How to Study for Chapter 7   Case Studies Using Demand and Supply Analysis

Chapter 7 develops the ability to apply the analysis of Chapter 6 to various cases.

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. Be sure to go over every shift so that you can see the reasons for them. By the end of this chapter, you should have mastered the use of this graph.
4. Go over the examples of tax incidence very carefully. In each case, you need to explain why the incidence of the tax is either absorbed by the one who pays the tax or is passed on to someone else. The explanation and reasoning are the most important aspects of this topic.
5. Go over the case on apartments carefully. Try to answer all of the questions when they are asked. Then, read the answers to check and correct your answers.
6. Go over the case on agriculture carefully. Be sure you can explain why the shifts were made in demand and supply and why the problem of falling farm profits resulted.
7. 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 .

Objectives for Chapter 7   Case Studies Using Demand and Supply Analysis

At the end of Chapter 7, you will be able to:

1. Define *"incidence"* of a tax.

2. Explain what determines whether the incidence of a tax is on the buyer or on the seller.

3. Apply the analysis of tax incidence to the case of the sales tax, to the case of the health care insurance premium, to the case of tariffs on foreign products, and to the case of the costs of environmental regulations

4. Completely analyze the case of the rent supplement program using demand – supply analysis and the price elasticities of demand and supply.

5. Completely analyze the case of a building subsidy program using demand – supply analysis and the price elasticities of demand and supply.

6. Use demand – supply analysis as well as the price elasticities of demand and supply to explain why American farmers have faced falling prices and profits over the past century.

Chapter 7: Case Studies Using Demand and Supply Analysis

(Most recent revision June 2006)

Part 1: Tax Incidence

As one example of demand and supply analysis, let us assume we have a product with the situation shown in the graph below. The price is $1.00 per unit.
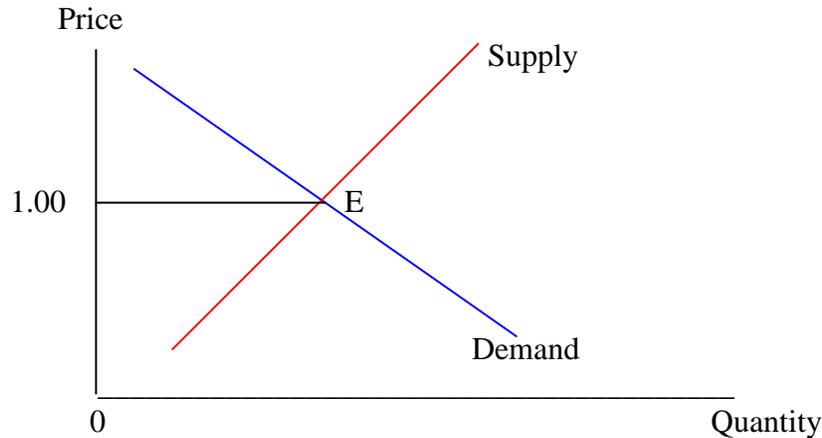
Now a sales tax is imposed. **The tax is charged to the seller**. For every $1.00 of sales, assume that the seller must pay $0.07 to the government. (Notice that consumers do not pay sales taxes. You have not paid any sales tax money to any government agency. The store pays the sales tax to the government.) From the point of view of the seller, this is **an additional cost of production**. In addition to all other costs, the seller must also pay the sales tax. Do costs of production affect demand or supply? The answer, as shown in the last chapter, is supply. Will there be a shift or movement along supply? Since the change is caused by something other than the price of the product, the answer is a shift. Since costs of production are increasing, the good is less profitable, causing supply to decrease. This is a shift to the left, as shown below.
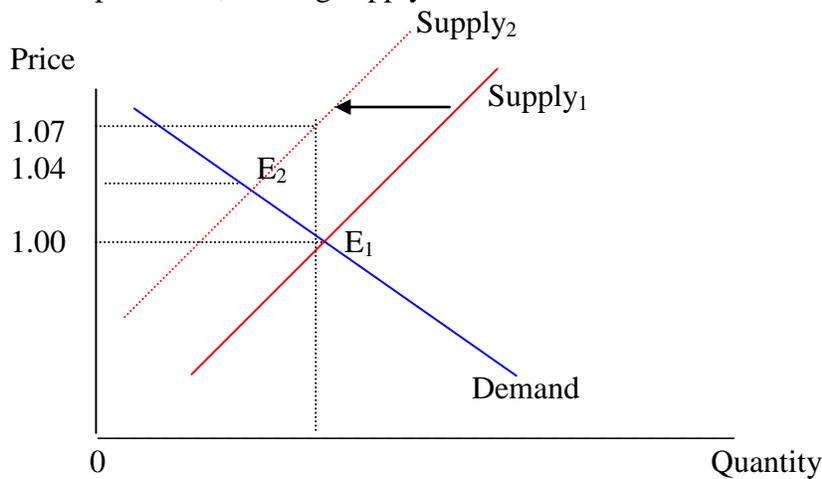
If we read the graph vertically instead of horizontally, we can say that the seller would like to raise the price to $1.07. Then, the seller could pay the $0.07 in tax and still have the same $1.00

