

How to Study for Class 6 Price Floors and Ceilings and the Invisible Hand

Class 6 introduces two ways of interfering with the normal working of markets --- maintaining the price above equilibrium (price floors) and maintaining the price below equilibrium (price ceilings).

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 are highlighted in italics in the text. Other key points are highlighted in bold type. Answer the questions in the text as they are asked. Then, check your answer by reading further in the text.
3. You have more work with the demand-supply graph in this chapter. In particular, **you need to recognize surpluses and shortages**.
4. Do the cases very carefully. Go over the explanations step-by-step. In each case, draw the graph.
5. You will be given an In Class Assignment and a Homework assignment to illustrate the main concepts of this chapter. When you have finished the text and the assignments, go back to the Objectives below. 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. Then, try the Practice Quiz for Class 6.

Objectives for Chapter 6 Price Floors and Ceilings and the Invisible Hand

At the end of Class 6, you will be able to:

1. Define **“price floor”** and draw it on the demand – supply graph.
2. Give some examples of price floors.
3. Analyze what results if there are price floors.
4. Analyze the results of the **price support program** for agriculture.
5. Analyze the results of the **acreage restriction program** for agriculture.
6. Define **“price ceiling”** and draw it on the demand – supply graph.
7. Name some examples of price ceilings.
8. Analyze the results of price ceilings.
9. Explain how goods and services are rationed if there is a price ceiling.
10. Define **“black market” and “gray market”**.
11. Use the analysis of price ceilings to analyze the problem relating to water in California.
Explain how a market for water in California is being created and its effects
12. Explain what is meant by **“consumer sovereignty”**.
13. Explain what is meant by the **“invisible hand”**.
14. Analyze the results of a change in tastes on the part of consumers.
15. Analyze the results of a change in the relative scarcities of the factors of production.
16. Explain the **two functions of the price** in a market system.
17. Explain how the self-interest of the sellers leads to behaviors in society’s (consumers’) interest.

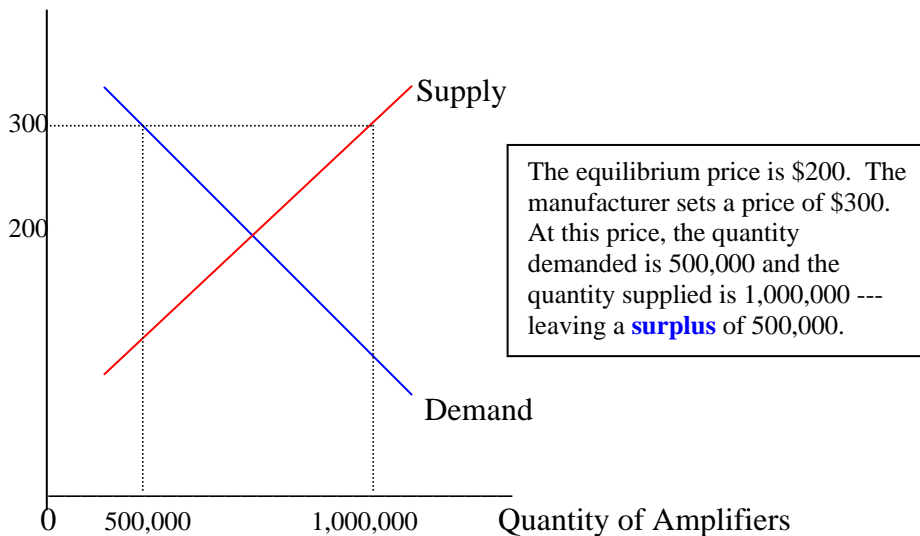
Class 6 Price Floors and Ceilings and the Invisible Hand (latest revision August 2004)

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 floors and price ceilings. Let us begin with price floors.

1. 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 (\$)



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 at Rite Aid, 7-11, and so forth at a lower price. Surplus liquor was bottled

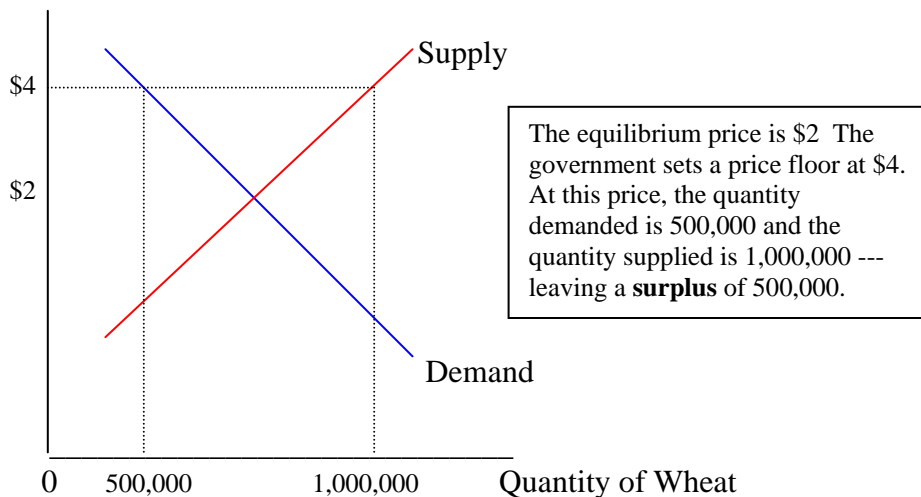
with a different label and sold as Slim Price or Yellow Wrap at a lower price. Surplus washing machines and refrigerators were sold, for example, to Sears and marketed as Kenmore at a lower price. When automobiles were fair-traded, the dealers could not lower the price; however, they would give a trade-in 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

