



**Raise The Minimum Wage
For 7.3 Million Americans**

After studying this chapter,
you will be able to:

- ◆ Explain how rent ceilings create housing shortages and inefficiency
- ◆ Explain how minimum wage laws create unemployment and inefficiency
- ◆ Explain the effects of a tax
- ◆ Explain the effects of production quotas and subsidies on production, costs, and prices
- ◆ Explain how markets for illegal goods work

6

GOVERNMENT ACTIONS IN MARKETS

In New York City, where the average weekly wage rate is \$1,000, it costs \$3,500 a month to rent an average two-bedroom apartment. Can governments cap rents to help renters live in affordable housing? Or instead, can governments make housing more affordable by raising incomes with minimum wage laws?

Taxes put the hand of government in almost every pocket and market. You probably think that you pay more than your fair share of taxes. But who actually pays and who benefits when a tax is cut: buyers or sellers?

In markets for farm products, governments intervene with the opposite of a tax: a subsidy. Sometimes, governments limit the quantities that farms may produce. Do subsidies and production limits help to make markets efficient?

Some people break the law to evade price and wage regulations and taxes and trade in an “underground” economy. How do markets work in the underground economy? In *Reading Between the Lines* at the end of this chapter, we apply what you’ve learned to the market for low-skilled labor in California and see how governments must be careful to avoid underground markets.

◆ A Housing Market with a Rent Ceiling

We spend more of our income on housing than on any other good or service, so it isn't surprising that rents can be a political issue. When rents are high, or when they jump by a large amount, renters might lobby the government for limits on rents.

A government regulation that makes it illegal to charge a price higher than a specified level is called a **price ceiling** or **price cap**.

The effects of a price ceiling on a market depend crucially on whether the ceiling is imposed at a level that is above or below the equilibrium price.

A price ceiling set *above the equilibrium price* has no effect. The reason is that the price ceiling does not constrain the market forces. The force of the law and the market forces are not in conflict. But a price ceiling *below the equilibrium price* has powerful effects on a market. The reason is that the price ceiling attempts to prevent the price from regulating the quantities demanded and supplied. The force of the law and the market forces are in conflict.

When a price ceiling is applied to a housing market, it is called a **rent ceiling**. A rent ceiling set below the equilibrium rent creates

- A housing shortage
- Increased search activity
- A black market

A Housing Shortage

At the equilibrium price, the quantity demanded equals the quantity supplied. In a housing market, when the rent is at the equilibrium level, the quantity of housing supplied equals the quantity of housing demanded and there is neither a shortage nor a surplus of housing.

But at a rent set below the equilibrium rent, the quantity of housing demanded exceeds the quantity of housing supplied—there is a shortage. So if a rent ceiling is set below the equilibrium rent, there will be a shortage of housing.

When there is a shortage, the quantity available is the quantity supplied and somehow, this quantity must be allocated among the frustrated demanders. One way in which this allocation occurs is through increased search activity.

Increased Search Activity

The time spent looking for someone with whom to do business is called **search activity**. We spend some time in search activity almost every time we make a purchase. When you're shopping for the latest hot new cell phone, and you know four stores that stock it, how do you find which store has the best deal? You spend a few minutes on the Internet, checking out the various prices. In some markets, such as the housing market, people spend a lot of time checking the alternatives available before making a choice.

When a price is regulated and there is a shortage, search activity increases. In the case of a rent-controlled housing market, frustrated would-be renters scan the newspapers, not only for housing ads but also for death notices! Any information about newly available housing is useful, and apartment seekers race to be first on the scene when news of a possible supplier breaks.

The *opportunity cost* of a good is equal not only to its price but also to the value of the search time spent finding the good. So the opportunity cost of housing is equal to the rent (a regulated price) plus the time and other resources spent searching for the restricted quantity available. Search activity is costly. It uses time and other resources, such as phone calls, automobiles, and gasoline that could have been used in other productive ways.

A rent ceiling controls only the rent portion of the cost of housing. The cost of increased search activity might end up making the full cost of housing *higher* than it would be without a rent ceiling.

A Black Market

A rent ceiling also encourages illegal trading in a **black market**, an illegal market in which the equilibrium price exceeds the price ceiling. Black markets occur in rent-controlled housing and many other markets. For example, scalpers run black markets in tickets for big sporting events and rock concerts.

When a rent ceiling is in force, frustrated renters and landlords constantly seek ways of increasing rents. One common way is for a new tenant to pay a high price for worthless fittings, such as charging \$2,000 for threadbare drapes. Another is for the tenant to pay an exorbitant price for new locks and keys—called “key money.”

The level of a black market rent depends on how tightly the rent ceiling is enforced. With loose

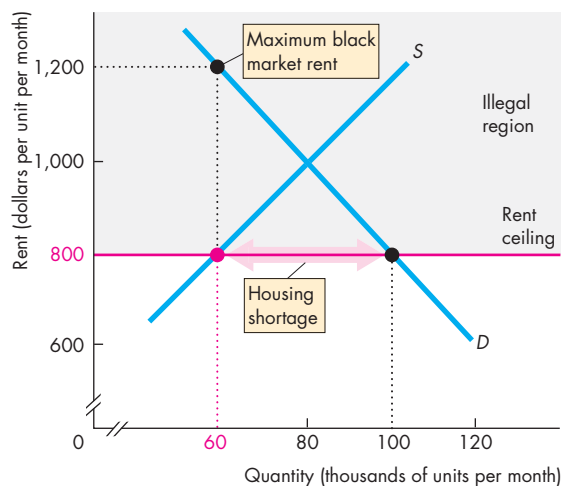
enforcement, the black market rent is close to the unregulated rent. But with strict enforcement, the black market rent is equal to the maximum price that a renter is willing to pay.

Figure 6.1 illustrates the effects of a rent ceiling. The demand curve for housing is D and the supply curve is S . A rent ceiling is imposed at \$800 a month. Rents that exceed \$800 a month are in the gray-shaded illegal region in the figure. You can see that the equilibrium rent, where the demand and supply curves intersect, is in the illegal region.

At a rent of \$800 a month, the quantity of housing supplied is 60,000 units and the quantity demanded is 100,000 units. So with a rent of \$800 a month, there is a shortage of 40,000 units of housing.

To rent the 60,000th unit, someone is willing to pay \$1,200 a month. They might pay this amount by incurring search costs that bring the total cost of housing to \$1,200 a month, or they might pay a black market price of \$1,200 a month. Either way, they end up incurring a cost that exceeds what the equilibrium rent would be in an unregulated market.

FIGURE 6.1 A Rent Ceiling



A rent above the rent ceiling of \$800 a month is illegal (in the gray-shaded illegal region). At a rent of \$800 a month, the quantity of housing supplied is 60,000 units. Frustrated renters spend time searching for housing and they make deals with landlords in a black market. Someone is willing to pay \$1,200 a month for the 60,000th unit.

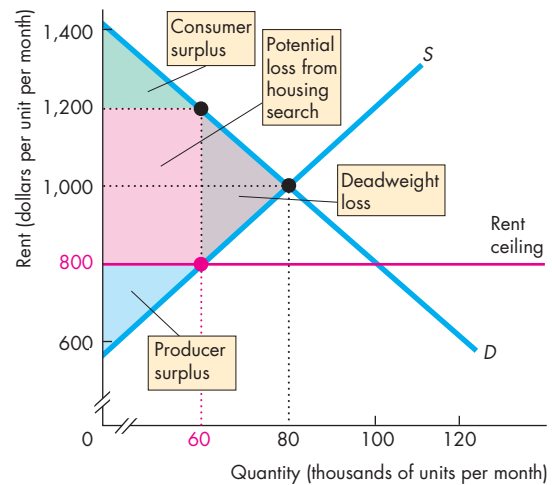
Inefficiency of a Rent Ceiling

A rent ceiling set below the equilibrium rent results in an inefficient underproduction of housing services. The *marginal social benefit* of housing exceeds its *marginal social cost* and a deadweight loss shrinks the producer surplus and consumer surplus (Chapter 5, pp. 112–114).

Figure 6.2 shows this inefficiency. The rent ceiling (\$800 per month) is below the equilibrium rent (\$1,000 per month) and the quantity of housing supplied (60,000 units) is less than the efficient quantity (80,000 units).

Because the quantity of housing supplied (the quantity available) is less than the efficient quantity, there is a deadweight loss, shown by the gray triangle. Producer surplus shrinks to the blue triangle and consumer surplus shrinks to the green triangle. The red rectangle represents the potential loss from increased search activity. This loss is borne by consumers and the full loss from the rent ceiling is the sum of the deadweight loss and the increased cost of search.