that was earned before the sales tax was imposed. However, due to the law of demand, the seller cannot raise the price to $1.07. If the seller raises the price, the quantity demanded will fall. In this case, equilibrium occurs with the new price at $1.04. At any higher price, there would be a surplus. We say that $0.04 is the ***incidence of the tax on the buyer*** because the buyer must pay a $0.04 higher price. We say that the other $0.03 is the ***incidence of the tax on the seller*** because the seller earns $0.03 less that was earned before the sales tax was imposed ($1.04 - $0.07 = $0.97).

In this example, $0.04 of the sales tax was passed along to the buyers as higher prices. This number was, of course, just made-up. How do we know in reality how much of the sales tax will be passed along to buyers and how much must be absorbed by the seller? ***The answer depends mainly on the price elasticity of demand for the product***. To illustrate this point, let us take two extreme cases. ***First, assume that the demand for the product is perfectly inelastic***. In this case, the demand curve is vertical:
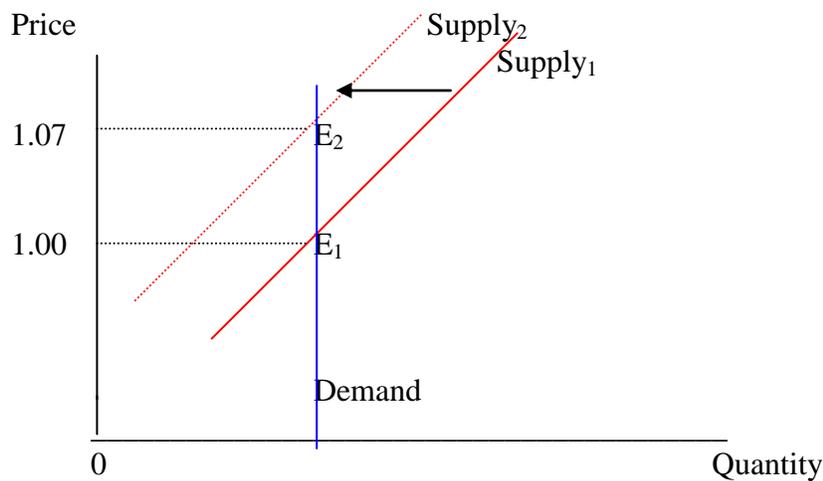
When the sales tax is imposed, the seller would like to raise the price to $1.07. Since, in this case, buyers will buy the same quantity at any price, there is no surplus and the price can just rise to $1.07. ***If the demand for the product were perfectly inelastic, all of the tax would be shifted on to the buyers; the incidence of the sales tax would be entirely borne by the buyers.***

Now let us examine the other extreme. **Assume that the demand for the product is perfectly elastic.** In this case, the demand curve is horizontal:

Price   Supply$_2$

Supply$_1$

1.00   E$_2$ E$_1$ Demand

0   Quantity
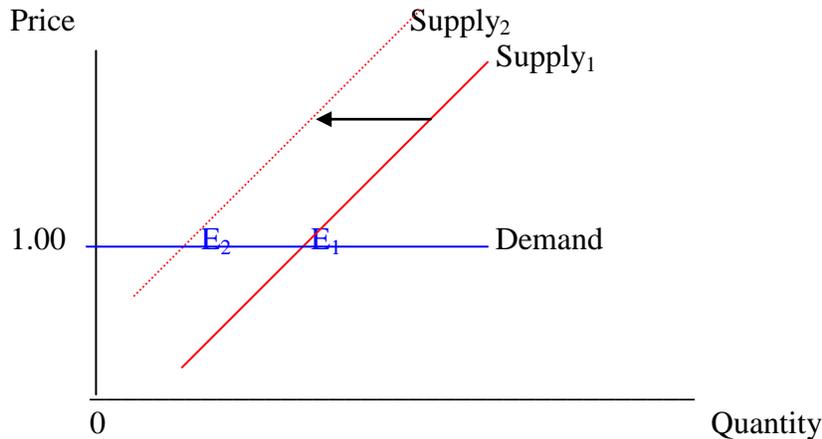
When the sales tax is imposed, the seller would like to raise the price. But when the price rises above $1.00, no one buys at all. Therefore, the seller cannot raise the price; the price will end up at $1.00. *In this case, none of the tax can be shifted on to the buyers. We say that the incidence of the sales tax is entirely on the sellers of the product.*

From these extreme cases, we can generalize. *The incidence of a sales tax will be more on the buyer (seller) the more inelastic (elastic) is the demand for the product*. **Remember (from Chapter 4) that the price elasticity of demand depends on the number of substitutes, the time involved, and the price of the product in relation to one's income.** So, we can make a good guess about the incidence of the 7% sales tax. Are there good substitutes for products taxed under the sales tax? The answer is "probably no". In California, most consumer items are taxed under the sales tax except food, shelter, and health care. So the substitutes to paying the sales tax are to eat more, live in a more expensive apartment or home, or go to the doctor more. Of course, there is one other substitute --- don't spend at all (better called saving). A reasonable guess is that, if the sales tax is raised, the quantity purchased of goods that are taxed will fall, but fall very little. Second, is the sales tax high or low in relation to buyers' incomes? At 7%, the answer is "probably low" for most people. (The answer, of course, is very different in countries where sales taxes reach 30% and up.) *If we accept these answers, the goods taxed under the sales tax have relatively inelastic demand and the incidence of the sales tax would be mostly on the buyers*. In fact, most economists assume that the incidence of the sales tax is completely on the buyers.

Test Your Understanding.
In 1991, a sales tax was imposed for the first time in California on "junk foods". This was the so-called "snack tax". It imposed a sales tax on goods like Twinkies and pretzels. Would the incidence of this sales tax be mostly on the buyers of these foods or would it be mostly on the stores that sell them? Explain why.

Example 1: Health Care

In the United States, most people get health insurance as a benefit from employers. Employers pay all, or some part, of the premium to a health insurance provider. But do employers actually pay this premium or do they shift the cost on to someone else?

Employers have two possible ways to shift the burden of the health insurance cost. One is to raise prices to consumers. The ability to do this depends on the reaction of consumers to the price increases. Most large companies pay health insurance and therefore would raise their prices. Many small companies (such as restaurants and gas stations) do not pay health insurance and therefore would not raise their prices. If consumers are able to substitute products made by the small companies for those made by the large companies, the large companies would not be able to raise their prices significantly. The incidence of the premium would then be on the companies. However, it seems more reasonable that buyers will not be able to substitute for the products of large companies very well. (If the price of automobiles increases, will we eat more in restaurants?) In this case, the large companies would be able to raise their prices. The incidence of the premiums would then be mainly on the consumers.