In the last class, the problem of the American farmers was discussed. Because of technological advances, the supply of agricultural products has increased greatly. On the other hand, the demand for agricultural products has increased much less. The result is that agricultural prices have been falling. When the demand is relatively inelastic, these falling prices cause falling revenues. Profits for farmers have been falling. 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. The first 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 farmer is allowed to produce all that the farmer desires to produce at the floor price of \$4 (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.

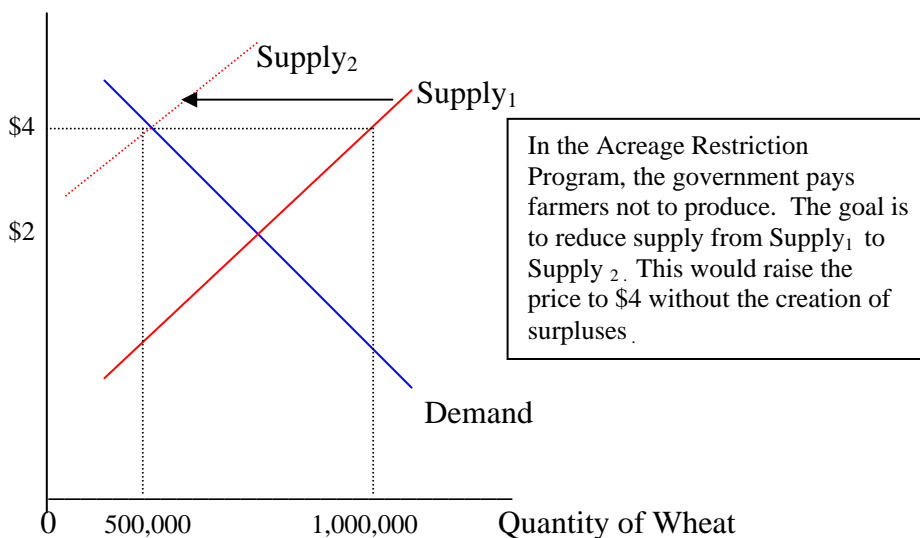
It is clear who wins from this program. The farmers produce more than they otherwise would produce and receive a higher price for their products. The consumers lose in that they pay higher prices (an estimated \$10 billion for all foods) and also that they buy less of them. The taxpayers lose first in the tax money used to buy the surplus and secondly in the tax money used to store the surplus. In recent years, the taxpayers have been 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.

There has been another farm program --- ***an acreage restriction program***. In this program, the government pays farmers not to grow certain crops on part of their land. See the graph on the next page. The idea was to reduce the supply and therefore raise the price to the floor price without the creation of surpluses. In this case, the farmers gain from the higher price. With demand being relatively inelastic, a higher price means that farmers gain higher total revenues. Farmers also gain the money paid by the government for not producing. Consumers lose by paying the higher price and by buying less grain products. Taxpayers lose the money that is paid to the farmers to not produce.

The program did not work as intended. Farmers took the worst lands out of production. They then farmed the remaining lands more intensively, planting closer and applying more fertilizers and pesticides. The result is that for every 10% of land taken out of production, production of grains fell only about 4%. To achieve the floor price, more and more land had to be taken out of production.

The acreage restriction program also had major effects on the environment. First, the increased application of fertilizers and pesticides ran into rivers and groundwater. Second, leaving the land unplanted often destroyed habitat for birds. Third, the program discouraged crop rotation, leading to greater soil erosion. In 1985, Congress made conservation a condition of eligibility for the program. The **Conservation Reserve Program** pays farmers to remove environmentally sensitive land from production for ten years and plant it with grass or trees. To date, this has been done on about 36 million acres, 8% of all U.S. cropland, mainly in the Midwest and Great Plains.

Price of Wheat



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. The policy of taking land out of production was eliminated and planting flexibility was increased. Because prices were rising from 1995 to 1997, it was not a difficult time for the farmers. But in 1998, 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. The price support program is still in existence as of this writing (August 2004). However, the United States government may agree to eliminate the program as part of an international trade agreement.

