

### 11-1c PATENTS

Most countries have patent laws to give inventors a property right to their inventions. A patent grants the owner the exclusive legal right to the commercial use of a newly invented product or process for a limited period of time—twenty years in the United States. Others are not allowed to copy the product or procedure without the permission of the patent holder. For example, when a pharmaceutical company is granted a patent for a newly developed drug, other potential suppliers must obtain permission from the patent holder before producing and selling the product during the life of the patent. Others might be able to supply the drug more economically. During that time period though, if they want to do so while the patent is in effect, they will have to purchase the production and marketing rights from the originating firm.

Both costs and benefits for consumers come with a patent system. The entry barrier created by the grant of a patent generally leads to higher consumer prices for several years, for products that have already been developed. On the positive side, however, patents increase the potential returns to inventive activity, thus encouraging scientific research and technological improvements. As we noted in the previous chapter, entrepreneurial discovery will occur at a faster rate when it is more profitable. A study at the Federal Trade Commission estimated the average cost of developing and testing a new pharmaceutical drug at more than \$1 billion.<sup>2</sup> Without the profit potential accompanying patents, the incentive to engage in research and develop new products would be reduced.

### 11-1d CONTROL OVER AN ESSENTIAL RESOURCE

Control over a resource essential to produce a product may also insulate a firm from direct competitors. An example often cited is the Aluminum Company of America, which before World War II controlled the known supply of bauxite conveniently available to American firms. Without this critical raw material, potential competitors could not produce aluminum. Over time, however, other supplies of bauxite were discovered, and the Aluminum Company of America lost its advantage. Resource monopolies are seldom complete or long lasting. Profit opportunities provide potential competitors with an incentive to search for mineral deposits, new technologies, and substitute resources. Over time, they are usually found.

Barriers to entry like the different ones we've just described are often temporary, but they do exist. Let's see what happens when, at least temporarily, there is a barrier to entry high enough to limit the market to only one seller.

## 11-2 CHARACTERISTICS OF A MONOPOLY

The word *monopoly*, derived from two Greek words, means "single seller." We will define **monopoly** as a market characterized by (1) high barriers to entry and (2) a single seller of a well-defined product for which there are no good substitutes. Even this definition is ambiguous, because "high barriers" and "good substitutes" are both relative terms. Are the barriers to entry into the automobile or steel industries high? Many observers would argue

<sup>2</sup>See Christopher P. Adams and Van V. Brantner, "Estimating the Cost of New Drug Development: Is It Really \$802 Million?" *Health Affairs* 25, no. 2 (March/April 2006): 421–28.



AP Images/Toby Talbot, file

Both the Keurig coffee maker and the pods (K-Cups) were protected by patents, so companies like Starbucks and Dunkin' Donuts had to pay licensing fees to sell coffee in the patented K-Cups. In 2012 patents on the K-Cups expired, so other companies can now produce and sell K-Cups that are compatible with the Keurig machine. The increased competition will result in lower prices for consumers.

### Monopoly

A market structure characterized by (1) a single seller of a well-defined product for which there are no good substitutes and (2) high barriers to the entry of any other firms into the market for that product.

that they are. After all, it takes a great deal of capital to operate at the least-cost scale of output in both of these industries. However, there are no *physical* or *legal* restraints that prevent an entrepreneur from producing automobiles or steel. If price is well above cost and profit potential is present, it should not be too difficult to find the necessary investment capital. Thus, some would argue that entry barriers into these industries are not particularly high.

“Good substitute” is also a subjective term. There is always some substitutability among products, even those produced by a single seller. Is a letter a good substitute for a telephone or e-mail message? For some purposes—correspondence between law firms, for example—a letter delivered by mail is a very good substitute. In other cases, when the speed of communication and immediacy of response are important, the telephone and e-mail are far superior forms of communication.

Monopoly, then, is a matter of degree. Only a small fraction of all markets are served by just one seller. In a few markets, governments have allocated specific markets to a single seller. In many communities, this is the case with cable television and providers of electricity. The monopoly model we discuss next will illuminate the operation of these markets. It will also help us understand markets in which there are just a few sellers and little active rivalry. When there are only two or three producers in a market, firms may seek to collude rather than compete, and thus, together, they may behave much like a monopoly.