The second option for employers is to pass the health insurance cost on to workers as lower wages (actually as reduced raises in the wages). For example, a worker who earns $30,000 per year could have been paid $35,000 per year, except that the employer also paid $5,000 for the health insurance premium. Who will ultimately pay the premium is determined in this case by the same reasoning. What will workers do when they find their wages reduced? If workers will leave their jobs and find other jobs with higher pay, then the employer will not be able to reduce the wages. The employer will have to bear the burden of the premium. But this seems unlikely. Most employers pay health insurance. Most workers would have nowhere else to go. As a result, workers would have to accept the reduced wages. The incidence of the premium would then be on the workers.

In 2003, there was considerable debate in the United States over forcing employers to pay for workers' health insurance. The California legislature debated a proposed law that would require all employers with more than 50 employees to pay for health insurance for their workers. This ended up as a ballot initiative (that ultimately failed). To most economists, workers pay for their health insurance even if the employers actually send the money to the insurance provider. *Workers pay either through higher prices for the products they buy or through lower wages they receive.* Workers believe they are getting health insurance from their employers as a benefit. They do not realize that, if the employers were not paying for the health insurance, their wages would be higher and the prices of the goods they buy would be lower.

Example 2: Tariffs

A tariff is a tax placed on the products of foreign countries sold in the United States. Assume, there is a 10% tax on foreign-made automobiles. Who would bear the incidence of this tax?
Assume that a Japanese car and a similar American car each sell in the United States at a price of $25,000. With the 10% tax on the Japanese car ($2,500), the Japanese company would like to raise the price of its car to $27,500. Whether it can do so or not depends on the price elasticity of demand for Japanese cars. If the demand for Japanese cars is relatively inelastic, the quantity demanded will fall very little at the price of $27,500. This means that buyers do not find Japanese and American cars to be close substitutes. The incidence of the tax would be on the car buyers. On the other hand, if the demand for Japanese cars is relatively elastic, the quantity of Japanese cars demanded will fall considerably at the price of $27,500. This means that buyers will closely substitute between Japanese and American cars. The Japanese company

will have to charge a price close to $25,000 in the United States to be able to compete. The incidence of the tariff will be on the Japanese automobile companies.

In technical language, *a tariff on a foreign product that has very elastic demand is called an optimal tariff*. The price of the foreign product rises very little in the United States. Most of the tariff is paid by the foreign company as reduced profits. The gain, of course, goes to the United States government, who collects the money.

Example 3: Environmental Regulations

As we will see in a later chapter, free markets commonly lead to excessive pollution. This occurs because, from the point of view of the company, polluting is free (or at least very inexpensive). Most of the costs that result from pollution are borne by other people --- people who breathe the air, fish in the water, become ill, and so forth. One way to reduce pollution is to force polluters to undertake activities that will reduce their pollutants. These activities are costly. Another approach is to tax polluters. For now, the question concerning us is this: who actually will pay for the costs of reducing pollutants?

One example is the tissue industry. The companies in this industry use raw wood or pulp to manufacture facial tissue, bathroom tissue, disposable diapers, and paper napkins. As water polluters, they were forced by the United States government to install pollution control equipment. This equipment represents a cost. The companies would like to recover the money spent on this equipment by raising the prices of their products to consumers. Whether they can do so or not depends on the price elasticity of demand for tissue products. Most studies find that the demand is relatively inelastic. This means that, when the price rises, buyers will reduce their quantity demanded of tissue products very little. (Question: using the factors affecting price elasticity of demand, explain why the demand for tissue products might be relatively inelastic.) The incidence of these costs therefore is borne mostly by the buyers of these products, who are paying higher prices. If the demand is relatively inelastic, the quantity produced by the companies in this industry will fall very little; as a result, there will be only a small number of jobs lost. **Studies find this to be the case for most industries affected by pollution controls --- few workers lose jobs but consumers face higher prices**. As we will see, the higher prices paid by consumers may actually be desirable for society as a whole.

