

least for some time, in the sense that its machines are specialized to this particular market. If the monopsony lowers its price to \$9, it may not pay for the firm to exit immediately. But the firm will not replace the specialized machines when they wear out, and the monopsony may eventually have no one willing to supply the product. Even if the buyer again promises \$10 per unit to induce a supplier to enter, no firm would believe the buyer in light of its previous behavior. So, for a buyer that is concerned about a long-run source of supply, it may not pay to exercise short-run monopsony power.



## Dominant Firm with a Competitive Fringe

*Where does the gorilla sleep?  
Anywhere the gorilla wants to sleep.*

What happens to a monopoly if other, higher-cost firms enter its market? Or, similarly, what happens if a lower-cost firm enters a market with many price-taking, higher-cost firms? After entry, the lower-cost firm has a relatively large share of the market. If one firm is a price setter and faces smaller, price-taking firms, it is called a **dominant firm**. It typically has a large market share. The smaller, price-taking firms, called **fringe firms**, each have a very small share of the market, though collectively they may have a substantial share of the market.

There are several industries in which one firm has a large share of the industry sales. For example, Kodak's share of the photographic film business has been estimated at 65 percent.<sup>15</sup> Hewlett-Packard is estimated to have 59 percent of laser printer sales.

We begin by discussing what makes a firm dominant. We then analyze how entry limits a dominant firm's market power. We examine two extreme cases. In the first, entry by other firms is impossible. In the second, entry by competing fringe firms can occur instantaneously. The analysis shows that a dominant firm's price-setting behavior depends on the ease of entry by fringe firms.

We draw two main conclusions. First, it is generally not in a profit-maximizing dominant firm's best interest to set its price so low that it drives all competitive-fringe firms out of the market. Second, the presence of competitive-fringe firms or the threat of entry by additional firms may force a dominant firm to set a price lower than the price a monopoly would set (see Example 4.8).

If a sufficiently large number of price-taking firms can enter the market, a dominant firm cannot continue to charge a price higher than the minimum average cost of these new firms. Indeed, if potential entrants' costs are as low as the dominant firm's, the dominant firm eventually has no more market power than any other firm.

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<sup>15</sup>A firm's share of sales in an industry depends crucially on how the industry is defined, and hence is often controversial, especially in court proceedings.

**EXAMPLE 4.8**

## Price Umbrella

It is often asserted that a dominant firm provides a *pricing umbrella* for smaller firms. As long as competing firms price at or below the level of the dominant firm, they will be able to find buyers. If their products are inferior (say because they are risky to use for legal reasons), the fringe firms have to set their prices substantially below the dominant firm's.

In many countries, phone monopolies charge rates that are more than twice those in the United States, where competition has kept rates relatively low. This price difference causes problems for the monopolies.

"Callback" services offer some customers a way to evade paying high monopoly prices. A callback service provides a "trigger" number connected to a computer in the United States. The customer calls that number using the monopoly service and hangs up before the phone is answered, paying nothing for the incomplete call. The computer calls the customers back and offers an American dial tone, which can be used to place a call anywhere in the world for rates well below the monopoly price. In some cases, the callback rates are less than the price of a local call. Hundreds of American companies provide these services, and the rate of use has grown exponentially over time. Ghana's monopoly is reported to lose \$1 million each week to callback and Internet services.

To protect local monopolies, governments in many countries—including Argentina, Canada's Northwest Territories, China, Malaysia, Saudi Arabia, South Korea, and Uganda—try to stop these services. The U.S. operators believe they are beyond the reach of local laws. For example, when Uganda blocked all calls to the Seattle, Washington, area code where one service, Kallback, is based, the company routed the calls through a different area. When other countries tried to identify and block the services by picking up the touch-tone beeps used to complete calls, Kallback added a voice-recognition system. As a firm spokesman said, "It's a cat and mouse game. It's kind of fun."

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Source: "Don't Call US," *The Economist*, 338(7947), January 6, 1996:55; [www.kallback.com](http://www.kallback.com); "Telecom Loses \$1m a Week, Communications Experts Say," *Ghanaian Chronicle*, February 7, 2003.