FIGURE 6.2 The Inefficiency of a Rent Ceiling



Without a rent ceiling, the market produces an efficient 80,000 units of housing at a rent of \$1,000 a month. A rent ceiling of \$800 a month decreases the quantity of housing supplied to 60,000 units. Producer surplus and consumer surplus shrink and a deadweight loss arises. The red rectangle represents the cost of resources used in increased search activity. The full loss from the rent ceiling equals the sum of the red rectangle and gray triangle.

Are Rent Ceilings Fair?

Rent ceilings might be inefficient, but don't they achieve a fairer allocation of scarce housing? Let's explore this question.

Chapter 5 (pp. 116–118) reviews two key ideas about fairness. According to the *fair rules* view, anything that blocks voluntary exchange is unfair, so rent ceilings are unfair. But according to the *fair result* view, a fair outcome is one that benefits the less well off. So according to this view, the fairest outcome is the one that allocates scarce housing to the poorest. To see whether rent ceilings help to achieve a fairer outcome in this sense, we need to consider how the market allocates scarce housing resources in the face of a rent ceiling.

Blocking rent adjustments doesn't eliminate scarcity. Rather, because it decreases the quantity of housing available, it creates an even bigger challenge for the housing market. Somehow, the market must ration a smaller quantity of housing and allocate that housing among the people who demand it.

When the rent is not permitted to allocate scarce housing, what other mechanisms are available, and are *they* fair? Some possible mechanisms are

- A lottery
- First-come, first-served
- Discrimination

A lottery allocates housing to those who are lucky, not to those who are poor. First-come, first-served (a method used to allocate housing in England after World War II) allocates housing to those who have the greatest foresight and who get their names on a list first, not to the poorest. Discrimination allocates scarce housing based on the views and self-interest of the owner of the housing. In the case of public housing, what counts is the self-interest of the bureaucracy that administers the allocation.

In principle, self-interested owners and bureaucrats could allocate housing to satisfy some criterion of fairness, but they are not likely to do so. Discrimination based on friendship, family ties, and criteria such as race, ethnicity, or sex is more likely to enter the equation. We might make such discrimination illegal, but we cannot prevent it from occurring.

It is hard, then, to make a case for rent ceilings on the basis of fairness. When rent adjustments are blocked, other methods of allocating scarce housing resources operate that do not produce a fair outcome.

Economics in Action

Rent Control Winners: The Rich and Famous

New York, San Francisco, London, and Paris, four of the world's great cities, have rent ceilings in some part of their housing markets. Boston had rent ceilings for many years but abolished them in 1997. Many other U.S. cities do not have, and have never had, rent ceilings. Among them are Atlanta, Baltimore, Chicago, Dallas, Philadelphia, Phoenix, and Seattle.

To see the effects of rent ceilings in practice we can compare the housing markets in cities with ceilings with those without ceilings. We learn two main lessons from such a comparison.

First, rent ceilings definitely create a housing shortage. Second, they do lower the rents for some but raise them for others.

A survey* conducted in 1997 showed that the rents of housing units *actually available for rent* were 2.5 times the average of all rents in New York, but equal to the average rent in Philadelphia. The winners from rent ceilings are the families that have lived in a city for a long time. In New York, these families include some rich and famous ones. The voting power of the winners keeps the rent ceilings in place. Mobile newcomers are the losers in a city with rent ceilings.

The bottom line is that in principle and in practice, rent ceilings are inefficient and unfair.

* William Tucker, "How Rent Control Drives Out Affordable Housing," Cato Policy Analysis No. 274, May 21, 1997, Cato Institute.

REVIEW QUIZ

- 1 What is a rent ceiling and what are its effects if it is set above the equilibrium rent?
- 2 What are the effects of a rent ceiling that is set below the equilibrium rent?
- 3 How are scarce housing resources allocated when a rent ceiling is in place?
- 4 Why does a rent ceiling create an inefficient and unfair outcome in the housing market?

You can work these questions in Study Plan 6.1 and get instant feedback.



You now know how a price ceiling (rent ceiling) works. Next, we'll learn about the effects of a price floor by studying a minimum wage in a labor market.

A Labor Market with a Minimum Wage

For each one of us, the labor market is the market that influences the jobs we get and the wages we earn. Firms decide how much labor to demand, and the lower the wage rate, the greater is the quantity of labor demanded. Households decide how much labor to supply, and the higher the wage rate, the greater is the quantity of labor supplied. The wage rate adjusts to make the quantity of labor demanded equal to the quantity supplied.

When wage rates are low, or when they fail to keep up with rising prices, labor unions might turn to governments and lobby for a higher wage rate.

A government imposed regulation that makes it illegal to charge a price lower than a specified level is called a **price floor**.

The effects of a price floor on a market depend crucially on whether the floor is imposed at a level that is above or below the equilibrium price.

A price floor set *below the equilibrium price* has no effect. The reason is that the price floor does not constrain the market forces. The force of the law and the market forces are not in conflict. But a price floor *above the equilibrium price* has powerful effects on a market. The reason is that the price floor attempts to prevent the price from regulating the quantities demanded and supplied. The force of the law and the market forces are in conflict.

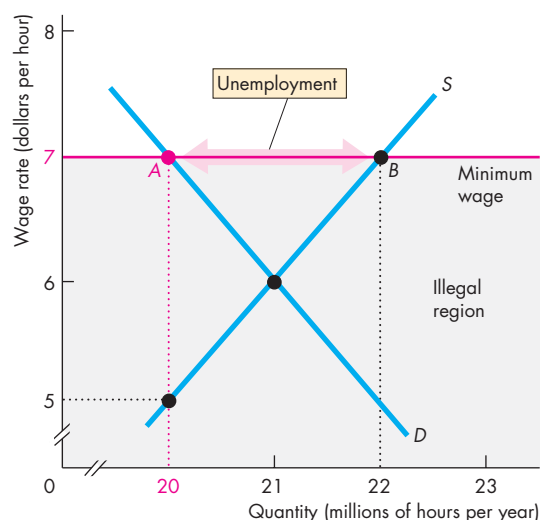
When a price floor is applied to a labor market, it is called a **minimum wage**. A minimum wage imposed at a level that is above the equilibrium wage creates unemployment. Let's look at the effects of a minimum wage.

Minimum Wage Brings Unemployment

At the equilibrium price, the quantity demanded equals the quantity supplied. In a labor market, when the wage rate is at the equilibrium level, the quantity of labor supplied equals the quantity of labor demanded: There is neither a shortage of labor nor a surplus of labor.

But at a wage rate above the equilibrium wage, the quantity of labor supplied exceeds the quantity of labor demanded—there is a surplus of labor. So when a minimum wage is set above the equilibrium wage, there is a surplus of labor. The demand for labor determines the level of employment, and the surplus of labor is unemployed.

FIGURE 6.3 Minimum Wage and Unemployment



The minimum wage rate is set at \$7 an hour. Any wage rate below \$7 an hour is illegal (in the gray-shaded illegal region). At the minimum wage of \$7 an hour, 20 million hours are hired but 22 million hours are available. Unemployment— AB —of 2 million hours a year is created. With only 20 million hours demanded, someone is willing to supply the 20 millionth hour for \$5.

 animation

Figure 6.3 illustrates the effect of the minimum wage on unemployment. The demand for labor curve is D and the supply of labor curve is S . The horizontal red line shows the minimum wage set at \$7 an hour. A wage rate below this level is illegal, in the gray-shaded illegal region of the figure. At the minimum wage rate, 20 million hours of labor are demanded (point A) and 22 million hours of labor are supplied (point B), so 2 million hours of available labor are unemployed.

With only 20 million hours demanded, someone is willing to supply that 20 millionth hour for \$5. Frustrated unemployed workers spend time and other resources searching for hard-to-find jobs.

Inefficiency of a Minimum Wage

In the labor market, the supply curve measures the marginal social cost of labor to workers. This cost is leisure forgone. The demand curve measures the marginal social benefit from labor. This benefit is the

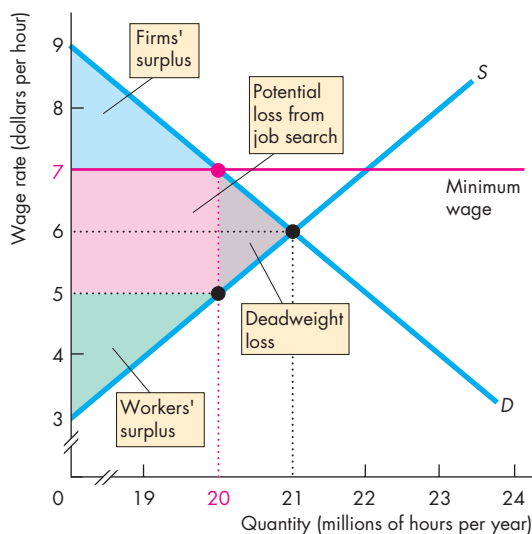
value of the goods and services produced. An unregulated labor market allocates the economy's scarce labor resources to the jobs in which they are valued most highly. The market is efficient.