Test Your Understanding

In California, the minimum wage is \$6.75 per hour. Companies are not allowed to pay a lower wage. Draw the graph for low-skilled workers. Draw the demand and the supply, showing an equilibrium wage of \$4.00. Show the minimum wage of \$6.75. Explain what will happen as a result of the minimum wage: (1) to the number of low-skilled workers employed and (2) to the total amount paid to low-skilled workers. (To answer (2), you need to consider whether the demand for low-skilled workers is relatively elastic or relatively inelastic. In determining this, it will help if you consider the kinds of companies that are likely to hire low-skilled workers.)

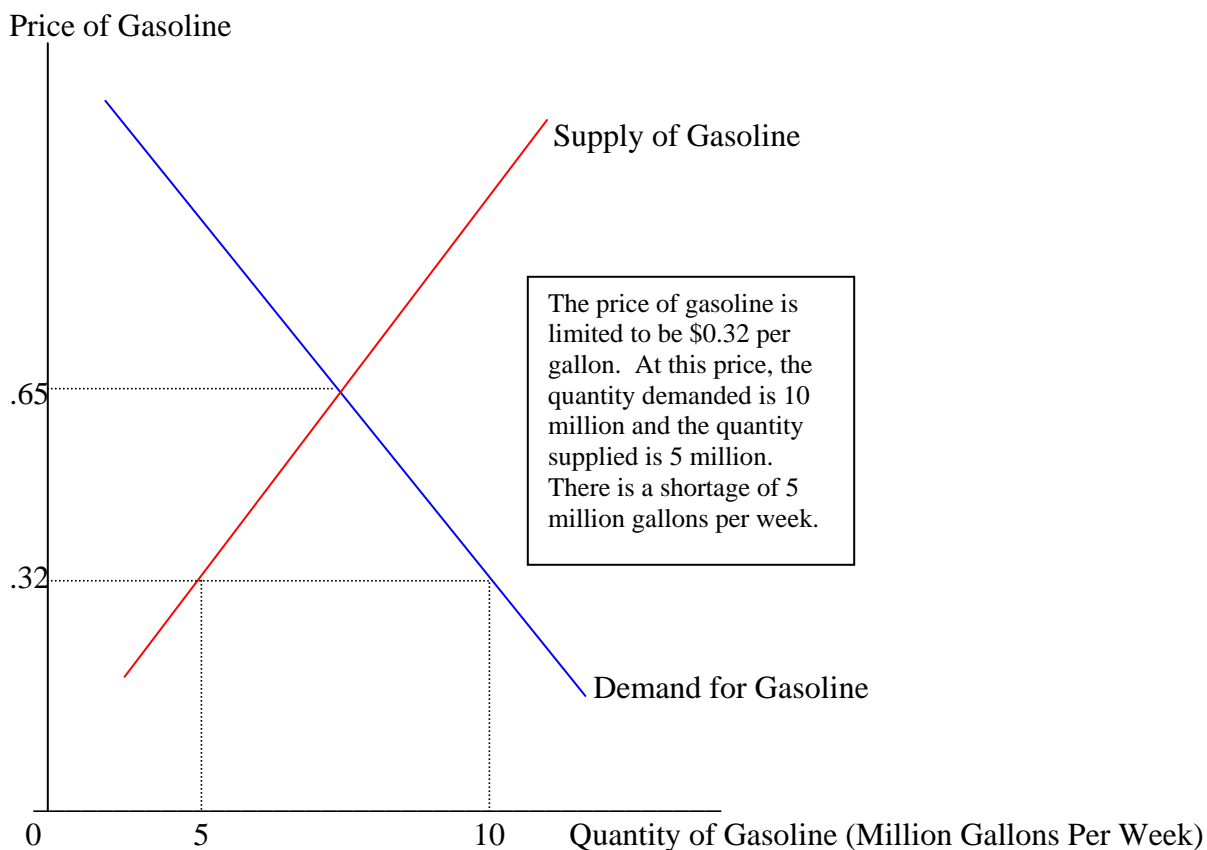
2. Price Ceilings

The other 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 chose not to do so.

In the graph on the next page, assume that the equilibrium price is \$0.65 per gallon of gasoline. The maximum price is set by the government at \$0.32 per gallon. At the price of \$0.32 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 **seller 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 1995 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 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, etc. 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 over \$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 about 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 that 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 have become 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. As noted above, 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. Therefore, **a market in water is being 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 \$200 per acre-foot, 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.

As noted above, **we are seeing the beginning of a market in water.** The San Diego County Water Authority is responsible for providing water for San Diego County. Most of this water is purchased from The Southern California Metropolitan Water District (MWD). MWD transports the water into Southern California. San Diego presently uses about 600,000 acre-feet of water per year. 90% of this water is imported while only 10% is generated locally. Of the imported water, 80% typically comes from the Colorado River and the other 20% is from the Bay Delta in Northern California. The San Diego County Water Authority presently pays MWD \$344 per acre foot for the water plus an additional \$82 for treatment. While Los Angeles County and Orange County each have sources of water other than MWD, San Diego is almost totally dependent on MWD for its water.