## Why Some Firms Are Dominant

*All animals are equal, but some animals are more equal than others.*

—George Orwell

Why do some firms gain substantial market power, while others do not? At least three possible reasons are sufficient to create a dominant firm-competitive fringe market structure.

The first reason is that *dominant firms may have lower costs than fringe firms*. There are at least four major causes of lower costs:

- A firm may be more efficient than its rivals. For example, it may have better management or better technology that allows it to produce at lower costs. Such a technological advantage may be protected by a patent.
- An early entrant to a market may have lower costs from having learned by experience how to produce more efficiently.
- An early entrant may have had time to grow large optimally (in the presence of adjustment costs) so as to benefit from economies of scale. By spreading fixed costs over more units of output, it may have lower average costs of production than a new entrant could instantaneously achieve.
- The government may favor the original firm. The U.S. Postal Service does not pay taxes or highway user fees, which reduces its cost relative to that of competing package delivery services.

A second important reason is that *a dominant firm may have a superior product* in a market where each firm produces a differentiated product. This superiority may be due to a reputation achieved through advertising or through goodwill generated by its having been in the market longer.

A third reason is that *a group of firms may collectively act as a dominant firm*. As Chapter 5 shows, groups of firms in a market have an incentive to coordinate their activities to increase their profits. A group of firms that explicitly acts collectively to promote its best interests is called a *cartel*. If all the firms in a market coordinate their activities, then the cartel is effectively a monopoly; if only some of them do so, then the group acts as a dominant firm facing a competitive fringe of noncooperating firms.

One example of a dominant firm is the cartel consisting of Philippine coconut-oil-producing firms that act in concert but face a fringe of firms in other countries that act as price takers. With nearly four-fifths of the world's export market, the Philippine cartel has dominant-firm market power with a Lerner Index of 0.89 (Buschena and Perloff 1991).

Whether a dominant firm can exercise market power in the long run depends crucially on the number of firms that can enter the market, how their production costs compare to those of the dominant firm, and how fast they can enter. We now examine the dominant firm-competitive fringe model under two alternative extreme assumptions about the ease of entry.

## The No-Entry Model

Consider a market with a dominant firm and a competitive fringe in which no additional fringe firms can enter. Two key results emerge from an analysis of this model: (1) It is more profitable to be the *gorilla* of a market than a mere fringe firm. (2) The existence of the fringe limits the dominant firm's market power—that is, it is more profitable to be the only firm in a market (a monopoly) than merely a dominant firm.

**Assumptions.** Five crucial assumptions underlie this no-entry model:

1. *There is one firm that is much larger than any other firm because of its lower production costs.* Although a market may be characterized by a small group of relatively large firms rather than a single dominant firm, we concentrate on the case of the single dominant firm for simplicity.
2. *All firms, except the dominant firm, are price takers,* determining their output levels by setting marginal cost equal to the market price ( $p$ ).
3. *The number of firms ( $n$ ) in the competitive fringe is fixed: No new entry can occur.* That is, the dominant firm knows that it can raise the market's price without causing new firms to enter the market or existing firms to build additional plants.
4. *The dominant firm knows the market's demand curve,  $D(p)$ .* Each firm produces a homogeneous product, so that there is a single price in this market.
5. *The dominant firm can predict how much output the competitive fringe will produce at any given price;* that is, it knows the competitive fringe's supply curve,  $S(p)$ .

The first three assumptions determine that this market has a dominant firm facing a competitive fringe with no more than  $n$  firms. The last two assumptions ensure that the dominant firm knows enough to be able to set its output level optimally.

**The Dominant Firm's Reasoning.** Suppose you ran the dominant firm. How would you choose your output level? Given your firm's large size, you could drive up the market's price by restricting your output. Unfortunately for you, as your dominant firm lowers its output and price rises, the competitive fringe output increases because the fringe supply curve,  $S(p)$ , is increasing in  $p$ . As a result, market output falls less than you would like, and the market price does not rise as high as it would if your firm had a monopoly.