Test Your Understanding.
1. There is a Transient Occupancy Tax of about 10% in San Diego. This means that people who stay in a hotel in San Diego pay an additional 10% of the price of a room as tax. (If a room charge is $100 per night, they pay an additional $10 in tax to the city.) Upon whom would the incidence of this tax fall --- those who stay in hotels (mainly tourists and businesspeople) or the hotels? **Explain why.**
2. A recent article estimated the following for restaurant meals:
    The price elasticity of demand = 0.188   The price elasticity of supply – 6.47
    The equilibrium price averaged $10.47 per meal (in 1992 prices)
    The equilibrium quantity was 8.14 billion meals per year.
If there were a $1.00 per meal tax, the article estimated that the new equilibrium price would be $11.44 per meal and the new equilibrium quantity would be 8.01 billion meals. Show these facts in the graph. Who bears most of the burden of the tax on restaurant meals? What percent of the tax do they bear? Using the analysis of the chapter, why do you think this is so?

Part 2: Case Using Demand and Supply Analysis

Try to answer the question first. Then, check your answer in the reading.

Assume there is a well-defined geographic area of a city. The area is composed exclusively of apartments and is populated by low-income residents. The people who live in the area tend to stay in that area because (1) they cannot afford to live in other areas of the city, (2) they prefer to live with people of their own ethnic group, or (3) there is discrimination against them in other areas of the city. Rents paid are a very high percent of peoples' incomes.

(1) Would the **demand** for apartments in this area be relatively inelastic or relatively elastic? State why.
(2) Would the **supply** of apartments in this area be relatively inelastic or relatively elastic? State why.
(3) Draw the demand and supply curves as you have described them, showing the initial equilibrium price and quantity. Label carefully.
 (4) Now assume the government creates a **rent supplement program**. Under this program, the renter is required to pay 30% of income in rent. Any additional rent is paid by the government --- up to a limit. For example, a low-income person with an income of $1,000 a month would be required to pay $300 in rent (30%). If the rent is $500, the other $200 would be paid by the government. Analyze the results of this program. Show the changes on the graph and explain what will result. Who gains and who loses from this program?
(5) Instead, now assume that the government decides to provide a **building subsidy** to people who build apartments in this low-income area. A certain percent of their costs will be paid by the government. Analyze the results of this program. Show the results on the graph and explain what will result.

Answer to the Case:

(1) Would the **demand** for apartments in this area be relatively inelastic or relatively elastic? State why.
   The demand for apartments would be relatively inelastic because there are few substitutes for the apartments in this area. However, you might argue that demand would be relatively elastic because the rent is a high proportion of the renters' incomes. A raise in rent could cause renters to leave the city altogether or to have to live on the streets.
(2) Would the **supply** of apartments in this area be relatively inelastic or relatively elastic? State why.
    The supply would also be relatively inelastic. The question is asking: would the quantity supplied rise just a little or rise greatly if the rents increase? Given that this is a low-income area and that there is probably not much free land available, it is likely that the quantity supplied would increase only a little. Even at increased rents, building apartments in low-income areas is not a good investment for apartment owners.
(3) Draw the demand and supply curves as you have described them, showing the initial equilibrium price and quantity. Label carefully.
    Both demand and supply should be drawn as steep (unless you argued that demand was relatively elastic).
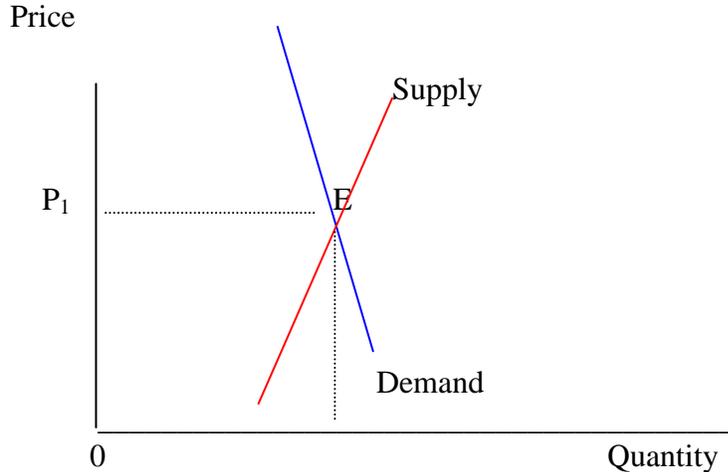
Price

Supply

P_1 .... E

Demand

0   Quantity

(4) Now assume the government creates a **rent supplement program**. Under this program, the renter is required to pay 30% of income in rent. Any additional rent is paid by the government --- up to a limit. For example, a low-income person with an income of $1,000 a month would be required to pay $300 in rent (30%). If the rent is $500, the other $200 would be paid by the government. Analyze the results of this program. Show the changes on the graph and explain what will result. Who gains and who loses from this program?

