INDUSTRIAL ORGANIZATION

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CHAPTER 17

Regulation and Deregulation

Governments enact regulations for a variety of reasons. For example, the Food and Drug Administration (FDA) was established in 1906 to protect consumers. Other agencies, such as the Federal Trade Commission (FTC) and the Consumer Product Safety Commission (CPSC), also protect consumers. The mission of the Environmental Protection Agency (EPA) is to protect the environment and that of the Occupational Safety and Health Administration (OSHA) is to ensure worker safety and health. And Congress created the Transportation Security Administration (TSA) in response to the attacks of 9/11 to protect the nation's transportation systems.

Our focus in this chapter, however, is on economic regulation: regulation that restricts firms' decisions about price, quantity, entry, and exit. Over the past three decades, the extent of direct government regulation of sectors such as public utilities and transportation has declined continually. What was the economic rationale for regulation of industries such as electricity, telecommunications, and airlines? What motivated the recent deregulation? Because a thorough examination of these issues would require an entire book, we address only the most important issues here. However, this is a useful concluding chapter in that it applies a great deal of the knowledge gained throughout the book.

17.1 The Rationale for Regulation: Traditional Public Utility Regulation

The authority for regulation of private industry comes from no less a source than the Constitution of the United States, which declares that Congress has the right to "regulate commerce . . . among the several states." Despite this constitutional mandate, for the first century of the nation's existence there was virtually no federal regulation over the day-to-day operation of business. In the latter half of the nineteenth century, however, the increasing significance of economies of scale in many sectors resulted in increased market power for some firms.[1] Nowhere was this increase in potential power more dramatic than in the railroad industry in the Midwest and West. Because of the monopoly power of the railroads in sparsely populated areas, farmers

were forced either to pay high shipping rates or to watch their grain spoil. As economic pressures grew, two important agrarian political groups arose: the Populists and the Grangers. These groups were able to support a candidate for President and to win a number of seats in Congress. As the influence of the Populists and Grangers grew, the two major parties were forced to address their economic concerns, and two policies emerged—antitrust and regulation.

The initial economic rationale for regulation was based on the existence of large economies of scale. Previous chapters devoted a great deal of attention to economies of scale, and Chapters 3 and 5 discussed the concept of a ***natural monopoly.*** Recall that in natural monopolies one firm can serve the market more efficiently than more than one firm. Figure 17.1 shows a natural monopoly. The LRAC curve in Figure 17.1 is sloping downward where it intersects the demand curve at an output of q_1. Because the LRAC curve is sloping downward at q_1, LRMC must lie below LRAC at q_1. Allocative efficiency demands that output be expanded as long as price is above LRMC or, as

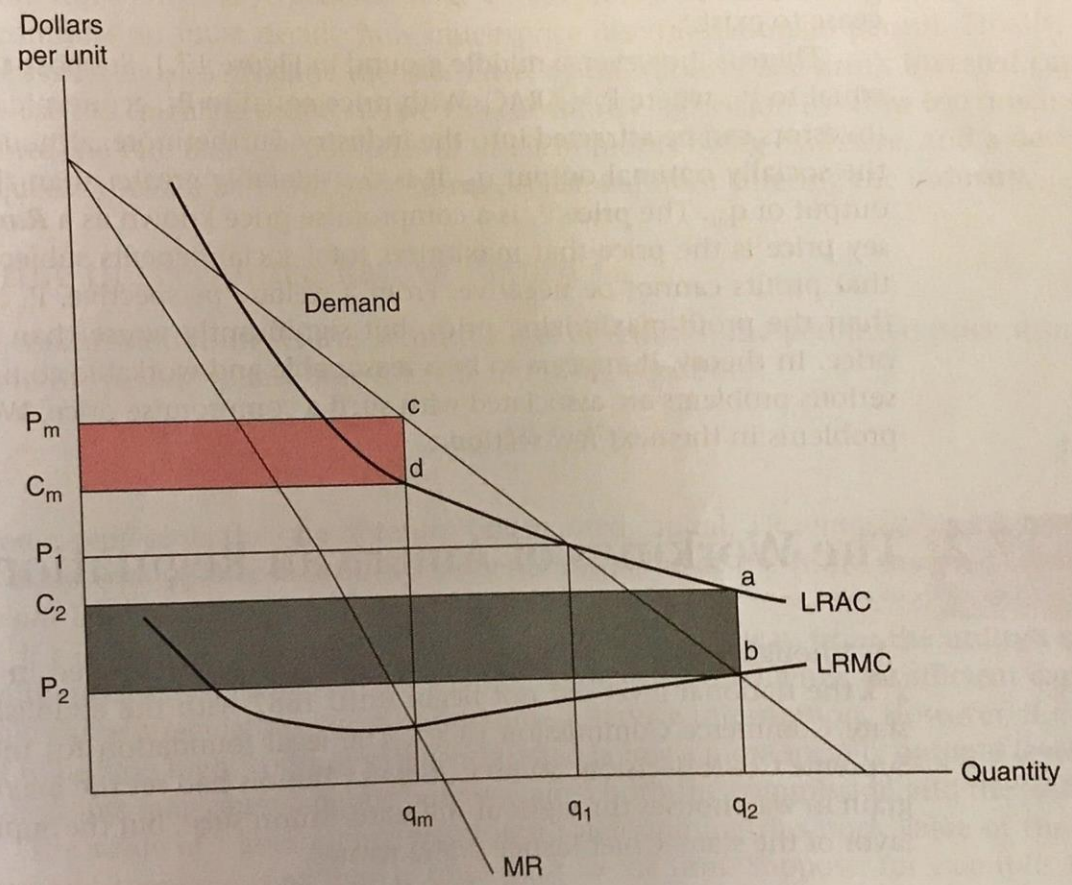

FIGURE 17.1 Natural Monopoly as a Justification for Regulation

This figure depicts a natural monopoly: The LRAC is sloping downward where it intersects the demand curve at q_1. An unregulated monopoly would produce the profit-maximizing output q_m, charge the profit-maximizing price P_m, and earn economic profits equal to the red area P_mcdC_m. Allocative efficiency requires that output be expanded to q_2 since price is above LRMC for all output levels less than q_2. The gray area C_2abP_2 shows the economic loss a firm would sustain if it were forced to produce q_2 and charge P_2. Under average cost pricing, regulators would set price equal to P_1 and economic profits would be normal.

in Figure 17.1, until output equals q_2. If a private firm were forced to expand output to q_2 and charge price P_2, price would be below LRAC and the firm would sustain an economic loss equal to the gray area C_2abP_2.

There is a policy dilemma associated with the natural monopoly depicted in Figure 17.1. If an unregulated firm were free to maximize profits, it would produce the profit-maximizing output q_m, charge the profit-maximizing price P_m, and earn excess economic profits equal to the red area P_mcdC_m. Entry would be virtually impossible because the natural monopolist would have a large first-mover advantage and could quickly expand output to q_1 if threatened with entry. The natural monopolist could, therefore, earn excess economic profits for a long period. In fact, in the absence of new technology, it could earn these excess profits indefinitely.

Conversely, if the government attempted to force the natural monopolist to charge the socially optimal price, P_2, at which MC = P, then the monopolist would sustain an economic loss. Under such draconian regulation, no investors would be attracted to the industry, and the industry would have to be subsidized or it would cease to exist.*

There is, however, a middle ground in Figure 17.1. Suppose the regulators set price equal to P_1, where P = LRAC. With price equal to P_1, economic profits are normal, so investors can be attracted into the industry. Furthermore, although output is less than the socially optimal output q_2, it is considerably greater than the profit-maximizing output of q_m. The price P_1 is a compromise price known as a ***Ramsey price.*** The Ramsey price is the price that maximizes total social benefits subject to the requirement that profits cannot be negative. From a welfare perspective, P_1 is significantly better than the profit-maximizing price, but significantly worse than the socially optimal price. In theory, it appears to be a reasonable and workable compromise. In practice, serious problems are associated with such a compromise price. We consider the major problems in the next few sections.

17.2 The Workings of American Regulation

Although the first state regulatory boards were established in 1874, regulation at the national level did not begin until 1887 with the establishment of the Interstate Commerce Commission (ICC). The legal foundation for the ICC was an 1877 Supreme Court decision, *Munn* v. *Illinois*.[2] Illinois had set the maximum price to store grain in warehouses throughout the state. Munn sued, but the Supreme Court ruled in favor of the state. Chief Justice Waite wrote:

> Looking, then, to the common law from whence came the right which the Constitution protects, we find that when private property is "affected with a public interest it ceases to be *juris privati* only."
>
> . . . When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use and must

*There is one exception to this conclusion. Price discrimination could enable a monopolist to charge the socially optimal price and still earn an economic profit. This point is discussed later.

submit to be controlled by the public for the common good to the extent of the interest he has thus created.

The *Munn* decision eventually led to the establishment of many regulatory commissions in the United States. Commissioners are appointed by the executive branch of government, the President at the federal level, or the governor at the state level. Most commissions are dominated by lawyers and former politicians and include few, if any, economists. Furthermore, although some commissioners are well trained in economics, most are not.

Public utility commissions have several major tasks. Commissions have the difficult job of simultaneously setting the permitted level of profits, the price level, the price structure, and the rate base. None of these tasks is more important than setting the "correct" level of profits. The target profit level is typically set as a permitted rate of return on invested capital. Profit rates must be high enough to ensure a flow of capital, but not so high as to generate large excess profits. In establishing a price structure, the commission must decide how much price discrimination to permit. Finally, the commission must determine the ***rate base,*** or the value of the firm's invested capital to be used to calculate profits. As we will see shortly, a decision to allow too much capital into the rate base calculation will result in profits being excessive, and a decision to squeeze the rate base will prevent needed capital from entering the industry.

17.2.1 Setting the Permitted Rate of Return

The commission must set the permitted rate of return r, the permitted price structure p, and the permitted rate base K in the following equation:*

$$r = \frac{TR - TC}{K}, \qquad [17.1]$$

where r represents the rate of return on invested capital, TR represents total revenue, TC represents total costs, and K represents the value of the firm's invested capital or the *rate base.*

If r is fixed at "too low" a level, investors will stay away from the utility's stocks and bonds, and capacity may lag behind demand requirements. Insufficient capacity could cause a regulator's worst nightmare—a service interruption. However, if r turns out to be "too high," output will be restricted below a more socially optimal level, and high profits may cause a public outcry against both the commission and the utility.