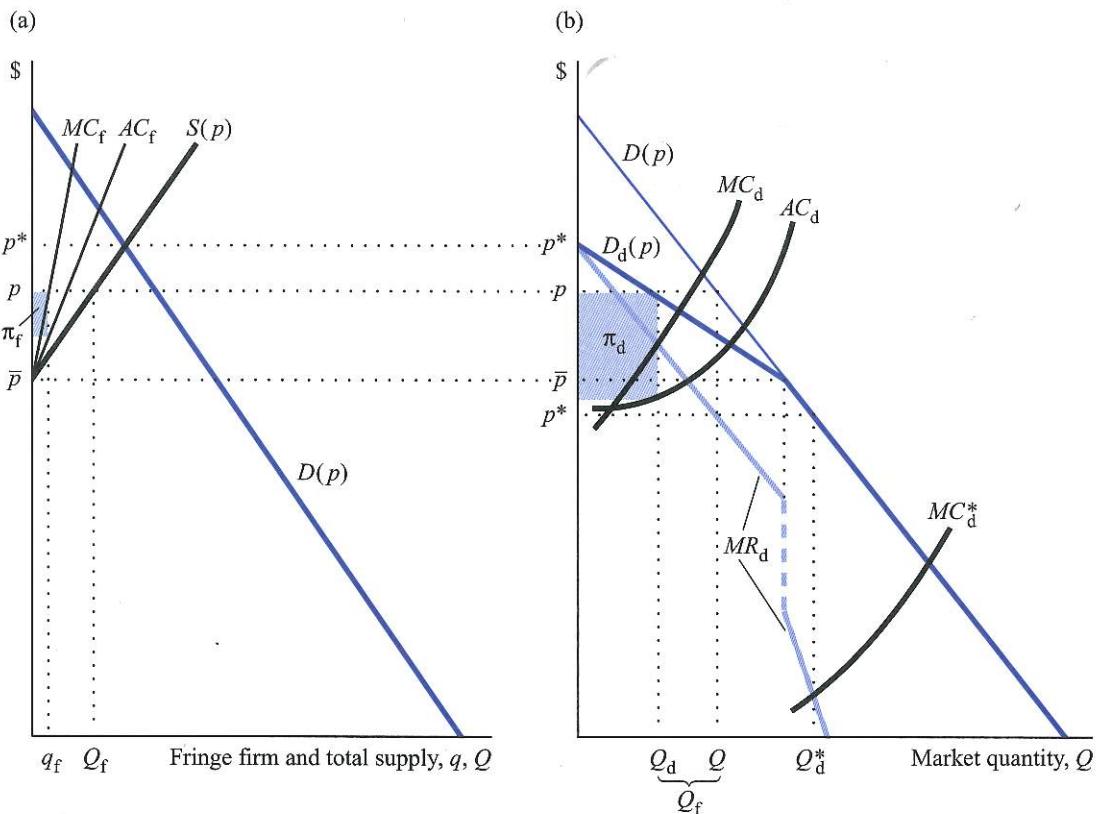
Thus, your dominant firm's problem is much more complex than that of a monopoly, which merely needs to consider the market demand curve (with its corresponding marginal revenue curve) and its marginal cost curve to determine its profit-maximizing output. Your dominant firm, in contrast, must consider not only those factors, but also how the competitive fringe responds to your actions.

To maximize your profits, you must take the competitive fringe's actions into account when setting your policy. A convenient way to calculate your optimal price level is to do the following thought experiment. For lack of an ability to stop them, let the fringe firms sell as much as they want at the market price: the price you set. Except at the very highest prices, the competitive fringe does not produce enough to meet all of the market's demand. Your dominant firm, then, is in a monopoly position with respect to this residual demand. Thus, you can determine your optimal output by a two-step procedure. First, determine your firm's residual demand curve; then, act like a monopoly with respect to the residual demand. This two-step procedure can be illustrated with the use of graphs.

**A Graphic Analysis of Dominant-Firm Behavior.** The first step is to determine the long-run residual demand curve facing the dominant firm. Figure 4.6 shows two graphs: (a) one for a representative competitive-fringe firm and for the entire competitive fringe, and (b) one for the dominant firm.

