Objectives for Chapter 8   Price Floors and Ceilings

At the end of Chapter 8, you will be able to:

1. Define **"price ceiling"** and draw it on the demand – supply graph.

2. Gives some examples of price ceilings.

3.   Analyze the results of price ceilings.

4.   Explain how goods and services are rationed if there is a price ceiling.

5.   Define *"black market" and "gray market"*.

6.   Use the analysis of price ceilings to analyze the problem relating to water in California.

7.   Define **"price floor"** and draw it on the demand – supply graph.

8. Give some examples of price floors.

9. Analyze what results if there are price floors.

10. Analyze the results of the price support program for agriculture.

Chapter 8   Price Ceilings and Floors (latest revision August 2004)

    We have been considering the way markets work under normal conditions. Sometimes, markets are not allowed to work. This means that the price is not allowed to move to the equilibrium level. Two such conditions are price ceilings and price floors. Let us begin with price ceilings.
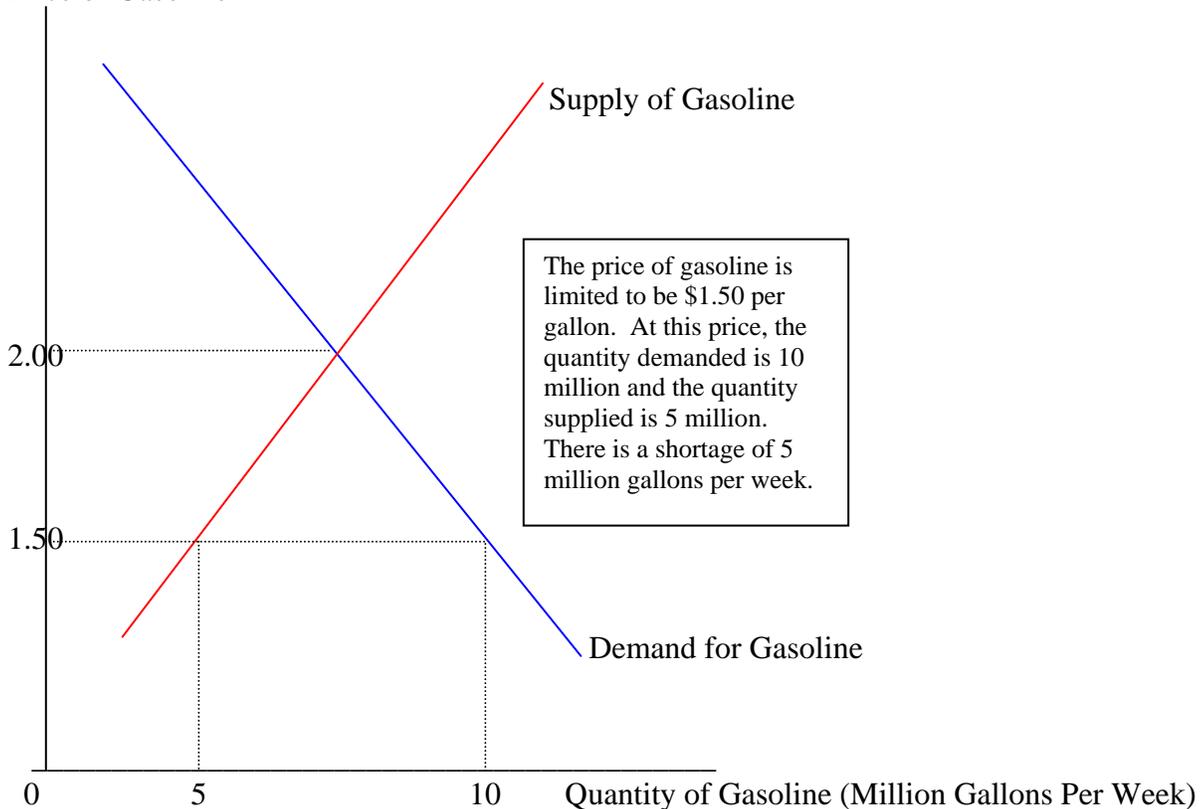
1. Price Ceilings