The value of r goes a long way toward determining the stock value of the company and therefore is extremely important to the firm. Suppose, for example, that a utility's stock is worth 10 times its annual profit flow; that is, the utility's price/earnings ratio equals 10. If the target value of r is set at 10 percent and K = $10 million, then targeted annual profits (TR − TC) are $1 million. The utility's stock value should then be 10 times $1 million, or $10 million. Now suppose the utility convinces

*This equation is often described as:

$$TR = OC + Dep + r(RB),$$

where TR represents total revenues, OC is operating costs, Dep is depreciation, r is the permitted rate of return, and RB is the rate base.

the commission to raise the target r to 11 percent. If K remains fixed at \$10 million, permitted target profits increase to \$1.1 million, and the value of the utility's stock should increase to 10 times \$1.1 million, or \$11 million. There is an immediate \$1 million capital gain to stockholders because of the increase in the target value of r. It is obviously worth a great deal of time and effort on the part of stockholders to lobby for an increase in r.

How does a commission set the targeted r? Commissions have generally considered three criteria: the cost of raising capital, the utility's capital attraction requirements (that is, whether the utility should be expanding or contracting its capacity), and comparable returns in other "equal risk" industries that would permit the utility to earn a normal economic profit. Historically, commissions have often relied on the third criterion, the concept of comparable returns, which means that the utility should earn a rate of return equal to the average in "similar industries." Although this criterion may initially seem to make economic sense, one realizes on second thought that there are no *unregulated* industries that are comparable to public utilities. Risk to a public utility is so fundamentally different from risk to a firm in an unregulated industry that it is virtually impossible to compare the two. For instance, even if IBM typically earns a 15 percent rate of return, it still runs a risk of sustaining an economic loss in any given year. If Consolidated Edison is targeted to earn a "comparable rate of return" of 15 percent, it runs virtually no risk of sustaining an economic loss in any year.

Because of the problems associated with using comparable returns, economists have argued that it makes more sense to rely on the cost of raising capital and the firm's capital attraction requirements when setting the target r. The cost of capital is calculated as a weighted average of the firm's cost of raising capital through the three standard securities: bonds, preferred stocks, and common stocks. Bonds and preferred stocks pay fixed interest rates, and therefore the cost of capital raised through these instruments is easy to calculate.

The cost of capital raised through the sale of common stocks is more complicated to determine because the cost is directly related to expected future profits. If the utility expects to pay stockholders a fixed dividend per share equal to D every year, and if the price of a share of common stock equals P, then the cost of capital raised by selling a share of common stock is s in the following equation:*

$$P = \frac{D}{(1+s)} + \frac{D}{(1+s)^2} + \cdots + \frac{D}{(1+s)^n}. \qquad [17.2]$$

To understand Equation 17.2, recall from the discussion of present value in Chapter 3 that if $n \to \infty$ in Equation 17.2, then:

$$P = \frac{D}{s} \quad \text{or} \quad s = \frac{D}{P}. \qquad [17.3]$$

If, for example, D = \$15 and P = \$100, then s = 15 percent.

A weighted average of the cost of bonds, preferred stocks, and common stocks is the preferred measure of the cost of capital, but it may not be the optimal permitted rate of return r. The commission also must consider the utility's capital attraction

*The assumption that dividends D are constant is highly questionable, and commissions typically assume some rate of growth in dividend payments over time.

requirements. In a declining industry (e.g., the railroads in 1960), an optimal rate of return should encourage the *withdrawal of capital*, and therefore, the target r should be set below the normal rate of return in the economy. The cost of capital calculation, therefore, is not the optimal way to calculate r in all cases. It is, however, a good first approximation.

17.3 Efficiency Problems Associated with Rate of Return Regulation

17.3.1 X-Inefficiency

Rate of return regulation causes serious efficiency problems. With r guaranteed, there is little incentive for the utility to minimize costs, and this encourages X-inefficiency.[3] Because X-inefficiencies increase total costs and cause r to fall below the permitted level, they may precipitate a request to increase prices. Although a commission can deny a price hike if it determines that X-inefficiencies exist, most price increase requests are approved.

An institutional check against X-inefficiency is ***regulatory lag.*** Regulatory lag exists whenever costs increase or decrease. If costs increase, the utility cannot immediately raise prices. It must first request a price increase. Until the price hike is approved, the utility will earn a rate of return less than r. Similarly, if costs decrease, the utility will earn a rate of return greater than r until a price reduction is approved. Regulatory lag punishes X-inefficiency and rewards improved efficiency.

17.3.2 The Averch-Johnson Effect

Another efficiency problem associated with public utility regulation was first suggested by Averch and Johnson.[4] They theorized that if r is greater than the market cost of capital, s, the utility has an incentive to use too much capital relative to other inputs. If r = 10 percent and s = 8 percent, for example, then every $1 increase in K costs the utility 8 cents but results in a 10-cent increase in permitted profits. The utility is guaranteed an extra 2 cents in profits for every additional $1 it invests in capital. Averch and Johnson hypothesized that the utility would consider its cost of capital to be approximately 6 percent, 8 percent minus the 2 percent "discount" the utility receives in the form of permitted profits above the market cost of capital. According to Averch and Johnson, therefore:

$$\text{The Utility's Cost of Capital} = s - (r - s) = 2s - r.$$

The ***Averch-Johnson effect*** is shown in Figure 17.2.* The red ***isoquants*** labeled Q_1 and Q_2 in Figure 17.2 show the combinations of labor and capital that the regulated firm can use to produce outputs of Q_1 and Q_2, respectively. In the absence of regulation, each dashed red ***isocost line*** has a negative slope equal to the ratio of the price of labor over the price of capital, $-w/s$. To minimize the cost of producing any quantity,

*It is necessary to have studied intermediate microeconomic theory to understand Figure 17.2.

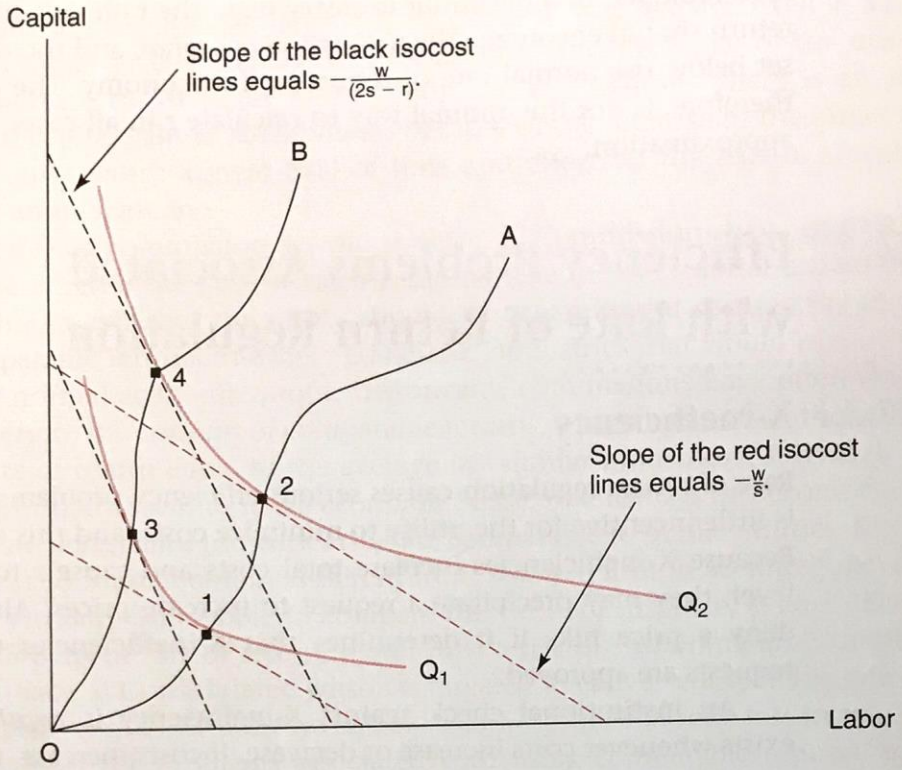

FIGURE 17.2 The Averch-Johnson Effect

In the absence of regulation, each dashed red isocost line has a negative slope equal to the ratio of the price of labor over the price of capital, $-w/s$. The input expansion path OA shows all the possible cost-minimizing combinations of labor and capital for a firm facing these input prices; OA is the socially optimal input expansion path. According to the Averch-Johnson effect, the cost of capital to the utility becomes $2s - r$, which is lower than the social cost of capital, s. Consequently, the isocost lines under regulation are steeper; the black isocost lines have a slope of $-w/(2s - r)$. OB shows the input expansion path under regulation. For any output, a regulated firm uses more capital and less labor than it would along the socially optimal expansion path.

a firm must produce at a point on the relevant isoquant at which the isocost line is tangent to the isoquant. For an output of Q_1 the cost-minimizing point is point 1, and for an output of Q_2 the cost-minimizing point is point 2. The ***input expansion path,*** OA, shows all the possible cost-minimizing combinations of labor and capital in the absence of regulation. Because the line OA identifies the lowest possible social cost of producing any possible output, it is the *socially optimal input expansion path.*

The Averch-Johnson effect suggests that the cost of capital to the utility is $2s - r$, which is lower than the social cost of capital, s. In Figure 17.2, each black isocost line represents an isocost line faced by a regulated firm. The black isocost lines are steeper than the dashed red isocost lines; the slope of the black lines equals $-w/(2s - r)$. Given the black isocost lines faced by a regulated utility, the optimal input expansion path is OB. For an output of Q_1 the cost-minimizing point is point 3, and for an output of Q_2 the cost-minimizing point is point 4. For any output, a regulated firm uses more capital and less labor along expansion path OB than along the socially optimal expansion path OA. According to Averch and Johnson, the regulated utility will invest in too much capital and select a nonoptimal combination of inputs.

Although testing empirically for the Averch-Johnson effect is difficult, the following evidence suggests that regulated firms attempted to increase their rate bases by using too much capital in the period before the early 1970s:[5]

1. Utilities avoided using ***peak-load pricing.***[6] Under peak-load pricing systems, firms charge higher prices during peak demand periods and lower prices during off-peak periods. Because marginal costs are higher during peak periods, peak-load pricing is efficient. By reducing the quantity demanded during peak periods, peak-load pricing reduces capacity requirements and lowers the utility's rate base. By avoiding peak-load pricing, utilities increase their capital requirements.