**FIGURE 4.6**

The Dominant Firm and the Competitive Fringe



The graph on the left, Figure 4.6a, shows the market demand curve,  $D(p)$ , and the supply curve of a typical, price-taking, competitive-fringe firm. The fringe firm's supply curve is its marginal cost curve above the minimum of its average cost curve  $\bar{p}$ . That is, the fringe firm's shutdown price is  $\bar{p}$ . Above  $\bar{p}$ , each fringe firm makes positive economic profits. At  $\bar{p}$ , each fringe firm makes zero profits and is indifferent between operating and shutting down.<sup>16</sup> Below  $\bar{p}$ , each firm shuts down, and the dominant firm is a monopoly.

The competitive fringe's supply curve,  $S(p)$ , is the horizontal summation of the individual fringe firm's supply curves, as Figure 4.6 shows. That is,  $S(p) = nq_f(p)$ , where  $n$  is the number of firms and  $q_f$  is the output of a typical fringe firm.

<sup>16</sup>As drawn, each fringe firm produces essentially no output at  $\bar{p}$ . If the firms had the usual U-shaped average cost curves, however, they would produce a positive amount of output at that price.

The dominant firm's residual demand curve is the horizontal difference between the market demand curve and the competitive fringe's supply curve:

$$D_d(p) = D(p) - S(p).$$

In Figure 4.6b, the market demand curve (thin blue line) is above the residual demand curve (heavy blue line) at prices above  $\bar{p}$  and equal to it at prices below  $\bar{p}$ . That is, the fringe firms meet some or all of the market demand if price is above  $\bar{p}$ , but they drop out of the market and leave all of the demand to the dominant firm if price falls below  $\bar{p}$ . At  $p^*$ , the quantity that the fringe supplies equals the quantity that the market demands, so the dominant firm has no residual demand.

The dominant firm maximizes its profits by picking a price (or equivalent, an output level) so that its marginal cost equals its marginal revenue. The dominant firm's marginal revenue curve ( $MR_d$ ) is derived from its residual demand curve and has two distinct sections. If the competitive fringe produces positive levels of output, the dominant firm's residual demand curve lies below (and is flatter than) the market demand curve. The dominant firm's marginal revenue curve,  $MR_d$ , in this region is flatter than the marginal revenue curve in the region where the dominant firm's residual demand curve and the market demand curve are coincident. There is a discrete jump between the two sections of the marginal revenue curve at the point where the residual demand curve and the market demand curve meet.

The dominant firm behaves as a monopoly would with respect to the residual demand; it sets its price (or output) so that its marginal cost equals marginal revenue. Because the marginal revenue curve has two sections, there are two possible types of equilibria; which one occurs depends on the dominant firm's cost curves.

We now consider two types of markets:

1. The dominant firm charges a high price, so that it makes economic profits and the fringe firms also make profits or break even.
2. The dominant firm sets a price so low that the fringe firms shut down to avoid making losses. The dominant firm is now a monopoly.

## The Dominant Firm–Competitive Fringe Equilibrium

The first type of equilibrium occurs if the dominant firm's costs are not substantially less than those of the fringe firms.<sup>17</sup> The dominant firm's marginal cost curve,  $MC_d$ , crosses the first downward-sloping segment of the marginal revenue curve,  $MR_d$ , in Figure 4.6b.

The dominant firm chooses to produce  $Q_d$  level of output at price  $p$  (the height of the residual demand curve at the output level  $Q_d$ ). At the price level  $p$ , the difference between the market demand,  $Q$ , and the dominant firm's output,  $Q_d$ , is the competitive fringe's supply,  $Q_f$  (which is shown in Figures 4.6a and 4.6b). If the dominant

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<sup>17</sup>A mathematical analysis of this case is presented at [www.aw-bc.com/carlton\\_perloff](http://www.aw-bc.com/carlton_perloff) "Dominant Firm and Competitive Fringe Model."

firm's costs are this high, it does not drive the competitive fringe out of business. Its own profits are maximized at a price so high that the fringe firms make positive profits.

In most markets, positive economic profits would attract new entrants. In this market, however, no new firms can enter (by assumption), so both the dominant firm and the competitive fringe firms can make positive profits forever. In Figure 4.6b, the dominant firm's profits are labeled  $\pi_d$ . The profits of a typical fringe firm are positive as well (because  $p > \bar{p}$ ), and a typical fringe firm's profits are shown as  $\pi_f$  in Figure 4.6a. Because the dominant firm's average cost is lower than that of the fringe firms (minimum  $AC_d < \bar{p}$ ), the dominant firm makes more profits per unit (average profits), and it also sells more units than an individual fringe firm, so it must make more total profits as well.