The minimum wage frustrates the market mechanism and results in unemployment and increased job search. At the quantity of labor employed, the marginal social benefit of labor exceeds its marginal social cost and a deadweight loss shrinks the firms' surplus and the workers' surplus.

Figure 6.4 shows this inefficiency. The minimum wage (\$7 an hour) is above the equilibrium wage (\$6 an hour) and the quantity of labor demanded and employed (20 million hours) is less than the efficient quantity (21 million hours).

Because the quantity of labor employed is less than the efficient quantity, there is a deadweight loss, shown by the gray triangle. The firms' surplus shrinks to the blue triangle and the workers' surplus shrinks to the green triangle. The red rectangle shows the potential loss from increased job search, which is borne by workers. The full loss from the minimum wage is the sum of the deadweight loss and the increased cost of job search.

FIGURE 6.4 The Inefficiency of a Minimum Wage



A minimum wage decreases employment. Firms' surplus (blue area) and workers' surplus (green area) shrink and a deadweight loss (gray area) arises. Job search increases and the red area shows the loss from this activity.

Economics in Action

Unscrambling Cause and Effect of the Minimum Wage

In the United States, the federal government's Fair Labor Standards Act sets the minimum wage, which has fluctuated between 35 percent and 50 percent of the average wage, and in 2010 was \$7.25 an hour. Most states have minimum wages that exceed the federal minimum.

Does the minimum wage result in unemployment, and if so, how much unemployment does it create? The consensus answer is that a 10 percent rise in the minimum wage decreases teenage employment by between 1 and 3 percent.

This consensus answer has been challenged by David Card of the University of California at Berkeley (see pp. 484–486) and Alan Krueger of Princeton University.

Card and Krueger say that increases in the minimum wage have *increased* teenage employment and *decreased* unemployment.

From their study of minimum wages in California, New Jersey, and Texas, Card and Krueger say that the employment rate of low-income workers increased following an increase in the minimum wage. They argue that a higher wage *increases* employment by making workers become more conscientious and productive

Is the Minimum Wage Fair?

The minimum wage is unfair on both views of fairness: It delivers an unfair *result* and imposes an unfair *rule*.

The *result* is unfair because only those people who have jobs and keep them benefit from the minimum wage. The unemployed end up worse off than they would be with no minimum wage. Some of those who search for jobs and find them end up worse off because of the increased cost of job search they incur. Also those who find jobs aren't always the least well off. When the wage rate doesn't allocate labor, other mechanisms determine who finds a job. One such mechanism is discrimination, which is yet another source of unfairness.

The minimum wage imposes an unfair *rule* because it blocks voluntary exchange. Firms are willing to hire more labor and people are willing to work more, but they are not permitted by the minimum wage law to do so.

and less likely to quit, which lowers unproductive labor turnover. They also argue that a higher wage rate makes managers seek ways to increase labor productivity.

Most economists are skeptical about Card and Krueger's argument. Why, economists ask, don't firms freely pay wage rates above the equilibrium wage to encourage more productive work habits? Also, they point to other explanations for the employment responses that Card and Krueger found.

According to Daniel Hamermesh of the University of Texas at Austin, Card and Krueger got the timing wrong. Hamermesh says that firms cut employment *before* the minimum wage is increased in anticipation of the increase. If he is correct, looking for the effects of an increase *after* it has occurred misses its main effects.

Finis Welch of Texas A&M University and Kevin Murphy of the University of Chicago say the employment effects that Card and Krueger found are caused by regional differences in economic growth, not by changes in the minimum wage.

One effect of the minimum wage is an increase in the quantity of labor supplied. If this effect occurs, it might show up as an increase in the number of people who quit school to look for work before completing high school. Some economists say that this response does occur.

REVIEW QUIZ

- 1 What is a minimum wage and what are its effects if it is set above the equilibrium wage?
- 2 What are the effects of a minimum wage set below the equilibrium wage?
- 3 Explain how scarce jobs are allocated when a minimum wage is in place.
- 4 Explain why a minimum wage creates an inefficient allocation of labor resources.
- 5 Explain why a minimum wage is unfair.

You can work these questions in Study Plan 6.2 and get instant feedback.



Next we're going to study a more widespread government action in markets: taxes. We'll see how taxes change prices and quantities. You will discover the surprising fact that while the government can impose a tax, it can't decide who will pay the tax! You will also see that a tax creates a deadweight loss.

Taxes

Everything you earn and almost everything you buy is taxed. Income taxes and Social Security taxes are deducted from your earnings and sales taxes are added to the bill when you buy something.

Employers also pay a Social Security tax for their workers, and producers of tobacco products, alcoholic drinks, and gasoline pay a tax every time they sell something.

Who *really* pays these taxes? Because the income tax and Social Security tax are deducted from your pay, and the sales tax is added to the prices that you pay, isn't it obvious that *you* pay these taxes? And isn't it equally obvious that your employer pays the employer's contribution to the Social Security tax and that tobacco producers pay the tax on cigarettes?

You're going to discover that it isn't obvious who *really* pays a tax and that lawmakers don't make that decision. We begin with a definition of tax incidence.

Tax Incidence

Tax incidence is the division of the burden of a tax between buyers and sellers. When the government imposes a tax on the sale of a good*, the price paid by buyers might rise by the full amount of the tax, by a lesser amount, or not at all. If the price paid by buyers rises by the full amount of the tax, then the burden of the tax falls entirely on buyers—the buyers pay the tax. If the price paid by buyers rises by a lesser amount than the tax, then the burden of the tax falls partly on buyers and partly on sellers. And if the price paid by buyers doesn't change at all, then the burden of the tax falls entirely on sellers.

Tax incidence does not depend on the tax law. The law might impose a tax on sellers or on buyers, but the outcome is the same in either case. To see why, let's look at the tax on cigarettes in New York City.

A Tax on Sellers

On July 1, 2002, Mayor Bloomberg put a tax of \$1.50 a pack on cigarettes sold in New York City. To work out the effects of this tax on the sellers of cigarettes, we begin by examining the effects on demand and supply in the market for cigarettes.

* These propositions also apply to services and factors of production (land, labor, capital).

In Fig. 6.5, the demand curve is D , and the supply curve is S . With no tax, the equilibrium price is \$3 per pack and 350 million packs a year are bought and sold.

A tax on sellers is like an increase in cost, so it decreases supply. To determine the position of the new supply curve, we add the tax to the minimum price that sellers are willing to accept for each quantity sold. You can see that without the tax, sellers are willing to offer 350 million packs a year for \$3 a pack. So with a \$1.50 tax, they will offer 350 million packs a year only if the price is \$4.50 a pack. The supply curve shifts to the red curve labeled $S + \text{tax on sellers}$.

Equilibrium occurs where the new supply curve intersects the demand curve at 325 million packs a year. The price paid by buyers rises by \$1 to \$4 a pack. And the price received by sellers falls by 50¢ to \$2.50 a pack. So buyers pay \$1 of the tax and sellers pay the other 50¢.

A Tax on Buyers

Suppose that instead of taxing sellers, New York City taxes cigarette buyers \$1.50 a pack.

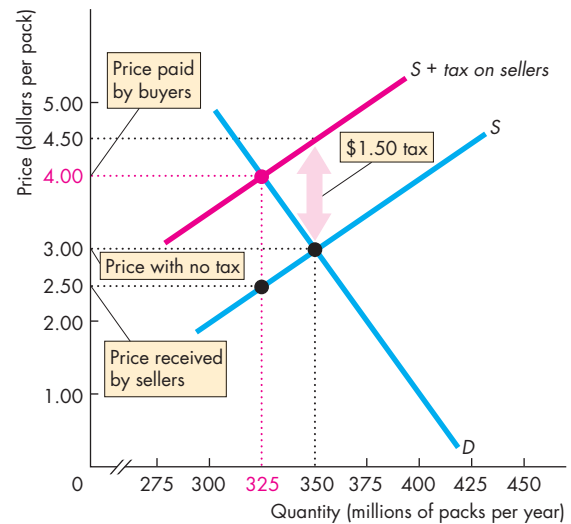
A tax on buyers lowers the amount they are willing to pay sellers, so it decreases demand and shifts the demand curve leftward. To determine the position of this new demand curve, we subtract the tax from the maximum price that buyers are willing to pay for each quantity bought. You can see, in Fig. 6.6, that without the tax, buyers are willing to buy 350 million packs a year for \$3 a pack. So with a \$1.50 tax, they are willing to buy 350 million packs a year only if the price including the tax is \$3 a pack, which means that they're willing to pay sellers only \$1.50 a pack. The demand curve shifts to become the red curve labeled $D - \text{tax on buyers}$.

