

How to Study for Class 14 Cases on Monopoly

Class 14 involves analysis using the case of pure monopoly. It introduces price discrimination and natural monopolies and builds on the reasoning of Class 13

1. Begin by looking over the Objectives listed below. This will tell you the main points you should be looking for as you read the chapter.
2. New words or definitions and certain key points are highlighted in italics and in red color. Other key points are highlighted in bold type and in blue color.
3. You will be given an In Class Assignment and a Homework assignment to illustrate the main concepts of this chapter.
4. There are a few new words in this chapter. Be sure to spend time on the various definitions. There are also some graphs. Go over each carefully.
5. The teacher will focus on the main technical parts of this chapter. You are responsible for the cases and the ways by which each case illustrates a main principle.
6. When you have finished the text, the Test Your Understanding questions, and the assignments, go back to the Objectives. See if you can answer the questions without looking back at the text. If not, go back and re-read that part of the text. When you are ready, take the Practice Quiz for Class 14

Objectives for Class 14 Cases on Monopoly

At the end of Class 14, you will be able to answer the following:

1. Explain what is meant by "**price discrimination**"? Explain why is it practiced? Give some examples of price discrimination.
2. State what conditions are necessary to be able to practice price discrimination?
3. Explain, if price discrimination occurs, which segment of the market gets the higher price? Why?
4. Explain what a "**natural monopoly**" is and why it exists?
5. Explain how natural monopolies have been regulated? Who regulates them?
6. Explain what is meant by "**average cost pricing**" (also called "**rate of return regulation**")?
7. What is meant by the "**rate base**"?
8. Using SDG&E as an example, state what problems result from average cost pricing for public utilities?
9. Name some changes that have been occurring recently in the regulation of public utilities? Why have they been occurring?

Class 14 Cases on Monopoly (latest revision August 2004)

(1) Price Discrimination

One behavior that tells us that there is monopoly power is price discrimination. Notice that the words "*monopoly power*" are used here. There company is not literally a monopoly --- that is, it is not the only seller. But the company does have the ability to affect the price in a way

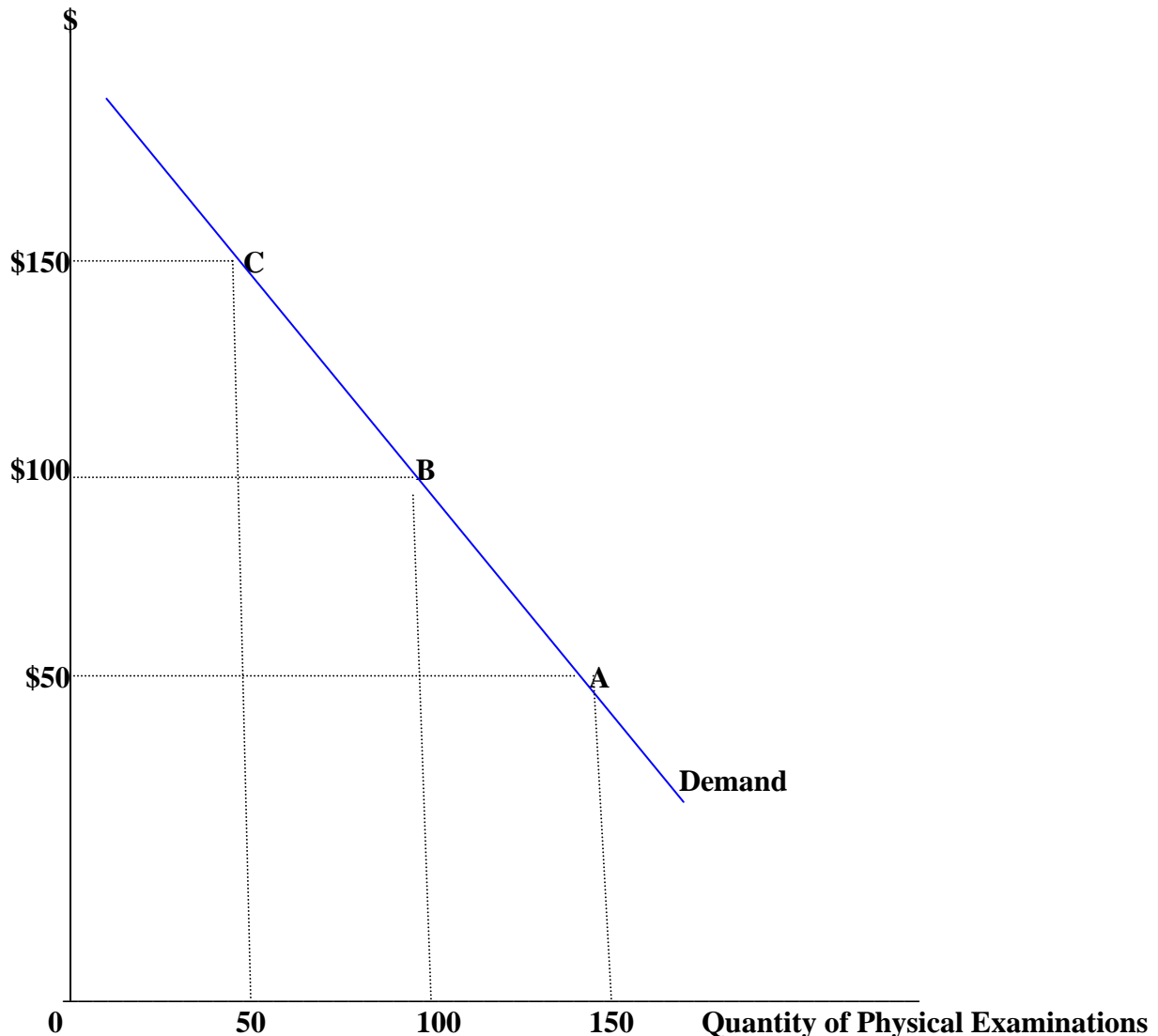
similar to what it would have if it were indeed the only company.