2. Utilities invested in capacity that exceeded demand even during peak demand periods.[7]

3. Instead of forming regional power pools to share electricity, power companies preferred to invest in enough capacity to meet their peak requirements.[8]

4. Utilities delayed the introduction of less capital-intensive technologies. In the late 1960s, for example, AT&T continued to invest in capital-intensive transcontinental cables between the United States and Europe when less capital-intensive satellite communications were available.[9] To meet winter peak demand in the northeastern United States, the natural gas industry built capital-intensive pipelines instead of less capital-intensive underground storage facilities.[10]

5. Regulated utilities refused to lease facilities even if leasing reduced costs because leased facilities are not included in a firm's rate base. In the communications industry, common carriers refused to lease satellite communications from Comstat (Communications Satellite Corporation) even though Comstat was established by the government as the official corporation for installing an international satellite communications network.[11] Similarly, electric utilities were hesitant to lease fuel cores for nuclear power plants.[12]

6. Public utilities set too high a standard of service reliability. By attempting to prevent all possible service interruptions, utilities were able to increase their capital expenditures and rate bases.[13]

7. Utilities permitted, even encouraged, outside suppliers to sell inputs at high prices.[14] In the 1950s when the electrical equipment manufacturers were fixing prices, the electric utilities not only failed to identify the conspiracy but also were less than vigorous in pressing damage claims. The utilities had an incentive to be exploited because high input prices increased their rate bases.

8. Utilities invested in capital-intensive areas that increased their rate bases even if the investments resulted in economic losses. In the 1960s, for example, AT&T invested in its TELPAK multichannel business service and its TWX teletype service in competition with Western Union. Its rate of return was very low on both services compared with its return on regulated interstate telephone activities.[15]

As noted, this empirical evidence in support of the Averch-Johnson effect all comes from before the early 1970s. From the end of World War II until the early 1970s, the marginal cost of capital tended to be fairly constant because of relatively low inflation and the Federal Reserve's ***Regulation Q,*** which limited the interest rates that banks could pay on all deposits, including large certificates of deposits (CDs). In

the early 1970s two factors changed. First, high energy prices resulted in increased inflation, which increased interest rates and the marginal cost of capital. Second, the Federal Reserve suspended Regulation Q, which caused a dramatic increase in the rate of return on CDs and resulted in a large increase in the marginal cost of capital. With interest rates on CDs rising from 7 percent in 1972 to 12 percent in 1974, the marginal cost of capital suddenly exceeded the permitted rate of return, r, for most utilities.[16] Given this new cost structure, the incentive to invest in excessive capital was eliminated for most utilities.

During the 1950s and 1960s, the Averch-Johnson effect may have had a redeeming feature. Each of these distortions increased costs, but each distortion also increased output. Recall from Figure 17.1 that regulation restricts output below the socially optimal level at which price equals marginal cost. The Averch-Johnson effect encourages regulated utilities to increase output beyond q_1 and to invest in riskier investments. By increasing output and encouraging risk-taking, the Averch-Johnson effect partially offsets two of the major problems associated with regulation. This led Alfred Kahn to suggest that "as an offset to monopoly, the [Averch-Johnson] distortion probably does more good than harm."[17]

Not all economists have accepted the Averch-Johnson hypothesis. Several have theorized that regulation results in the use of too few units of capital relative to other inputs.[18] One alternative hypothesis suggests that firms may underinvest in capital because they fear that future regulations will be tightened. Tighter future regulation would cause a lower permitted rate of return on invested capital.[19] By underinvesting in capital, regulated firms limit the potential damage associated with a lower rate of return in the future. Some empirical studies have failed to find evidence of an Averch-Johnson effect, and at least one study found evidence of undercapitalization.[20]

17.3.3 Setting the Price Structure

The Price Structure with Decreasing Costs

From the end of World War II through the early 1970s, utilities faced declining long-run average cost curves such as those shown in Figure 17.1. Under these cost conditions, commissions used second-degree and third-degree price discrimination to increase output and decrease average costs. In Figure 17.1 if the utility sets price at P_1, profits are normal but output is below the socially optimal level q_2. To increase output toward q_2, commissions permitted the use of second-degree price discrimination. Recall from Chapter 15 that with second-degree price discrimination all buyers are offered the same price schedule and they self-select into different groups.

Figure 17.3 shows how, under conditions of decreasing LRAC, price discrimination can enable a utility to produce the socially optimal output and earn a normal profit. Buyers are offered a price schedule based on their willingness to pay. In response, customers divide themselves into three groups: residential buyers, small commercial buyers, and large commercial buyers. Residential buyers pay the highest price P_1, small commercial buyers pay a lower price P_2, and large commercial buyers pay a price equal to marginal cost P_{mc}. The quantity purchased by residential consumers is q_1, the quantity purchased by small commercial users is $q_2 - q_1$, and the quantity purchased by large commercial users is $q_3 - q_2$. Because total output is q_3, the average cost of production is $AC = P_2$ for *all* units produced. The utility earns a

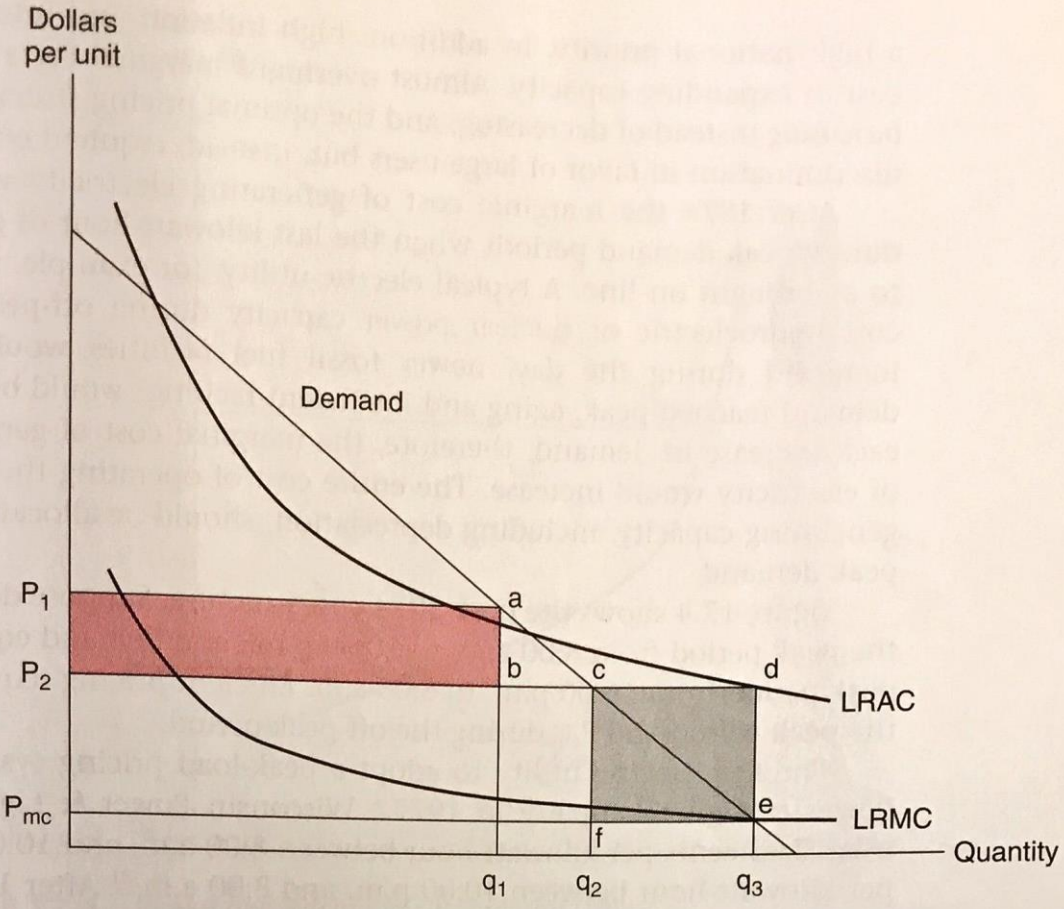

FIGURE 17.3 The Use of Price Discrimination to Improve Economic Efficiency

Under price discrimination, buyers are offered a price schedule based on their willingness to pay. Residential buyers pay the highest price P_1, small commercial buyers pay a lower price P_2, and large commercial buyers pay a price equal to marginal cost P_{mc}. The utility earns a positive economic profit equal to the red area P_1abP_2 on sales to residential users, earns a normal profit on sales to small commercial users, and sustains an economic loss equal to the gray area cdef on sales to large commercial users. If area P_1abP_2 equals area cdef, the utility earns a normal economic profit and output is equal to the socially optimal output.

positive economic profit equal to the red area P_1abP_2 on sales to residential users, earns a normal profit on sales to small commercial users, and sustains an economic loss equal to the gray area cdef on sales to large commercial buyers. If the red area P_1abP_2 equals the gray area cdef, the utility earns a normal economic profit and output is equal to the socially optimal output.

Commissions have also permitted third-degree price discrimination. In the telecommunications industry, for example, customers have been separated into business and residential buyers. Business customers have a more inelastic demand and pay higher rates.

The Price Structure with Increasing Costs

Recall that in the early 1970s cost conditions changed dramatically as the price of oil and other fossil fuels increased and Regulation Q was suspended by the Federal Reserve System. Electric utilities suddenly faced an entirely new cost structure as variable fuel costs became a significant component of total costs and conservation became

a high national priority. In addition, high inflation and interest rates increased the cost of expanding capacity. Almost overnight marginal costs and average costs were *increasing* instead of decreasing, and the optimal pricing structure no longer called for discrimination in favor of large users but, instead, required efforts to reduce demand.

After 1974 the marginal cost of generating electricity was significantly higher during peak demand periods when the last kilowatt-hour of generating capacity had to be brought on line. A typical electric utility, for example, would use only its low-cost hydroelectric or nuclear power capacity during off-peak periods. As demand increased during the day, newer fossil fuel facilities would be used. Finally, as demand reached peak, aging and inefficient facilities would be brought on line. With each increase in demand, therefore, the marginal cost of generating a kilowatt-hour of electricity would increase. The entire cost of operating the last inefficient units of generating capacity, including depreciation, should be allocated to those last units of peak demand.

Figure 17.4 shows the post–1974 cost structure. Suppose demand equals D_P during the peak period from 8:00 a.m. to 10:00 p.m., and demand equals D_{OP} during the off-peak period from 10:00 p.m. to 8:00 a.m. Efficient pricing requires charging P_P during the peak period and P_{OP} during the off-peak period.

