

Lesson-29

Monopoly

We have seen that p-competition has some remarkable results. It defines an ideal market structure in two senses:

1. In p-competition, price competition dominates all other forms of competition and forces the price to the supply-and-demand equilibrium.
2. At that price and the corresponding output, marginal benefit is equal to marginal cost, so the allocation of resources is efficient, i.e. net benefits are maximized.

But it seems unlikely that all industries are p-competitive, even approximately. We expect to find p-competition in industries that (among other characteristics) have many small sellers. But we observed some industries (Cable TV, for example) in which there is only one seller in a particular local market, and other industries in a whole spectrum from one to few to many sellers. P-competition is the many-small-sellers extreme of that spectrum.

Now we consider the opposite extreme-- a monopoly. By definition, a monopoly is the only seller of a product for which there is no close substitute. It is an industry in which there is only one firm, or conversely, a firm that has the whole industry to itself.

Causes of Monopoly

Most economists regard monopoly as an exceptional case in a modern economy. In an economy populated by alert profit-seekers, it seems that any profitable monopoly would quickly attract competitors. For a monopoly to be stable, there must be some "barrier to entry." The assumption of free entry into the industry should not apply. Thus, we ask what might create the exception, what might "cause" a monopoly, and what the "barrier to entry" might be.

Following are some of the causes of monopoly:

- Patents and other forms of intellectual property
- Control of an input resource
- Government
- Decreasing cost
- Crime

Patents and Other Forms of Intellectual Property

Patent law is designed to increase the incentive to invent new methods of production and new goods. The inventor is granted a temporary monopoly on the use of the invention. The idea behind this is that the patent makes the invention more profitable, during the term of the patent, and that these profits encourage inventors. So, it increases the rate of technical progress.

For example, the Polaroid Company owns the basic patents on instant cameras. When the Kodak Company produced instant cameras in competition with Polaroid, a court found that this violated Polaroid's patent rights. As a result, Kodak had to cease and desist, and pay a penalty to Polaroid.

Other forms of "intellectual property" include copyrights on books and works of art such as trademarks and trade secrets. Copyrights and trademarks probably do not create monopolies in and of themselves. There may be close substitutes for copyrighted books, and close or even perfect substitutes can be offered for trademarked goods, provided they do not falsify the trademark. However, it is possible that trade secrets might create monopolies. The formula for Coca Cola, for example, is a trade secret. While Coca Cola probably is not a monopoly, this is a matter of degree-- it is a distinctive product. Whether other colas are close substitutes or not, we leave to your own judgment.

Control of an Input Resource

Products which require a natural resource input may be monopolized if one supplier can get control of all known supplies of the natural resource. For example, at one time all the known supplies of nickel were controlled by a single company. Aluminum ore too was, at one time, controlled by a single supplier.

Government Grants of Monopoly

Monopolies can be created by legislation. Historically, this has been an important source of monopolies as, for example, a monarch might grant a monopoly of wine to a favorite. In the modern world, governments may still encourage monopoly in many countries of the world, though this seems less common as time goes on.

Decreasing Costs

Monopolies can come about because there are decreasing costs (increasing returns to scale) in the long run. In such a case, the long run average cost slopes downward, as shown in the:

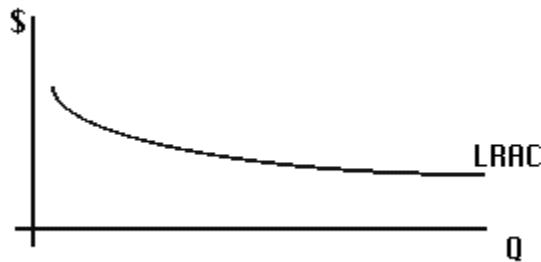


Figure 29.1

Increasing Returns to Scale

In such a case, the largest producer can undersell the rest and still make a bigger profit. Therefore, in an industry in which there are increasing returns to scale, we would not be surprised to find a monopoly in the absence of any other causes. Such a case is called a "natural monopoly."