What is price discrimination? The term means that the company sells exactly the same product to different buyers for different prices. Examples of this practice are familiar to many of you. For example, magazines and newspapers advertise on campus that they will sell their magazines or newspapers to students at a price below that charged to others. You get exactly the same magazine or newspaper as anyone else; however, you pay a lower price. The same practice occurs at the movies. As a student or as a senior citizen, you get to see the movie for a lower price than others have to pay. You do not have to go at unusual times or sit in undesirable seats to get this lower price. There are many other examples. When you pay a bill by mail, you pay the first class rate of 37 cents. But when a company sends you junk mail advertising, it pays the much lower fourth-class rate. San Diego Gas and Electric charges lower rates to business users of electricity than to household users. However, long-distance companies charge higher prices to business users (who call between 8 A.M. and 5 P.M. on weekdays) than to household users (who call at other times). Even self-service gasoline can be seen as a form of price discrimination. The lower price for self-service gasoline is not justified by the cost savings to the gasoline station. **Notice that, for there to be price discrimination, the one paying the lower price gets exactly the same product as the others.**

Why does price discrimination occur? And what determines who will pay the higher price? To answer these questions, let us turn to a different example of price discrimination --- that practiced by doctors. Refer to the demand curve below. Assume that this represents the demand for physical examinations. **The important point is that this is a downward-sloping demand curve.** If the doctor raises the price, the quantity demanded falls, but not to zero. The supply curve is not shown here. If it were shown, the equilibrium price would be \$100. At this price, the doctor would provide 100 physical examinations per year. The doctor would earn \$10,000 (100 @ \$100) from physical examinations.

Notice point A. If the price were \$150, there are 50 people who still want physical examinations. These 50 people are willing to pay \$150 for a physical examination. But the market price is only \$100.

Price Discrimination



Now notice point B. Since we know that 100 people would have physical examinations at the price of \$100, there must be 50 people who are willing to pay \$100 for a physical examination but are not willing to pay \$150. Finally, notice point C. If the price is \$50, there are 150 people who desire a physical examination. Therefore, there must be 50 people who are willing to pay \$50 but are not willing to pay \$100 or more. At the market price of \$100, these people would not have a physical examination.

Now assume that the doctor practices price discrimination. Assume that the doctor can easily determine which patients are in group A, which patients are in group B, and which patients are in group C. Since each of the 50 people in group A are willing to pay \$150, the doctor charges each person this amount. Since each of the 50 people in group B are willing to pay only \$100, the doctor charges each person this amount. And finally, since each of the 50 people in group C is willing to pay only \$50, the doctor charges each person this amount. Notice that there are 150 people having physical examinations. However, they are paying different prices for the same

physical examination. Why would the doctor do this? **The answer is that the revenue received by the doctor rises.** Instead of \$10,000 from physical examinations, the doctor now earns \$15,000 ($50 \times \$150 + 50 \times \$100 + 50 \times \50). Doctors commonly undertake this practice. To them, it is called the **“sliding scale”**.

How does the doctor know which patient is in which group? There are two answers to this question. First, the doctor ascertains whether the patient has health insurance. On one's first visit to a doctor, the doctor's staff will take your insurance card and then call the insurance company to find out what will be paid. If the insurance company will pay most of the bill, the patient is in group A. A person with no health insurance will be in group C. The second answer is to determine the patient's income. A person with a high income would be in group A. One with a low income would be in group C. Of course, it would be crude for the doctor to ask one's income. But this is not necessary. All the doctor needs to ask is your place of residence, your occupation, and your place of employment. All doctors ask these questions. If a person lives in La Jolla and is the Chief Executive Officer of a large corporation, the person is in group A. One who is homeless and unemployed would be in group C.

The practice of price discrimination provides much of the explanation as to why Medicare came to cost so much more than expected. Medicare provides health insurance coverage for people age 65 and up. Prior to 1965, there was no Medicare. Most elderly people had low incomes. When they went to doctors, they would be in a group such as C. After 1965, they were covered by insurance. The government does not have a low income. Therefore, doctors could now bill for the elderly at the rate for group A. In the example above, a physical examination would be billed for \$150. The government would pay 80% (\$120). The patient would have to pay the rest (\$30). The patient is better off than paying the entire bill of \$50. But the doctor is even better-off. The irony is that, while doctors opposed the passage of the law creating Medicare, it became a source of great financial benefit to them.

While access to health insurance and income explain which person is in group A, B, or C for physical examinations, it does not do so for magazines. **And yet, when you subscribe to a magazine, you will pay a lower price than when you renew your subscription.** Since you get the same magazine, this is a form of price discrimination. Why do you have to pay a higher price when it is time to renew? The answer is that you have come to enjoy the magazine. You look forward to its arrival each week. You would be very disappointed if you no longer received it. In the language of Economics, when you subscribe to a magazine, your demand for it is relatively elastic. There are many substitutes since you know little about the magazine. But when you renew, your demand is more inelastic. Since you know and like the magazine, the substitutes are just not as good. ***In general, the portion of the market for which demand is more inelastic (elastic) will pay the higher (lower) price. Demand is likely to be more inelastic if there are few substitutes or if the price is low in relation to income.*** For higher income people, the demand for physical exams was more inelastic; therefore, they are charged the higher price.

Another example of price discrimination involves California agriculture. Several products, including lemons, oranges, raisins, and almonds, operate with what is called a **Marketing Order**. Government mandates that a group of growers control the supply so as to raise the price of the product. In each of the above cases, the group of growers divides the market into a domestic market and an export market. In the case of citrus, they also divide the market into a fresh market and a processing market. The price elasticity of demand is much lower in the

domestic market (and also in the fresh market). In these markets, the supply is strictly limited in order to keep prices high. Any extra production is sold in the foreign (or processing) markets at much lower prices.