    One interference with the market process is called a price ceiling. *A price ceiling occurs when the price is artificially held below the equilibrium price and is not allowed to rise*. There are many examples of price ceilings. Most price ceilings involve the government in some way. For example, in many cities, there are **rent controls**. This means that the maximum rent that can be charged is set by a governmental agency. This rent is usually allowed to rise a certain percent each year to keep up with inflation. However, the rent is below the equilibrium rent. **Also, from 1973 to 1981, there was a price ceiling for gasoline.** There was a maximum price allowed by law. Any gas station owner charging more than this maximum price would be guilty of fraud. During World War II, there were price ceilings on most products. **Occasionally, price ceilings are imposed by the seller.** For example, when the Chargers and Padres played in the playoffs, they sold about 65,000 seats. There was demand for at least twice that many. Nothing prevented the Chargers or Padres from raising the price to whatever the market would bear. But they did chose not to do so.

In the graph below, assume that the equilibrium price is $2.00 per gallon of gasoline. The maximum price is set by the government at $1.50 per gallon. At the price of $1.50 per gallon, the quantity demanded is 10 million gallons per week and the quantity supplied is 5 million gallons per week. There is a *shortage* (5 million gallons per week). *Price ceilings lead to shortages.*
Shortages create a rationing problem --- somehow, it must be determined who will get the product and who will not. There are many ways to resolve the shortage problem. (1) The most common way is *first-come, first-served*. Shortages are typically associated with long lines. In the case of apartments, there are perhaps hundreds of people looking for each apartment that is vacant. In the case of gasoline and sports teams, people stand in line for hours or even days to be able to buy. (2) Another common way to resolve the problem of shortages is for the **sellers to choose** which buyers they will sell to. Landlords often rent to preferred renters. These are likely to be married couples, probably over 30, and without children or pets. Gasoline station owners sell gasoline to those customers who regularly have their cars repaired at that station. The Chargers and Padres assure that season ticket buyers get tickets for the playoffs. (3) A third way to resolve the problem of shortages is by **lottery**. Those who pick the right numbers are allowed to buy. The Chargers used a system such as this to determine who would be able to buy some of the tickets for their Super Bowl game. (4) And a fourth way to resolve the problem of shortages is to have **the government make the choice** of buyer. In 1979, the California government decided that those with license plates that ended in an odd number could buy gasoline only on odd days of the month. Those with license plates that ended in an even number could buy gasoline only on the even days of the month. (Everyone could buy on the 31st.) In Europe, government choice of the buyer has been common, especially for apartments. During World War II, Americans had ration coupons, issued by the government, to determine the quantities of various products that they would be entitled to buy.

Price of Gasoline

Supply of Gasoline

The price of gasoline is limited to be $1.50 per gallon. At this price, the quantity demanded is 10 million and the quantity supplied is 5 million. There is a shortage of 5 million gallons per week.

2.00

1.50

Demand for Gasoline

0   5   10   Quantity of Gasoline (Million Gallons Per Week)

Price ceilings provide a gain for buyers and a loss for sellers. Sellers would like to avoid the loss if they can. One way to do so is called a *black market*. In this case, the sellers illegally raise the price and hope to get away with it. So, for example, tickets to popular events are sold by scalpers at high prices. (In California, ticket scalping is not illegal if it is not conducted at the place the event takes place.) While there are many other examples, black markets are not smart; it is just too easy to be caught. It is also not smart because of the existence of gray markets. A *gray market* is a way of getting around the price ceiling without actually doing anything illegal. There are two forms of gray market. *One form of gray market involves charging for goods or services that were formerly provided free*. If the rent cannot be raised on the apartment, there is nothing preventing the landlord from charging for the parking space, charging for use of the elevator, charging for gardening and cleaning services, forcing the tenants to pay for electricity and water, and so forth. In New York, a rent-controlled apartment near Central Park might rent for $300 to $400 per month; in a free market, the rent would probably be $2,000 per month. To get in, one needs the key. This has been known to cost $1,000. This is not a refundable deposit; this is a charge to have the key. It is obviously worth it to be able to rent the apartment for $300 to $400 per month. A Berkeley apartment owner converted his apartment into a church. To be able to live there, one had to pay church dues of $1,200 per year in addition to the rent. Gasoline stations would commonly charge for washing the windows, checking the tires, and so forth. The price of oil used in oil changes would be raised. (Those having oil changes at the station were favored in access to gasoline during the years of the price ceiling. In these years, Americans had the cleanest engines in history.) Some gas station owners ran the line to the gasoline pump through the car wash. One San Diego station forced people to have a $7 car wash to get to the gasoline pump. ($7 in these years is the equivalent of about $20 today.). This practice was later declared illegal.