Thus, the dominant firm maximizes its profits by charging a price so high that it loses some of its market share to the competitive fringe. It does not make sense for the dominant firm to set its price so low that it drives the fringe out of business, even though that would increase the number of units of output the dominant firm could sell. After all, few good business people accept the argument, "I lose a little on every sale, but make up for it in volume."

The dominant firm makes lower profits than it would if it were a monopoly and the fringe did not exist. The fringe can only hurt the dominant firm and benefit consumers. For example, in 1993, NEC Corporation, which then controlled half of all personal computer sales in Japan, had to cut its prices roughly in half due to increased competition from U.S. fringe firms.

**The Dominant Firm as Monopoly.** Now, suppose that the dominant firm has extremely low costs compared to the fringe firms, so that its marginal cost curve is  $MC^*_d$  in Figure 4.6b. Notice that  $MC^*_d$  crosses  $MR_d$  in the lower part of its two downward-sloping sections. The dominant firm chooses to produce  $Q_d^*$  level of output at price  $p^*$  (the height of the residual demand curve at output level  $Q_d^*$ ). Because  $p^*$  is below the fringe firms' shutdown point ( $\bar{p}$  = their minimum average cost), the fringe firms produce nothing ( $Q_f^* = 0$ ). As a result, market output,  $Q^*$ , equals the dominant firm's output,  $Q_d^*$ .

The dominant firm sets a monopoly price, and no competitive-fringe firm enters. The dominant firm meets all the demand of the market, unchecked by the fringe, and is thus a monopoly. The reason it has a monopoly is that  $MC^*_d$  intersects  $MR_d$  along the segment of  $MR_d$  that is the same as the marginal revenue curve associated with the market demand curve. That is, the monopoly price is below  $\bar{p}$ , so no fringe firm wants to produce.

## A Model with Free, Instantaneous Entry

If unlimited entry is possible, a dominant firm cannot set as high a price as it can if entry is limited or prevented. This section retains all the assumptions made in the preceding section except that now an unlimited number of competitive-fringe firms may enter the market. Firms enter if they can make positive profits.

In this situation, fringe firms cannot make profits in the long run; they either break even or are driven out of business. If identical fringe firms produce at all, the market

**EXAMPLE 4.9**

## *China Tobacco Monopoly to Become a Dominant Firm*

Established in 1982, the Chinese government's tobacco monopoly, the China National Tobacco Corporation, has been the most profitable corporation in the world, accounting for 12% of the Chinese government's revenues. It sells to China's 310 million smokers, a quarter of the world's smoking population, who consume 1,700 billion cigarettes a year—about 30% of global consumption.

By imposing a 230% tax rate on foreign cigarettes, and by imposing import quotas and restrictions (such as designating only a few sales outlets for imported cigarettes), the government limited legal foreign cigarette sales to less than 2% of total Chinese sales in the late 1990s. By 2003, their share was only 10%.

To appease the World Trade Organization (WTO), China has agreed to lift restrictions on the retail sale of imported cigarettes by January 2004, to reduce the tariff on cigarettes from the current 65% to 24%, and to phase out the tariff over the next two years.

Thus, the state's monopoly will be turned into a dominant firm. Government officials expect that the price of imported cigarettes will drop in half, and that they will gain a major share of the market.

*Sources:* Glenn Collins, "U.S. Tobacco Industry Looks Longingly at the Chinese Market, but in Vain," *New York Times*, November 20, 1998:A10; "China to Lift Restrictions on Retail Sales of Imported Cigarettes Next Year," *AFX European Focus*, February 11, 2003; "Remove of Foreign Tobacco Retailing Licenses to Cut Prices by Half" (sic), *China News*, February 14, 2003:1; "Chinese Tobacco Industry Facing Mergers and Recapitalizations," *China Business Times*, February 17, 2003:1.

price ultimately can go no higher than a fringe firm's minimum average cost, so that fringe firms always just break even. After all, if they made positive profits, more firms would flood into the market and drive price down to the level where each earns zero economic profits. Because the dominant firm has lower costs than fringe firms, it makes positive profits, but its profits are lower than if entry did not occur.