Another example of price discrimination that you may be familiar with is [Priceline.com](https://www.priceline.com). With Priceline.com, the seller tells them the minimum price it is willing to accept. Then, Priceline.com finds out the maximum price you are willing to pay by simply asking you. If they accept your offer, they charge your credit card. What makes Priceline.com work is that it is deliberately burdensome. For example, for airline flights, you do not get to choose the airline you fly or the time to fly. People who are not concerned with the price will not put up with that. Those who care most about the price will tolerate it.

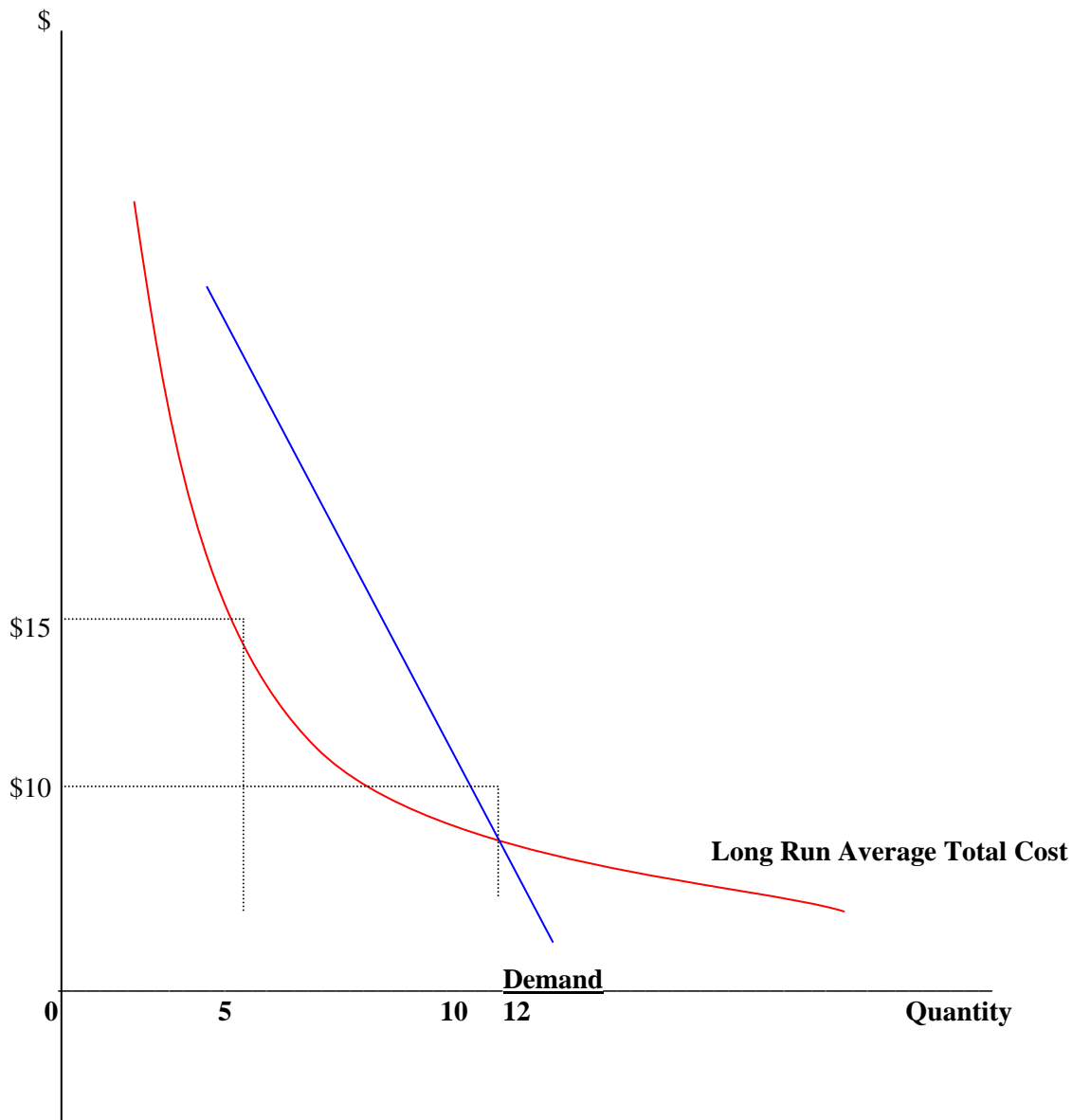
Perhaps the best example of price discrimination is that done by universities. Take the example of Money U. People apply to Money U. It will admit those it desires most. It will choose people who have a high likelihood of succeeding at the university and who will create the type of student body it believes is best. Having decided whom to admit, Money U asks in effect “what is the most we can charge this person and still have the person attend?”. This question can be answered based on the financial information provided when one applies for financial aid. With this information, there are formulas telling the university the maximum one would be willing and able to pay. If the university wants the person to attend, the difference between the full charge and this maximum is given to the person as financial aid. So, for example, Mary comes from a rich family. She will be charged the full \$25,000 per year to attend. The university knows that, because this is a small part of her family’s income, her demand is relatively inelastic. On the other hand, Linda comes from a middle class family. Based on the formulas, it is determined that she can be charged \$10,000 and she will still choose to attend. Linda then gets financial aid of \$15,000. The financial aid is a form of price discrimination. It is possible that every student at Money U is paying a different price to attend.

Test Your Understanding

1. It is a surprise to many people that a Mercedes Benz, produced in Germany, is more expensive in Germany than the **same car** sold in the United States. This is true despite the added costs of shipping the car to the United States. **Use the principles of price discrimination to explain why this would be so.** Ignore differences in taxes.
2. “9 cents of the difference between full service and self-service gas has nothing to do with the added cost but is simply a result of people self-selecting themselves for the privilege of paying more. **Use the principles of price discrimination to explain this quote.**

(2) Natural Monopoly

Occasionally, there are situations in which *the market will produce only one seller*. *The main condition that leads to this result is economies of scale over the entire market*. This means that **larger companies can continually produce at a lower cost per unit than smaller companies**. There is, of course, some limit to the advantage that large companies will have. But this limit occurs at a quantity above the entire market. The situation is shown in the graph below. Notice that the cost per unit of making the product reaches its minimum at some quantity larger than 12 whereas the maximum size of the market is 12 (if the price were zero, 12 would be demanded).