The payment by the government can be treated as an **increase in income**. This affects the demand for apartments. An increase in demand would be shown as a shift to the right. This creates a shortage of apartments. As a result, **rents rise**. The quantity of apartments supplied also rises. If the supply is indeed relatively inelastic, **the quantity supplied rises very little**. The major effect is the rise in rents. Renters gain from the program. **But most of the gain goes to the owners of the apartments**. This is not what was intended. The "losers" are the taxpayers who pay for the program.

Price

Supply

P_2 ....

P_1 .... E_1

Demand$_2$

Demand$_1$

0   Q_1 Q_2 Quantity
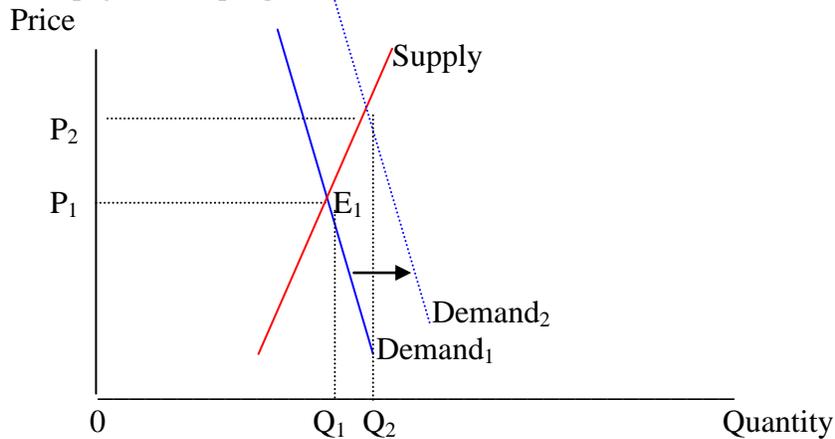
(5) Instead, assume that the government decides to provide a **building subsidy** to people who build apartments in this low-income area. A certain percent of their costs will be paid by the government. Analyze the results of this program. Show the results on the graph and explain what will result.

The subsidy program is a **decrease in costs of production**. With lower costs of production, **supply increases (shifts to the right)**. This creates a surplus, causing apartment

owners to **lower the rents.** The quantity of apartments supplied increases. If demand is relatively inelastic, **the largest effect is the reduction in rents. The quantity supplied increases only a little.** Renters and apartment owners gain from the program. But in this case, renters gain the most.

Price
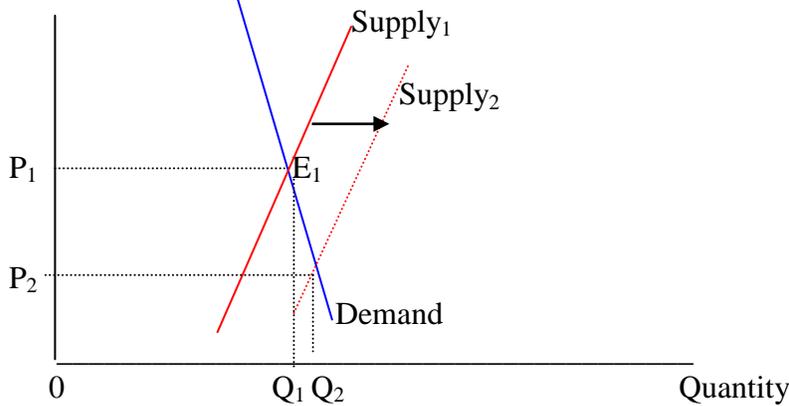
(6) From the point of view of improving housing for the poor, decide for yourself which is the better public policy?

Part 3: Case on American Agriculture

Try to answer the question first. Then, check your answer in the reading.