To partially remedy this dependence, the San Diego County Water Authority negotiated to purchase water from the Imperial Valley Irrigation District (IID). The IID holds in trust the water rights of Imperial Valley landowners. The Imperial Valley presently uses 2.9 million acre-feet of water annually. The IID receives the water from the Colorado River at no cost. The farmers in the Imperial Valley pay only for the cost of transporting water --- presently \$12.50 per acre-foot. **The San Diego County Water Authority has the authority to purchase from IID 200,000 acre-feet of water each year until 2008 (possibly rising to 500,000 acre-feet at a later date) at a price of \$200 per acre-foot in starting in 1999 and rising to \$306 per acre-foot by 2008.** In addition to this, the San Diego County Water Authority will have to pay for the cost of transporting the water to San Diego. It still considers this cheaper than any alternative way of providing water.

Since Imperial Valley will be selling water for \$200 to \$306 that they now pay \$12.50 for, this would seem to be a good deal for Imperial Valley. Where will they get the water to sell to San Diego? The answer is **conservation**. The difference between the \$200 to \$306 and the \$12.50 provides a great incentive to conserve. However, conservation also entails costs. Some conservation may result from simply producing less (such as producing only one crop per year instead of the current two). Any reduction in agricultural production would hurt seed producers, machinery producers, farm workers, and so forth in the Imperial Valley. Conservation might also create costs if equipment is purchased for the purpose of enhancing water efficiency. Imperial Valley economists estimate that conservation costs in the future could be as much as \$175 to \$190 per acre-foot. The proposed deal aroused a considerable controversy in the Imperial Valley. In San Diego, it led to a dispute between the MWD, fearful of losing its control over San Diego water, and the San Diego County Water Authority, anxious to gain some independence. Despite the politics, an economist would applaud this deal as providing a market price for water and therefore providing market incentives for conservation and rational use of water. A deal such as this would end the shortages created by the fact that the price of water had been below equilibrium for so many decades.

Test Your Understanding

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.

- (1) Draw the demand for immigration rights into the United States on the graph. Draw the supply as perfectly inelastic (at 800,000 permits). Show that, at a price of zero, there is a large shortage.
- (2) **Use the procedures of rational decision-making** to explain why a person might choose to migrate to the United States. (What are the marginal benefits? What are the marginal costs?)
- (3) 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?
- (4) Is there a **black or gray market** in this case?

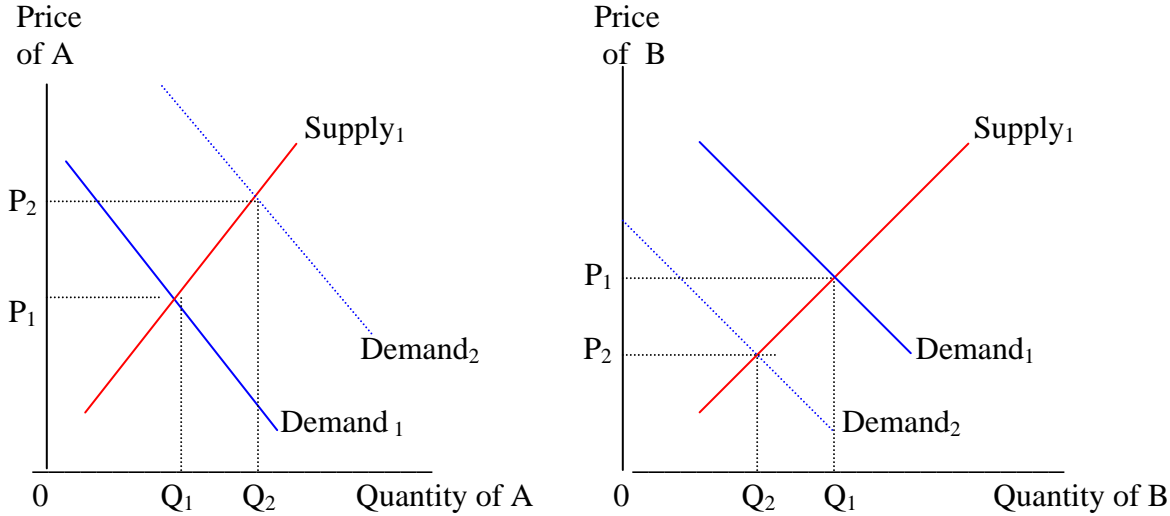
(3) The Invisible Hand

Thus far in the course, we have been discussing the way markets operate. In the United States, the questions of what to produce, how to produce, and for whom to produce are answered mainly through the operation of markets. The basic justification for this market system was first argued by the Scottish philosopher, **Adam Smith**, in 1776. There are several parts to Smith's justification. We will consider one major part here.