Economies of scale are so great because a high portion of the total cost of production is fixed (this means that a high portion of the total cost is the cost of the capital goods). Industries generating a natural monopoly situation typically produce with large amounts of capital and small amounts of labor.

Imagine that there were two companies in this industry, each with half of the market. **Each would have considerable excess capacity. This means that each company would find that it could lower its costs of production considerably if it could sell more.** (That is, each would have a cost per unit of \$15. By increasing production from 5 to 10, the cost per unit could be lowered to \$10.) Each company would have capital goods that were being underutilized.

Company 1 would decide to attract more customers in order to lower its average total cost. It would do this by lowering its price. This takes buyers away from company 2. Company 2 therefore would respond by lowering its price. Each is back where it began. Company 1 therefore lowers its price yet again. **A price war occurs.** Typically, one company is financially stronger and is able to survive the lower prices. The other company fails and is bought out by the survivor. The surviving company emerges as a monopoly.

One recent illustration of this occurred with airlines. Most of the production cost of an airline company is capital --- the cost of the plane itself. Many other costs are fixed as well. With many airlines, each had excess capacity. This was seen as empty seats. Each airline realized that filling the empty seats would bring in revenue while adding little to costs. To fill these seats, one airline lowered its price. The others followed. The first responded by lowering its price again. A price war occurred. Not only were there lower prices, but there was intense competition over frequent flyer miles, paying for hotels and food, and so forth. Some of the airlines (Eastern, Braniff, etc.) were driven out of business. When the price war ended, there were fewer airlines. However, because the market for airline travel is so large, more than one company survived. In a small market, the number of companies would be reduced to only one. Thus, ***a second condition for a natural monopoly to result is that the market size be relatively small.***

Let us examine another example: the San Diego Padres. Suppose you want to start a team to compete with the San Diego Padres. Assume that you can get the money, the dates at the stadium, and the teams to play against you. Is it possible that two teams could be profitable in San Diego County? The answer is "probably not". To get just enough revenue to cover the costs, the team would need attendance of at least 2 1/2 million people. The Padres alone have done this only once in their history. The market in San Diego County is just too small to support more than one baseball team. (Question: Since the Padres are the only baseball team in the county, would this be considered pure monopoly or monopolistic competition? Why?)

Let us examine yet another example: **high technology.** High technology companies have two characteristics that make them similar to the case of airlines. One is that **a high portion of the total cost of production for a high technology company is a fixed cost.** But whereas for the airlines, this was represented by the cost of the airplane (capital), for high technology companies, it is represented by the costs of research and development (R&D). (Question: explain why research and development costs are fixed and not variable.) The second reason is that, **in high technology companies, learning by doing is much more important than for most other businesses.** New products are developed with great frequency. Development of a new product then requires development of the means to produce it. The production method is then refined over and over as the company accumulates experience with it. It should not be surprising that companies in industries that are considered high technology (computers, semiconductors, aerospace, pharmaceutical drugs, electronics, and so forth) are characterized by a small number of very large companies. **Perfect competition is not a feasible option in high technology industries.** Because of the importance (and high cost) of research and development and because of the importance of learning by doing, a small company just cannot compete effectively against the larger ones. It is just too costly for a small company to produce.

In the case of airline companies and high technology companies, there will be few large

companies in the industry. But the market is large enough to support more than one company. ***When the market is very small, as noted above, the number of companies will be reduced to one. This is a natural monopoly.*** If the demand for the product is relatively elastic, there is no great problem caused by this natural monopoly. If the company raised its prices too greatly, people would just buy something else. ***But if the demand is relatively inelastic, there is a major problem. The company will be a pure monopoly and, if it raises its prices, buyers can only reduce their demand very little.*** Since there is great potential for these companies to exploit buyers, they are regulated as ***public utilities***. (In many countries, they are government owned.) Companies that have been regulated as natural monopolies with relatively inelastic demand include San Diego Gas and Electric, SBC, the various Cable Television Companies, bus companies, taxi companies, and so forth.

Test Your Understanding

In the solid waste and hazardous waste control industries, government environmental regulations have imposed substantial costs on companies. These costs include purchasing control equipment, paying for permits, and hiring lawyers, engineers, and scientists. Before the imposition of these environmental regulations in the 1970s, this was a reasonably competitive industry. Today, two companies control over 50% of the market. Many companies with landfills to dispose of this waste have shut down. The result has been higher prices and increased profits for the two companies. Use the material of this section to explain why the imposition of the environmental regulations would contribute to the domination of a former competitive industry by only two companies. (Hint: the costs imposed by the environmental regulations are fixed costs.)

3. Public Utilities

In the United States, most public utilities are privately owned companies. Let us take the case of familiar companies such as San Diego Gas and Electric (SDG&E) and SBC. SDG&E is now part of Sempra Energy, and is owned by shareholders. Before it became part of Sempra, SDG&E had about 115,000 shareholders, mostly from San Diego County. SBC is also owned by shareholders. But even though these are private companies, they have been heavily regulated by an agency known as the ***Public Utilities Commission (PUC)***. The PUC operates at the state level of government. It has five members, each of whom is appointed by the Governor of California and confirmed by the State Senate for a four-year term. These five people regulate the most important activities of about 1,264 telecommunications, energy, and water companies as well as 3,300 transportation companies.