Consider the market for **grains**. (1) Is the demand for grains relatively elastic or relatively inelastic with respect to the price? **Explain why.** (2) Is the demand for grains relatively elastic or relatively inelastic with respect to income? **Explain why.** (3) Is the supply of grains relatively elastic or relatively inelastic with respect to the price? **Explain why.** (4) On the graph, draw the demand and supply curves as you have described them. Show the equilibrium price and quantity. (5) Over time, the demand for wheat has shifted to the right. Why has this occurred? (6) Over time the supply of wheat has shifted to the right. Why has this happened? (7) Which do you believe has shift more over the past century: the demand curve or the supply curve? Explain why. Then, show these two shifts on the graph. (8) As a result of these two shifts, the price of wheat will _____ (rise or fall?) Because of the price elasticity of demand for wheat, total revenues received by farmers will _____(rise or fall?) The result is that the total profits of farmers will _____(rise or fall?) (9) The market is sending a signal to the farmer. What is it telling the farmer to do?

Answer to the Case:

   Begin with the demand for grains. **Would this demand be relatively elastic or relatively inelastic?** The answer, most studies show, is relatively inelastic. Why? One reason is that people are unwilling to substitute from products made from grain, such as bread. Another reason is that buying grain products is inexpensive in relation to people's incomes.

   Now, consider the supply. **Would this supply of wheat be relatively elastic or relatively inelastic?** The answer, most studies show, is relatively inelastic. Why? In a short period of time, supply may be perfectly inelastic. Once the seeds are planted, the supply cannot be adjusted until the next planting. Over a longer time, farmers can adjust supply by planting more or less. But this is limited by the fact that the farmer has only so much land, barn space, and

machinery. The graph below shows the demand and supply as relatively inelastic.
Price of Grain

Supply

P_1 .... E_1

Demand

0   Q_1 Quantity of Grain
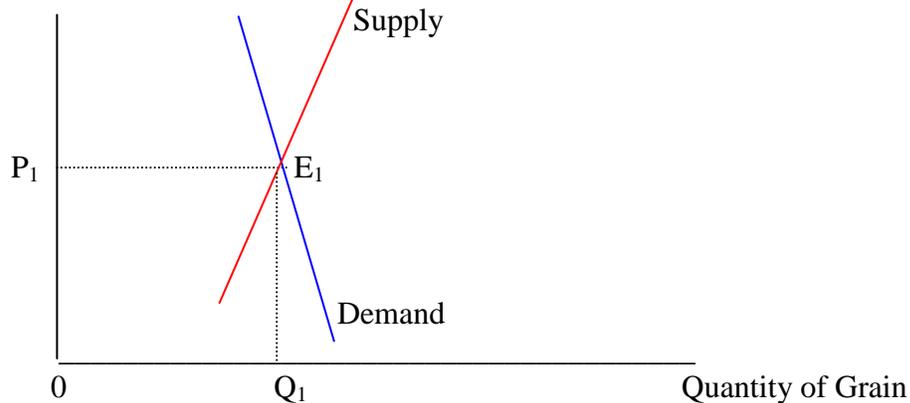
   Over time, the demand for wheat will rise (shift to the right). Why? One reason is that
population rises (both because the American population increases and because farmers are able
to sell more in foreign markets). Another is that incomes rise. However, according to what is
called ***Engel's Law, the income elasticity of demand for products made from grains is low***.
This means that, as incomes rise, the demand for these products (and many other food products)
rises very little. A third reason for the shift in demand is that tastes change toward eating more
meat. As people eat more meat, the demand for wheat rises. This occurs because about 90% of
the sun's energy is lost if the animal eats the plant and then a person eats the animal. However,
in recent years, tastes may have caused a leftward shift in demand for wheat as diet-conscious
people have tried all-protein diets.
   Over time, the supply of wheat will also rise (shift to the right). Why? The cause has
been the enormous technological advances that have increased productivity and lowered costs of
production. These technological advances have been the result of the work of universities,
agricultural extension programs, and the companies that sell products to farmers. A large part of
this technological advance has been financed by the federal government.
   Which do you believe has experienced the greater shift to the right? The answer has been that
the supply has shifted to the right much more than the demand has shifted to the right. This is
shown in the graph below. The technological advances over the past century have been
exceptional. ***If the supply increases more than the demand increases, the result is that the
price of wheat must fall***. This indeed has been occurring over the past century. ***If the price
falls, and the demand is relatively inelastic, what will happen to the total revenue received?
The answer is that it falls.*** As the price falls, people do not eat that much more. When total
revenue falls, the farmer would like to reduce costs to maintain profits. But many of the costs
cannot be reduced. The land, buildings, and machinery must be paid for. Many of the workers
are relatives and cannot be laid-off (although family workers often take part-time jobs in the
nearest town). ***The result is that profits fall.***