The second form of gray market is to provide less service for the same price. The apartment owner would not repair, clean, paint, nor otherwise maintain the apartment building. Some people argue that rent controls are one reason for the dilapidated state of many apartments in New York and for the fact that nearly half of furnaces in New York apartment buildings do not work. The gasoline companies would lower the octane rating. Unleaded gasoline, which was 91 octane, becomes 89 octane and then 87 octane. (For a while, Texaco even tried 85 octane.) If you want 91 octane, you must now buy Super Unleaded, and pay $0.30 per gallon extra.

Case on Price Ceilings: Water in California

Let us begin the case of water with the agricultural industry, which consumes 80% to 85% of the water in California. For most of the twentieth century, the federal government has constructed and maintained water storage and delivery projects in the West. About 90% of this water is provided to agricultural users. Water is allocated to farmers who must either use their water allocation or lose the right to that water in the future (*the so-called "use-it-or-lose-it" principle*). Until very recently, farmers have not been allowed to sell their water to other users. Farmers in California typically pay $10 to $13 per acre-foot, and sometimes as little as $5 per acre-foot, for irrigation water. (An acre-foot is the amount of water to cover one acre of level land to a depth of one foot, 326,000 gallons.) Since there has not been a functioning market, we cannot be sure what the equilibrium price would be. But we do know that California cities pay $200 to $500 per acre-foot for water. Thus, we can be sure that the $5-$13 per acre-foot paid by farmers is substantially below the equilibrium price.

As you can imagine, the low price paid for water increases the quantity demanded greatly. Farmers have applied massive amounts of water to their lands. Water-intensive crops, such as rice,

alfalfa, and cotton, are grown. These could never be profitable in an arid region like California without the artificially low price for water. These three crops, along with pasture, use 40% of California's water but are low value crops (they provide only 0.2% of the total state income). The use of such large amounts of water has had serious effects on the soil quality of the San Joaquin Valley (due to the bringing of salts to the surface).

From the earlier analysis, you can guess that the policy of low water prices brings about a **shortage of water**. Until the 1980s, Western agricultural interests were able to persuade the government to keep increasing the supply of water. Dam projects were built on nearly every major river in the West. In the 1980s, however, budget limitations forced the government to stop funding so many of these projects and people became more conscious of the environmental impacts of these projects.   The result is that the shortage has become more obvious. Water issues have been major political issues in California.

The shortage of water is still resolved largely by government choice of buyer. Farmers have been the preferred buyers. Individual farmers are allocated water according to historical precedent (the first to arrive had the claim to the water). However, in recent years, pressure from city and state governments changed this somewhat. **Now, farmers who do not use their water are able to sell some of it to cities.** The Bradley - Miller Bill of 1992 allows the sale of up to 20% of water allocations without approval of government agencies. Thus, **a market in water has been created**. Farmers now have an incentive to conserve water. For example, installing and using drip irrigation is estimated to cost $175 per acre-foot. This would never pay when the farmers could buy water for $5 per acre-foot. But when they can sell water for $300 per acre-foot or more, drip irrigation might be a good investment.

