

# 10

## REVENUE

### OVERVIEW

1. When a firm changes the price of its own good, it will affect its own revenue. But it may also affect the revenue of other firms.
2. The ability of a firm to control its own price is called market power.
3. Market structure refers to three elements of market organization that affect the market power of firms. The three elements are the number of firms in the market, freedom of entry, and the degree to which the product is standardized.
4. A market with many firms, free entry, and standardized product is perfectly competitive, and no firm has any market power. As entry becomes difficult, or the product is differentiated, the number of firms is reduced, and the firms gain market power. When there is one firm, blocked entry, and no acceptable substitutes, the market is a monopoly.
5. In either the perfectly competitive market or the monopoly market, the revenue of one firm is unrelated to the revenue of another firm. In perfect competition, the lack of market power makes it impossible for a firm to change its price, so it cannot affect another firm's revenue. In monopoly, there is no other firm to affect. In all other market structures, firms will have related revenues.
6. Total revenue is price times quantity sold. Marginal revenue is the change in total revenue due to a change in output.
7. In perfect competition, no firm has market power and each firm accepts the horizontal line at the market price as its demand curve. The market price is constant to the individual firm. When this firm sells another unit of output, total revenue changes by the price. So the marginal revenue is equal to the price.
8. A monopoly must lower price on all units to sell another unit. The marginal revenue is the extra revenue from the extra unit sold, the price of that unit, minus the reduction in revenue due to the lower price. Since the firm receives less than the price of the extra unit, marginal revenue is less than price. Price is on the demand curve, so marginal revenue is below the downward-sloping demand for a monopoly.

## MATCHING

- |       |    |                              |    |   |
|-------|----|------------------------------|----|---|
| _____ | 1. | market power                 | a. | the total receipts to the firm from the selling of output           |
| _____ | 2. | market structure             | b. | the consumer cannot distinguish one firm's output from another      |
| _____ | 3. | easy entry                   | c. | the change in total revenue when one more unit of output is sold    |
| _____ | 4. | standardized product         | d. | a market with only one seller, no substitutes, and restricted entry |
| _____ | 5. | differentiated product       | e. | the ability of a firm to control price                              |
| _____ | 6. | perfectly competitive market | f. | the output of one firm can be distinguished from that of another    |
| _____ | 7. | total revenue                | g. | a market with many firms, standardized product, and easy entry      |
| _____ | 8. | marginal revenue             | h. | the elements of a market that affect the behavior of firms          |
| _____ | 9. | monopoly                     | i. | the absence of barriers to entry                                    |

## TRUE-FALSE

- \_\_\_\_\_ 1. If there is a perfectly competitive market, then the firm can determine its own price.
- \_\_\_\_\_ 2. If the firm is perfectly competitive, then the marginal revenue slopes down.
- \_\_\_\_\_ 3. If the firm is a monopoly, then marginal revenue is less than price.
- \_\_\_\_\_ 4. If there is easy entry, then it is most likely that the firm is a monopoly.
- \_\_\_\_\_ 5. If the marginal revenue is falling, then total revenue must also fall.

- \_\_\_\_\_ 6. If the firm is a monopoly, then the firm can choose both price and quantity.

### PROBLEMS

1. Suppose you were given the following hypothetical information. Which markets are more likely to be perfectly competitive?

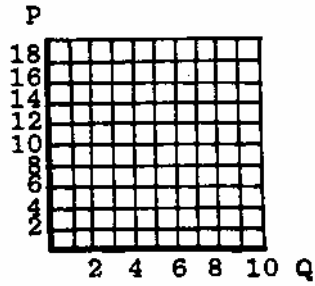
| Market         | Number of firms | Product standard? | Easy entry? | Perfectly competitive? |
|----------------|-----------------|-------------------|-------------|------------------------|
| U. S. auto     | 250             | No                | No          |                        |
| World auto     | 700             | No                | No          |                        |
| Steel in U.S.  | 10              | Yes               | No          |                        |
| Oats           | 100,000         | Yes               | Yes         |                        |
| Potato chips   | 250             | No                | Yes         |                        |
| Soft drink     | 2200            | No                | Yes         |                        |
| Gasoline brand | 150             | Yes               | No          |                        |
| Shirts         | 2000            | No                | No          |                        |

2. One measure of competition is called the concentration ratio. It measures the percent of the market held by the largest four firms. It is sometimes thought that a large concentration ratio is a sign of monopoly, while a small concentration ratio is a sign of competition. In the following table we list some industries and their concentration ratio. Which would you classify as monopoly and which as perfectly competitive?

| Industry          | Concentration ratio | Perfectly competitive? |
|-------------------|---------------------|------------------------|
| motor vehicles    | 93                  |                        |
| aircraft          | 59                  |                        |
| bread, cake, etc. | 33                  |                        |
| sawmills          | 17                  |                        |

- 3.a. Given the following information for a perfectly competitive firm, calculate marginal revenue. As output goes from 1 to 2, total revenue goes from 5 to 10. The change in total revenue is 5; the marginal revenue of the second unit is \$5. Continue for all levels of output.