We want an economy to work as well as possible for society. But when we say "society", exactly whom do we mean? In the days of Adam Smith, the prevailing view was called **mercantilism**. In this view, the goal of an economy was to earn gold and silver for the king. The monarch would then use the gold and silver to pay for a large military for defense and conquest. To Smith, this was wrong. The goal of an economy, he argued, was to serve consumers. **"The consumer is the king."** To this day, this has been called **"consumer sovereignty"**.

A Change in Tastes

To illustrate Smith's argument, assume there are two products: A and B. The consumer (the king) has a change in tastes; the consumer now prefers A more and B less. Let us start with A. The demand for A increases (shifts right).



There is now a shortage of A. Recognizing this, sellers of A will raise the price of A from P_1 to P_2 . **The price has two main functions in a market economy: first, it provides information telling people what to do. Second, it provides incentives for them to act on this information.** The increase in the price tells sellers all they need to know; they do not need any fancy market research. The increase in the price tells sellers of A to produce more of A because buyers want more of A. It also provides the incentive to do just that. Sellers are self-interested. Their goal is the maximization of their profits. **They produce more of A (from Q_1 to Q_2) because doing so increases their profits.** Sellers probably do not know why the price increased. And they do not need to know this. Sellers certainly do not care that they made buyers happy by producing A. **But, by acting in their own self-interest, they have also acted in the social (consumers') interest.**

Now, let us look at sellers of B. The demand for B has fallen (shifted left). There is now a surplus of B. Recognizing this, sellers will be forced to lower the price of B from P_1 to P_2 . The decrease in the price of B provides all the **information** these sellers need; it tells them that buyers do not desire as much B. It also provides an **incentive** to produce less B. Producing less B (from Q_0 to Q_2) provides sellers of B with the highest possible profit under the new condition of reduced demand for B.

What about the workers? A major goal of workers is to maximize wages. As the production of A increases, producers of A will need to hire more workers. To attract them, the wages paid to workers producing A rise. As the production of B decreases, the producers of B will either hire fewer workers or will reduce the wages of their workers. Those facing lower wages or loss of jobs in B will find the higher wages in A attractive. **Workers will move to produce those goods and services that consumers desire most.** As just one example: nature was "cruel" and located a large amount of oil in Alaska. Consumers desire oil greatly, but Alaska is not a desirable location for most workers. How did oil companies get workers to go to Alaska to produce oil? The answer, of course, was that they raised the wages substantially. A person working maximum overtime could earn perhaps \$75,000 in six months in Alaska.

Both companies and workers are guided, as if by an invisible hand, to produce the goods and

services that are most desired by consumers. And this occurs when all of them were only pursuing their own self-interest. To quote Adam Smith, "He...neither intends to promote the publick (sic) interest, nor knows how much he is promoting it...he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention."

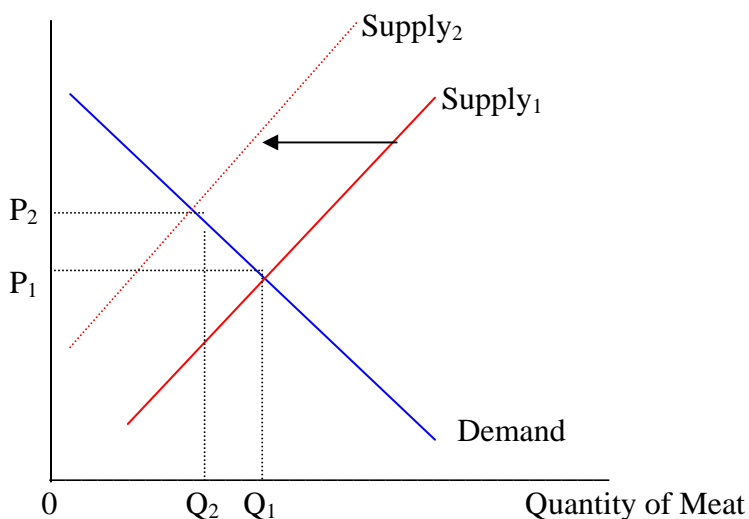
Imagine that sellers of B and their workers refuse to follow the information and incentives provided by the falling price of B. They truly love what they are doing and do not wish to change. They would produce a certain amount (Q_1) of B. Some of the B that they produce will not sell. Their profit is less than if they had reduced production to Q_2 . The low profit would eventually force them out of business. *Producers and workers must follow the wishes of consumers, even if they hate it, or perish.*

Assume that sellers actually cared about consumers and wanted to make consumers happy. How would they know what to do? Imagine the time and cost to get all the information they would need to know. More than likely, they would still not produce the right goods or services. *Yet, in trying to maximize their own profits or wages, people are guided to produce the right goods and services. They may not even know that they are doing so.* To quote Adam Smith again, "by pursuing his own self-interest he frequently promotes that of society more effectively than when he really intends to promote it."