The first electric utility to adopt a peak-load pricing system was the Wisconsin Power & Light Company in 1977.* Wisconsin Power & Light charged commercial users 2.03 cents per kilowatt-hour between 8:00 a.m. and 10:00 p.m. and 1.013 cents per kilowatt-hour between 10:00 p.m. and 8:00 a.m.[21] After 1977 many states implemented peak-load pricing schemes into their price structures.[22]

17.4 The Spread of Regulation into Other Markets

17.4.1 The Capture Theory of Regulation

The existence of large economies of scale was used to justify regulation in the railroad industry and the traditional public utilities, such as electricity, gas, and telecommunications. But why did regulation spread to markets in which economies of scale were not significant? Why, for example, did the government regulate trucking rates and airline fares? One possible explanation is that the regulated firms "captured" control of the regulatory commissions. According to this ***capture theory,*** once the railroads were regulated, the commissions came to view their primary responsibility as protecting the regulated firms from "too much" competition, rather than protecting consumers from monopoly prices. As a result, regulation spread into other transportation industries.

Stigler first suggested that regulation is supplied in response to interest group lobbying pressure to protect the group from competition.[23] Peltzman expanded on Stigler's theory by suggesting that legislators select regulatory policies that maximize the legislators' political support.[24] Interest groups provide votes, campaign contribu-

*Long before the electric utilities moved to a peak-load pricing structure, AT&T charged higher long-distance rates during the peak demand period on weekdays from 8:00 a.m. to 5:00 p.m. In 1984 AT&T offered a 40 percent rate reduction on weekdays from 5:00 p.m. to 11:00 p.m. and a 60 percent reduction on weekends, holidays, and on weekdays from 11:00 p.m. to 8:00 a.m.

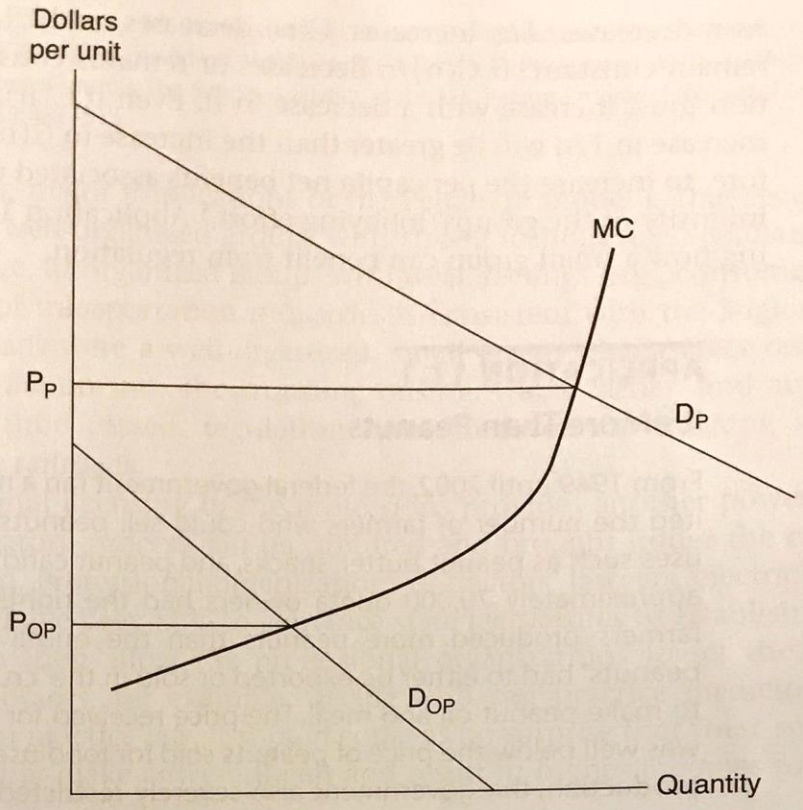

FIGURE 17.4 **Peak-Load Pricing in a Regulated Utility**

D_P shows the demand for electricity during the peak period, say from 8:00 a.m. to 10:00 p.m., while D_{OP} shows the demand during the off-peak period from 10:00 p.m. to 8:00 a.m. Efficient pricing requires charging P_P during the peak period and P_{OP} during the off-peak period.

tions, and other campaign resources to the legislators. In turn, the legislators provide support in the form of wealth transfers to the interest groups that provide the most votes and resources.

To formalize the model, suppose there are n firms in an industry that benefits from regulation. Assume the following:

1. Regulation results in a wealth transfer of T from consumers to the n firms.
2. The cost of organizing firms to lobby is a function of the number of firms n, and equals C(n). The cost function C(n) is a positive function of n because it is more difficult and costly to organize a large group than a small group.
3. The incentive for consumers to lobby against regulation increases with an increase in the total number of consumers negatively impacted by regulation and an increase in the intensity of consumers' feelings.

Given these assumptions, the per capita net benefits of regulation for each firm i, B_i, equal:

$$B_i = \frac{T - C(n)}{n} = \frac{T}{n} - \frac{C(n)}{n}. \qquad [17.4]$$

As n decreases, T/n increases, C(n) decreases, and C(n)/n may increase, decrease, or remain constant. If C(n)/n decreases or remains constant, the net benefits of regulation must increase with a decrease in n. Even if C(n)/n increases, it is likely that the increase in T/n will be greater than the increase in C(n)/n.* Reducing n is likely, therefore, to increase the per capita net benefits associated with regulation and increase the intensity of the groups' lobbying effort.† Application 17.1 illustrates this model, showing how a small group can benefit from regulation.

APPLICATION 17.1

It's More Than Peanuts

From 1949 until 2002, the federal government ran a marketing quota program that limited the number of farmers who could sell peanuts in the domestic market for food uses such as peanut butter, snacks, and peanut candy. At the time the program ended, approximately 70,000 quota owners had the rights to sell these "quota peanuts." If farmers produced more peanuts than the quota limit, these so-called "additional peanuts" had to either be exported or sold in the "crush" market, where they were used to make peanut oil and meal. The price received for peanuts sold to the crush market was well below the price of peanuts sold for food uses. In addition to limiting domestic production, the government also severely restricted imports of peanuts. Finally, price supports guaranteed that the farmers with the peanut quotas could cover their production costs. Not surprisingly, this program led to peanuts selling in the United States at a price above the world price: Estimates indicate that the U.S. price of peanuts was 50 percent higher than the world price.

Randal Rucker and Walter Thurman estimated the welfare costs of this program. They calculated that for the period 1982 through 1987, the average annual transfer from consumers to producers was $255 million (in 1987 dollars). The program also resulted in an estimated deadweight loss of $34 million. Why did consumers tolerate this loss of surplus? We can use Peltzman's model to answer this question. In 1982 there were 23,046 peanut farmers, so, using Peltzman's notation:

$$\frac{T}{n} = \frac{\$255 \text{ million}}{23{,}046} = \$11{,}065.$$

Each peanut farmer gained over $11,000 from the government program. On the other hand, the cost to the average consumer of this program was $1.23. In terms of which group is likely to organize, there is a tremendous asymmetry. Few consumers would spend any time attempting to save $1.23, but peanut farmers were willing to invest a great deal of time, effort, and money to gain $11,000 in benefits.

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*In the term T/n, only the denominator declines as n declines. In the term C(n)/n, both the numerator and denominator decline as n declines. If follows that the increase in the term T/n associated with a decrease in n is likely to be greater than any decrease in the term C(n)/n associated with a decrease in n.

†Similarly, as n increases, T/n decreases, whereas C(n)/n may increase, decrease, or remain constant. If C(n)/n increases or remains constant, the net benefits of regulation must decrease with an increase in n. Even if C(n)/n decreases, it is likely that the decrease in T/n will be greater than the decrease in C(n)/n. Increasing n is likely, therefore, to decrease the net benefits associated with regulation and decrease the groups' intensity of lobbying effort.

Sources: Erik Dohlman and Janet Livesey, "Peanut Backgrounder," http://www.ers.usda.gov/Publications/OCS/Oct05/OCS05I01, accessed on March 24, 2006; Randal R. Rucker and Walter N. Thurman, "The Economic Effects of Supply Controls: The Simple Analytics of the U.S. Peanut Program," *Journal of Law and Economics* 33 (October 1990): 483–515.

One of the major implications of the Peltzman model is that regulation tends to benefit small, well-organized groups with strong feelings (e.g., regulated firms) at the expense of large, unorganized groups with weak feelings (e.g., consumers). The history of regulation of transportation industries is consistent with the Stigler/Peltzman theory: the railroads were a well-organized, small group with a great deal to gain from expanded regulation into the trucking, busing, water carrier, and airline industries. Ironically, as time passed, regulation came to favor the trucking industry at the expense of the railroads.

Occupational licensing in the professions provides another powerful example of how the regulatory process can be captured and brought under the control of those being regulated. Professional organizations of doctors, lawyers, electricians, engineers, and plumbers have been able to convince state legislatures to establish licensing regulations and to then allow the professional organizations to set the licensing rules themselves. Doctors, for example, decide who can practice medicine, and lawyers decide who can practice law. It should come as no surprise that these self-imposed regulations typically make entry difficult and result in higher incomes for those already licensed.[25]

Additional evidence in support of the capture theory is provided by the aggressive opposition of regulated firms to deregulation. AT&T fought deregulation of the telecommunications industry, and the major air carriers led the fight against airline deregulation.[26] If regulation were detrimental to regulated firms and served the interests of consumers, regulated firms would welcome deregulation. In fact, few regulated firms have supported deregulation.

17.5 The Movement from Regulation to Deregulation

The 1970s and 1980s brought a dramatic move away from regulation. While fully regulated industries produced 17 percent of GNP in 1977, they produced only 6.6 percent by 1988.[27] This move toward deregulation continued into the 1990s. In part, this is due to the development of new technologies that have reduced the incidence of natural monopoly, decreasing the number of justified areas for regulation. Also, supporters of deregulation pointed to the efficiency problems associated with regulation such as those discussed earlier, arguing that deregulation would increase efficiency and lower prices. In this section we consider some of the important movements away from regulation that have occurred in the past 30 years.