## 11-2a PRICE AND OUTPUT UNDER MONOPOLY

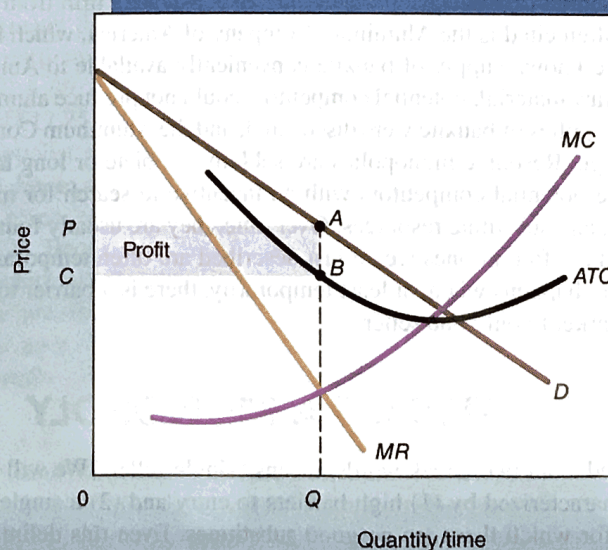
Because a monopolist is a price searcher like the firms we examined in the previous chapter, the graphical analysis is similar. The main difference is that because the monopolist is the only seller in the market, the demand curve facing the firm ( $d$ ) is the entire market demand curve ( $D$ ), and the firm’s output ( $q$ ) is the entire market output ( $Q$ ). ***Like other price searchers, the monopolist will expand its output until marginal revenue equals marginal cost. This profit-maximizing output rate can be sold at the price indicated on the firm’s demand curve.***

Exhibit 1 graphically illustrates how a monopolist derives the profit-maximizing output rate.<sup>3</sup> Output will be expanded to  $Q$ , where  $MR = MC$ . The monopolist will

### EXHIBIT 1

#### The Short-Run Price and Output of a Monopolist

The monopolist will reduce its price and expand its output as long as  $MR$  exceeds  $MC$ . Output  $Q$  will result. When the price exceeds the average total cost at any output level, a profit will be earned.



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<sup>3</sup>In this chapter, we assume that firms are unable to use price discrimination to increase their revenues. If they could, the analysis of price discrimination from the previous chapter would be relevant to their decision-making.

## EXHIBIT 2

## Profit Maximization for a Monopolist

RATE OF OUTPUT (PER DAY) (1)	PRICE (PER UNIT) (2)	TOTAL REVENUE (1) × (2) (3)	TOTAL COST (PER DAY) (4)	PROFIT (3) – (4) (5)	MARGINAL COST (6)	MARGINAL REVENUE (7)
0	—	—	\$50.00	\$–50.00	—	—
1	\$25.00	\$25.00	60.00	–35.00	\$10.00	\$25.00
2	24.00	48.00	69.00	–21.00	9.00	23.00
3	23.00	69.00	77.00	–8.00	8.00	21.00
4	22.00	88.00	84.00	4.00	7.00	19.00
5	21.00	105.00	90.50	14.50	6.50	17.00
6	19.75	118.50	96.75	21.75	6.25	13.50
7	18.50	129.50	102.75	26.75	6.00	11.00
8	17.25	138.00	108.50	29.50	5.75	8.50
9	16.00	144.00	114.75	29.25	6.25	6.00
10	14.75	147.50	121.25	26.25	6.50	3.50
11	13.50	148.50	128.00	20.50	6.75	1.00
12	12.25	147.00	135.00	12.00	7.00	–1.50
13	11.00	143.00	142.25	.75	7.25	–4.00

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set a price of  $P$  to sell exactly the desired profit-maximizing level of output  $Q$  (the height of the demand curve at  $Q$ ). Thus, output rate  $Q$  and price  $P$  will maximize the firm's profit.

The profits earned by the monopolist are also shown in Exhibit 1. At output  $Q$  and price  $P$ , the firm's total revenue is equal to  $PAQO$ , the price times the number of units sold. The firm's total cost would be  $CBQO$ , the average per-unit cost multiplied by the number of units sold. The firm's profits are total revenue less total cost, the shaded area of Exhibit 1 ( $PABC$ ).

Exhibit 2 provides a numeric illustration of decision-making by a profit-maximizing monopolist. At low output rates, marginal revenue exceeds marginal cost. The monopolist will expand output as long as  $MR$  is greater than  $MC$ . Thus, an output rate of eight units per day will be chosen. (Note: If tiny portions of a unit could be produced and sold, then production would increase to where  $MR = MC$ .) Given the demand for the product, the monopolist can sell eight units at a price of \$17.25 each. Total revenue will be \$138, compared with a total cost of \$108.50. The monopolist will make a profit of \$29.50. The profit rate will be smaller at all other output rates. For example, if the monopolist reduces the price to \$16 in order to sell nine units per day, revenue will increase by \$6. However, the marginal cost of producing the ninth unit is \$6.25. Because the cost of producing the ninth unit is greater than the revenue it brings in, profits will decline.