There has been considerable dispute as to what the Public Utilities Commission ought to do. In theory, it is to try to achieve the results that would occur if perfect competition existed, even though the companies are actually natural monopolies. Of course, as we saw, there are many results from perfect competition. The one that is chosen here is profits. ***The basic regulatory principle is that these companies should earn the same profits as would be earned if there were perfect competition. This means zero economic profits --- the shareholders should earn a return that is equal to what they would earn in alternative investments of equal risk. This is known as Average Cost Pricing (if the price is equal to the average total cost of production, the economic profit must be zero).*** The price is set equal to the average total cost. The company sets its prices so that it earns the profits it is allowed to earn. If, for some reason, the prices are too high and the company earns more than it is allowed, it must give the excess back to the

customers as a rebate. If conditions change and the company is earning less profit than it is allowed, the company must apply to the PUC for an increase in its prices (the prices are known as “**rates**”). The PUC may be slow to grant the approval, a phenomenon known as “**regulatory lag**”. For most businesses, profits are calculated as a percent of the owner’s investment. For example, if you bought a stock for \$100 and you received a dividend of \$5, you would say that your return was 5%. But, for public utilities, the situation was different. *Here, profits were calculated as a percent of the value of the capital goods. The value of the capital goods was called the “rate base”.*

Over the years, there have been many criticisms of the way by which public utilities were regulated. Some of the problems resulting from the regulatory procedures acted to hurt the companies. **First, there was the “regulatory lag”**, as noted above. In the past, the PUC could take up to two years to act on a proposal to allow an increase in the rates. During this time, the companies would earn an economic profit that was less than zero. **Second, there were problems with the calculation of the rate base. The capital goods are valued at historical cost minus depreciation.** Some of the large buildings and other equipment were purchased many years ago, when the price paid was much lower than today. The prices of all goods and services (including capital goods) have risen rapidly. For buildings and equipment bought many years ago, the value on the books may have been much less than the true value in the market today. **This means that the companies’ profits were, in reality, too low.** The company could apply for an increase in rates, but often had to wait for a considerable time for approval. This scenario describes much of what happened to SDG&E during the 1970s and 1980s. (As an analogy, let us say that you bought a house in 1975. You would have paid about \$65,000 for the average house. Today, it would be partly depreciated. By conventional accounting methods, your house would be worth perhaps \$35,000 to \$40,000. If your profits were based on this, you would not earn much. In reality, your house today might be actually worth \$500,000 in the market. The same principle applies to the buildings and equipment bought by the public utility companies.)

On the other hand, most of the criticisms involved procedures that either hurt consumers or were economically inefficient. **One criticism involves the decision to base the profits on the value of the capital goods. This gave the companies the incentive to expand the amount of capital goods.** More capital goods would not mean a higher profit rate, but would mean more dollars of profit. These dollars could be spent by the management. The public utility companies have often requested an expansion of the amount of their capital goods. While these requests must be approved by the PUC, this has typically been done (often with considerable controversy). Three requests from San Diego Gas and Electric in the 1970s were very controversial. In 1970, SDG&E issued a report stating that the demand for electricity would triple by 1982. On the basis of this report, the Public Utilities Commission approved these requests to build new power plants. One was for a coal-fired power plant in Utah. A second was for a coal-fired power plant in Sycamore Canyon (east of Poway). And a third was for a nuclear power plant near Blythe (not far from Yuma Arizona). Considerable funds were spent on all three projects. Yet, none of these three ever produced electricity. All were stopped for environmental reasons. The question then became “who is to pay for the funds that were spent on these projects?” Should it be the owners of the company or the ratepayers? The Commission decided that the ratepayers should pay. The amount spent was included in the rate base for

SDG&E. (One should not exaggerate the effect of this. The amount paid represented only a small portion of a typical family's bill.) The 1970 report on which the requests were based turned out to be erroneous. Instead of tripling, as SDG&E had predicted, the demand for electricity rose only about 50%. Is this an honest error, given the difficulty of predicting into the future? Or was the report biased by the fact that the company would gain dollars if the projects were approved?

Another criticism involves the definition of “cost”. Since cost is a reduction from profits, we normally assume that, if a company decides to incur a cost, it must be necessary. But when the profit rate is set, there is no reason for such an assumption. **Companies whose profit rates were set, such as public utilities, had little incentives to hold down costs.** For example, one controversial cost is lobbying. San Diego Gas and Electric has maintained a paid lobbyist in Sacramento. Would it do so if the cost of this lobbyist reduced the company's profits? Should ratepayers have to pay for a lobbyist who may be advocating policies that ratepayers oppose? Another controversial cost is advertising. And a third controversial cost involves the salaries of the executives. When a recent Chief Executive Officer of SDG&E took over in the early 1980s, his salary was approximately \$160,000. Most people believe that did a very good job. Before he retired in 1995, the same person received a salary of \$528,615 plus bonuses of \$253,000. Is this a legitimate salary for such a position or not? Would the owners have agreed to pay this much if doing so had come from their profits?

A third criticism involves the perverse incentives from any effort to achieve conservation. San Diego Gas and Electric was ordered by the PUC to create conservation programs to reduce the use of gas and electricity. And the water District has undertaken programs to help people use less water. In both cases, the demand falls. This would reduce the company's profits. In order to prevent this, after some time, the rates must be raised. **The reward for conserving electricity or water is that one must pay higher rates.**

Test Your Understanding

This section has described the reasons for the phenomenon of natural monopolies. Yet, at this time, natural monopolies seem to be ending in many public utilities. We say that **“the public utilities are being deregulated”**. As of now, you are able to buy your natural gas and electricity through SDG&E from any of a large number of companies. You can also buy local telephone services from any of a large number of companies, just as you have been able to do for long-distance for many years. Based on the principles that generated natural monopolies, **why do you think these changes have been occurring at this time?** Based on your understanding of the effects of competition and your understanding of the procedures of public utility regulation in this section, **what changes will occur as a result of this deregulation?** In your opinion, will deregulation ultimately be good or bad for society? Explain why.

4. Electricity Deregulation in California

In the year 2000, electricity became the hottest political issue in California. Electricity rates soared beyond anything that had been seen before. The state experienced rolling blackouts. The public was mad --- mad at the electric utility companies, mad at the state government, mad at the electricity generating companies. A popular governor saw his popularity with the public plunge. In other states, California was a subject for derision. For late night comedians, California was an infinite source of jokes. The problem is not fully solved as of this writing and is likely to be a

major issue for years to come. Let us examine what happened, beginning with the decision to abandon the system of public utility regulation described above.