Crime

While economists usually limit themselves to the discussion of legal activities, it is clear that criminal coercion can prevent competition and create monopolies. This is probably most common in activities that are anyway illegal, such as gambling, which often seem to be local monopolies.

Once established in illegal activities, criminals may use their profits and means of coercion to monopolize businesses that are legal, in principle, such as small scale lending. A possible example is the so-called "loan sharking." The "loan shark" makes risky loans, which is legal in itself, but limits his risk by using the threat of violence (which is not legal) to limit the risk and assure that the loan and interest are paid. High interest rates will be charged, and these may be illegal. When there is a high risk of default, loans will be supplied only at very high interest rates, legal or not. But, if the loan shark uses coercive threats to maintain a monopoly of these risky loans, the rate of interest may be even higher than the risk of default requires, because of a monopoly mark-up.

Monopoly Demand

The demand curve for a monopoly is different from that of a p-competitive firm.

In p-competitive industry, we have to distinguish between the industry demand and the demand for the output of an individual firm, which are quite different. As we can recall, the p-competitive firm has a horizontal demand curve. If there are two or more firms in an industry, we have to distinguish between the industry demand and the firm demand. But in a monopoly-- an industry with only one firm-- there is no such distinction.

The demand curve for the monopoly is the demand curve for the industry-- since the monopoly controls the output of the entire industry-- and the industry demand curve is downward sloping. So, the monopoly's demand curve is downward sloping. This means that the monopoly can push the price up by limiting output. If the monopoly cuts back on its output, it can move up the industry demand curve to a higher price.

To illustrate what this means, let us "tell a story" about monopoly. In this story, the monopoly will be created by legislation.

The story begins with a competitive industry consisting of many firms. As usual, we will call it the "widget" industry. Economists often use the word "widget" meaning "some small good or service, not specific." (This came from a 1950's musical comedy-- "How to Succeed in Business Without Really Trying.") You would not be far off if you think of it as a small manufactured good.

We will need to make a few simplifying assumptions.

Assumption-- Each firm operates under constant costs in the long run. We recall that with constant costs in the long run, each firm's long run average cost is a horizontal line. We need two more facts about constant costs in the long run, and one more assumption.

Fact-- With constant long run costs, the firm's long run marginal cost is also a horizontal line, identical with the LRAC curve.

Assumption-- The firm cost curves remain the same as the number of firms in the industry increases.

Fact-- When the assumption is true, the long run average cost, marginal cost and supply curve of the industry are also the same horizontal line.

With these assumptions, the competitive industry's supply curve is a horizontal line. The discussion would be a little more complex in general, allowing for more complicated supply curves, but the overall results would be the same.

The following figure shows long run supply and demand under these assumptions. In the figure, it is assumed that the constant average cost for the widget industry is \$40 per unit. So, the long run supply curve is the horizontal red line at \$40, while the industry demand is the downward sloping green line.

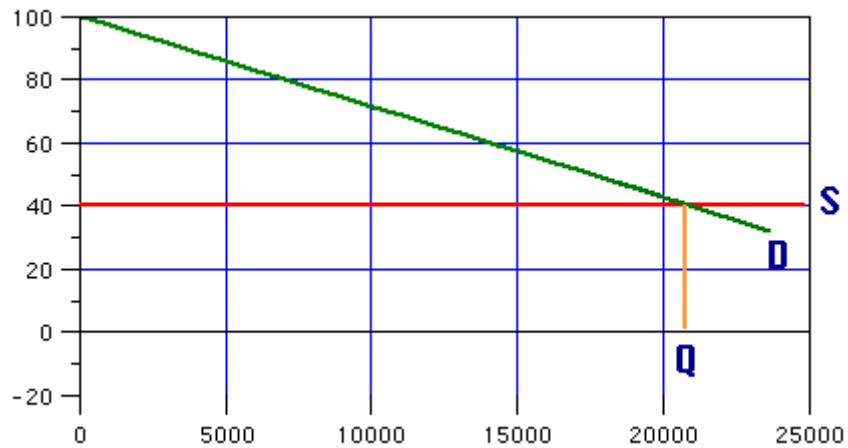


Figure 29.2

As we can see, the long run equilibrium output for the widget industry is 21,000 units of output at a price of \$40.