Price of Grain
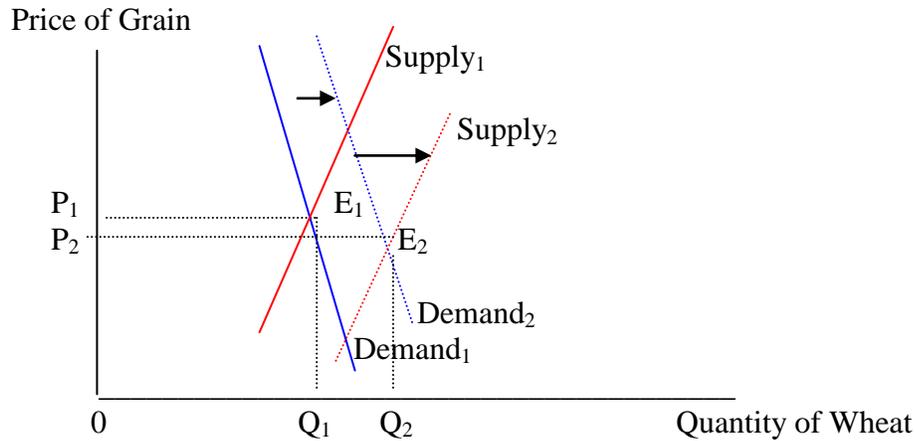
The market is sending the farmer a signal. It is telling him or her to leave farming and do something else. What is the farmer's sin? It is not that the farmer has been inefficient or has made bad business decisions. The problem is that the farmer is too good. Farmers produce more food than consumers want to buy at prices that will allow the farmer to make a profit. To many, this seems unfair. How this problem has been dealt with will be considered in the next chapter.

Practice Quiz for Chapter 7

1. The **incidence** of as sales tax will be more on the buyers of the product if
   a. the price elasticity of demand is low   c. the income elasticity of demand is low
   b. the price elasticity of demand is high   d. the cross elasticity of demand is high

2. The **incidence of a sales tax** is most likely on the
   a. buyers   b. sellers

3. An **"optimal tariff"** is a tax on imported goods which have a high
   a. price elasticity of demand   c. price elasticity of supply
   b. income elasticity of demand   d. cross elasticity of demand

4. If there is a **rent supplement** program:
   a. rents will rise   b. the quantity of apartments available will fall   c. landlords will be hurt

5. If there is a **building subsidy** program,
   a. rents will rise   b. the quantity of apartments available will rise   c. landlords will be hurt

6. In the case of agriculture, the **demand for grain products** is likely to be
   a. relatively elastic   b. relatively inelastic   c. perfectly elastic

7. In the case of agriculture, the **supply of grain products** is likely to be
   a. relatively elastic   b. relatively inelastic   c. perfectly elastic

8. In the case of agriculture,
    a. the demand has shifted to the right more than the supply has shifted to the right
    b. the demand has shifted to the right less than the supply has shifted to the right
    c. the demand has shifted to the left more than the supply has shifted to the left
    d. the demand has shifted to the left less than the supply has shifted to the left

9. Because of what happened in question 8, the **prices of grain products** have
    a. risen   b. fallen   c. stayed the same

10. The market is telling farmers to
    a. produce more   b. expand their farms   c. leave farming   d. wait for better days

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