A Change in the Relative Scarcity of Resources

Let us take a different example. In 1973, there was a mysterious disappearance of the anchovy catch off the Peruvian coast. The supply of anchovies was significantly reduced. This hardly seems like the most important news; in fact, very few people even knew of it. In the United States, anchovies are mainly used in the production of animal feed. When the supply of anchovies was reduced, producers of animal feed had to turn to other sources of protein (mainly wheat). These other sources were more expensive. This increase in cost caused an increase in the price of animal feed. When the price of animal feed rose, the costs of production rose for those companies producing beef and pig products. The rising costs of production caused the supply of meat products to shift left. The result is that the price of meat products rose from P_1 to P_2 on the graph.

Price of Meat



Consumers were totally unaware of the disappearance of the anchovies. But when they went to market, they noticed that the prices of hamburger, steak, ham, and bacon had all risen. Faced with these higher prices, they ate more chicken, fish, and cheese. **They were guided, as if by an invisible hand, to economize on that which had become scarce.** Again, the rising price provided all the **information** consumers needed to know. And it provided the **incentive** for them to buy fewer products that were produced with anchovies and more products that were not. *The market not only guides producers to produce those products consumers desire most, it also guides consumers to buy less of those products that use resources that have become relatively scarce.* (As another example, when oil became relatively scarce, it was important that consumers use less of it. This was accomplished very well once the price of gasoline rose above \$2.00.)

To summarize: the "invisible hand" is the market. The most important variable in the market is the price. The price has two functions: it provides information to both buyers and sellers and it provides incentives to act on that information. People act in the own self-interest. Buyers act to maximize the satisfaction they get from the products they buy, given the limitations of their incomes. Sellers act to maximize profits. Workers act to maximize the wages they receive. In pursuing their own self-interest, sellers and workers ultimately do that which is best for society as a whole (consumers), even though doing so is not their intent and even though they may not know they are doing so. This is the magic of the market.

Test Your Understanding

(1) Some people advocate a plan for educational vouchers. In its extreme form, this plan would give to the parents of each child in California a voucher for the money currently spent on schooling (about \$4,500 per child). The parents could then use that voucher to buy schooling for the child at any school in California. In some plans, the parents could pay more than the amount of the voucher if they desire. The voucher could not be used for any purpose other than school. This would replace the current system in which the money goes to the school and, with few exceptions, each child goes to the school in the neighborhood. Thus, in effect, schools would become private businesses who would compete for students in a market. Use the principles of the "invisible hand" and the benefits of a market to argue **in favor of** replacing the current system with educational vouchers. Then, argue **against** the replacement of the current system with education vouchers by naming some of the problems that a system of education vouchers might cause.

The following has arguments both for and against educational vouchers:

<http://secular.org/library/modern/church-state/vouchers.html>.

The following has arguments against educational vouchers: http://www.adl.org/frames/front_vouchers.html

The following sites consider the use of educational vouchers in the city of Milwaukee:

<http://hdc-www.harvard.edu/pepg/op/evaluate.htm>

<http://www.lafollette.wisc.edu/outreach/pubs/fifthyear/index.htm>

(2) In April of 1995, the television show 60 Minutes had a feature on a small town in Vermont. The town was one of many small towns that were trying to stop Wal-Mart from opening a store ten miles outside of town. (Wal-Mart is a giant super-store that used to locate primarily in rural areas.) The town was complaining that Wal-Mart would ruin many of the local businesses. As those would fail businesses fail, their owners and workers would reduce buying at the other businesses, such as barbers or gasoline stations. The whole community of the small town will be lost. People will have to move. Because people would have less income, they would pay less taxes, reducing the money available for schools, roads, police, and so forth.

Write a brief response to the town justifying the coming of the Wal-Mart. Base your response on the principles of the "invisible hand". Then, explain what problems are likely to result if the "free market" is allowed to work in this case (that is, if Wal-Mart is allowed to open its store).

Case: Environmental Regulation

We know that many activities that people undertake cause harm to the environment. As will be argued later, preventing people from harming the environment is one of the functions government should fulfill in a market economy. In this section, let us focus mainly on the harm to the environment that results from **air pollution**. Government needs to concern itself first with the question of how much air pollution to allow and how much to prevent. As was shown in Class 2, it may not be desirable to eliminate all air pollution. *Policies should be undertaken to reduce air pollution only as long as the marginal benefit of doing so exceeds the marginal opportunity cost.* (Review the argument in Class 2)