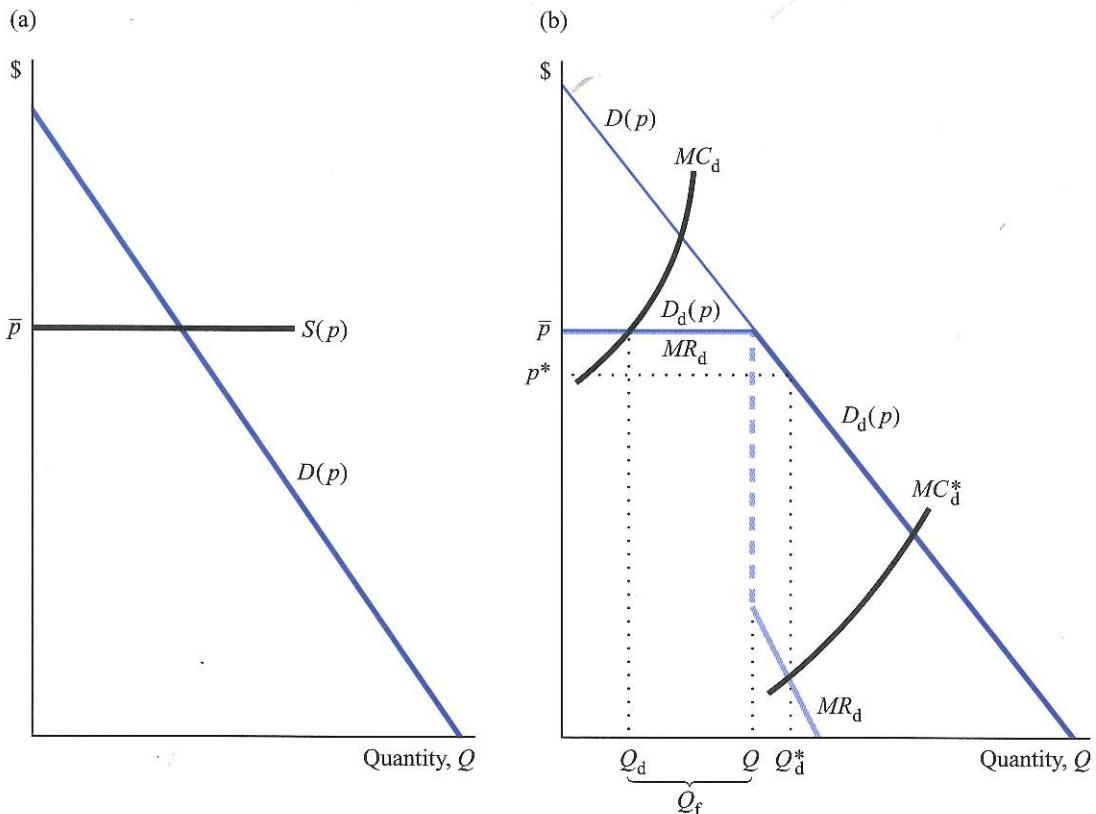
Even with unlimited entry, the dominant firm can gain and hold indefinitely a large share of the market if it has some cost or other advantage (see Example 4.9). Another example is the Cheerleader Supply Co., which accounts for 60 percent of cheerleading uniforms and equipment sold in this country.<sup>18</sup> This is an industry with easy entry, and yet one firm has the lion's share of the market, presumably because it has superior products, a superior sales force, lower costs, or has generated goodwill with buyers.

The competitive-fringe firms' cost curves are the same as before. As more and more firms enter ( $n$  rises), the slope of the competitive-fringe supply curve becomes flatter

<sup>18</sup>According to its chief executive officer, Lawrence Herkimer, in Peter Applebome, "The World's Oldest and Fattest Cheerleader," *San Francisco Chronicle*, January 12, 1984:24.