The same principle holds for the household users of water, who consume about 10% of the water in California (the rest goes to industry). Water users are charged a certain rate for the use of water. (At the time of this writing, this rate is $482 per acre-foot for treated water in San Diego.) During the recent drought, the water rates were not raised. There was a shortage. Some cities passed laws with mandatory reductions in water use. The city of San Diego asked people to voluntarily reduce use of water. In both cases, the city government determined that some uses were less important than others. People were asked (or told) not to wash their cars in the daytime, not to clean their driveways with water, not to water their lawns in the daytime, and so forth. In some cities, people were told not to water their lawns at all. San Diego now requires people to have toilets that use only 1 1/2 gallons of water, instead of the usual 5 gallons.

Test Your Understanding
1. In 2000, the price of electric power rose enormously in California. The government responded with a price ceiling. The utilities (such as SDG&E) were not allowed to charge customers more than a certain price, a price that was well below equilibrium. The rest of the charge is deferred for two years. As the utilities faced bankruptcy, there was pressure to have a price ceiling for the companies that produce the electric power, lowering the prices they could charge for their electricity. Explain what will occur as a result of these price ceilings.
2. In 1971, the United States was experiencing high inflation. To end inflation, President Nixon enacted price controls. For three months, no price of any product was allowed to rise at all. Then, prices would be allowed to rise, but at a low rate. For over two years, it is certain that the prices of most goods and services were well below equilibrium. President Nixon also imposed wage controls, doing the same for wages as had been done for prices. Explain what would result from President Nixon's wage and price controls.
3. Under the Immigration Act of 1990, the United States grants permits for legal immigration to approximately 800,000 people each year (not considering refugees). While there is a great opportunity cost for

people migrating to the United States, the charge for the permit is virtually zero.
Draw the demand for immigration rights into the United States on the graph. Draw the supply as vertical (at 800,000 permits). Show that, at a price of zero, there is a large shortage. Since there is a **price ceiling** on entry permits, name some ways that the shortage might be resolved. That is, how might it be decided who will be allowed to enter? Is there **a black or gray market** in this case?

(2)   Price Floors

   A price floor exists when the price is artificially held above the equilibrium price and is not allowed to fall. There are many examples of price floors. In some cases, private businesses maintain the price floor while, in other cases, it is the government that maintains the price floor. One price floor that was maintained by the private businesses used to be called "**fair trade**". In the case of fair trade, the manufacturer would set a price for the product that was above the equilibrium price. The manufacturer then told the retail stores that the price could not be lowered or the store would not be able to sell any of the manufacturer's products. From the late 1930s through the 1980s, this practice was legal. It is still occasionally conducted. Many familiar items were fair traded --- your textbook, televisions, radios, stereo sets, washing machines, automobiles, gasoline, liquor, and so forth.
   In the graph below, the equilibrium price for stereo amplifiers is assumed to be $200. The floor on the price set by the manufacturer is $300. The price is not allowed to fall below $300. At this floor price, the quantity demanded is 500,000 and the quantity supplied is 1,000,000. As you can see, there is a **surplus** of 500,000 amplifiers. **Price floors always generate surpluses.** All who wish to buy at the floor price ($300) will be able to do so. The problem is: "what to do with the surpluses"?

Price of Amplifiers ($)