Equilibrium occurs where the new demand curve intersects the supply curve at a quantity of 325 million packs a year. The price received by sellers is \$2.50 a pack, and the price paid by buyers is \$4.

Equivalence of Tax on Buyers and Sellers

You can see that the tax on buyers in Fig. 6.6 has the same effects as the tax on sellers in Fig. 6.5. In both cases, the equilibrium quantity decreases to 325 million packs a year, the price paid by buyers rises to \$4 a pack, and the price received by sellers falls to \$2.50 a pack. Buyers pay \$1 of the \$1.50 tax, and sellers pay the other 50¢ of the tax.

FIGURE 6.5 A Tax on Sellers



With no tax, 350 million packs a year are bought and sold at \$3 a pack. A tax on sellers of \$1.50 a pack shifts the supply curve from S to $S + \text{tax on sellers}$. The equilibrium quantity decreases to 325 million packs a year, the price paid by buyers rises to \$4 a pack, and the price received by sellers falls to \$2.50 a pack. The tax raises the price paid by buyers by less than the tax and lowers the price received by sellers, so buyers and sellers share the burden of the tax.

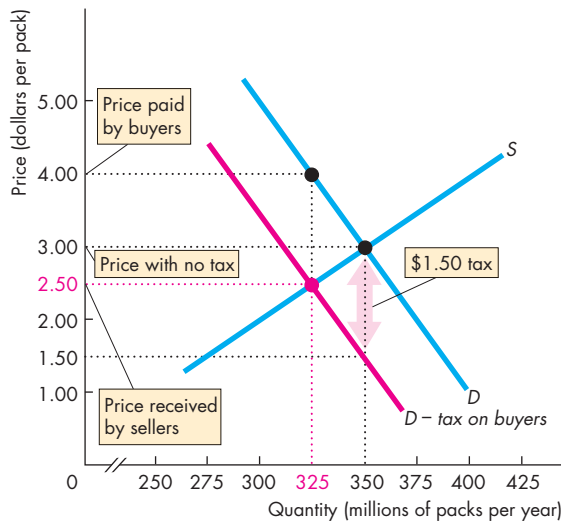
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Can We Share the Burden Equally? Suppose that Mayor Bloomberg wants the burden of the cigarette tax to fall equally on buyers and sellers and declares that a 75¢ tax be imposed on each. Is the burden of the tax then shared equally?

You can see that it is not. The tax is still \$1.50 a pack. You've seen that the tax has the same effect regardless of whether it is imposed on sellers or buyers. So imposing half the tax on sellers and half on buyers is like an average of the two cases you've just examined. (Draw the demand-supply graph and work out what happens in this case. The demand curve shifts downward by 75¢ and the supply curve shifts upward by 75¢. The new equilibrium quantity is still 325 million packs a year. Buyers pay \$4 a pack, of which 75¢ is tax. Sellers receive \$3.25 from buyers, but pay a 75¢ tax, so sellers net \$2.50 a pack.)

When a transaction is taxed, there are two prices: the price paid by buyers, which includes the tax; and the price received by sellers, which excludes the tax.

FIGURE 6.6 A Tax on Buyers



With no tax, 350 million packs a year are bought and sold at \$3 a pack. A tax on buyers of \$1.50 a pack shifts the demand curve from D to $D - \text{tax on buyers}$. The equilibrium quantity decreases to 325 million packs a year, the price paid by buyers rises to \$4 a pack, and the price received by sellers falls to \$2.50 a pack. The tax raises the price paid by buyers by less than the tax and lowers the price received by sellers, so buyers and sellers share the burden of the tax.



Buyers respond to the price that *includes* the tax and sellers respond to the price that *excludes* the tax.

A tax is like a wedge between the price buyers pay and the price sellers receive. The size of the wedge determines the effects of the tax, not the side of the market on which the government imposes the tax.

The Social Security Tax The Social Security tax is an example of a tax that Congress imposes equally on both buyers and sellers. But the principles you’ve just learned apply to this tax too. The market for labor, not Congress, decides how the burden of the Social Security tax is divided between firms and workers.

In the New York City cigarette tax example, buyers bear twice the burden of the tax borne by sellers. In special cases, either buyers or sellers bear the entire burden. The division of the burden of a tax between buyers and sellers depends on the elasticities of demand and supply, as you will now see.

Tax Incidence and Elasticity of Demand

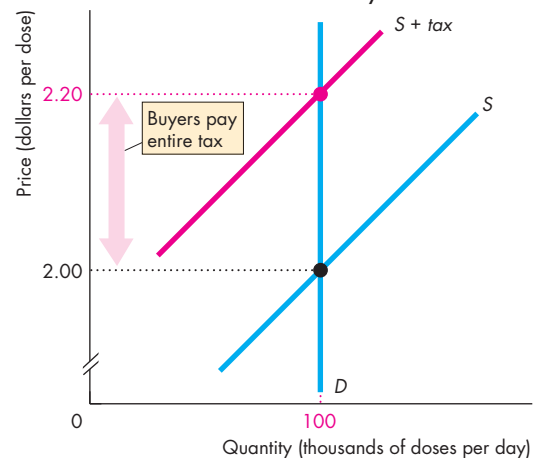
The division of the tax between buyers and sellers depends in part on the elasticity of demand. There are two extreme cases:

- Perfectly inelastic demand—buyers pay.
- Perfectly elastic demand—sellers pay.

Perfectly Inelastic Demand Figure 6.7 shows the market for insulin, a vital daily medication for those with diabetes. Demand is perfectly inelastic at 100,000 doses a day, regardless of the price, as shown by the vertical demand curve D . That is, a diabetic would sacrifice all other goods and services rather than not consume the insulin dose that provides good health. The supply curve of insulin is S . With no tax, the price is \$2 a dose and the quantity is 100,000 doses a day.

If insulin is taxed at 20¢ a dose, we must add the tax to the minimum price at which drug companies are willing to sell insulin. The result is the new supply curve $S + \text{tax}$. The price rises to \$2.20 a dose, but the quantity does not change. Buyers pay the entire tax of 20¢ a dose.

FIGURE 6.7 Tax with Perfectly Inelastic Demand



In this market for insulin, demand is perfectly inelastic. With no tax, the price is \$2 a dose and the quantity is 100,000 doses a day. A tax of 20¢ a dose shifts the supply curve to $S + \text{tax}$. The price rises to \$2.20 a dose, but the quantity bought does not change. Buyers pay the entire tax.

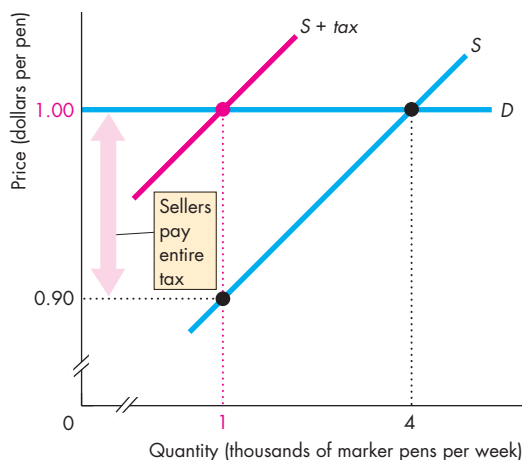


Perfectly Elastic Demand Figure 6.8 shows the market for pink marker pens. Demand is perfectly elastic at \$1 a pen, as shown by the horizontal demand curve D . If pink pens are less expensive than the other colors, everyone uses pink. If pink pens are more expensive than other colors, no one uses pink. The supply curve is S . With no tax, the price of a pink pen is \$1 and the quantity is 4,000 pens a week.

Suppose that the government imposes a tax of 10¢ a pen on pink marker pens but not on other colors. The new supply curve is $S + tax$. The price remains at \$1 a pen, and the quantity decreases to 1,000 pink pens a week. The 10¢ tax leaves the price paid by buyers unchanged but lowers the amount received by sellers by the full amount of the tax. Sellers pay the entire tax of 10¢ a pink pen.

We've seen that when demand is perfectly inelastic, buyers pay the entire tax and when demand is perfectly elastic, sellers pay the entire tax. In the usual case, demand is neither perfectly inelastic nor perfectly elastic and the tax is split between buyers and sellers. But the division depends on the elasticity of demand: The more inelastic the demand, the larger is the amount of the tax paid by buyers.

FIGURE 6.8 Tax with Perfectly Elastic Demand



In this market for pink pens, demand is perfectly elastic. With no tax, the price of a pen is \$1 and the quantity is 4,000 pens a week. A tax of 10¢ a pink pen shifts the supply curve to $S + tax$. The price remains at \$1 a pen, and the quantity of pink pens sold decreases to 1,000 a week. Sellers pay the entire tax.