In 1994, California began the process of restructuring of its electricity system. This decision had been motivated by **the relatively high prices of electricity faced by California consumers and businesses, especially compared to neighboring states**. The high prices existed partially because of the decision to build the amount of capital needed to produce the amount of electricity generated at the peak of the day. For the rest of the day, this capital lay idle. The high electricity prices had also been the result of costly mistakes that had been made by the investor-owned utilities, with the approval of the PUC. The investor-owned utilities had built nuclear power plants that had turned out to be much more expensive than had originally been expected. They also had signed long-term contracts with small electricity generators that had committed them to pay very high wholesale prices for electricity.¹ The three large investor-owned utilities in the state (Pacific Gas & Electric, Southern California Edison, and SDG&E) are powerful political forces. So when the restructuring law was finally passed in 1996, they used their influence to assure that the law permitted them to fully recover the costs of these mistakes (these were known as **“stranded costs”**).

To do this, the 1996 restructuring law created a **Competition Transition Charge**. This fixed the retail price for electricity at about six cents per kilowatt-hour (= \$60 per megawatt hour). Since the wholesale price of electricity was expected to be lower than six cents, the utilities would use the difference between six cents and the actual wholesale price to “recover their stranded costs”. (**“Wholesale prices”** are paid by the utility company to buy electricity from the generating company. So, for example, SDG&E pays the wholesale price when it buys electricity from Duke Energy, which owns the generating plant in Carlsbad. **“Retail prices”** are paid by households and businesses to buy electricity from utilities such as SDG&E.) That is, if the wholesale price were four cents, then two cents for each kilowatt-hour would go to the utilities to allow them to pay the costs of their nuclear power plants and the long-term contract wholesale purchases. The lower the wholesale prices of electricity, the faster the utilities would recover their stranded costs. Once a utility had recovered all of its stranded costs, the consumer would pay a rate based only on the wholesale price of electricity (as had been the case under regulation). As this occurred, it was expected that retail prices would decrease.

SDG&E was the first company to recover its stranded costs. It did so in 1999. As described below, in 2000, the wholesale prices soared. SDG&E passed these higher wholesale prices on to consumers, as it was now allowed to do. The public protested vigorously. As a result of the outcry, the California legislature decided to freeze the retail prices SDG&E could charge. The other two investor-owned utilities had not yet recovered their stranded costs, so they still had to sell electricity at six cents per kilowatt-hour that was costing them ten cents per kilowatt-hour to buy.

The 1996 restructuring law created the **California Power Exchange (PX), a non-profit corporation**. The Power Exchange ran a market for the next day’s electricity (called a **“day ahead market”**). All producers were to sell their power through the Power Exchange. All retailers were to buy their power through the Power Exchange. The price was determined by demand and supply. As of 1998, the three investor-owned utilities were producing most of their own electricity. **But from then through the end of 1999, they were required to sell nearly all of their natural gas powered plants**, plants that had produced about 40% of the state’s

electricity, presumably in order to increase competition. (The utilities did keep ownership of their nuclear, hydroelectric, and geothermal plants.) These natural gas powered electricity generation plants were bought by five companies (Duke, AES/Williams, Reliant, Dynegy, and Southern). Each of these five companies came to own about 6% to 8% of the state's capacity to produce electricity, presumably not enough to affect market prices. Pacific Gas & Electric and Southern California Edison still do produce some of their own electricity. SDG&E sold all of its production plants and has become mainly a regulated distributor of electricity. (The distribution of electricity to your home or business has not been restructured and is still a regulated public utility monopoly.) *So there were seven suppliers of electricity in California. And the demanders – the companies who were to buy electricity on the Power Exchange --- were mainly the three investor-owned utilities.*

The restructuring law also created the **Independent System Operator (ISO), also a non-profit corporation**. The job of the Independent System Operator was to manage the electricity grid in the state. It was to adjust the supply of electricity to equal the demand in all parts of the state. It also was to adjust the prices to reflect the difference between supply and demand, up to a price ceiling (\$750 per megawatt hour after October of 1999).

In June of 2000, the wholesale prices of electricity increased greatly. The total cost of wholesale electricity rose from \$7.4 billion in 1999 to \$27 billion in 2000. In September of 2001, average wholesale prices averaged 20-23 cents per kilowatt-hour, compared to 3.3 cents in 1999. The wholesale prices increased for several reasons. **First, the year 2000 was dryer than normal**, reducing hydroelectric production, both in California and in the Pacific Northwest. The summer of 2000 was also hotter than normal, raising the demand for electricity to use for air conditioning. **Second, there had been considerable economic growth in California, especially in the high technology industries.** High technology industries are large users of electricity. **Third, there were large increases in the costs of producing electricity as natural gas prices more than doubled and the cost of pollution permits for nitrous oxide rose from \$4,000 per ton to over \$45,000 per ton – adding about \$45 per megawatt hour to the cost of electricity.**² **Fourth, the high demand for electricity forced the producers to use the least efficient plants.** On a hot summer afternoon, 97% of all generators must be running in order to meet demand. The least efficient plants are about half as efficient at converting natural gas to electricity and are also high polluters. **Their costs were more than \$100 per megawatt hour greater than those of the most efficient plants.** The wholesale price of electricity had to rise enough to make it profitable for these less efficient plants to produce. Since all electricity, no matter where it is produced, sells for the same price, the high price needed to make the least efficient plants profitable generated very high economic profits for the most efficient plants. **Fifth, because excess capacity had existed in producing electricity in California, because of the uncertainty of the new restructuring, and because of community opposition to new power plants, no new generating capacity had been added in California in the 1990s. Sixth, there is considerable market power by electricity producers when supplies are tight.** One study estimated that one-third of the wholesale price increase can be attributed to market power. Possibly as an example of this market power, an unusually large amount (up to 35%) of generating capacity was out-of-service between November 2000 and May 2001.³ There are charges being brought against certain energy traders (especially at Enron) at the present time (2004) for manipulating the market for electricity so as to increase prices. **And finally, the**

investor-owned utilities had asked to enter into long-term agreements that might reduce the risk of price increases. But this was denied. Therefore, they had to procure much of their electricity from the Power Exchange for next day delivery.

