

Wow, Samsung has committed to produce 45 units of output; that's a lot! With that much output, the market price can't be any higher than \$55, and it would be that high only if we didn't produce anything! [$P = 100 - 45 = 55$]. That puts us in a somewhat difficult position. If we produce the same quantity of output as Samsung, or anything even close to it, the market price is going to be really low, which is bad news for us. Frankly, Samsung hasn't given us very much "wiggle room" to work with here. The best thing for us to do is to be somewhat conservative in our output choice; sure, we don't get as much market share that Samsung has, but at least we keep the market price at a reasonably decent level. Those guys over at Samsung, by getting the jump on us and moving first, have really boxed us in!

The Stackelberg model of oligopoly is a particular example of a sequential game, one in which one player in the game moves before the other players do. We will study sequential games in Chapter 14, and we will see that there can be a strategic value associated with the ability to be the first mover in the game.

13.3 DOMINANT FIRM MARKETS

In some industries, a single company with an overwhelming share of the market—what economists call a dominant firm—competes against many small producers, each of whom has a small market share. For example, in 2004, General Electric had 71.5 percent of the U.S. lightbulb market. The next largest competitor, Osram Sylvania, had just 7.4 percent.¹⁷ During prior periods, U.S. Steel was the dominant firm in the U.S. steel industry, and Alcoa was the dominant firm in the aluminum industry.

Figure 13.7 illustrates a model of price setting by a dominant firm. Market demand is D_M . The dominant firm sets the market price and splits the market demand with a group of small firms that constitute the industry's competitive fringe. Fringe firms produce identical products and act as perfect competitors: each chooses a quantity of output, taking the market price as given. The curve S_F is the competitive fringe's supply curve.¹⁸

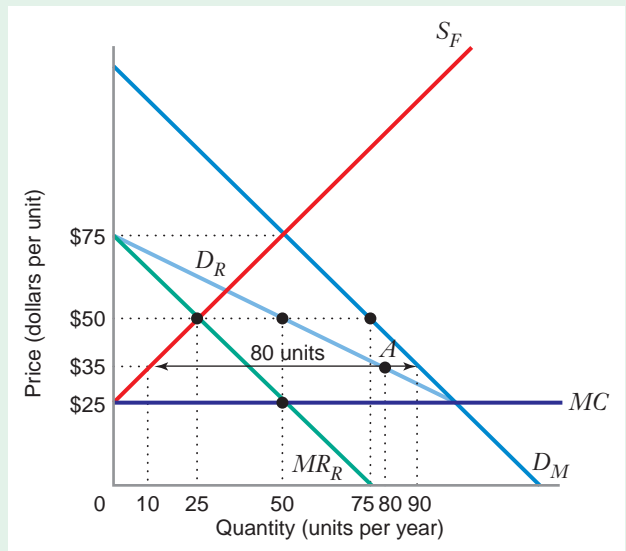


FIGURE 13.7 Dominant Firm Market

The dominant firm's residual demand curve D_R is the horizontal difference between the fringe's supply curve S_F and the market demand curve D_M . The dominant firm's profit-maximizing quantity is 50 units, and its profit-maximizing price is \$50 per unit. At this price, the fringe supplies 25 units.

¹⁷U.S. Business Reporter, Market Research, <http://www.usbrn.com/mrktdetail2.asp?MarketID=MRK364105> (accessed January 1, 2007).

¹⁸With a fixed number of fringe firms, S_F is the horizontal sum of fringe marginal cost curves. The vertical intercept of S_F thus shows the minimum price at which a fringe firm would supply output.

The dominant firm's problem is to find a price that maximizes its profits, taking into account how that price affects the competitive fringe's supply. To solve this problem, we need to identify the dominant firm's residual demand curve D_R , which will tell us how much the dominant firm can sell at different prices. We derive D_R by subtracting the fringe's supply from the market demand at each price. For example, at a price of \$35, market demand is 90 units, and the price-taking fringe would supply 10 units. The dominant firm's residual demand at a price of \$35 is thus 80 units. Point A is thus one point on D_R . By identifying the horizontal distance between D_M and S_F at every price, we can trace out the full residual demand curve. At prices less than \$25 per unit, fringe firms will not supply output, and the dominant firm's residual demand curve coincides with the market demand curve. At \$75, the dominant firm's residual demand shrinks to zero, and fringe firms satisfy the entire market demand.

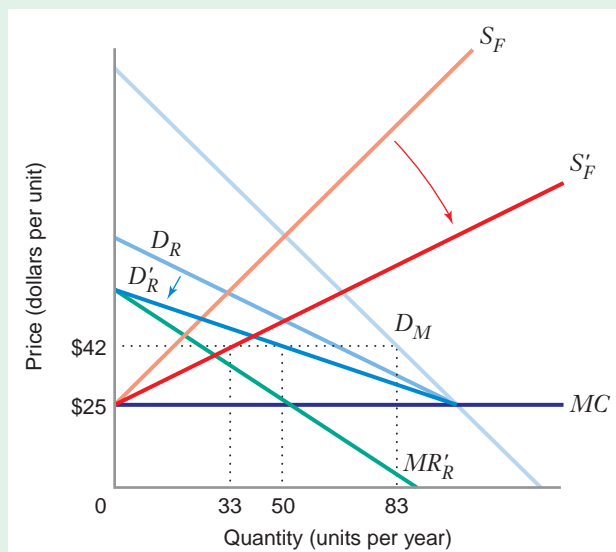
The dominant firm finds its optimal quantity and price by equating the marginal revenue MR_R associated with the residual demand curve to its marginal cost MC (\$25 in Figure 13.7). We see that the dominant firm's optimal quantity is 50 units per year, with the profit-maximizing price of \$50 per unit. We use the residual demand curve rather than the market demand curve to determine the price because it is the residual demand curve that tells us how much the dominant firm can sell at various market prices.