17.5.1 Surface Transportation

Despite the efforts of the Interstate Commerce Commission (ICC) to protect the railroads, their competitive position declined after World War II. The development of the interstate highway system combined with the growth of the commercial airline industry destroyed the railroads' passenger business, which declined from 50 billion passenger miles in 1940 to 22 billion in 1960 and 10 billion in 1975.[28] The railroads argued

that the government unfairly subsidized competing modes of transportation. For example, while the government built the interstate highway system and new airports, the railroads had to use their own funds to build and maintain their rail beds. Furthermore, the government permitted truck carriers to use collusion and price discrimination to compete with the railroads, and the ICC was slow to allow the railroads to reduce rates in response to discriminatory price cutting by truckers.*

By 1960 the railroads were in deep financial trouble. The ICC responded by encouraging mergers and permitting service reductions, but the commission still refused to permit major rate cuts. Under pressure from the railroads to deregulate, in 1976 Congress passed the Railroad Revitalization and Regulatory Reform Act, which (1) provided $1.6 billion in government subsidies; (2) increased price flexibility; (3) accelerated the pace of merger approvals; and (4) expedited the closing of low-volume rail routes. The 1976 act did not go far enough, however, and in 1980 Congress passed the Staggers Act, which authorized more subsidies, eliminated antitrust immunity, and permitted greater price flexibility.

Deregulation resulted in immediate improvements in the railroads' economic performance. First, the railroads eliminated many unprofitable routes. Between 1975 and 1982, the railroads abandoned 17.2 percent of their track miles.[29] Deregulation enabled the railroads to increase rates in markets in which they had a comparative advantage, such as the transportation of bulky commodities like coal, and decrease prices in markets in which they faced stiff competition. Overall, rail prices decreased by 17.5 percent between 1975 and 1983.[30]

To level the playing field, in 1980 Congress also passed the Motor Carrier Act, which partially deregulated the trucking industry. This act, which was strongly opposed by the large truck carriers, eased entry and allowed greater price flexibility. Before 1980 regulation prevented entry into trucking if existing truckers could meet demand. Given this restriction, most entry requests were denied. Table 17.1 shows the dramatic impact of the 1980 Motor Carrier Act on entry. Requests for entry authority by truckers increased dramatically after deregulation, and the percentage of requests granted increased as well. One striking figure is the 60.7 percent increase in the number of carriers between 1975 and 1982. Entry caused rates for truckload carriers to decline by 25 percent in this period.[31] As prices fell, profits were squeezed, and the number of trucking bankruptcies increased 400 percent between 1980 and 1985.[32]

Deregulation of surface transportation resulted in improved economic efficiency.[33] Inefficient firms closed down, costs fell, and rates declined. Railroad profits increased, and trucking profits decreased. These results were a direct consequence of increased interindustry competition.

17.5.2 Airline Regulation and Deregulation

Regulation of the airline industry began in the 1920s, when the United States Postal Service was authorized to award mail routes and set rates. In 1934, the ICC took over the regulation of mail carriage and set up a competitive bidding system to allocate routes. To ensure a flow of mail traffic, the airlines continuously bid under cost, and

*The Reed-Bullwinkle Act of 1948 legalized the establishment of cartels, or rate bureaus, in the railroad, trucking, airline, and water carrier industries.

TABLE 17.1 Entry Requests and Approved Requests of Carriers

	Entry Authority Applications from Carriers		Percentage of Applications Approved		
Year	*Existing*	*New*	*Existing (%)*	*New (%)*	*Number of Carriers*
1975	2822	276	55	61	16,005
1976	6406	586	61	62	16,462
1977	8622	558	65	72	16,606
1978	12,983	703	69	78	16,874
1979	20,687	974	69	80	17,083
1980	18,788	1490	73	86	18,129
1981	19,135	4576	88	85	22,270
1982	9150	4925	84	55	25,722

Source: Thomas Gale Moore, "Rail and Trucking Deregulation," in Leonard W. Weiss and Michael W. Klass (eds.), *Regulatory Reform: What Actually Happened* (Boston: Little, Brown, 1986), p. 31.

soon many were on the verge of bankruptcy.[34] Congress responded to this threat to the airlines by passing the Civil Aeronautics Act of 1938, which established the Civil Aeronautics Authority. In 1940 the Civil Aeronautics Authority became the Civil Aeronautics Board (CAB). The CAB controlled the industry until the early 1980s and had complete control over rates, entry, exit, and safety. In 1958 the authority over safety was transferred to the Federal Aviation Authority (FAA).

The CAB set fares to earn a target rate of return on investment, and the fares had little relationship to costs. Average costs per passenger mile were significantly higher on short routes than on long routes. Fares, however, were related primarily to distance, so they were maintained well above average cost on long routes. These high fares subsidized below-average-cost fares on short routes. Price changes tended to be across-the-board, and the CAB discouraged price competition. Entry was approved only if it would not harm existing carriers. Finally, inefficient carriers that were in danger of sustaining economic losses were rewarded with new, profitable routes to keep them from going bankrupt.

Between 1949 and 1969, passenger miles increased at an average annual rate of 14 percent, while the average fare per mile decreased by 2 percent.[35] During this period, the Consumer Price Index (CPI) increased by 50 percent.[36] The decline in real air fares resulted from a 22 percent decrease in the average cost per passenger mile.[37] In the late 1960s the impact of regulation first came into serious question when it was discovered that fares on unregulated *intrastate* routes were much lower than fares on comparable regulated routes.[38]

In the absence of price competition, the airlines turned to various forms of nonprice competition, which took the form of increased frequency of flights and more amenities. As the airlines kept adding extra flights, empty seats abounded and load

factors were low. In 1969, for example, only 50.3 percent of available seats were filled.[39] These low load factors increased average costs and reduced profits. (See Application 17.2.)

APPLICATION 17.2

Airline Regulation: Where Did All the Profits Go?

As the discussion in the text indicates, in the era of airline regulation the Civil Aeronautics Board (CAB) closely regulated the fares airlines could charge. Even before deregulation, considerable evidence suggested that the fares permitted by the CAB were well above the level that would have prevailed in an open market. For example, interstate airlines flying between Washington, DC, and Boston charged almost twice as much as intrastate airlines flying between Los Angeles and San Francisco. The flights were approximately the same length, but the interstate fares were regulated by the CAB while the intrastate fares were not. Similar differences in fares existed for the unregulated flights between Dallas and Houston and the regulated flights between Washington and New York City. When some airlines requested reductions in fares, the CAB typically denied them.

Even though airlines were receiving higher-than-market fares because of the CAB's policy, they do not appear to have been earning excess economic profits. Over the 20 years prior to the 1978 deregulation, the average accounting profits for the airline industry were slightly below the national average across all industries. What is the explanation for this seeming paradox?

At least three factors played a role in eating away at airlines' profits. First, as part of its regulation of routes, the CAB required airlines to service some unprofitable routes, typically between sparsely populated areas. On these routes, demand was too low to allow profitable operation. A second factor was payments to employees. Airline employees' unions bargained for and got higher wages, made possible by the above-market fares permitted by the CAB.

The third factor is nonprice competition. In order to make profits at the high prices established by the CAB, airlines had to have passengers. Because they could not cut price, airlines looked for other ways to steal customers from their competitors. They scheduled more frequent flights to reduce waiting times, attracting passengers with the increased convenience. Additionally, airlines competed with each other on the basis of frills: gourmet meals, movies, more flight attendants, complimentary Mickey Mouse ears for passengers traveling to Disney World, and sometimes even live entertainment. Evidence about nonprice competition comes from the period immediately following deregulation. While the Consumer Price Index for food increased 62 percent between 1976 and 1982, the cost of food for airlines increased only 40 percent as airlines cut back on the quality of their food. The number of flight attendants per passenger fell 16 percent during the same period. Overall, the nonprice competition during the period of regulation increased the airlines' costs until the excess economic profits disappeared. Estimates indicated, in fact, that if the airline industry had not been regulated in 1977, industry profits would have been more than $4 billion higher than they actually were.

Source: Steven Morrison and Clifford Winston, *The Economic Effects of Airline Deregulation* (Washington, DC: Brookings Institution, 1986). ■

In 1976 the CAB took its first tentative steps toward deregulation when it permitted charter flight operators to reduce fares on advance purchase tickets with a minimum stay requirement. In 1977 the CAB allowed certain major carriers to lower fares by 45 percent on "Super Saver" transcontinental flights if the tickets were purchased at least 30 days in advance and were for a minimum seven-day stay. When economist Alfred Kahn became chair of the CAB in June 1977, he announced that his goal was to eliminate all regulation of fares and entry and to ultimately disband the CAB.[40] Under Kahn the CAB began permitting fare reductions of up to 70 percent and fare increases of up to 10 percent.

Over the protests of the major airlines, Congress passed the Airline Deregulation Act (ADA) in October 1978.[41] The ADA ended the CAB's route authority effective December 1980 and its fare authority effective January 1983. The act also abolished the CAB at the end of 1984 and transferred the CAB's remaining authority over antitrust and international matters to the Department of Transportation (DOT).

Deregulating the industry in 1979 proved to be unfortunate. In 1979 the Shah of Iran was overthrown, causing oil prices to increase to $34 a barrel, at the time an all-time high. As a result, the price of jet fuel jumped from 40 cents to over 60 cents per gallon. High oil prices precipitated a severe worldwide recession that greatly reduced the demand for air travel.

Despite these economic problems, entry occurred after deregulation. Midway entered in 1979, New York Air in 1980, and People Express in 1981. Furthermore, several of the larger carriers, such as Pacific Southwest Airlines and Southwest Airlines, entered the interstate market. In addition, most of the major airlines expanded into new territories. The effect was an explosion of new competition.

The new carriers had significantly lower costs than the established airlines and were able to compete effectively based on lower fares. One major advantage for the new airlines was a nonunionized labor force. In 1985, for example, pilots for nonunionized People Express earned between $22,000 and $70,000, compared with an average of $90,000 at the unionized major airlines. The major carriers were also saddled with a large fleet of 747 and DC-10 jumbo jets, which could not be used efficiently on the more price-competitive middle- and short-distance routes. In addition, the entrants reduced maintenance costs by relying on one or two types of aircraft, and they squeezed more seats into their planes. Further cost reductions were achieved by reducing in-flight amenities. People Express even charged for soft drinks and snacks. Between 1976 and 1983, the ratio of flight attendants to passengers decreased by 16 percent. Under deregulation airline travel began to resemble bus travel, with low prices and low amenities.

The increase in competition and reduction in costs led to a sharp decline in fares in those large cities in which a new low-cost airline entered. Between 1975 and 1983, after adjusting for inflation, the average price per passenger-mile declined by 8.5 percent.[42] The major carriers left the smaller markets, and small-market fares tended to increase. The increase in small-market fares was expected because regulation had highly subsidized service to small cities. The overall fare reductions forced several large carriers into bankruptcy. Victims included Braniff and Continental. Continental took advantage of bankruptcy to destroy its unions, reduce costs, and reemerge as a low-cost, low-price carrier.