But once it has been decided how much air pollution to eliminate, there is another important question that government agencies must answer: **how should the air pollution be reduced?** In most cases, air pollution has been reduced through laws that make certain polluting activities illegal. This is known as **“command and control regulation”**. You are familiar with one example of this type of regulation --- the requirement that all cars licensed in California have a smog control device that works. Command and control regulation has been criticized by many economists. **First, they argue that the environmental laws are enforced by government bureaucracies.** Bureaucracies often have their own goals and can be very inefficient. **Second, they argue that government regulations are not the least costly means to achieve the goals the government desires.** There is too much paperwork involved. Companies spend too much money on lobbyists. And the regulators are likely to make serious mistakes, especially as they must rely on people from the industries involved for the information they need to make their decisions. **Third, consistent with the second point, they argue that the government requires all polluters to reduce their pollutants equally.** The government does not distinguish between those companies who can reduce pollutants easily (at low cost) and those who cannot. **And fourth, they argue that government regulations create a hostile, adversarial relationship between the industries involved and the government.** Instead of trying to reduce their pollution, companies devote their energies to trying to avoid the regulations. Because of these objections to government regulations, these economists have recommended the use of market solutions. At their insistence, market solutions have come to be used more and more. Let us consider a few examples of these market solutions.

One important example of the use of markets to reduce air pollution has occurred in the greater Los Angeles area. This area has long been noted for excessive air pollution. The local government is required by the Clean Air Act of 1990 to reduce air pollution emissions. The use of market solutions in greater Los Angeles has so far focused exclusively on industrial polluters. Under a program of the South Coast Air Quality Management District, companies in the greater Los Angeles area are given **“rights to pollute”**. This means that they are allowed to dump a certain amount of emissions into the air --- and no more. Some companies can meet, and even exceed, these limits easily. Other companies have a very difficult time meeting these limits. **Those companies who cannot meet the limits have the right to buy the “rights to pollute” from the other companies.** The price is determined by the demand for and supply of these rights. There are companies, such as AER*X, who specialize in dealing in rights to pollute. Let us illustrate the way such a market would work. Suppose that Company X has the right to dump 50 tons of pollutants per year into the air. And suppose that it could install a new production process that would reduce its emissions by 10 tons at an added cost of \$20,000 per year. Under command and control regulation, Company X would have no incentive to reduce its emissions below 50 tons. But under the market approach, it does. Suppose that

rights to pollute sell for \$5,000 per ton. Company X could spend the \$20,000 to reduce its pollutants by 10 tons, and then sell the rights to those 10 tons to Company Y for \$50,000 (\$5,000 times 10 tons), pocketing the difference of \$30,000. *Company X now has a financial incentive to reduce its air pollution as much as it can --- even below the level required by the government.* Company Y also has the same financial incentive. If Company Y cannot find a way to reduce its pollutants, it is required to pay an extra \$50,000. This adds to its costs of production. Since Company Y is now a high cost producer in comparison to its competitors, it may be faced with the prospect of financial losses. *The market forces Company Y either to find a way to reduce its pollution or, eventually, to go out of business.* In a market, those who are inefficient (in this case in reducing pollution) die out. So the market solution gives both companies the proper incentives. *It also generates the result that most of the reduction in air pollution is accomplished by the companies who can do it most cheaply. And it gives companies the incentives to actually reduce pollutants more than required.* As companies discover ways to produce with less pollution, the government can reduce the total amount of “rights to pollute”. (A reduced supply of “rights to produce” would raise the price. This would create an even greater incentive to find ways to reduce pollutants.) Studies shows that this trading program has saved billions of dollars, despite the fact that only a small number of the possible trades have actually taken place. The air quality in the greater Los Angeles area is better than it once was. But the program of trading “rights to pollute” can take only a small amount of the credit because it is limited to industrial polluters. Most of the air pollution in the Los Angeles area is generated by automobiles. There have been proposals to have one’s automobile license fee depend on the amount of air pollution emitted. To date, this has not been put into effect.

Market solutions have also been tried to solve the problem of **acid rain**. Power plants generate most of the acid rain. Acid rain is formed when sulfur dioxide, released when coal is burned, and nitrogen oxide, released from any fossil fuel combustion, are transformed into sulfuric and nitric acids. With very high smokestacks in these power plants, the acids are transmitted hundreds of miles by the wind, returning to earth attached to raindrops. Acid rain has created excess acidity of lakes and streams. It has harmed forests, reduced agricultural productivity, eroded building and bridges, and even contributed to human illness. The areas that are most harmed by acid rain are New York, New England, and Canada. For years, little was done about this problem. The main command and control attempt at a solution was to require power plants to shift from high-sulfur coal to low-sulfur coal. This approach was never implemented because the people who would have been hurt (those whose jobs related to high-sulfur coal in Pennsylvania, Indiana, Ohio, and Illinois) were able to prevent the shift to low-sulfur coal. In 1990, the Clean Air Act required a reduction of 10 million tons of sulfur dioxide emissions and 2.5 million tons of nitrogen oxide emissions by the year 2000. Emissions of these two were then to be capped at the level reached in the year 2000. Marketable permits were issued, first to the largest coal-burning producers of electricity and then to other power companies throughout the United States. In this case, trading is national. There is an organized market for the trading of these permits. By 1995, the permits were selling for between \$100 and \$400 per ton. The fact that there are hundreds of companies trading these permits generates a better market than that found in the Los Angeles example. **Early studies indicate that this market-based approach will allow companies to meet the goals stated in the Clean Air Act at a cost that will be 15% to as much as 25% less than the cost that would have resulted had traditional command and control regulation been used.**