Tax Incidence and Elasticity of Supply

The division of the tax between buyers and sellers also depends, in part, on the elasticity of supply. Again, there are two extreme cases:

- Perfectly inelastic supply—sellers pay.
- Perfectly elastic supply—buyers pay.

Perfectly Inelastic Supply Figure 6.9(a) shows the market for water from a mineral spring that flows at a constant rate that can't be controlled. Supply is perfectly inelastic at 100,000 bottles a week, as shown by the supply curve S . The demand curve for the water from this spring is D . With no tax, the price is 50¢ a bottle and the quantity is 100,000 bottles.

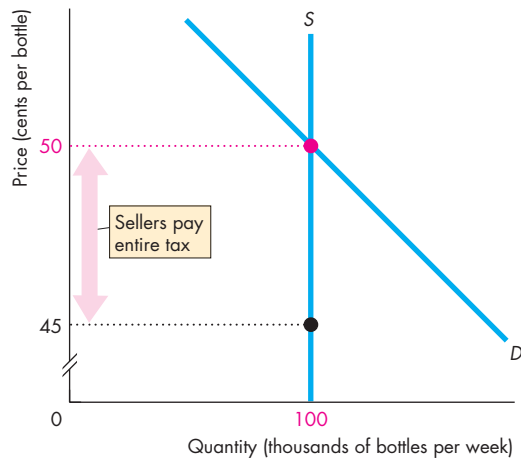
Suppose this spring water is taxed at 5¢ a bottle. The supply curve does not change because the spring owners still produce 100,000 bottles a week, even though the price they receive falls. But buyers are willing to buy the 100,000 bottles only if the price is 50¢ a bottle, so the price remains at 50¢ a bottle. The tax reduces the price received by sellers to 45¢ a bottle, and sellers pay the entire tax.

Perfectly Elastic Supply Figure 6.9(b) shows the market for sand from which computer-chip makers extract silicon. Supply of this sand is perfectly elastic at a price of 10¢ a pound, as shown by the supply curve S . The demand curve for sand is D . With no tax, the price is 10¢ a pound and 5,000 pounds a week are bought.

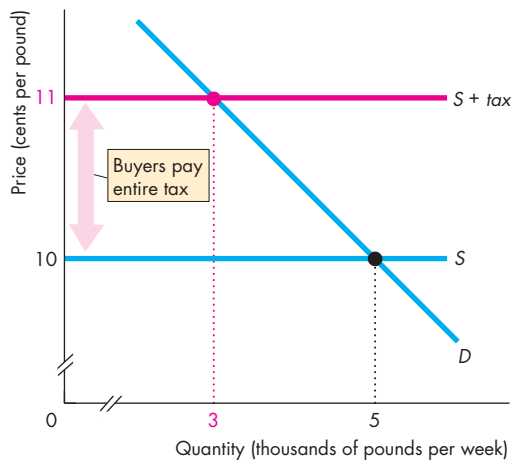
If this sand is taxed at 1¢ a pound, we must add the tax to the minimum supply-price. Sellers are now willing to offer any quantity at 11¢ a pound along the curve $S + tax$. A new equilibrium is determined where the new supply curve intersects the demand curve: at a price of 11¢ a pound and a quantity of 3,000 pounds a week. The tax has increased the price buyers pay by the full amount of the tax—1¢ a pound—and has decreased the quantity sold. Buyers pay the entire tax.

We've seen that when supply is perfectly inelastic, sellers pay the entire tax, and when supply is perfectly elastic, buyers pay the entire tax. In the usual case, supply is neither perfectly inelastic nor perfectly elastic and the tax is split between buyers and sellers. But how the tax is split depends on the elasticity of supply: The more elastic the supply, the larger is the amount of the tax paid by buyers.

FIGURE 6.9 Tax and the Elasticity of Supply



(a) Perfectly inelastic supply



(b) Perfectly elastic supply

Part (a) shows the market for water from a mineral spring. Supply is perfectly inelastic. With no tax, the price is 50¢ a bottle. With a tax of 5¢ a bottle, the price remains at 50¢ a bottle. The number of bottles bought remains the same, but the price received by sellers decreases to 45¢ a bottle. Sellers pay the entire tax.

Part (b) shows the market for sand. Supply is perfectly elastic. With no tax, the price is 10¢ a pound. A tax of 1¢ a pound increases the minimum supply-price to 11¢ a pound. The supply curve shifts to $S + tax$. The price increases to 11¢ a pound. Buyers pay the entire tax.



Taxes and Efficiency

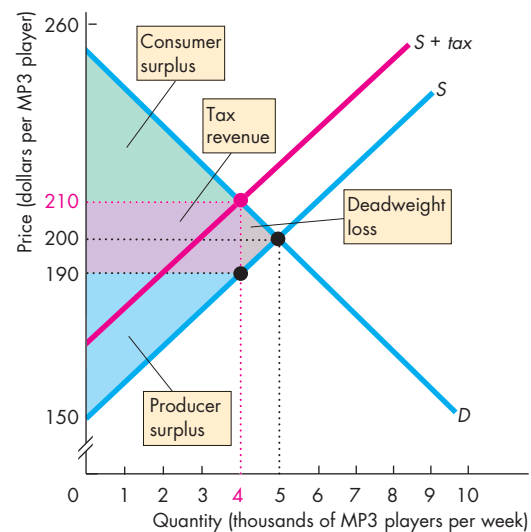
A tax drives a wedge between the buying price and the selling price and results in inefficient underproduction. The price buyers pay is also the buyers' willingness to pay, which measures *marginal social benefit*. The price sellers receive is also the sellers' minimum supply-price, which equals *marginal social cost*.

A tax makes marginal social benefit exceed marginal social cost, shrinks the producer surplus and consumer surplus, and creates a deadweight loss.

Figure 6.10 shows the inefficiency of a tax on MP3 players. The demand curve, D , shows marginal social benefit, and the supply curve, S , shows marginal social cost. Without a tax, the market produces the efficient quantity (5,000 players a week).

With a tax, the sellers' minimum supply-price rises by the amount of the tax and the supply curve shifts to $S + tax$. This supply curve does *not* show marginal social cost. The tax component isn't a *social* cost of

FIGURE 6.10 Taxes and Efficiency



With no tax, 5,000 players a week are produced. With a \$20 tax, the buyers' price rises to \$210, the sellers' price falls to \$190, and the quantity decreases to 4,000 players a week. Consumer surplus shrinks to the green area, and the producer surplus shrinks to the blue area. Part of the loss of consumer surplus and producer surplus goes to the government as tax revenue (the purple area) and part becomes a deadweight loss (the gray area).



production. It is a transfer of resources to the government. At the new equilibrium quantity (4,000 players a week), both consumer surplus and producer surplus shrink. Part of each surplus goes to the government in tax revenue—the purple area; part becomes a deadweight loss—the gray area.

Only in the extreme cases of perfectly inelastic demand and perfectly inelastic supply does a tax not change the quantity bought and sold so that no deadweight loss arises.

Taxes and Fairness

We've examined the incidence and the efficiency of taxes. But when political leaders debate tax issues, it is fairness, not incidence and efficiency, that gets the most attention. Democrats complain that Republican tax cuts are unfair because they give the benefits of lower taxes to the rich. Republicans counter that it is fair that the rich get most of the tax cuts because they pay most of the taxes. No easy answers are available to the questions about the fairness of taxes.

Economists have proposed two conflicting principles of fairness to apply to a tax system:

- The benefits principle
- The ability-to-pay principle

The Benefits Principle The *benefits principle* is the proposition that people should pay taxes equal to the benefits they receive from the services provided by government. This arrangement is fair because it means that those who benefit most pay the most taxes. It makes tax payments and the consumption of government-provided services similar to private consumption expenditures.

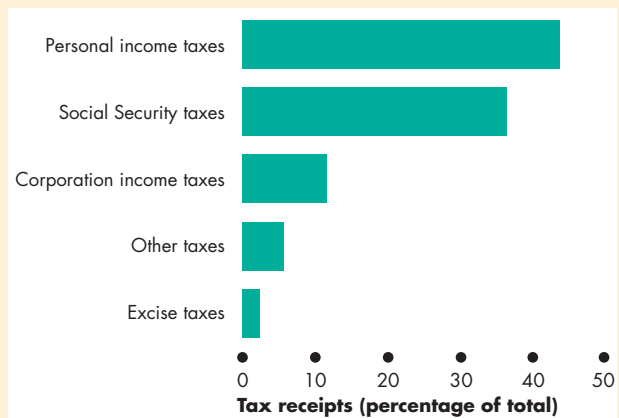
The benefits principle can justify high fuel taxes to pay for freeways, high taxes on alcoholic beverages and tobacco products to pay for public health-care services, and high rates of income tax on high incomes to pay for the benefits from law and order and from living in a secure environment, from which the rich might benefit more than the poor.