**FIGURE 4.7**

Dominant Firm with Free, Instantaneous Entry by Fringe Firms



and flatter (it is  $n$  times the slope of a typical firm's supply, or  $MC$ , curve). As the number of firms grows large, the fringe's supply curve becomes essentially horizontal, as shown in Figure 4.7a. That is, as long as price is at least  $\bar{p}$ , the competitive fringe is capable of and is willing to supply any quantity that the market demands.

As shown in Figure 4.7b, the residual demand curve facing the dominant firm is horizontal at  $\bar{p}$  so the corresponding marginal revenue curve is also flat (remember that in a competitive market a firm faces a horizontal demand curve, and hence its marginal revenue curve is identical to its demand curve at the market price). Below  $\bar{p}$  the residual demand curve is the market demand, which slopes downward, so that the corresponding marginal revenue curve also slopes downward. Again, the marginal revenue curve corresponding to the residual demand curve jumps at the quantity where the kink in the residual demand curve occurs.

There are two possible equilibria. First, if the dominant firm's marginal cost is relatively high ( $MC_d$  in Figure 4.7b), so that it intersects the horizontal portion of the

$MR_d$  curve, the price is  $\bar{p}$ , and the competitive fringe meets some of the market's demand. At this price, each fringe firm makes zero economic profits (because its average cost equals  $\bar{p}$ ) and is indifferent between staying in business and leaving the market. How much is produced by the competitive fringe depends on the dominant firm's cost structure (that is, where  $MC_d$  intersects the horizontal marginal revenue curve), which determines the dominant firm's output,  $Q_d$ . Collectively, the fringe firms produce an output level  $Q_f = Q - Q_d$ , as Figure 4.7b shows.<sup>19</sup> It is possible that  $Q_f = 0$  even though the presence of the fringe constrains price to equal  $\bar{p}$ .

Thus, if fringe firms flood into a market whenever positive profits can be made, the dominant firm cannot charge a price above the minimum average cost of a fringe firm. Although a dominant firm can make positive profits, competitive-fringe firms just break even. If the dominant firm's price would be above  $\bar{p}$  in the absence of entry, consumers are better off if entry is possible because it results in lower prices.

The second type of equilibrium occurs if the dominant firm's marginal cost is lower ( $MC_d^*$  in Figure 4.7b), so that it hits the marginal revenue curve in the downward-sloping portion. Here, the price is so low that no fringe firm stays in the market when the dominant firm's costs are lower than the fringe firms' costs. This equilibrium ( $Q_d^*, p^*$ ) is the same as discussed previously in the second no-entry equilibrium and is shown in Figures 4.6b and 4.7b. The dominant firm is a monopoly, and the potential supply of fringe firms is irrelevant.

## SUMMARY

Monopoly or market power is the ability to price profitably above marginal cost. A single seller of a product, a monopoly, faces a downward-sloping demand curve and sets its price above marginal cost. As a result, less is purchased than if the market were perfectly competitive and society suffers a deadweight loss.

In some markets, however, there are benefits to monopoly. For example, the promise of future monopoly profits can spur a firm to develop new products or more efficient production techniques.

Not all firms that earn profits are monopolies, and not all monopolies earn profits. Just like a competitive firm, a monopoly can make either profits or losses in the short run. However, unlike a competitive firm, a monopoly can earn positive profits in the long run. A natural monopoly exists when it is efficient to have only one firm produce the market's output.

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<sup>19</sup>Why don't fringe firms meet the entire demand at  $\bar{p}$ , instead of splitting it with the dominant firm? The answer is that the dominant firm has lower costs and can force some of the fringe firms out of the industry. Suppose that the dominant firm is producing its desired output of  $Q_d$ , and  $n$  fringe firms are producing  $Q_f = Q - Q_d$ . Now, if additional fringe firms enter this market, output exceeds market demand at  $\bar{p}$ . For the market to clear, the price must fall. Since the dominant firm is making positive profits, it stays in the industry. The fringe firms, however, start making losses (because they just break even at  $\bar{p}$ ). Thus, some of the fringe firms must drop out of the industry until the price again rises to  $\bar{p}$ . Alternately stated, the dominant firm can always charge slightly below  $\bar{p}$  to sell as much as it wants.