One of the most dramatic impacts of deregulation was the development of the hub-and-spoke system.[43] Under regulation, many passengers were forced to change

airlines on medium or long trips. Under deregulation the airlines quickly learned that passengers preferred to stay with one carrier. By creating hubs and channeling passengers into and out of these hubs, the airlines could prevent most passengers from changing airlines. The hub-and-spoke system also reduced costs by allowing the airlines to rely on smaller, more efficient planes. Before long, all of the successful airlines were structured around a hub-and-spoke system. The system enabled several regional airlines, such as USAirways and Piedmont, to expand into national carriers.

Deregulation has had many positive effects. Fares have declined, the number of flights has increased, productivity has improved, and capacity utilization has increased.[44] Problems, however, have appeared in recent years as concentration has increased. Recall from Chapter 11 that the major carriers were very aggressive in fighting entry and succeeded in eliminating most of the new firms from the market. Concentration also increased because the Department of Transportation (DOT) failed to prevent a number of anticompetitive mergers even after the Department of Justice (DOJ) opposed them.* In 1986, for example, the TWA–Ozark and Northwest–Republic mergers were both opposed by the Department of Justice but were approved by the Department of Transportation. In just the three short years of 1985 to 1987, 20 mergers were approved. The Department of Transportation consistently acted as though the airline industry is perfectly contestable, yet as we saw in Chapter 5, this is not the case.[45] As Alfred Kahn noted:[46]

> [T]he reconcentration of the industry reflects in part the deplorable failure of the Department of Transportation to disallow even one merger, or, in all but one case, even to set conditions to mitigate potential anticompetitive consequences. The DOT seems to have no appreciation whatever of the dangers our antitrust laws were set up almost a century ago to forestall.

A good deal of empirical evidence indicates that increasing airline concentration is correlated with higher fares.[47] The cost of the DOT's failure to enforce the antitrust laws, therefore, has been substantial. It is now clear that a necessary part of deregulation is strict enforcement of the antitrust laws, which is critical in nurturing competition.

As of early 2006, policy signals are mixed.[48] The Department of Justice did block a merger proposed in May 2000 between United Airlines, the nation's largest carrier at the time, and USAirways, the sixth largest carrier. However, in 2001, it approved the acquisition of TWA and its St. Louis hub monopoly by American Airlines. Additionally, the antitrust agencies and the Department of Transportation have allowed the major carriers to enter into a variety of affiliations and partnerships that have given them considerable control over many of the leading regional and commuter carriers. The agencies have also not been aggressive in attacking barriers to entry identified in Chapter 5 such as slots, gates, and airport ground facilities. On the other hand, the Department of Justice challenged the communication and signaling practices of the airlines' computer reservation systems in the mid-1990s, accusing them of collusive behavior. And government lawyers filed an antitrust suit against American Airlines in 1999, alleging that American used predatory pricing to eliminate new competitors in

*The 1978 deregulation statute gave the Department of Transportation the authority to disapprove anticompetitive mergers. Beginning on January 1, 1989, Congress transferred authority over airline mergers to the Department of Justice.

its Dallas–Fort Worth hub, a practice discussed in Chapter 11.* The future of the airline industry, and of policy toward the industry, remains somewhat up in the air.

17.5.3 Regulation of Telecommunications and Broadcasting

Telecommunications

The history of telecommunications began with the invention of the telephone by Alexander Graham Bell in 1876. Bell founded the American Telephone and Telegraph Company (AT&T) and aggressively attempted to monopolize the communications industry by driving out small local telephone companies.† AT&T refused to sell equipment to independent telephone companies, refused to connect independents to its long-distance lines, and used predatory pricing when necessary. By 1940 AT&T controlled more than 85 percent of the nation's telephones.

There was no federal regulation of the industry until the ICC was given limited authority to regulate telephone service in 1910. The ICC, however, did not control the growth of AT&T. Early in the century, state commissions were established, but they too were passive. The Communications Act of 1934 established the Federal Communications Commission (FCC) to regulate telephone service and radio broadcasting. The FCC studied the industry for four years, and in 1939 issued a report that put the Commission's seal of approval on the existing market structure. Over the next 20 years the FCC undertook few important regulatory actions regarding the telephone industry.

State commissions had no legal authority to regulate interstate commerce, and therefore, state commissions had no authority over long-distance interstate rates and tended to be passive. With a few exceptions, such as California and New York, states spent few resources on telephone regulation. The national Bell system, consisting of a series of regional monopolies that cut across state lines, greatly complicated the state commissions' tasks. Southwestern Bell Telephone, for example, provided service to five states with over 40 million telephones. The interstate composition of the regional Bell companies made it difficult for state commissions to separate intrastate from interstate costs, which made it virtually impossible to regulate effectively.

Early regulation served the interests of AT&T well. The FCC established long-distance rates based on data supplied and interpreted by AT&T. Long-distance rates declined, not because of effective FCC oversight, but because of technological advances and economies of scale. AT&T's profits were high, and it was secure in its monopoly position because the Commission prevented entry.

Under regulation, AT&T kept long-distance rates high to subsidize local service. This pricing policy made entry into long-distance service look particularly attractive. With the development of microwave technology in the 1940s, potential competitors filed with the FCC to enter the long-distance market. The FCC consistently refused to grant licenses to use the microwave radio band for long-distance telecommunications. After a three-year review, the FCC finally ruled in 1959 that it would permit limited

*The court dismissed the case without allowing it to proceed to trial, ruling that American was following a legal, competitive pricing strategy.

†There were actually three conflicting legal claims to invention of the telephone. After many years in court, in 1888 Bell finally won out over the claims of Elisha Gray and Daniel Drawbaugh by a 4–3 Supreme Court decision.

private use of the microwave band.[49] The Commission, however, refused to authorize use of the microwave band by common carriers, and AT&T refused to allow private line users to interconnect with the AT&T system. To compete against the development of private microwave lines, AT&T slashed the price of its TELPAK business service, and the FCC found that AT&T's TELPAK rates were below cost.

In 1963 Microwave Communications Inc. (MCI) filed for common carrier status to build a microwave system for privately leased lines between Chicago and St. Louis. AT&T opposed the request and stated that it would refuse interconnection for the new system. AT&T argued that the proposal was a form of ***cream-skimming,*** which would allow MCI to steal AT&T's best corporate customers and lead to higher rates for AT&T's subsidized local customers. In 1969 the FCC approved MCI's request, and in 1971 the Commission expanded its ruling to approve interconnection with the AT&T system. AT&T, however, continued to fight interconnection.[50] It was not until 1976 that the FCC granted MCI unlimited interconnection privileges for its private lines.

MCI's legal battle did not end there. In 1975 MCI began to offer limited dial-up long-distance service. Once again AT&T argued this was cream-skimming that would harm local residential customers. This time the FCC agreed with AT&T and refused to permit MCI to offer dial-up service. MCI appealed the FCC ruling to the federal courts, and in 1977 the Court of Appeals overturned the Commission.[51] In 1978 the Supreme Court refused to reconsider the Court of Appeals' decision, and discount long-distance dial-up service became available for many customers.[52] Long-distance rates between cities served by MCI declined dramatically. AT&T's monopoly over long-distance service had been broken by a series of FCC and court decisions, but the major industry changes were yet to come.

Recall from Chapter 3 that in 1974, the Justice Department filed an antitrust suit against AT&T. On January 8, 1982, AT&T signed a consent decree that permitted AT&T to keep Western Electric, Long Lines, and Bell Labs. AT&T's 22 local operating companies, however, had to be divested. Furthermore, AT&T was given permission to enter unregulated markets. This decree resulted in the largest divestiture in antitrust history, over $87 billion in assets.

The combined effect of the 1978 Supreme Court ruling in favor of MCI and the consent decree was a monumental change in market structure. In 1979 AT&T held a 96 percent share of long-distance revenues; by 1987 that share had declined to approximately 70 percent and by 2001 AT&T's market share of long-distance revenues was slightly less than 38 percent.[53] Rates declined dramatically as well. A 10-minute daytime call from New York to Chicago that cost $4.49 in December 1983 was only $2.23 in December 1988, and a 10-minute call from New York to Los Angeles declined from $5.15 to $2.32.[54] Rates for long-distance calls have continued to fall since then. AT&T remained the dominant firm in terms of market share, but it was unable to use this dominance to raise long-distance rates. Furthermore, until 1989 continued regulation made it impossible for AT&T to cut rates in a predatory manner, allowing MCI and Sprint to gain footholds in the long-distance market.[55]

In 1989 the FCC replaced traditional rate of return regulation with ***price cap*** regulation.[56] Price cap regulation allows firms to raise prices a maximum amount based on the following formula, where X represents expected productivity increases:

$$\text{Permitted Price Increase} = \text{Increase in CPI} - X.$$

In theory, price cap regulation provides an incentive for firms to improve efficiency because they must keep price increases below the increase in the Consumer Price Index (CPI). In the long-distance telecommunications industry, however, the price cap was essentially meaningless because AT&T wanted to *reduce* rates in response to lower costs and increased competition. The 1989 policy change, therefore, effectively deregulated long-distance rates.

The breakup of AT&T resulted in the creation of seven large regional telephone companies to replace the 22 AT&T local operating companies.* Local telephone rates increased immediately after the breakup of AT&T.[57] Three primary factors combined to cause local rate increases. First, after divestiture the local companies could no longer use profits earned on long-distance service to subsidize losses on local service. Second, large users were able to set up their own communications systems, bypassing the local companies entirely. Third, under regulation AT&T had used slow depreciation of its equipment, which left the operating companies greatly underdepreciated at the time of divestiture. After divestiture, the local companies pressed for accelerated depreciation, which increased their short-run costs. Immediately after divestiture, local rates increased dramatically, rising at an 8.7 percent annual rate.[58] In 1985, Pacific Bell requested a 94 percent increase in its basic monthly rate, and Bell of Pennsylvania requested a 66 percent increase.[59] Later in the decade, however, the rate of price increases slowed down considerably.[60] Overall, the prices of local telephone service have increased moderately since 1989.[61]

Broadcasting

Regulation of broadcasting began shortly after the introduction of radio broadcasting in 1920. Because of the limited number of available wavelengths in the radio spectrum, without regulation the airwaves would have turned into a veritable Tower of Babel with stations crowding each other on the spectrum. The Radio Act of 1927 established the Federal Radio Commission to control access to the radio spectrum. With the passage of the Communications Act of 1934, the FCC took over the responsibilities of the Radio Commission. The FCC has had three primary responsibilities: (1) allocating the radio spectrum in a way that maintains a clarity of signals; (2) controlling the ownership structure to achieve a diversity of opinions; and (3) ensuring that broadcasters keep the public informed. Although the FCC was passive in its regulation of telecommunications, it was aggressive in its regulation of the more glamorous broadcasting industry.