The Ability-to-Pay Principle The *ability-to-pay principle* is the proposition that people should pay taxes according to how easily they can bear the burden of the tax. A rich person can more easily bear the burden than a poor person can, so the ability-to-pay principle can reinforce the benefits principle to justify high rates of income tax on high incomes.

Economics in Action

Workers and Consumers Pay the Most Tax

Because the elasticity of the supply of labor is low and the elasticity of demand for labor is high, workers pay most of the personal income taxes and most of the Social Security taxes. Because the elasticities of demand for alcohol, tobacco, and gasoline are low and the elasticities of supply are high, the burden of these taxes (excise taxes) falls more heavily on buyers than on sellers.



U.S. Taxes

Source of data: Budget of the United States Government, Fiscal Year 2011, Historical Tables, Table 2.2.

REVIEW QUIZ

- 1 How does the elasticity of demand influence the incidence of a tax, the tax revenue, and the deadweight loss?
- 2 How does the elasticity of supply influence the incidence of a tax, the quantity bought, the tax revenue, and the deadweight loss?
- 3 Why is a tax inefficient?
- 4 When would a tax be efficient?
- 5 What are the two principles of fairness that are applied to tax systems?

You can work these questions in Study Plan 6.3 and get instant feedback.



Your next task is to study production quotas and subsidies, tools that are used to influence the markets for farm products.

Production Quotas and Subsidies

An early or late frost, a hot dry summer, and a wet spring present just a few of the challenges that fill the lives of farmers with uncertainty and sometimes with economic hardship. Fluctuations in the weather bring fluctuations in farm output and prices and sometimes leave farmers with low incomes. To help farmers avoid low prices and low incomes, governments intervene in the markets for farm products.

Price floors that work a bit like the minimum wage that you've already studied might be used. But as you've seen, this type of government action creates a surplus and is inefficient. These same conclusions apply to the effects of a price floor for farm products.

Governments often use two other methods of intervention in the markets for farm products:

- Production quotas
- Subsidies

Production Quotas

In the markets for sugarbeets, tobacco leaf, and cotton (among others), governments have, from time to time, imposed production quotas. A **production quota** is an upper limit to the quantity of a good that may be produced in a specified period. To discover the effects of a production quota, let's look at what a quota does to the market for sugarbeets.

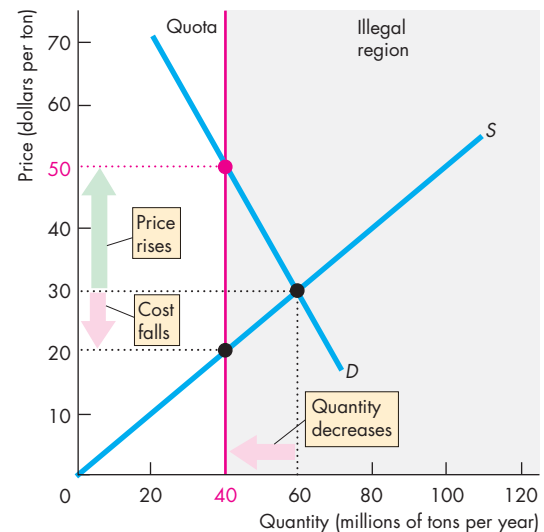
Suppose that the growers of sugarbeets want to limit total production to get a higher price. They persuade the government to introduce a production quota on sugarbeets.

The effect of the production quota depends on whether it is set below or above the equilibrium quantity. If the government introduced a production quota above the equilibrium quantity, nothing would change because sugarbeet growers would already be producing less than the quota. But a production quota set *below the equilibrium quantity* has big effects, which are

- A decrease in supply
- A rise in price
- A decrease in marginal cost
- Inefficient underproduction
- An incentive to cheat and overproduce

Figure 6.11 illustrates these effects.

FIGURE 6.11 The Effects of a Production Quota



With no quota, growers produce 60 million tons a year and the price is \$30 a ton. A production quota of 40 million tons a year restricts total production to that amount. The quantity produced decreases to 40 million tons a year, the price rises to \$50 a ton, and the farmers' marginal cost falls to \$20 a ton. Because marginal social cost (on the supply curve) is less than marginal social benefit (on the demand curve), a deadweight loss arises from the underproduction.

 animation

A Decrease in Supply A production quota on sugarbeets decreases the supply of sugarbeets. Each grower is assigned a production limit that is less than the amount that would be produced—and supplied—without the quota. The total of the growers' limits equals the quota, and any production in excess of the quota is illegal.

The quantity supplied becomes the amount permitted by the production quota, and this quantity is fixed. The supply of sugarbeets becomes perfectly inelastic at the quantity permitted under the quota.

In Fig. 6.11, with no quota, growers would produce 60 million tons of sugarbeets a year—the market equilibrium quantity. With a production quota set at 40 million tons a year, the gray-shaded area shows the illegal region. As in the case of price ceilings and price floors, market forces and political forces are in conflict in this illegal region.

The vertical line labeled “Quota” becomes the supply curve of sugarbeets at prices above \$20 a ton.

A Rise in Price The production quota raises the price of sugarbeets. When the government sets a production quota, it leaves market forces free to determine the price. Because the quota decreases the supply of sugarbeets, it raises the price. In Fig. 6.11, with no quota, the price is \$30 a ton. With a quota of 40 million tons, the price rises to \$50 a ton.

A Decrease in Marginal Cost The production quota lowers the marginal cost of growing sugarbeets. Marginal cost decreases because growers produce less and stop using the resources with the highest marginal cost. Sugarbeet growers slide down their supply (and marginal cost) curves. In Fig. 6.11, marginal cost decreases to \$20 a ton.

Inefficiency The production quota results in inefficient underproduction. Marginal social benefit at the quantity produced is equal to the market price, which has increased. Marginal social cost at the quantity produced has decreased and is less than the market price. So marginal social benefit exceeds marginal social cost and a deadweight loss arises.

An Incentive to Cheat and Overproduce The production quota creates an incentive for growers to cheat and produce more than their individual production limit. With the quota, the price exceeds marginal cost, so the grower can get a larger profit by producing one more unit. Of course, if all growers produce more than their assigned limit, the production quota becomes ineffective, and the price falls to the equilibrium (no quota) price.

To make the production quota effective, growers must set up a monitoring system to ensure that no one cheats and overproduces. But it is costly to set up and operate a monitoring system and it is difficult to detect and punish producers who violate their quotas.

Because of the difficulty of operating a quota, producers often lobby governments to establish a quota and provide the monitoring and punishment systems that make it work.

Subsidies

In the United States, the producers of peanuts, sugarbeets, milk, wheat, and many other farm products receive subsidies. A **subsidy** is a payment made by the government to a producer. A large and controversial Farm Bill passed by Congress in 2008 renewed and extended a wide range of subsidies.

The effects of a subsidy are similar to the effects of a tax but they go in the opposite directions. These effects are

- An increase in supply
- A fall in price and increase in quantity produced
- An increase in marginal cost
- Payments by government to farmers
- Inefficient overproduction

Figure 6.12 illustrates the effects of a subsidy to peanut farmers.

An Increase in Supply In Fig. 6.12, with no subsidy, the demand curve D and the supply curve S determine the price of peanuts at \$40 a ton and the quantity of peanuts at 40 million tons a year.

Suppose that the government introduces a subsidy of \$20 a ton to peanut farmers. A subsidy is like a negative tax. A tax is equivalent to an increase in cost, so a subsidy is equivalent to a decrease in cost. The subsidy brings an increase in supply.

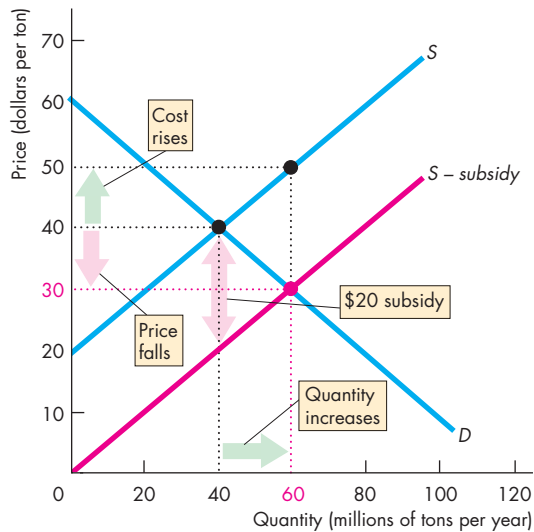
To determine the position of the new supply curve, we subtract the subsidy from the farmers' minimum supply-price. In Fig. 6.12, with no subsidy, farmers are willing to offer 40 million tons a year at a price of \$40 a ton. With a subsidy of \$20 a ton, they will offer 40 million tons a year if the price is as low as \$20 a ton. The supply curve shifts to the red curve labeled $S - \text{subsidy}$.