One result of the high wholesale prices was the financial decline of the investor-owned utilities. **Pacific Gas & Electric and Southern California Edison were paying wholesale prices for electricity that far exceeded the retail prices they were allowed to charge.** (Pacific Gas & Electric declared bankruptcy in 2001.) By December 2000, these two investor-owned utilities were paying almost \$400 per megawatt hour for wholesale electricity and then reselling it at the fixed price of \$65 per megawatt hour, losing about \$50 million each day. Because it had already recovered its stranded costs, SDG&E was allowed to raise its retail price; for some people in San Diego, the monthly electricity bill tripled between May and June of 2000. Then, as noted above, there was public outcry and the rates for SDG&E were frozen by the state legislature at \$65 per megawatt hour (a price ceiling). These utility companies borrowed over \$15 billion to be able to buy the electricity at the high wholesale prices. The credit rating of these companies fell greatly until eventually no more credit was forthcoming.⁴

The period saw more than a large increase in wholesale prices. It also saw **“rolling blackouts”** --- periods of time during which the electricity was turned off at various places. These resulted from the particular characteristics of the electricity industry, characteristics that differentiate it from other industries. **First, the demand for electricity is very inelastic with respect to the price in the short-run.** This is especially so as there is no mechanism at present to raise prices at times of high demand and lower them at times of low demand (as exists, for example, for long-distance telephone service or airlines). However, the demand for electricity is not perfectly inelastic. A study of San Diego in 2000 indicated that a doubling of the retail price of electricity would cause a decline in demand of 2.2% to 7.6%, depending on the time of day. Demand for electricity is, of course, more elastic in the longer run.

Second, the supply of electricity is also very inelastic with respect to the price for three reasons. First, storage of electricity is extremely expensive. Second, increasing production beyond the normal capacity of a plant cannot be done for very long without risking significant damage. Under the old system of regulation described in the chapter, the investor-owned utilities were assured of covering their costs and making a profit (so that economic profits equaled zero). As mentioned earlier, in this regulatory system, they built capacity great enough to cover the peak demand. The state did not suffer from shortages. **Except at rare times of very high demand, the investor-owned utilities had excess capacity.** The cost of this excess capacity was included in the rates paid by consumers. (Remember that the profits of the investor owned utilities was based on the **rate base** --- the value of the capital goods they owned.) In the new system of restructuring, it would be very expensive for companies to have excess capacity that could be used to expand production quickly. **And third, it takes several years to build a new electricity generation plant.** So the ability to increase production in a short time as a result of a rise in the price is very limited.

Third, all studies of the matter indicate that companies that produce electricity have some degree of market power, especially in those periods during which demand is high. This is a surprising result given the small share of the market held by each producer. But it does seem to hold. When the demand rose and the costs of production rose, there was very little ability for either buyers or sellers to change their behaviors significantly in a short time. Because of these

characteristics, even if there had been no ceiling on the price, the rise in demand and the rise in costs would have resulted in a shortage. In California, that shortage manifested itself as rolling blackouts.

In response to the electricity crisis, the Power Exchange crumbled in January 2001. **The state of California, through the California Department of Water Resources, took over the purchase of electricity.** The state then sold this power to the investor-owned utilities to sell to customers. The state had to take over the purchase of electricity because of the poor financial condition of the utilities. The state sold bonds to raise the money to buy this electricity. The bonds are to be paid off over 15 years by raising rates on ratepayers. (Because of their poor financial condition, the utility companies could not sell bonds that people would want to buy.) Another new agency, the **California Consumer Power and Conservation Authority**, was created to acquire generating capacity and sell it to the Department of Water Resources.

The state believed that the practice of requiring the utilities to buy electricity on the day-ahead market had been a mistake. So when it took over the purchase of electricity, **the state purchased perhaps \$60 billion worth of electricity under long-term contracts from electricity generators and marketers.** Using long-term contracts was designed to protect the state from a situation in which the wholesale prices would rise further. **However, beginning in the summer of 2001, after the long-term contracts were negotiated, wholesale prices of electricity began to fall.** Wholesale electricity prices fell first because of a significant decline in demand, *partly as a result of a successful conservation effort. Electricity wholesale prices also fell because of a decline in natural gas prices, because of price controls put in place by the Federal Energy Regulatory Commission (FERC), because of the opening of three new power plants in 2001 (the licensing process has been speeded up), because of the return to service of much of the generating capacity that had been off-line, and because of a reduction in the market power of electricity producers.* Therefore, the state is paying more for electricity than it would be paying if it had not negotiated the long-term contracts. (As of January 2002, the state was paying about \$100 per megawatt-hour for electricity that could be bought in the day-after market for perhaps \$30.) As of this writing, the state of California is still seeking to re-negotiate these long-term contracts.

There is an issue as to which ratepayers should pay for the cost of the bonds sold by the state government. As of this writing, to pay off the bonds, consumers pay higher rates based on the costs of delivering electricity to each region of the state. **Consumers in northern California pay higher rates than do consumers in San Diego.** Under a plan proposed in January of 2002, these higher rates would be allocated more equally among ratepayers. This new plan would raise rates in San Diego and lower them in northern California compared to the current system. Needless to say, people in San Diego are not happy about this.