There have been a few other examples of the use of markets to reduce environmental harm. For

example, recently, the government desired to re-introduce the gray wolf to the area near Yellowstone National Park. Ranchers in the area commonly killed these wolves, fearing that the wolves posed a threat to their livestock. Government command-and-control regulation made such killing illegal. But the killing continued anyway. There was great hostility between the landowners and the government agencies. Then, an environmental group, Defenders of Wildlife, offered to pay landowners \$5,000 if they could show that a litter of wolf pups had been reared on their property. This policy created a market incentive for the landowners to act in ways that improve the environment. It also reduces the hostility that is felt, as both landowners and environmentalists are now on the same side. At the time of this writing, it is too early to tell how successful this program has been. But some people are encouraged enough to propose similar market incentives to preserve other species.

Environmental problems have been major political issues in the United States. These problems will be discussed in various places throughout this course. As of now, command and control regulation is still the dominant way by which we deal with environmental problems. The use of markets to solve environmental problems is still in its infancy. Yet, the use of markets has the potential to solve environmental problems at a lower cost. It also has the potential to reduce much of the hostility that accompanies command-and-control solutions. Market solutions to environmental problems could become much more prevalent in the future.

Internet Assignments

1. Go to the site of the South Coast Air Quality Management District at <http://www.aqmd.gov>. Read about the Market Incentives Program under Rules (Rule 20) at <http://www.aqmd.gov/rules/html/tofc20.html>. Describe the market incentives program as it exists today (this is the program described in the chapter). Provide more detail than the chapter does. Then, search the AQMD site for information as to the success or failure of the program.
2. Go to the EPA site at <http://epa.epa.gov>. Highly recommended. The Plain English Guide to the Clean Air Act. The Role of the Federal Government and the Role of the States.
 - a. Are the states or the EPA primarily responsible for pollution control?
 - b. Does the 1990 Act provide for **market based solutions** to air pollution problems? Give examples.
 - c. Go back to the Highly Recommended page. The Value and Quality of our Water Resources. National Environmental Goals. The Quality of America's Lakes
What is the primary cause of pollution in lakes? What is the most common source of these pollutants?
3. The Thoreau Institute is a libertarian institute supporting free markets solutions to environmental problems. Go to the site: <http://www.teleport.com/~rot/articles.html>. Choose one of the articles there. Read and summarize the article. Then, write a criticism of the main arguments made in the article.
4. The Foundation for Research on the Economy and the Environment (FREE) is a libertarian institute supporting free markets solutions to environmental problems. Go to the site: <http://www.free-eco-org/publications.html#oped>. Choose one of the articles there. Read and summarize the article. Then, write a criticism of the main arguments made in the article.

Practice Quiz for Class 12

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

3. 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

4. In the Chapter, the problem with water in California is that
 - a. there are shortages because the price is too low
 - b. there are surpluses because the price is too high
 - c. there are shortages because the price is too high
 - d. there are surpluses because the price is too low

5. Which of the following is **NOT** an example of a **gray market**?
 - a. Gas stations charge extra to wash your windows
 - b. Ticket scalpers sell football tickets in the stadium parking lot for a price double the regular price
 - c. Apartment owners charge a separate fee for access to the key
 - d. An apartment owner converts his apartment to a “church” and charges “church dues” to live there

6. The goal of a pure market economy is to best meet the desires of
 - a. consumers
 - b. companies
 - c. workers
 - d. the government

7. In a pure market economy, which of the following is a **function of the price**?
 - I. provide information to sellers and buyers
 - II. provide incentives to sellers and buyers
 - a. I only
 - b. II only
 - c. both I and II
 - d. neither I nor II

8. In a market system, sellers act in _____ interest, but this leads to behaviors in _____ interests.
 - a. self; self
 - b. self; society’s
 - c. society’s; society’s
 - d. society’s; self

9. In a market system, if buyers desire more of product A,
 - a. more of Product A will be produced
 - b. less of Product A will be produced
 - c. the price of Product A will fall
 - d. there will be a gray market for Product A

10. In a market system, if one factor of production becomes scarce,
 - a. products that use much of that factor of production will have their prices rise
 - b. buyers will buy less of products that use much of that factor of production
 - c. buyers will buy more of products that use little of that factor of production
 - d. all of the above

Answers 1. B 2. A 3. D 4. A 5. B 6. A 7. C 8. B 9. A 10. D