A Fall in Price and Increase in Quantity Produced

The subsidy lowers the price of peanuts and increases the quantity produced. In Fig. 6.12, equilibrium occurs where the new supply curve intersects the demand curve at a price of \$30 a ton and a quantity of 60 million tons a year.

An Increase in Marginal Cost The subsidy lowers the price paid by consumers but increases the marginal cost of producing peanuts. Marginal cost increases because farmers grow more peanuts, which means that they must begin to use some resources that are less ideal for growing peanuts. Peanut farmers slide up their supply (and marginal cost) curves. In Fig. 6.12, marginal cost increases to \$50 a ton.

Payments by Government to Farmers The government pays a subsidy to peanut farmers on each ton of peanuts produced. In this example, farmers increase production to 60 million tons a year and receive a

FIGURE 6.12 The Effects of a Subsidy

With no subsidy, farmers produce 40 million tons a year at \$40 a ton. A subsidy of \$20 a ton shifts the supply curve rightward to $S - \text{subsidy}$. The equilibrium quantity increases to 60 million tons a year, the price falls to \$30 a ton, and the price plus the subsidy received by farmers rises to \$50 a ton. In the new equilibrium, marginal social cost (on the supply curve) exceeds marginal social benefit (on the demand curve) and the subsidy results in inefficient overproduction.

 animation

subsidy of \$20 a ton. So peanut farmers receive payments from the government that total \$1,200 million a year.

Inefficient Overproduction The subsidy results in inefficient overproduction. At the quantity produced with the subsidy, marginal social benefit is equal to the market price, which has fallen. Marginal social cost has increased and it exceeds the market price. Because marginal social cost exceeds marginal social benefit, the increased production brings inefficiency.

Subsidies spill over to the rest of the world. Because a subsidy lowers the domestic market price, subsidized farmers will offer some of their output for sale on the world market. The increase in supply on the world market lowers the price in the rest of the world. Faced with lower prices, farmers in other countries decrease production and receive smaller revenues.

Economics in Action

Rich High-Cost Farmers the Winners

Farm subsidies are a major obstacle to achieving an efficient use of resources in the global markets for farm products and are a source of tension between the United States, Europe, and developing nations.

The United States and the European Union are the world's two largest and richest economies. They also pay their farmers the biggest subsidies, which create inefficient overproduction of food in these rich economies.

At the same time, U.S. and European subsidies make it more difficult for farmers in the developing nations of Africa, Asia, and Central and South America to compete in global food markets. Farmers in these countries can often produce at a lower opportunity cost than the U.S. and European farmers.

Two rich countries, Australia and New Zealand, have stopped subsidizing farmers. The result has been an improvement in the efficiency of farming in these countries. New Zealand is so efficient at producing lamb and dairy products that it has been called the Saudi Arabia of milk (an analogy with Saudi Arabia's huge oil reserve and production.)

International opposition to U.S. and European farm subsidies is strong. Opposition to farm subsidies inside the United States and Europe is growing, but it isn't as strong as the pro-farm lobby, so don't expect an early end to these subsidies.

REVIEW QUIZ

- 1 Summarize the effects of a production quota on the market price and the quantity produced.
- 2 Explain why a production quota is inefficient.
- 3 Explain why a voluntary production quota is difficult to operate.
- 4 Summarize the effects of a subsidy on the market price and the quantity produced.
- 5 Explain why a subsidy is inefficient.

You can work these questions in Study Plan 6.4 and get instant feedback.



Governments intervene in some markets by making it illegal to trade in a good. Let's now see how these markets work.

◆ Markets for Illegal Goods

The markets for many goods and services are regulated, and buying and selling some goods is illegal. The best-known examples of such goods are drugs, such as marijuana, cocaine, ecstasy, and heroin.

Despite the fact that these drugs are illegal, trade in them is a multibillion-dollar business. This trade can be understood by using the same economic model and principles that explain trade in legal goods. To study the market for illegal goods, we're first going to examine the prices and quantities that would prevail if these goods were not illegal. Next, we'll see how prohibition works. Then we'll see how a tax might be used to limit the consumption of these goods.

A Free Market for a Drug

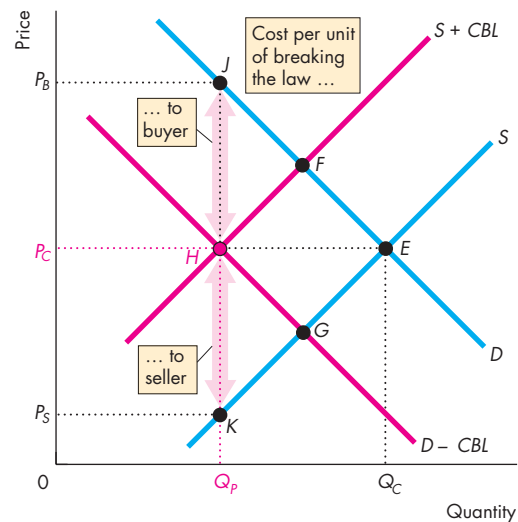
Figure 6.13 shows the market for a drug. The demand curve, D , shows that, other things remaining the same, the lower the price of the drug, the larger is the quantity of the drug demanded. The supply curve, S , shows that, other things remaining the same, the lower the price of the drug, the smaller is the quantity supplied. If the drug were not illegal, the quantity bought and sold would be Q_C and the price would be P_C .

A Market for an Illegal Drug

When a good is illegal, the cost of trading in the good increases. By how much the cost increases and who bears the cost depend on the penalties for violating the law and the degree to which the law is enforced. The larger the penalties and the better the policing, the higher are the costs. Penalties might be imposed on sellers, buyers, or both.

Penalties on Sellers Drug dealers in the United States face large penalties if their activities are detected. For example, a marijuana dealer could pay a \$200,000 fine and serve a 15-year prison term. A heroin dealer could pay a \$500,000 fine and serve a 20-year prison term. These penalties are part of the cost of supplying illegal drugs, and they bring a decrease in supply—a leftward shift in the supply curve. To determine the new supply curve, we add the cost of breaking the law to the minimum price that drug dealers are willing to accept. In Fig. 6.13, the cost of breaking the law by selling drugs (CBL) is added to the minimum price that

FIGURE 6.13 A Market for an Illegal Good



The demand curve for drugs is D , and the supply curve is S . If drugs are not illegal, the quantity bought and sold is Q_C at a price of P_C —point E . If selling drugs is illegal, the cost of breaking the law by selling drugs (CBL) is added to the minimum supply-price and supply decreases to $S + CBL$. The market moves to point F . If buying drugs is illegal, the cost of breaking the law is subtracted from the maximum price that buyers are willing to pay, and demand decreases to $D - CBL$. The market moves to point G . With both buying and selling illegal, the supply curve and the demand curve shift and the market moves to point H . The market price remains at P_C , but the market price plus the penalty for buying rises—point J —and the market price minus the penalty for selling falls—point K .

animation

dealers will accept and the supply curve shifts leftward to $S + CBL$. If penalties were imposed only on sellers, the market equilibrium would move from point E to point F .

Penalties on Buyers In the United States, it is illegal to *possess* drugs such as marijuana, cocaine, ecstasy, and heroin. Possession of marijuana can bring a prison term of 1 year, and possession of heroin can bring a prison term of 2 years. Penalties fall on buyers, and the cost of breaking the law must be subtracted from the value of the good to determine the maximum price buyers are willing to pay for the drugs. Demand decreases, and the demand curve shifts leftward. In Fig. 6.13, the demand

curve shifts to $D - CBL$. If penalties were imposed only on buyers, the market equilibrium would move from point E to point G .

Penalties on Both Sellers and Buyers If penalties are imposed on both sellers *and* buyers, both supply and demand decrease and both the supply curve and the demand curve shift. In Fig. 6.13, the costs of breaking the law are the same for both buyers and sellers, so both curves shift leftward by the same amount. The market equilibrium moves to point H . The market price remains at the competitive market price P_C , but the quantity bought decreases to Q_P . Buyers pay P_C plus the cost of breaking the law, which equals P_B . Sellers receive P_C minus the cost of breaking the law, which equals P_S .