No company can operate an over-the-air broadcast station without a license from the FCC. Licenses are terminated automatically after five years, and broadcasters must apply for renewals. It is rare for a renewal request to be denied. The fundamental guideline used by the FCC to allocate licenses is that a licensee must operate for the "public interest, convenience and necessity." To say the least, this is a vague guideline.

The limited number of VHF television stations (channels 2 through 13) available created market power for those companies fortunate enough to obtain a VHF license. In 1975, the average pretax return on invested capital in a VHF television station was 67 percent, and in the largest cities it was generally above 100 percent.[62] In the 1950s

*The seven regional companies were NYNEX, Bell Atlantic, Bell South, Ameritech, Southwestern Bell, U.S. West, and Pacific Telesis. Mergers have since reduced the number.

and 1960s, the FCC protected VHF stations from competition with cable television by limiting cable service to rural areas that could not receive clear over-the-air television signals. When this FCC position became untenable in the late 1960s, the Commission added a series of restrictions on cable services. The FCC limited the number of stations a cable system could carry, required the provision of free public access channels for local government and educational use, and prevented entry into large cities.

With the national movement toward deregulation in the early 1980s, many restrictions on cable television were lifted. The cable industry, however, came under new regulation in 1984, when Congress passed the Cable Communications Act. The 1984 law gave local governments the power to license and control cable companies, which were viewed as natural monopolies. Although the Cable Communications Act of 1984 gave cable companies increased price flexibility, it continued to require cable systems to set aside stations for public and educational access.

To ensure a diversity of opinions in a free and open society, the FCC has ownership restrictions that limit the number of stations any one person or company can own. Until 1996 no one person or company could own more than 12 television stations, 12 AM radio stations, and 12 FM radio stations. Furthermore, the 12 television stations could not reach more than 25 percent of the national population, and no one company could own more than one station in the same market.

The Telecommunications Act of 1996

On February 8, 1996, President Clinton signed into law sweeping changes in the communications industry. The Telecommunications Act of 1996 dramatically reduced regulation in telecommunications, television and radio broadcasting, and cable television. Key provisions of the bill included the following:

1. Local telephone companies, long-distance telephone companies, and cable television companies were allowed to enter each other's markets.
2. Broadcasting ownership regulations were liberalized, permitting television companies to own over-the-air stations reaching up to 35 percent of national viewers. The number of radio stations that could be controlled by one company was also increased, and the ban on ownership of a television station and cable company in the same market was lifted.
3. The bill phased in deregulation of cable television rates by 1999, and many rates were deregulated effective January 8, 1996.
4. Cable and telephone companies were forbidden from acquiring more than a 10 percent interest in each other's operations, except in small communities with a population below 35,000.
5. The bill made it illegal to transmit indecent materials (pornography) across the Internet. This section of the bill came under immediate First Amendment challenge in the courts and was declared unconstitutional.
6. The act expanded FCC jurisdiction to include satellite services.
7. Television manufacturers were required to install a "v-chip" in all new televisions larger than 13 inches. The v-chip allows parents to block out violent or sexually

explicit programming. The television industry was required to develop a rating system within one year warning of violent and sexual content.

The bill has revolutionized telecommunications and broadcasting by blurring the distinctions between markets. AT&T, MCI, and Sprint entered local telephone markets, and some of the Regional Bell Operating Companies (RBOCs) entered the long-distance market. The act opened the door to a huge consolidation merger wave as firms attempted to position themselves for future competition in this vast industry. SBC acquired three former RBOCs: Ameritech, Pacific Bell, and Southwestern Bell. Bell Atlantic, an RBOC, acquired another RBOC, NYNEX, and GTE; AT&T acquired TCI, a cable television provider, and Teleport Communications Group; and AOL acquired Time Warner. The merger activity continues. In October 2005, the FCC approved two mergers involving giants in the telecommunications industry: Verizon acquired MCI and SBC purchased AT&T and changed its name to AT&T. And on March 5, 2006, AT&T announced its intention to acquire BellSouth.

These mergers have only increased the concerns of opponents of the bill that it would result in higher telephone and cable rates as competition decreased. Consumer groups continue to worry that without antitrust enforcement, large mergers will consolidate the industry in the hands of a few large multimedia giants and result in a reduction in competition and a loss of tens of thousands of jobs.

As of this writing, there is no way to know what the final impact of the 1996 Telecommunications Act will be, but the industry is certain to be changed forever. Given the history of telephone deregulation, where we have seen changes such as cell phones and Voice Over Internet Protocol (VOIP) put strong competitive pressure on both local and long-distance phone rates, one virtual certainty is that increased competition will speed up the rate of technological advance in all sectors.

17.5.4 Electricity

In 1935 Congress passed the Public Utility Act, establishing the Federal Power Commission (FPC) to regulate the interstate aspects of the electricity industry. The Department of Energy Organization Act of 1977 transferred authority over interstate electricity regulation to the Federal Energy Regulatory Commission (FERC).

Vertical integration is extremely important in the electricity industry. There are three vertical stages: generation, transmission, and distribution.* Economies of scale are significant at the transmission and distribution stages, but less significant at the generation stage. Unlike the transportation and communications industries, there is a significant amount of government ownership in electricity. The federal government owns facilities that generate approximately 10 percent of all electricity. The Tennessee Valley Authority (TVA) is the most famous of the federal government's operations. State and local governments control approximately 10 percent of distribution services. Nebraska has a statewide distribution utility, and the tiny hamlet of Hamilton, New York, population 3600, has a village electric utility.

Given current cost structures, there is little disagreement that the transmission and distribution sectors are still natural monopolies. The debate over deregulation is

*A fourth function is retailing, which includes metering, billing, and marketing.

centered on the generation stage, in which economies of scale are much less significant. Generation typically has accounted for over 50 percent of total industry costs, so deregulation of generation would have a significant impact.[63] If vertical integration were dissolved, resulting in independent generation, transmission, and distribution companies, most regions could support multiple generation companies and a reasonable level of competition.[64]

Vertical disintegration and increased competition would likely result in lower industrial rates relative to residential rates because generating companies would compete for large commercial accounts. Deregulation also might result in entry by large, private bulk-power users. A lesson learned from the airlines is that for deregulation to benefit residential consumers it would have to be accompanied by watchful antitrust policies aimed at preventing mergers that would increase regional concentration. Generating companies also would have to be guaranteed interconnection to transmission lines.

APPLICATION 17.3

Electricity Restructuring: Lights Out in California?

Recently, several states have moved toward restructuring of electricity. Not surprisingly, these states include California, Massachusetts, and New York: states where the regulated rates have been considerably above the cost of generating power using the best available technology and also above the average rates across the country. For example, in California in 1993, the average retail electricity price was 9.7 cents per kilowatt-hour, while the national average was 6.9 cents. In an attempt to improve efficiency, California's state legislature passed a bill in 1996 that separated generation from transmission and distribution. Because independent generators were allowed to produce power, the hope was that competition at this level would increase efficiency and lower prices.

Initially, deregulation worked reasonably well: Wholesale prices were low and consumer rates were steady. In the summer of 2000, however, a combination of factors hit the California energy market hard. A heat wave caused demand for electricity to soar. Supply was also tight because of a lack of new power plants built over the previous 10 years, because of a drought that reduced the amount of hydroelectric power that could be produced, and because of the inability of outside power generators to supply enough power to the state. In addition, several empirical studies by economists suggest that the generating companies exercised considerable market power in the wholesale market. As a result of these several factors, wholesale energy prices in California rose sharply in June 2000 (to a level more than twice as high as during any month since 1998, when the transition to deregulation began); they increased for almost a year. The average wholesale price of electricity in the spring of 2001 was more than 10 times greater than its price a year earlier.

At the same time as the wholesale price of electricity was soaring, the retail price of electricity was still regulated. Utilities were sometimes forced to sell electricity at a retail price well below the price they were paying in the wholesale market; the distribution companies lost as much as $50 million per day. Because of tight supplies, the lights went out: California experienced rolling blackouts in June 2000 and again on two consecutive days in January 2001. As utilities accumulated huge debts and faced bankruptcy, the state of California took action, becoming the purchaser of wholesale power

for the utilities and regulating retail prices in order to recover the cost of the power the state had purchased during the energy crisis.

What lessons can be learned from California's experience? Some of the problems arose from features of the restructuring plan that can be changed as other states and countries develop plans for their electricity industries. In particular, the distribution companies faced a cap on their retail prices and limits on their ability to enter into forward contracts.* However, some features of the market for electricity—on both the demand and supply sides—imply that restructuring this market is more difficult than deregulating markets such as airlines, trucking, and natural gas. Demand is difficult to forecast; varies widely over the day, over the week, and over the year; and yet is highly price inelastic at any moment. On the supply side, electricity is prohibitively expensive to store, so that producers operate on a just-in-time basis with whatever generating capacity is available. At peak times, capacity is fully utilized; network congestion, combined with nonstorability, keeps remote suppliers from providing power in times of high demand.

Still, economists hold out hope for an improvement over the completely regulated electricity market of the past. Some ideas under consideration include introducing real-time retail pricing and long-term contracting. Real-time pricing would indicate to the final consumer on an hourly basis when electricity is more or less expensive to consume, helping to make short-term demand more responsive to price. Long-term contracting would give utilities more control over wholesale prices while also giving them time to expand transmission capacity.

*A forward contract is an agreement between two parties to buy or sell an asset at an agreed-upon future point in time. This kind of contract is used to control exposure to risk.