Here, in Table 29.1, the numbers for the example are given.

Table 29.1

Price	Quantity
100	0
97	1000
94	2000
90	4000
82	6000
77	8000
71	10000
66	12000
60	14000
54	16000
48	18000
42	20000
37	22000
31	24000
26	26000

20	20000
14	20000

The national legislature passes a law limiting competition in the widget industry. All the small firms in the industry are consolidated into one large corporation. The owners of the old competitive firms are issued shares in the corporation proportionate to their ownership in the old firms. The corporation is now the only firm allowed to supply the widget industry.

The board of directors of the widget industry now meet to consider their policy, and they aim at maximizing profits. How will they go about this?

In general, the logic of monopoly profit maximization is very much like the logic of the other "maximization" questions we have dealt with. We will use the marginal cost, marginal benefit logic to solve it.

But it is different from the p-competitive firm, because the price is no longer fixed, from the point of view of the monopoly.

Of course, the monopoly will charge "all the market will bear," i.e. it will choose a price and output on the demand curve. But that does not tell us much. Starting at the competitive equilibrium price of \$40, the monopoly will raise its price to increase its profits, but its quantity sold will drop with each price increase. Eventually, its profits will begin to decline because the lost sales offset the higher prices. How far up will the monopoly push the price?

To solve this problem, we need to go through one more concept-- marginal revenue.

Marginal Revenue

We can define marginal revenue by the following formula:

$$\text{Marginal Revenue} = \frac{\Delta R}{\Delta Q}$$

Where R is revenue (i.e. price times quantity sold) and Q is the quantity sold. As usual, this is an approximative formula, and the smaller the change in Q, the better the approximation. We can interpret marginal revenue as (approximately) the increase in total revenue as a result of selling one more unit of output. Here is an example of the calculation of the approximation-- suppose output increases from 10,000 to 11,000 and revenue increases from 7,54,286 to 7,14,286. Then, we have the following equation:

$$\frac{\Delta R}{\Delta Q} = \frac{754286 - 714286}{11000 - 10000} = \frac{40000}{1000} = 40$$

Thus, between 10,000 and 11,000 units of output, the marginal revenue is approximately \$40.

Monopoly, P-Competition and Marginal Revenue

Here is a difference between monopoly and p-competition. For the p-competitive firm, the marginal revenue is the same as the price, since each unit sold will add the price to revenue. For the monopoly, it is different. In order to sell one more unit, the monopoly has to drop its price a bit. The additional unit sold will add something to revenue, but the cut in price will decrease the revenue from the units the monopoly could have sold at the old price without cutting. So, the net addition to revenue will be less than the price at which the additional unit is sold. It could even be negative-- the lost revenue from the price cut could be more than the price for which the additional unit is sold.

For example, suppose the monopoly is selling 11,000 widgets at \$69 each. This gives a total revenue of \$759,000. In order to increase sales to 13,000 widgets, the monopoly has to reduce its price to \$63. The price of \$63 applies to the first 11,000 units as well as the remaining 2000-- all units of output are sold at the same market price. So, 11,000 units at \$63 per unit yields only \$693,000. This is more than made up by the \$126,000 earned from selling 2000 more units at \$63, leaving a total revenue of \$819,000-- an increase in

revenue relative to the \$759,000 the monopoly started with. But this increase is not in proportion to the additional sales.

Example of Marginal Revenue

The following is a table of the output, price and marginal revenue with regard to the numerical example discussed in this lesson. Notice that the marginal revenue drops much faster than the price, and in fact, it is negative when the price is \$40 or more.