Several other issues remain from the electricity crisis. As mentioned above, the Federal Energy Regulatory Commission (FERC) did enact a price ceiling on the wholesale price of electricity. The Governor of California had argued for this price ceiling on the wholesale price while the government of President Bush had originally resisted it. **This price ceiling expired in September of 2002.** Also, the state of California is also seeking a refund of \$9 billion from the electricity producers due to “overcharges”. A determination of these refunds was made by the

Federal Energy Regulatory Commission and was significantly less than the state of California was seeking. California government officials and the members of the Federal Energy Regulatory Commission have been quite hostile toward each other in the recent past. (The collapse of Enron and the subsequent admission of price fixing have certainly bolstered the case of the state of California.) **The state of California is also suing Pacific Gas & Electric.** The state argues that Pacific Gas & Electric transferred funds from its public utility to other parts of its corporation and then had the utility declare bankruptcy. This case could take many years to resolve.

Restructuring attempted to lower electricity rates. **Yet, electricity rates are higher today than they ever were before restructuring.** Restructuring also created a system in which shortages were possible if either demand rose or supply fell greatly. This was indeed the experience of California in 2000 – 2001. There are two ultimate solutions to the problem of high electricity prices and/or electricity shortages. **One is that there are dozens of new electricity generation plants under construction in California.** Some of these began production in the fall of 2001. Others began production in 2003 and 2004. (Remember that it takes several years to complete an electricity generation plant.) **The other ultimate solution is that Californians have begun to conserve electricity much more than before.** In July 2001, Californians were using 11% less electricity than they had been using in July of 2000. Small technological changes are very feasible and are currently under development; cumulatively these could have a large effect in reducing electricity use. Examples include the following: (1) more lighting fixtures made especially for the energy-saving compact fluorescent bulbs, (2) improved gaskets, joints, and seals in heating and air conditioning ducts to prevent air leaks, (3) water heaters that draw heat from the surrounding air to reduce energy use in heating the water by up to 60%, (4) washing machines that can adjust water and temperature levels after they figure out how big and soiled a load is, (5) dishwashers that shorten or lengthen cycles depending on how dirty the water is as it re-circulates, (6) new technologies to reduce the need for standby power for VCRs, stereos, televisions, or computers when they are off (standby power accounts for 4% to 7% of residential energy use), (7) greater use of photovoltaic solar energy, geothermal energy, and fuel cells; and so forth. The combination of greater production and greater conservation will ultimately make the electricity crisis of 2000-2001 fade away just as the gasoline crises of the 1970s have faded away.

Footnotes

1. The Public Utility Regulatory Policy Act, passed in 1978, had required utilities to purchase electric power from certain qualifying cogeneration and small power producers who use renewable fuels. California had required the utilities to purchase electric power from such facilities under long-term contracts at high prices, in order to encourage cogeneration and use of renewable fuels. In the late 1980s and early 1990s, so much of this type of generating capacity began operating that there was significant excess capacity. These high priced contracts helped to drive up retail prices.
2. At that time, natural gas prices were as much as five times higher in California than in other parts of the country. This difference no longer exists.
3. The companies argued that the generating capacity was out-of-service because they had to run the machines so hard that they had broken down. California officials believe that this was a way to raise prices artificially.
4. The restructuring law allowed people to buy electricity directly from new electricity service providers. These new providers were to have access to the transmission and distribution networks of the investor-owned utilities at prices set by the PUC. It had been expected that a large portion of electricity users would switch from the investor-owned utilities to these new electricity service providers. In fact, only 3% of electricity consumers did so. By law, the utilities are obligated to provide electricity to all customers who wish it. They ended up having more customers than they had expected.

Assignments

1. California is now often cited as an example of “how not to do deregulation”. Write a short essay describing to someone unfamiliar with Economics exactly what went wrong with California’s deregulation. (In essence, you are writing a brief summary of this Appendix.)
2. Part 4 was written in mainly January 2002. Go to the Internet. Find whatever articles you need. Write a brief essay explaining what has occurred with regard to the electricity crisis since January 2002.
3. Go to the site: <http://www.ucan.org> UCAN is a consumers group that involves itself with issues relating to utilities. Peruse the site. Then write a brief (one page) essay summarizing some of UCAN’s positions regarding the electricity crisis in California and their reasons for these positions.
4. A **Municipal Utility District (MUD)** is a public utility that is government owned instead of investor owned. There is one in Sacramento (SMUD), in Los Angeles (Department of Water and Power), and in Seattle (Seattle Light). In 2001, San Francisco defeated an attempt to create one. Go to the Internet. Get the information you need to answer the following (you might go to the arguments surrounding the San Francisco vote in November, 2001): what are the advantages and what are the disadvantages of a Municipal Utility District as compared to an investor-owned utility?

Practice Quiz for Class 14

1. Which of the following best defines **price discrimination**?
 - a. selling a certain product of given quality and cost at different prices to different buyers
 - b. charging different prices on the basis of race
 - c. charging different prices for goods with different costs of production
 - d. charging different prices based on cost-of-service differences
2. To be able to practice **price discrimination**, which of the following is/are needed?
 - a. monopoly power
 - b. ability to separate the market
 - c. ability to prevent reselling
 - d. all of the above
3. In price discrimination, the **higher price** goes to that section of the market where:
 - a. cost per unit is lower
 - b. demand is more elastic
 - c. demand is lower
 - d. demand is more inelastic
4. Which of the following is necessary for a **natural monopoly**?
 - a. economies of scale
 - b. a high proportion of the total cost is the cost of capital
 - c. the market is very small
 - d. all of the above
5. In California, natural monopolies have been private companies regulated by the
 - a. Federal Reserve
 - b. Governor
 - c. PUC
 - d. FBI
6. **Average cost pricing** means that the
 - a. economic profits are zero
 - b. average total cost equals the marginal revenue
 - c. average total cost equals the marginal cost
 - d. all of the above
7. The **rate base** was the
 - a. amount borrowed by the company
 - b. amount invested by the owners
 - c. value of the capital goods
 - d. profits earned by the company
8. Which of the following resulted from the way by which SDG&E was regulated by the PUC?
 - a. when demand fell, the price would fall
 - b. there were incentives to produce as efficiently as possible
 - c. there were incentives to buy more capital goods than would be bought by an unregulated company
 - d. all of the above

Answers: 1. A 2. D 3. D 4. D 5. C 6. A 7. C 8. C