At a price of \$50, market demand is 75 units per year, and the competitive fringe supplies 25 units. By setting a price of \$50, which is twice as high as the minimum price of \$25 at which fringe firms would be willing to supply output, the dominant firm creates a price umbrella that allows some fringe firms to operate profitably. And of course, as we have just shown, this price maximizes profit for the dominant firm, which earns a profit equal to $(\$50 - \$25) \times 50$, or \$1,250 per year.

Figure 13.8 shows what happens when the size of the competitive fringe grows because additional fringe producers enter the market. The fringe's supply curve pivots rightward, from S_F to S'_F (the fringe supplies more at a given price). This causes the dominant firm's residual demand curve to pivot leftward from D_R to D'_R (the dominant

FIGURE 13.8 Dominant Firm Market When the Size of the Competitive Fringe Grows

When the size of the fringe grows, the fringe's supply curve rotates rightward to S'_F , causing the residual demand curve to rotate leftward to D'_R . The new profit-maximizing quantity for the dominant firm is 50 units, and the profit-maximizing price is \$42. At this price, the fringe supplies 33 units of the total market demand of 83 units.



firm supplies less at a given price). As a result, the dominant firm's profit-maximizing price becomes \$42 per unit, rather than \$50 per unit. Its optimal quantity continues to be 50 units, but the fringe's supply increases from 25 to 33.¹⁹ The dominant firm's market share falls from 67 percent to 60 percent, and its profit falls from \$1,250 to \$833.

limit pricing A strategy whereby the dominant firm keeps its price below the level that maximizes its current profit in order to reduce the rate of expansion by the fringe.

Given this, why doesn't the dominant firm do something to slow the rate of entry of fringe firms? The prices \$50 and \$42 maximize the dominant firm's profit at a particular point in time (e.g., in a given year). But if the rate of entry by fringe firms depends on the current market price, the dominant firm might want to follow a strategy of **limit pricing**, whereby the dominant firm keeps its price below the level



LEARNING-BY-DOING EXERCISE 13.3

Computing the Equilibrium in the Dominant Firm Model

Suppose that the market demand curve in a global mining industry is given by $Q^d = 110 - 10P$, where Q^d is measured in millions of units of product mined per year and P is measured in dollars per unit. The industry is dominated by a large firm with a constant marginal cost of \$5 per unit. There also exists a competitive fringe of 200 firms, each of whom has a marginal cost given by $MC = 5 + 100q$, where q is the output of a typical fringe firm.

Problem

- What is the equation of the supply curve for the competitive fringe?
- What is the equation of the dominant firm's residual demand curve?
- What is the profit-maximizing quantity of the dominant firm? What is the resulting market price? At this price, how much does the competitive fringe produce, and what is the fringe's market share (i.e., the fringe quantity divided by total industry quantity)? What is the dominant firm's market share?

Solution

(a) To find the supply curve of the competitive fringe, we proceed as follows. Each price-taking fringe firm produces to the point at which the market price equals marginal cost: $P = 5 + 100q$, or $q = (P - 5)/100$. This equation is valid only if the market price is greater than or equal to 5. If the price is less than 5, each fringe firm would produce nothing. In this exercise, there is no loss of

generality in assuming that the market price will exceed 5 and that a fringe firm's supply curve is given by $q = (P - 5)/100$. This is because the marginal cost of the dominant firm is 5, and the dominant will not operate at a point at which its price is less than its marginal cost. Given this, the fringe's overall supply curve is found by multiplying the individual fringe supply curve by the number of fringe firms (200): $Q^s = (200)(P - 5)/100 = 2P - 10$. Thus, the overall fringe supply curve is $Q^s = 2P - 10$.

(b) We find the residual demand curve by subtracting the overall fringe supply from the market demand curve. Letting Q^r denote residual demand, we have: $Q^r = Q^d - Q^s = (110 - 10P) - (2P - 10)$, which implies $Q^r = 120 - 12P$.

(c) To find the profit-maximizing quantity of the dominant firm, we first invert the residual demand (dropping the superscript r) to get: $P = 10 - (1/12)Q$. The corresponding marginal revenue curve is $MR = 10 - (1/6)Q$. Equating marginal revenue to marginal cost gives us $10 - (1/6)Q = 5$, which implies $Q = 30$ million units per year. The resulting market price is $P = 10 - (1/12)(30) = \$7.50$ per unit. At this price, the fringe's overall supply is: $2(7.50) - 10 = 5$ million units per year. The total industry output is thus 35 million units: 30 million units produced by the dominant firm and 5 million units produced by the fringe. The fringe's market share is thus $5/(5 + 30) = 14.29$ percent, while the dominant firm's market share is 85.71 percent.

Similar Problems: 13.20, 13.21, 13.23

¹⁹The dominant firm's profit-maximizing quantity stayed at 50 units per year because of the way we constructed the demand curve and fringe supply curve for this example. A shift in the fringe's supply curve could, in general, change the dominant firm's profit-maximizing output.