Table 29.2

Output	Price	Marginal Revenue
0	0	0
1000	07	00
2000	01	77
3000	06	66
4000	00	54
5000	74	42
6000	60	31
7000	60	20
8000	57	0
9000	51	7
10000	46	-14

Demand and Marginal Revenue

The following figure of demand and marginal revenue for the example is based on the data in the previous table. Demand is shown as the dark green line, and marginal revenue as the light green line.

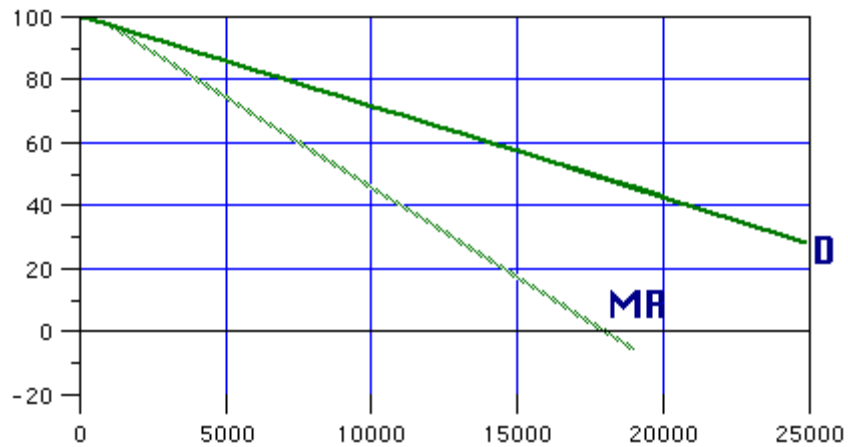


Figure 29.3

Monopoly Profit Maximization

The rule for monopoly profit maximization is as follows:

$$MR = MC$$

The rule says that the monopoly should increase output up to the level where the marginal cost curve intersects the marginal revenue curve, in order to maximize its profits. The price charged is the corresponding price on the demand curve. Notice that this is a two-stage analysis:

1. At the first stage, the marginal cost, shown in red, and the marginal revenue, shown in light green, determine the output. Profit maximizing output is the output at which they intersect, shown by the gold line.
2. At the second stage, the output and the demand curve determine the price. Trace up the vertical gold line to the dark green demand curve, and that is the profit-maximizing price.

The figure is a little more complex:

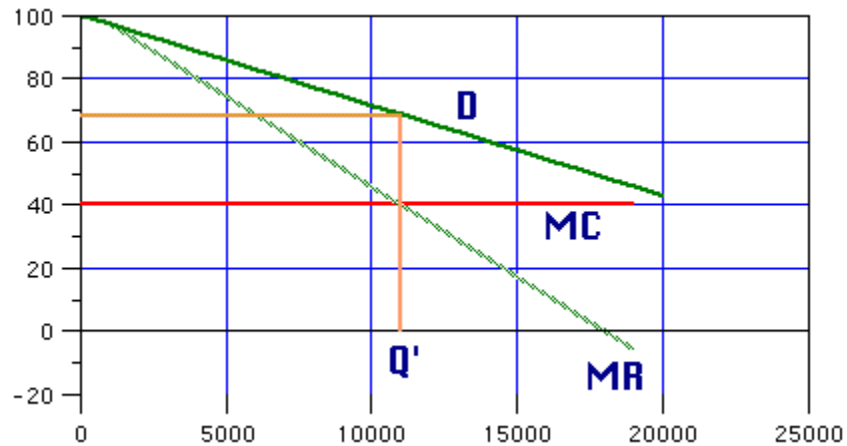


Figure 29.4

The output that corresponds to maximum profits is Q' , which is 10,500 widgets, and the monopoly price is \$70 per widget.

Monopoly Output Restriction

In the figure, the monopoly maximizes its profits by selling Q' .

Now, let us get back to our story. You may recall that the widget industry had been monopolized by an act of the legislature. Before it was monopolized, it had sold 21,000 units at a price of \$40-- to the right where demand crosses the marginal cost line. Now, we see the monopoly selling much less. In fact, it will sell just half what the competitive industry sold-- 10,500 units at a price of \$70.