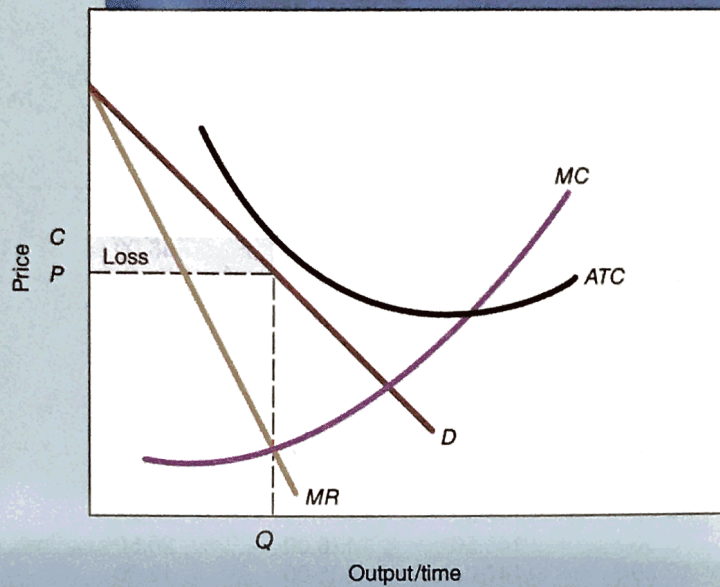
**When high barriers to entry are present, they will insulate the monopolist from competition from new entrants producing a similar product. Thus, in markets with high entry barriers, short-run monopoly profits will not be competed away through the process of entry.**

Protected by high entry barriers, a monopolist may be able to continue earning a profit, even in the long run. Does this mean that monopolists can charge as high a price as they want? Monopolists are often accused of price gouging. In evaluating this charge, however, it is important to recognize that, like other sellers, monopolists will seek to maximize *profit*, not *price*. Consumers will buy less as the price increases. Thus, a higher price is not always better for a monopolist. Exhibit 2 illustrates this point. What would happen to the profit of the monopolist if the price were increased from \$17.25 to \$18.50? At the higher price, only seven units would be sold, and total revenue would equal \$129.50. The cost of producing seven units would be \$102.75. Thus, when the

**EXHIBIT 3**

**How a Monopolist Can Lose Money**

Even a monopolist will lose money if its average total cost curve lies everywhere above the demand curve.



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price is \$18.50 and output seven units, profit is only \$26.75—less than it would be at the lower price (\$17.25) and larger output (eight units). The highest price is not usually the best price for the monopolist.

Will a monopolist always earn a profit? The ability of a monopolist to cover cost and make a profit is limited by the demand for the product that it produces. In some cases, a monopolist—even one protected by high barriers to entry—may be unable to sell its product for a profit. For example, there are thousands of clever, patented items that are never produced because demand–cost conditions are not favorable. Exhibit 3 illustrates this possibility. Here, the monopolist’s average total cost curve is above its demand curve at every level of output. Even when operating at the  $MR = MC$  rate of output, economic losses (shaded area) will occur. While output  $Q$  could be sold at price  $P$ , this price and quantity yield too little revenue to cover cost for the monopolist. This model explains why many small towns lack even a single bookstore, gourmet coffee shop, or any number of other specialty stores, even though if one opened up it would be the only one in town. Under these circumstances, not even a monopolist would want to operate—at least not for long.

**11-3 THE CHARACTERISTICS OF AN OLIGOPOLY**

In the United States, the domestic output in certain industries, such as the automobile, cigarette, and aircraft industries, is produced by five or fewer dominant firms. These industries are characterized by **oligopoly**. *Oligopoly* means “few sellers.” *The distinguishing characteristics of an oligopolistic market are (1) a small number of rival firms, (2) interdependence among the sellers because each is large relative to the size of the market, (3) substantial economies of scale, and (4) high entry barriers to the market.*

**Oligopoly**

A market situation in which a small number of sellers constitutes the entire industry. It is competition among the few.

**11-3a INTERDEPENDENCE AMONG OLIGOPOLISTIC FIRMS**

Because the number of sellers in an oligopolistic industry is small, the supply decisions of any one firm will significantly influence the demand, price, and profit of rival firms. This adds to the complexity of the firm’s decision-making. A firm that is deciding what price