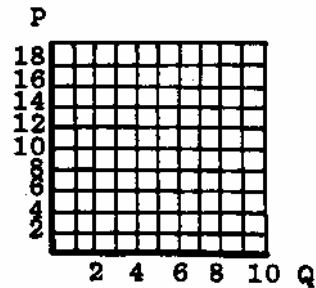
| output | price | total revenue | marginal revenue |
|--------|-------|---------------|------------------|
| 1      | \$5   | 5             | -                |
| 2      | 5     | 10            |                  |
| 3      | 5     | 15            |                  |
| 4      | 5     | 20            |                  |
| 5      | 5     | 25            |                  |
| 6      | 5     | 30            |                  |
| 7      | 5     | 35            |                  |
| 8      | 5     | 40            |                  |



b. Graph marginal revenue on the graph provided.

4. a. Given the following information for a monopoly firm, calculate total revenue by multiplying output by price.

| output | Demand price | total revenue | marginal revenue |
|--------|--------------|---------------|------------------|
| 1      | \$20         |               | -                |
| 2      | 18           |               |                  |
| 3      | 16           |               |                  |
| 4      | 14           |               |                  |
| 5      | 12           |               |                  |
| 6      | 10           |               |                  |
| 7      | 8            |               |                  |
| 8      | 6            |               |                  |
| 9      | 4            |               |                  |



- b. Use total revenue to calculate marginal revenue. As output goes from 1 to 2, total revenue goes from \$20 to \$36. The change in total revenue is \$16; the marginal revenue of the second unit is \$16. Continue for all levels of output.
- c. Graph marginal revenue on the graph provided.
- d. Graph demand on the same graph.
- e. What is the relationship of demand to marginal revenue?
- 
- f. How is the marginal revenue graph of a monopoly different from the marginal revenue graph of the perfectly competitive firm in problem 3?
- 

### IN THE NEWS

1. There are several major steel producers. They sell steel to many users. When a company wants to buy steel, it will consider several different sources of steel. Each steel producer would like to get the business, and it submits a bid for the job. Only one steel producer gets the contract.

- a. How are the revenues of one steel firm affected by the price of another firm?  
 \_\_\_\_\_  
 \_\_\_\_\_
- b. Discuss the market structure of this industry. \_\_\_\_\_  
 \_\_\_\_\_
2. When a farmer sells corn, it is graded and priced. The farmer then receives payment based on the volume of corn sold.
- a. How much more revenue will the farmer receive for selling one more bushel of corn?  
 \_\_\_\_\_
- b. Is this industry perfectly competitive? \_\_\_\_\_ Why? \_\_\_\_\_  
 \_\_\_\_\_
3. The local nursery has a special offer. Buy one maple tree and get the second for half price.
- a. What is the marginal revenue of the second tree? \_\_\_\_\_
- b. Is this market more like perfect competition or more like monopoly? Why?  
 \_\_\_\_\_
4. Many ice cream parlors sell the second scoop for less than the first and the third scoop for less than the second.
- a. What can you conclude about marginal revenue? \_\_\_\_\_  
 \_\_\_\_\_
- b. Is this pricing more like perfect competition or more like monopoly?  
 \_\_\_\_\_
5. Recycling centers offer to pay for aluminum cans. Enterprising collectors are collecting cans and selling them to the centers. The collectors eagerly watch their revenues.
- a. How much more will the collectors get if they bring one more can to the center?  
 \_\_\_\_\_
- Is the marginal revenue less than price? \_\_\_\_\_
- b. Are the collectors engaged in a perfectly competitive or monopolistic market? Explain.  
 \_\_\_\_\_  
 \_\_\_\_\_

### PRACTICE TEST

Circle the correct response.

1. The total revenue from selling 9 units is \$80. The total revenue from 10 units is \$86. What is the marginal revenue of the tenth unit?
- a. \$6  
 b. \$10  
 c. \$80  
 d. \$86

2. Elements of market structure include all except
  - a. the number of firms in the market.
  - b. freedom of entry.
  - c. the degree to which the product is standardized.
  - d. the revenue collected.
  
3. In the case of perfect competition: .
  - a. the market demand and supply determine the firm's demand.
  - b. market demand is the firm's demand.
  - c. market supply determines the firm's demand.
  - d. the individual firm determines price.
  
4. In perfect competition, price is always \_\_\_\_\_ marginal revenue.
  - a. greater than
  - b. equal to
  - c. less than
  - d. unrelated to
  
5. What is the relation of price to marginal revenue for the monopoly firm?
  - a. Price is always less.
  - b. Marginal revenue is always less.
  - c. Price and marginal revenue are always equal.
  - d. No relation can be determined.