(It will not be this simple as a rule. Remember, we have made a lot of simplifying assumptions to get here. What we can be sure of in general is that a profit-maximizing monopoly will sell less than the supply-demand output, at a higher price).

Monopoly Profits

In the example, the widget industry started out in long run equilibrium with zero economic profits. Once the monopoly cuts back to its long run equilibrium at a higher price, it will have positive economic profits. In the Figure 29.5 below, profits are shown by the shaded blue area. The amount of monopoly profit in this example is \$30 (the markup over \$40 of cost per unit) times 10,500 widgets sold, or \$315,000.

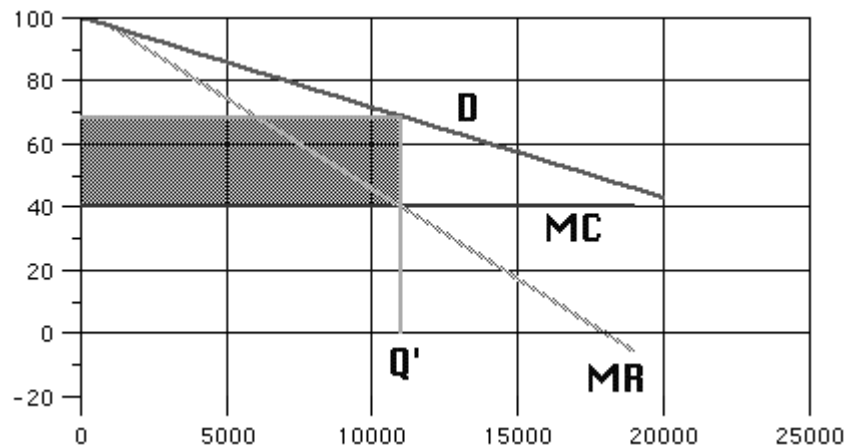


Figure 29.5

Monopoly Inefficiency

The restriction of output by the monopoly is inefficient. This inefficiency is shown in the following figure:

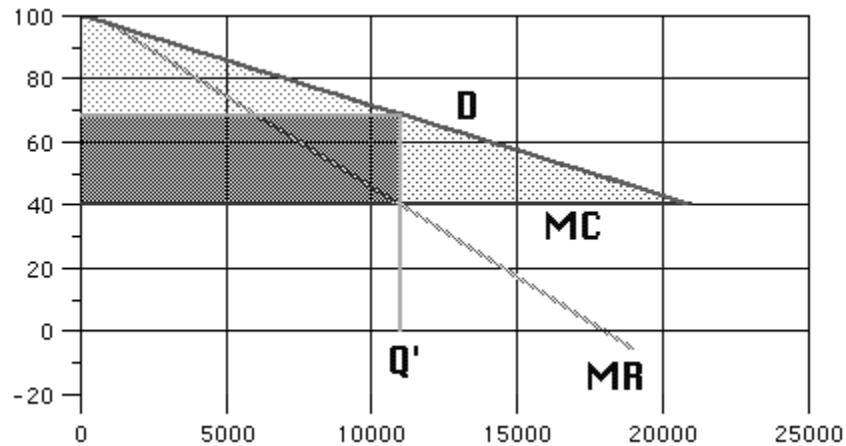


Figure 29.6

We can explain the inefficiency of monopoly by using the concept of consumers' surplus with the help of the figure. There are three areas-- the lightly shaded area above the profit rectangle, the lightly shaded area to its right, and the profit rectangle itself. Before the industry is monopolized, consumers buy 21,000 widgets at \$40 per widget and their consumers' surplus is the sum of the three areas. After the monopolization, the consumers buy 11,500 widgets at \$70, and their consumers' surplus is the area of the upper triangle.