The equilibrium price is $200. The manufacturer sets a price of $300. At this price, the quantity demanded is 500,000 and the quantity supplied is 1,000,000 --- leaving a **surplus** of 500,000.
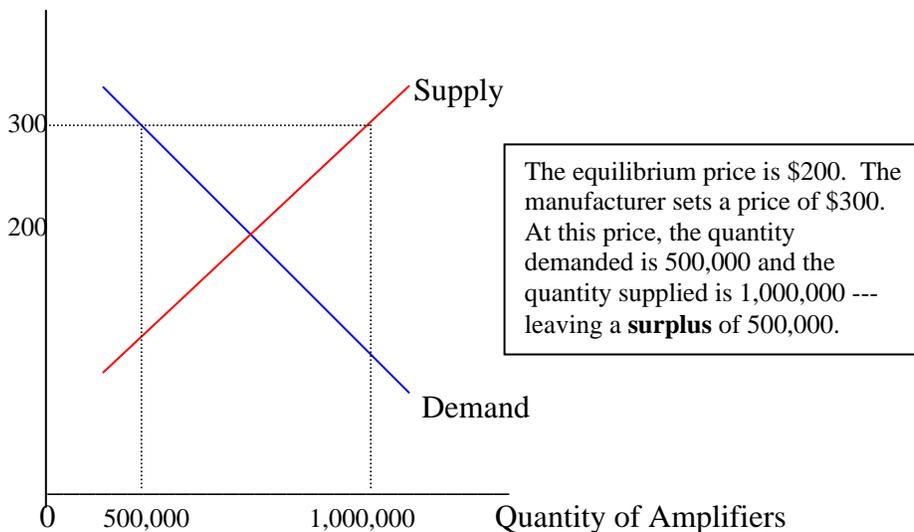
   There were many ways to solve the problem of surpluses. **Occasionally, a store simply broke the manufacturer's policy**. The store lowered the price to get rid of the surplus. The manufacturer had threatened that the store would be prohibited from selling the manufacturer's product; the store either believed that the manufacturer would not carry-out the threat or did not care. For example, Crown Books began lowering the prices of its books and a company called Discount Records began lowering the prices of phonograph records.
   More likely, stores would try to get around the price floor without actually violating it. One
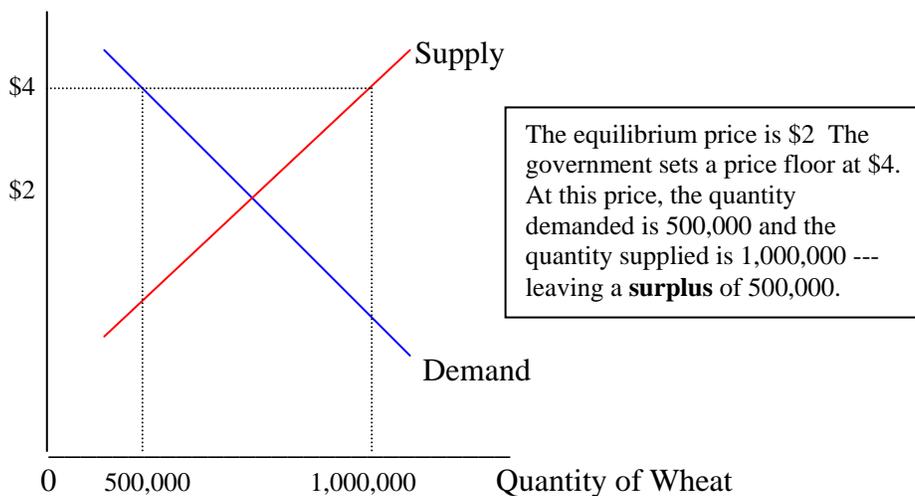
common solution was to provide more service for the same money. Stereo stores could add free CDs or other free accessories. Washing machine stores used to virtually give away the dryer. Gas stations gave away glasses, knives, and Blue Chip Stamps. A second solution was to simply **absorb the surplus**. Your textbook producers would have a surplus of textbooks. At the end of each edition, the books would be returned to the publisher and the paper was recycled. A third solution was to **change the name of the product** in order to reduce the price. Surplus gasoline was sold to independent dealers who would sell it as Thrifty, 7-11, or Discount Gas at a lower price. Surplus liquor was bottled with a different label and sold as Slim Price, or Yellow Wrap at a lower price. Surplus washing machines and refrigerators were sold, for example, to Sears and marketed as Kenmore at a lower price. When automobiles were fair-traded, the dealers could not lower the price; however, they would give a trade-in value that was much greater than the trade-in car was actually worth. *The main point here is that, even if someone interferes with the market process, there are powerful forces to return to equilibrium.*

Case on Price Floors: Agriculture

The economic problem of the American farmer has been longstanding. Because of technological advances, the supply of agricultural products has increased greatly. But the demand for agricultural products has increased much less. The result is that agricultural prices have been falling. These falling prices have caused the profits of farmers to fall. The market is sending the farmer a signal. It is telling him or her to leave farming and do something else. What is the farmer's sin? It is not that the farmer has been inefficient or has made bad business decisions. The problem is that the farmer is too good. Farmers are able to produce more food than consumers want to buy at prices that will allow the farmer to make a profit. To farmers and others, this seems unfair.