### ANSWERS

#### Matching

1. e
2. h
3. i
4. b
5. f
6. g
7. a
8. c
9. d

#### True-False

1. F
2. F
3. T
4. F
5. F

Problems

| 1. | Market         | Perfectly competitive? |
|----|----------------|------------------------|
|    | U. S. auto     | No                     |
|    | World auto     | No                     |
|    | Steel in U.S.  | No                     |
|    | Oats           | Yes                    |
|    | Potato chips   | No                     |
|    | Soft drink     | No                     |
|    | Gasoline brand | No                     |
|    | Shirts         | No                     |

Neither auto market is perfectly competitive because the number of firms is not large enough and the product is not standardized. Similar comments apply to steel. Oats is probably perfectly competitive. There are many sellers and the product is standardized. Also entry into the market is easy. Potato chips and soft drinks are slightly different. There are more producers of potato chips than soft drinks which would lead us to think that the chip market might be more competitive than the soft drink market. But both markets involve products which are not standardized. Soft drink makers are particularly aggressive about asserting the differences in their products. Chip makers have the opportunity to make their product differentiated by adding flavors or ridges. Gasoline is not perfectly competitive. Even though the product is fairly standardized, there are not enough firms to achieve a perfectly competitive market, and entry into the market is not easy. Shirts? The market lacks a standardized product. One easy test to apply to see if a market is perfectly competitive is whether the firms advertise. If the firms advertise, then they are not perfectly competitive.

| 2. | Industry          | Concentration ratio | Perfectly competitive? |
|----|-------------------|---------------------|------------------------|
|    | motor vehicles    | 93                  | No                     |
|    | aircraft          | 59                  | No                     |
|    | bread, cake, etc. | 33                  | Yes                    |
|    | sawmills          | 17                  | Yes                    |

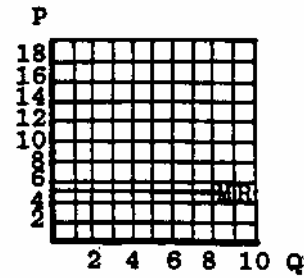
Motor vehicles is a likely to be a monopoly. Even though there are more than 4 firms, 4 of the firms do 93 percent of the business. The smaller firms are not likely to have an impact on the price of automobiles.

Sawmills probably approach perfectly competitive conditions. Four firms share 17 percent of the market meaning that each firm has about 4 percent of the total market. No one firm is so large that it can affect price. In the case of aircraft and bread and cake, it is not so clear what the market structure is. It is thought that any industry where the concentration ration is more than 50 is more like monopoly than competition. So aircraft is more like monopoly. Bread and cake is more competitive.

3.a.

| output | price | total revenue | marginal revenue |
|--------|-------|---------------|------------------|
| 1      | \$5   | 5             | -                |
| 2      | 5     | 10            | 5                |
| 3      | 5     | 15            | 5                |
| 4      | 5     | 20            | 5                |
| 5      | 5     | 25            | 5                |
| 6      | 5     | 30            | 5                |
| 7      | 5     | 35            | 5                |
| 8      | 5     | 40            | 5                |

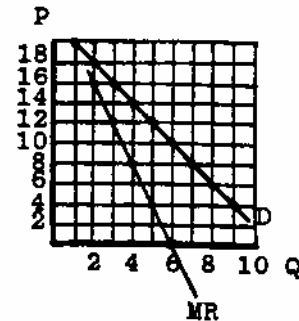
b.



4.a. and b.

| output | Demand price | total revenue | marginal revenue |
|--------|--------------|---------------|------------------|
| 1      | \$20         | \$20          | -                |
| 2      | 18           | 36            | 16               |
| 3      | 16           | 48            | 12               |
| 4      | 14           | 56            | 8                |
| 5      | 12           | 60            | 4                |
| 6      | 10           | 60            | 0                |
| 7      | 8            | 56            | -4               |
| 8      | 6            | 48            | -8               |
| 9      | 4            | 36            | -12              |

c. and d.



- e. MR Marginal revenue is below demand at each level of output for the monopolist.
- f. The marginal revenue for a monopoly is downward sloping from left to right and the marginal revenue is below demand. In the perfectly competitive case, the firm's demand is horizontal and equal to the price and the marginal revenue.

#### In the News

1. a. If one steel firm makes a bid that is higher than the bid price of another firm, then the higher-priced firm will not get the work and its revenue will be less. The fact that there is another firm with a lower price causes one firm's revenues to be lower than it would if there were no other firm.
- b. The market structure in the steel industry involves a standardized product. There are some substitutes in the form of glass, aluminum, fiberglass, and other metals. There are barriers to entry because of the high cost of getting into the industry. The industry is not perfectly competitive or a monopoly.

2.
  - a. The farmer will get the price of a bushel of corn.
  - b. The industry is perfectly competitive because the marginal revenue is equal to the price of the product.
3.
  - a. The marginal revenue of the second unit is half the price of the first unit.
  - b. This market is more like a monopoly because the marginal revenue is less than price.
4.
  - a. The marginal revenue falls as you buy more scoops.
  - b. The market is more like monopoly because the marginal revenue is downward sloping from left to right.
5.
  - a. When another can is sold, the extra revenue from the added can is the same as for the previous can, and equal to the price.
  - b. This market is more like a perfectly competitive market because the marginal revenue is equal to the price.

#### Practice Test

1.a., 2.d., 3.a., 4.b., 5.b.