Let us add up the benefits of monopolization. After monopolization, the net benefits from widget production have two components-- the profit rectangle plus the upper consumers' surplus triangle. But the opportunity cost of monopolization is the consumers' surplus the consumers would have enjoyed if they had continued to buy at \$40-- the sum of the three areas. Thus, the benefits of monopolization are less than the costs, and the difference-- the excess cost-- is measured by the area of the (red) triangle to the right.

This loss of consumers' surplus is called the "deadweight loss" (meaning the monopoly profits are not enough to offset it) or the "welfare triangle." It is a measure of the waste due to monopoly restriction of output. In this example, it is half of the monopoly profits.

Complications in the Theory of Monopoly

But there are still some complications we have not taken account of. So far, we have been assuming that the monopoly has the same cost conditions that a competitive industry would have. The complications arise when the monopoly and a competitive industry cannot have the same cost conditions. This could happen for two reasons.

1. The monopoly, lacking the spur of competition, wastes resources so that its cost curves are above those of a competitive industry. The term for this is "X-Inefficiency." This is a deviation from the neoclassical assumption of absolute rationality, but perhaps a very important realistic deviation. A good deal of observational evidence suggests that different firms can have quite different costs, in what seems to be the same circumstances. Competition, driving prices down, will tend to eliminate this problem by eliminating the high-cost firms. In the absence of any competition at all, costs would be higher than they would be in a competitive industry. There is some evidence that this is true.
2. There are economies of scale, so the monopoly, operating on a larger scale, can achieve lower costs. This is the case of natural monopoly.

"Natural" Monopoly

"Natural" monopoly creates a dilemma for neoclassical economics and (perhaps) for market economies.

The following figure is an example of "natural" monopoly. The example assumes that there is one indivisible cost. But once it is paid, the firm can produce an unlimited amount at a constant marginal cost. Thus, the long run marginal cost is horizontal, but the long run average cost is downward sloping.

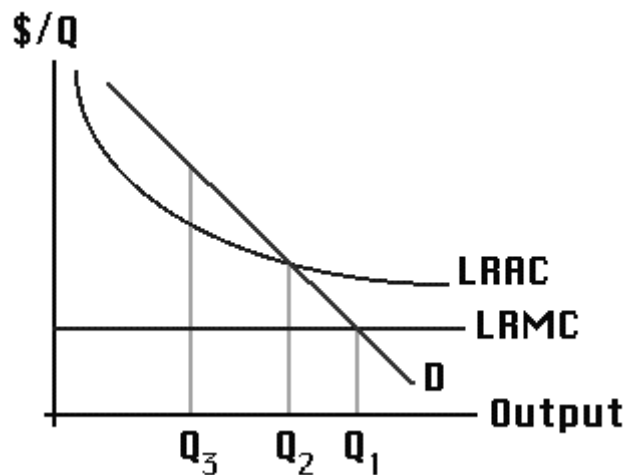


Figure 29.7

The dilemma is that output Q_1 , where $MC = \text{price}$, is still the efficient output. But at that output, the monopoly cannot cover its total costs. On the other hand, a profit-maximizing monopoly will produce much less, at Q_3 , which covers costs but is inefficient.

In different countries and at different times, governments have dealt with this problem in three primary ways:

- Government Ownership
- Regulation
- Deregulation

Government Ownership

Government ownership has been a common response outside the United States, and there are cases of municipal ownership in the US.

Government ownership could, in principle, solve the problem. This is because the government could operate the monopoly efficiently, charging a price equal to marginal cost, and cover the losses out of tax revenues.

In practice, however, government monopolies usually seem to have been operated as "cash cows" for the government, and that is not a solution to the problem of high monopoly prices. It has been quite common around the world, for example, for public telephone monopolies to raise the price of telephone service to pay the deficit of the postal system. Poor telephone service at a high price is the predictable result.

In recent years, many of these government monopolies have been privatized.

Regulation

In the United States, for most of the 20th century, the most common response has been regulation. In this system, a private monopoly is recognized and protected as such on the condition that it keeps its price down below the profit-maximizing level. The monopoly would be allowed to earn a "fair rate of return."