Sources: Severin Borenstein, "The Trouble with Electricity Markets: Understanding California's Restructuring Disaster," *Journal of Economic Perspectives* 16 (Winter 2002): 191–211; Paul L. Joskow, "Deregulation and Regulatory Reform in the U.S. Electric Power Sector," in Sam Peltzman and Clifford Winston (eds.), *Deregulation of Network Industries: What's Next?* AEI-Brookings Center for Regulatory Studies (Washington, DC: Brookings Institute): pp. 113–154; and W. Kip Viscusi, Joseph E. Harrington Jr., and John M. Vernon, *Economics of Regulation and Antitrust* (4th edition), (Cambridge, MA: The MIT Press, 2005): pp. 456–461. ■

17.5.5 Natural Gas Industry

Vertical integration is also very important in the natural gas industry, in which there are also three vertical stages: production at the wellhead, transportation through pipelines, and distribution. Although economies of scale are highly significant in transportation and distribution, they are insignificant at the production stage. Before 1938 the Federal Power Commission had no authority to regulate the price of natural gas, and the Supreme Court had ruled that state and local commissions could not set the price of interstate gas. In 1938 Congress passed the Natural Gas Act, which gave the FPC the power to set interstate pipeline rates but exempted producing and gathering operations at the wellhead from regulation. The FPC was also specifically given control over entry in the transmission segment. In order to build an interstate pipeline that served an area already served by another gas line, a company needed FPC approval.

In 1954 in *Phillips Petroleum* v. *Wisconsin*, the Supreme Court ordered the FPC to begin to regulate the wellhead price of natural gas.[65] Phillips was the largest

nonintegrated gas producer in the county. When Phillips raised its rates to the state of Wisconsin, Wisconsin complained to the FPC. The Commission claimed it had no regulatory authority over gas prices, and Wisconsin then sued Phillips. The Supreme Court ruled that although the 1938 act had exempted producing and gathering operations, it had not exempted the subsequent sale of natural gas across state lines. The Supreme Court ordered the FPC to expand its authority into pricing at the wellhead.

Initially the FPC attempted to regulate gas prices using traditional rate of return regulation, but because gas and oil are usually produced together (gas was actually a wasted by-product of oil production for decades), it was virtually impossible to separate the costs of gas production from the costs of oil production. Rate cases became hopelessly backlogged before the FPC. In desperation the Commission turned to setting regional wellhead prices. The FPC divided the country into 23 producing areas and announced temporary price ceilings in each area. A distinction was made between gas produced from "old" wells and "new" wells. The price ceiling was higher on "new" gas to provide an incentive for exploration.

Regulation of the wellhead price of natural gas never made economic sense, and this became abundantly clear with the onset of the energy crisis of 1973–1974. As OPEC increased oil prices, regulation kept the price of natural gas artificially low. This resulted in an excess demand for natural gas as consumers rationally attempted to switch from expensive oil and electricity to artificially low-priced natural gas. Price controls also reduced the incentive for exploration.

In 1978 Congress passed the Natural Gas Policy Act. The act gradually deregulated the price of natural gas at the wellhead. Price ceilings were removed from deep-well gas (wells more than 5000 feet deep) in November 1979 and from "new" gas in January 1985. "Old" gas remained under price control until July 1989. Today the wellhead price of natural gas is unregulated.

SUMMARY

1. Direct regulation of business began in the United States in markets in which economies of scale were very significant, such as the railroads, electricity and natural gas, and telecommunications.
2. Many government commissions were established to control these industries. Often these commissions were captured by the firms they were meant to regulate.
3. Regulated industries attempted to suppress competition by convincing commissions to expand their regulatory authority into new markets such as trucking, airlines, and cable television.
4. Commissions were primarily concerned with ensuring that service was provided at reasonable rates and with few service interruptions.
5. Regulations centered on establishing a permitted rate of return, a price structure, and a rate base.
6. Effective regulation probably lowered prices, but also resulted in X-inefficiencies and the use of too much capital relative to other inputs.

7. In recent years there has been a movement away from direct regulation of business and toward the use of increased competition to improve economic efficiency.

8. New product technology has tended to create new competition for most regulated industries. Trucking and air travel destroyed the power of the railroads, microwave systems undermined AT&T's control of long-distance telephone service, and cable television weakened the power of over-the-air television stations.

9. More recently, rapid technological change is leading to competition among local telephone, long-distance telephone, and cable television companies in many markets.

10. Although regulation will continue to exist in the few remaining areas of natural monopoly, such as the transmission and local distribution of electricity and gas, the primary lesson from America's history of regulation is that, over time, it is technology and competition that move an economy forward.

11. Creative destruction is a more powerful force than any government policy aimed at protecting consumers from high prices or industries from competition.

KEY TERMS

Averch-Johnson effect
capture theory of regulation
cream-skimming
input expansion path
isocost lines
isoquants
natural monopoly
peak-load pricing
price cap
Ramsey price
rate base
Regulation Q
regulatory lag

DISCUSSION QUESTIONS

1. Describe the conditions that result in natural monopoly. What industries remain natural monopolies today? In the past 30 years has the number of natural monopolies in the United States increased or decreased? Why has this change occurred?
2. In what ways can rate of return regulation result in a nonoptimal use of capital? *Ceteris paribus*, would this distortion increase or decrease with an increase in the permitted rate of return r?
3. Under traditional rate of return regulation, would regulated firms prefer rapid rates of depreciation or slow rates of depreciation? Why?
4. Under traditional rate of return regulation, what happens to a firm if it earns too high a rate of return? What happens if a firm earns a rate of return below the target rate? Keeping your answers to these questions in mind, discuss a firm's incentive to innovate under rate of return regulation.
5. Why do you believe that AT&T agreed to divest most of its assets? Do you think AT&T would have agreed to keep the local operating companies and divest the rest of its operations? Why or why not?
6. Do you think there are economies of scope between local and long-distance telephone service? Why or why not? Why might a regulatory agency want to know if there are economies of scope?
7. When cable television was first introduced, the over-the-air broadcasting industry welcomed the innovation; however, recently the broadcasting industry has opposed deregulation of the cable television industry. Why do you think the industry's position changed?

8. What were the historical similarities and differences in the origins of regulation in the railroads and trucking? In which industry was the economic rationale for regulation greater?
9. Entry restrictions were very important in the regulatory history of the trucking and airline industries, but much less important in the railroad industry. Why?
10. In what ways has airline deregulation been a success? What problems have arisen under deregulation? Do these problems suggest that the industry should be re-regulated?
11. Read Application 17.3. How would the policy proposals under consideration mitigate against the unusual demand and supply conditions of the electricity industry?
12. What problems were caused by the continued regulation of the price of natural gas during the energy crisis of the early 1970s?

PROBLEMS

1. Consider a regulated natural monopoly with the following demand and cost conditions:

$$\text{Demand: } P = 100 - Q$$
$$\text{Total Costs: } TC = 1800 + 10Q$$
$$AC = \frac{TC}{Q} = \frac{1800}{Q} + \frac{10Q}{Q} = \frac{1800}{Q} + 10$$
$$MC = 10.$$

   a. If a regulatory commission sets the price at the Ramsey price at which P = AC, what would be the regulated price? Show this result on a graph. [*Hint:* Set AC equal to demand and find the two roots of the quadratic equation. The AC curve "cuts" the demand curve at two outputs, but the Ramsey price is set at the larger quantity.]
   b. What is consumer surplus plus profit at the Ramsey price? Show this on your graph.
   c. If price were set at marginal cost, what would be the industry output? What would be the value of consumer surplus plus industry profits? Show these areas on your graph.
   d. Which price results in greater economic welfare (that is, the sum of consumer surplus plus economic profit)? What area on your graph represents the change in welfare? Explain.

2. Consider the same regulated natural monopoly from problem 1 with the same demand and cost conditions:

$$\text{Demand: } P = 100 - Q$$
$$\text{Total Costs: } TC = 1800 + 10Q$$
$$AC = \frac{TC}{Q} = \frac{1800}{Q} + \frac{10Q}{Q} = \frac{1800}{Q} + 10$$
$$MC = 10.$$

   Suppose a regulatory commission established the following price structure: The first 60 units are sold at a price of 40, and the next 30 units are sold at a price of 10.
   a. Is this price structure allocatively efficient?
   b. What are the profits earned by the regulated firm?

3. Consider a natural monopoly with the following total cost function:

$$LRTC = 0.1q^3 - 10q^2 + 275q.$$

This implies that $LRMC = 0.3q^2 - 20q + 275$ and $LRAC = 0.1q^2 - 10q + 275$. The product demand is $P = 500 - 10q$. Given these conditions, the demand curve cuts the LRAC curve at a point where the LRAC is downward sloping.

a. Solve for the profit-maximizing unregulated monopoly price and output.
b. Find the unregulated monopoly's profits.
c. Now assume this monopoly is regulated. Solve for the output that the monopoly would charge if Ramsey pricing were enforced. What is the price? What is the profit to the monopolist?
d. Calculate the increase in consumer surplus that results from regulation.

4. Suppose a regulated utility faces the following demand curves:

$$\text{Demand Off-Peak: } P = 50 - Q$$
$$\text{Demand Peak: } P = 110 - Q.$$

Marginal costs are:

$$MC = 20 + \frac{1}{2}Q.$$

a. What are the socially optimal peak and off-peak prices?
b. Suppose the regulatory commission sets $P = 30$ during both peak and off-peak periods. What is the social cost of such a pricing policy?
c. Suppose the regulatory commission sets $P = 40$ during both peak and off-peak periods. What is the social cost of such a pricing policy?

5. Suppose that a heat wave hits. Consequently, both the off-peak (night) and peak (day) demand curves from problem 4 shift out. The new demand curves are as follows:

$$\text{Demand Off-Peak: } P = 80 - Q$$
$$\text{Demand Peak: } P = 140 - Q.$$

Assume marginal cost does not change.

a. What are the socially optimal peak and off-peak prices now?
b. Suppose the regulatory commission keeps prices at $P = 40$ during both peak and off-peak periods. Find the social cost of this pricing policy.

NOTES

1. For historical background see I.L. Sharfman, *The Interstate Commerce Commission, A Study in Administrative Law and Procedure* (New York: The Commonwealth Fund, 1931–1937); Gabriel Kolko, *Railroads and Regulation, 1877–1916* (Princeton: Princeton University Press, 1965); Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions* (Cambridge, MA: MIT Press, 1988), particularly vol. II, pp. 26–28. For related background on the passage of the Sherman Act in 1890 see H.B. Thorelli, *The Federal Antitrust Policy: Organization of an American Tradition* (Baltimore: Johns Hopkins Press, 1955); J.D. Clark, *The Federal Trust Policy* (Baltimore: Johns Hopkins Press, 1931); A.H. Walker, *History of the Sherman Law* (New York: Equity Press, 1910); A.D. Neale and D.G. Goyder,