, how would your answers to parts (a), (b), and (c) change?
10. If the government wanted to encourage a monopoly to produce the socially efficient quantity, should it use a per-unit tax or a per-unit subsidy? Explain how this tax or subsidy would achieve the socially efficient level of output. Among the various interested parties—the monopoly firm, the monopoly's consumers, and other taxpayers—who would support the policy and who would oppose it?
11. Many schemes for price discriminating involve some cost. For example, discount coupons take up the time and resources of both the buyer and the seller. This question considers the implications of costly price discrimination. To keep things simple, let's assume that our monopolist's production costs are simply proportional to output so that average total cost and marginal cost are constant and equal to each other.
- Draw the cost, demand, and marginal-revenue curves for the monopolist. Show the price the monopolist would charge without price discrimination.
  - In your diagram, mark the area equal to the monopolist's profit and call it X. Mark the area equal to consumer surplus and call it Y. Mark the area equal to the deadweight loss and call it Z.



- c. Now suppose that the monopolist can perfectly price discriminate. What is the monopolist's profit? (Give your answer in terms of  $X$ ,  $Y$ , and  $Z$ .)
  - d. What is the change in the monopolist's profit from price discrimination? What is the change in total surplus from price discrimination? Which change is larger? Explain. (Give your answer in terms of  $X$ ,  $Y$ , and  $Z$ .)
  - e. Now suppose that there is some cost of price discrimination. To model this cost, let's assume that the monopolist has to pay a fixed cost  $C$  to price discriminate. How would a monopolist make the decision whether to pay this fixed cost? (Give your answer in terms of  $X$ ,  $Y$ ,  $Z$ , and  $C$ .)
  - f. How would a benevolent social planner, who cares about total surplus, decide whether the monopolist should price discriminate? (Give your answer in terms of  $X$ ,  $Y$ ,  $Z$ , and  $C$ .)
  - g. Compare your answers to parts (e) and (f). How does the monopolist's incentive to price discriminate differ from the social planner's? Is it possible that the monopolist will price discriminate even though it is not socially desirable?
12. Only one firm produces and sells soccer balls in the country of Wiknam, and as the story begins, international trade in soccer balls is prohibited. The following equations describe the monopolist's demand, marginal revenue, total cost, and marginal cost:

$$\begin{aligned}\text{Demand: } P &= 10 - Q \\ \text{Marginal Revenue: } MR &= 10 - 2Q \\ \text{Total Cost: } TC &= 3 + Q + 0.5Q^2 \\ \text{Marginal Cost: } MC &= 1 + Q\end{aligned}$$

where  $Q$  is quantity and  $P$  is the price measured in Wiknamian dollars.

- a. How many soccer balls does the monopolist produce? At what price are they sold? What is the monopolist's profit?
- b. One day, the King of Wiknam decrees that henceforth there will be free trade—either imports or exports—of soccer balls at the world price of \$6. The firm is now a price taker in a competitive market. What happens to domestic production of soccer balls? To domestic consumption? Does Wiknam export or import soccer balls?

- c. In our analysis of international trade in Chapter 9, a country becomes an exporter when the price without trade is below the world price and an importer when the price without trade is above the world price. Does that conclusion hold in your answers to parts (a) and (b)? Explain.
  - d. Suppose that the world price was not \$6 but, instead, happened to be exactly the same as the domestic price without trade as determined in part (a). Would allowing trade have changed anything in the Wiknamian economy? Explain. How does the result here compare with the analysis in Chapter 9?
13. Based on market research, a film production company in Ectenia obtains the following information about the demand and production costs of its new DVD:

$$\begin{aligned}\text{Demand: } P &= 1,000 - 10Q \\ \text{Total Revenue: } TR &= 1,000Q - 10Q^2 \\ \text{Marginal Revenue: } MR &= 1,000 - 20Q \\ \text{Marginal Cost: } MC &= 100 + 10Q\end{aligned}$$

where  $Q$  indicates the number of copies sold and  $P$  is the price in Ectenian dollars.

- a. Find the price and quantity that maximizes the company's profit.
- b. Find the price and quantity that would maximize social welfare.
- c. Calculate the deadweight loss from monopoly.
- d. Suppose, in addition to the costs above, the director of the film has to be paid. The company is considering four options:
  - i. A flat fee of 2,000 Ectenian dollars
  - ii. 50 percent of the profits
  - iii. 150 Ectenian dollars per unit sold
  - iv. 50 percent of the revenue
 For each option, calculate the profit-maximizing price and quantity. Which, if any, of these compensation schemes would alter the deadweight loss from monopoly? Explain.

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