Because of this sense of inequity, or because of political pressure from farm groups, the government has had programs to aid farmers since the mid-1930s. One of these, called *the price support program*, is an example of a price floor. In the graph below, the equilibrium price for wheat would be $2 per bushel. Assume the government sets a floor price of $4 per bushel.
Price of Wheat

The equilibrium price is $2 The government sets a price floor at $4. At this price, the quantity demanded is 500,000 and the quantity supplied is 1,000,000 --- leaving a **surplus** of 500,000.

The farmer is allowed to produce all that the farmer desires to produce at the floor price of $4 per bushel (1,000,000 tons). The farmer can then sell all that can be sold at the price of $4 (500,000

tons). The result, as with all price floors, is a surplus of agricultural products. For most of the past 60 years, **the government has entered the market and bought the surplus from the farmers**. The government then stored the surplus. When the storage costs became unacceptable, the government found ways to get rid of the surplus. Some dairy products were just given away. Some of the surplus wheat was sold to other countries, usually at a loss to the government. For example, in the 1970s, wheat was sold to the former Soviet Union at the world price, which was considerably below the price the government had paid to buy it. To get rid of the surplus, the government has also tried to raise the demand for these products. For example, a proposed requirement that 10% of gasoline be ethanol would increase the demand for corn greatly. And the school lunch program also helps to increase the demand for agricultural products.

   It is clear who wins from this program. The farmers produce more than they otherwise would produce and receive a higher price for their products. The consumers lose in that they pay higher prices (an estimated $10 billion for all foods) and also that they buy less food (because of the higher price). The taxpayers lose first in the tax money used to buy the surplus and secondly in the tax money used to store the surplus. As of 1997, the taxpayers were spending about $10 billion per year on these price support programs. There is yet another loser from this program --- the environment. The price support program encourages farmers to produce more than they would otherwise find profitable. This requires more land. Land is likely to be used for crops for which it is not well suited. Those lands brought into production have been drenched with pesticides and herbicides which then runoff into rivers and groundwater.

   By the middle of the 1980s, these agricultural policies had become very expensive. Yet they had not solved the financial problems of the farmers. There were several attempts at reform, culminating in the **Federal Agricultural Improvement and Reform (FAIR) Act of 1996**. In this act, price floors were to be lowered and then eliminated by 2002. Because market prices were rising from 1995 to 1997, it was not a difficult time for the farmers. But in 1998, market prices dropped and farmers in some regions faced serious financial difficulty. As they had in the 1930s, the low prices generated a government response. The government subsidy to farmers increased by $6 billion in 1998. As of this writing (2004), the price floors are still definitely in existence.

Test Your Understanding
1. The **minimum wage** is an example of a price floor. This is the lowest wage that an employer is allowed to pay a worker. Recently, the minimum wage was raised from $5.15 to over $6.00 per hour. Use the analysis of this chapter to explain the results of raising the minimum wage.
2. Assume that there is a recession. The demand for new homes and other buildings decreases. As it does, the demand to hire construction workers also decreases. However, because construction workers have a strong labor union, the wages of construction workers will not fall (a price floor). Explain what will result for construction workers during the recession.

Practice Quiz for Chapter 8

1. If there is a **price ceiling**, there will be
    a. shortages   b. surpluses   c. equilibrium

2. If there is a price ceiling, which of the following is **NOT** likely to occur?
    a.   rationing by first-come, first-served
    b.   black markets
    c.   gray markets
    d.   sellers providing goods for free that were formerly not free

3. The **agricultural price support program** is an example of
   a. a price ceiling   b. a price floor   c. equilibrium pricing

4. If there is a **price floor**, there will be
   a. shortages   b. surpluses   c. equilibrium

5. If the **minimum wage** is increased,
   a. the number of workers hired will fall
   b. those still working will have higher incomes
   c. the overall wage cost of employers will increase
   d. all of the above