Over the years, this was more and more interpreted as meaning that the monopoly would operate at Q_2 where the price just covers average cost. This is less efficient than Q_1 but better than Q_3 . However, there are some other complications that led economists and regulators to question this interpretation by the 1960s. In recent years, the trend has been away from regulation.

Deregulation

Natural monopolies are complex businesses with different lines of business and different cost conditions. Here, changing technology may change the cost curves, making more competition possible. The telephone industry provides some examples. The Bell monopoly of the 1970s offered both long distance and local service as well as some other lines of business. Microwave technology and other technical developments were making it possible for smaller firms to compete with Bell in long distance service. But, so long as Bell remained under "natural monopoly" regulations, all its lines of business were interdependent and had to be regulated in complicated ways.

This led some economists to argue that even in natural monopoly conditions, it is best to rely more on market forces and less on government. Under the influence of those economists, US natural monopolies have increasingly been "deregulated." This began with the Jimmy Carter Administration (1977-80) and has been continued since by all administrations, whether Republican or Democratic.

Deregulation has not meant that all regulations were eliminated, but their scope has been cut back a great deal. At a minimum, the companies have had more freedom to set their own prices, while in most cases they are no longer protected from new competition.

Deregulation as Market-Based Regulation

It is not clear that "deregulation" has really reduced the scope of regulation of "natural monopolies." In practice, what emerged in the 1990s might be better described as market-based regulation. The nature of the regulations has changed in ways that are designed to encourage rather than restrict price competition.

This is illustrated by a recent court decision. Michael Weinstein, a columnist for the *New York Times*, writes (January 28, 1999, p C2) that the Supreme Court in January upheld Federal Communications Commission regulations that had been challenged by the local telephone service providers in some parts of the United States. The regulations were designed to encourage new companies to enter the local markets to compete with the Bell Telephone Companies and other local service providers. Free entry, remember, is a key characteristic of price-competitive markets. "The problem was that no company was in a position to provide local service using only its own equipment. Entrants would need to use, at least initially, some or all of the Bell network, including wires into homes, switching equipment and operator services," writes Weinstein. He quotes Gene Kimmelman, a Consumers' Union representative, as saying that the FCC had imposed "smart rules that compel the Bell companies to compete on fair terms with their rivals." The rules required that the local providers lease their physical facilities to the new entrants and limit the price they can charge. "... under the commission's rules, the Baby Bells would charge enough to cover legitimate costs-- the costs of a low-cost provider-- and not one penny more." Similar rules have been imposed on local providers of electrical power in some areas, including the Philadelphia region.

The local service providers had argued that they should not be forced to help their competitors by allowing them to use the physical facilities which are the property not of the new entrants, but of the established local providers. They argued that this was against the spirit of deregulation and perhaps against the constitutional protection of private property. However, the FCC argued that a failure to require the local providers to rent their facilities at a controlled price "posed the danger that the Bells would exploit the 1996 act to dominate telecommunications markets, making a mockery of Congress' will."

Once again, we see the dilemma of natural monopoly. It may be that the new sort of regulations, designed to make the telecommunications and other "public utility" markets function more like price-competitive markets, will be more effective in the long run than the old sort that tolerated the monopoly so long as it did not raise the price too high. But the idea that we can get rid of regulation and rely on the spontaneous forces of competition seems as far away as ever.

Summary

Monopoly provides an important example of an exception to the Fundamental Principle of Microeconomics in that there is not enough competition to push the price down to the supply-demand level. Indeed, there is only one seller.

We have seen that a profit-maximizing monopoly will involve in the following:

- Produce less than a comparable p-competitive industry
- Charge a higher price
- This output restriction is inefficient

However, if there are economies of scale, p-competition may simply not be possible. The extreme case of "natural monopoly" leaves us with a choice of the least of three evils:

- Public ownership
- Regulation
- Deregulation