The larger the penalties and the greater the degree of law enforcement, the larger is the decrease in demand and/or supply. If the penalties are heavier on sellers, the supply curve shifts farther than the demand curve and the market price rises above P_C . If the penalties are heavier on buyers, the demand curve shifts farther than the supply curve and the market price falls below P_C . In the United States, the penalties on sellers are larger than those on buyers, so the quantity of drugs traded decreases and the market price increases compared with a free market.

With high enough penalties and effective law enforcement, it is possible to decrease demand and/or supply to the point at which the quantity bought is zero. But in reality, such an outcome is unusual. It does not happen in the United States in the case of illegal drugs. The key reason is the high cost of law enforcement and insufficient resources for the police to achieve effective enforcement. Because of this situation, some people suggest that drugs (and other illegal goods) should be legalized and sold openly but also taxed at a high rate in the same way that legal drugs such as alcohol are taxed. How would such an arrangement work?

Legalizing and Taxing Drugs

From your study of the effects of taxes, it is easy to see that the quantity bought of a drug could be decreased if the drug was legalized and taxed. Imposing a sufficiently high tax could decrease the supply, raise the price, and achieve the same decrease in the quantity bought as does a prohibition on drugs. The government would collect a large tax revenue.

Illegal Trading to Evade the Tax It is likely that an extremely high tax rate would be needed to cut the quantity of drugs bought to the level prevailing with a prohibition. It is also likely that many drug dealers and consumers would try to cover up their activities to evade the tax. If they did act in this way, they would face the cost of breaking the law—the tax law. If the penalty for tax law violation is as severe and as effectively policed as drug-dealing laws, the analysis we’ve already conducted applies also to this case. The quantity of drugs bought would depend on the penalties for law breaking and on the way in which the penalties are assigned to buyers and sellers.

Taxes Versus Prohibition: Some Pros and Cons

Which is more effective: prohibition or taxes? In favor of taxes and against prohibition is the fact that the tax revenue can be used to make law enforcement more effective. It can also be used to run a more effective education campaign against illegal drug use. In favor of prohibition and against taxes is the fact that prohibition sends a signal that might influence preferences, decreasing the demand for illegal drugs. Also, some people intensely dislike the idea of the government profiting from trade in harmful substances.

REVIEW QUIZ

- 1 How does the imposition of a penalty for selling an illegal drug influence demand, supply, price, and the quantity of the drug consumed?
- 2 How does the imposition of a penalty for possessing an illegal drug influence demand, supply, price, and the quantity of the drug consumed?
- 3 How does the imposition of a penalty for selling *or* possessing an illegal drug influence demand, supply, price, and the quantity of the drug consumed?
- 4 Is there any case for legalizing drugs?

You can work these questions in Study Plan 6.5 and get instant feedback.



◆ You now know how to use the demand and supply model to predict prices, to study government actions in markets, and to study the sources and costs of inefficiency. In *Reading Between the Lines* on pp. 144–145, you will see how to apply what you’ve learned to the market for low-skilled labor in California and see some pitfalls of government intervention in this market.

Government Actions in Labor Markets

Bipartisan Plan to Crack Down on California's Underground Economy

The Mercury News
May 3, 2010

California has an underground economy that has been estimated to generate between \$60 billion and \$140 billion a year. This represents a tax loss to California of between \$3 billion and \$6 billion. ...

The underground economy in construction and other industries includes employers who pay cash under the table (often under the minimum wage); do not withhold payroll or other taxes; do not provide workers' compensation protection; and often do not maintain safe working conditions. ...

Consider an unscrupulous building contractor who is not playing by the rules and who underbids law-abiding competitors to win a home remodeling or other construction contract. The low bid wins because the violator is not paying the minimum wage, pays no overtime, pays no payroll tax, and does not provide workers' compensation insurance coverage. A worker who is injured operating an unsafe piece of equipment may be lucky to be dropped at a local emergency room, with implicit instructions not to identify the rogue employer.

Some workers actually gravitate toward a rule-breaking employer to avoid garnishment of wages for child support. As a result, these employers have provided a haven for some.

The underground economy represents a lose-lose-lose for California: Employees get cheated of wages, benefits, and other protections; law-abiding employers are forced to compete against scofflaws who gain an economic advantage; the state loses billions in tax revenue that could be keeping schools open and reducing the deficit.

[State legislators Bill Monning and Bill Berryhill] have ...[an] action plan to take on the underground economy. ...

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ESSENCE OF THE STORY

- California's underground economy generates an estimated \$60 billion to \$140 billion a year.
- California loses \$3 billion to \$6 billion a year in tax revenues from underground production that could be used to keep schools open and to reduce the deficit.
- Employers in the underground economy pay cash wages at rates below the minimum wage.
- Employers in the underground economy don't withhold taxes.
- A builder in the underground economy underbids law-abiding competitors to win contracts.
- Some workers seek a rule-breaking employer to avoid garnishment of wages for child support.
- State legislators are working on a bipartisan bill to limit the underground economy.

ECONOMIC ANALYSIS

- The news article touches on three topics covered in this chapter: the minimum wage, taxes, and trading illegally.
- Trading illegally to avoid a minimum wage regulation or to avoid paying taxes is called “underground” activity and it takes place in the “underground economy.”
- A minimum wage set above the competitive equilibrium wage creates incentives for law-breaking on both sides of the market: Employers can find unemployed workers willing to work for much less than the minimum wage and workers can find employers offering to pay a wage above the minimum they are willing to accept.
- Once the line is crossed into illegal activity, other laws get broken, in particular tax laws and health and safety laws.
- Thorough policing of regulations and stiff penalties for law-breaking are needed to achieve the intended regulated outcome.
- Figure 1 illustrates the situation that lawmakers want to achieve in a market for low-skilled labor in California.
- The demand for labor curve is D and the supply of labor curve is S . A tax on employment (income tax and payroll tax) shifts the supply curve to $S + tax$. A minimum wage regulation sets the minimum legal wage at \$8 per hour.
- Employers obey the law and hire 300 million hours of labor at the minimum wage rate of \$8 per hour.
- Workers want to supply 700 million hours of labor at the minimum wage rate, so 400 million hours of labor are unemployed.
- The law is enforced, but the outcome is inefficient. A deadweight loss arises from the tax on employment (dark gray) and the minimum wage (light gray).
- Figure 2 shows what happens when employers and workers break the law and trade in the underground economy.
- The demand curve, D , tells us the wage that employers are willing to pay and the supply curve, S , tells us the wage that workers are willing to accept. The minimum wage law and tax laws are broken.
- The underground market finds an equilibrium at a wage rate of \$5 an hour and 600 million hours of labor are employed. There is no unemployment.

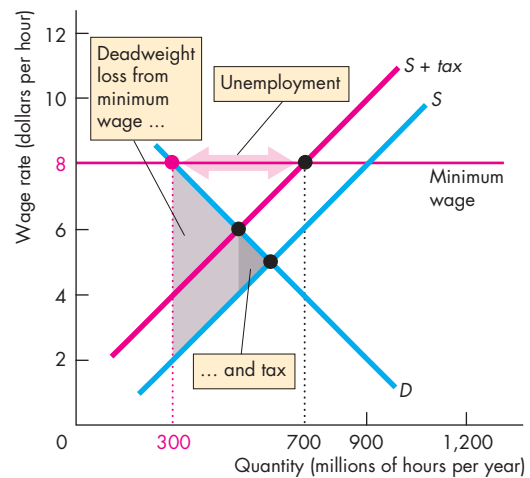


Figure 1 A regulated market with law enforcement

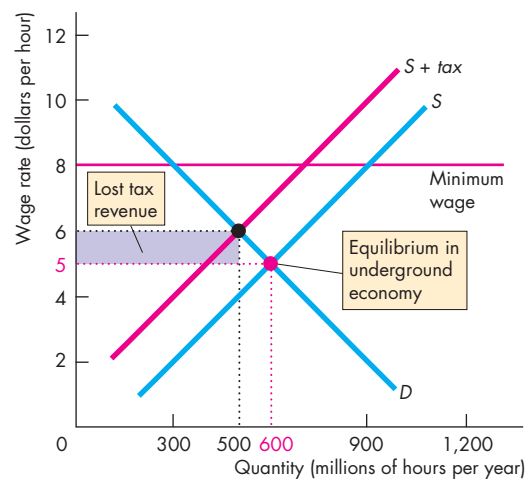


Figure 2 An underground market with law-breaking

- The outcome in the underground market is efficient—the deadweight loss is eliminated.
- The state loses tax revenues (the purple rectangle in Fig. 2). The loss of tax revenues means either that public services must be cut or taxes on other activities must be increased.
- The cost of lost public services and higher taxes is greater than the efficiency gain in the underground labor market, which is why lawmakers are attacking the underground economy.

SUMMARY

Key Points

A Housing Market with a Rent Ceiling (pp. 128–130)

- A rent ceiling that is set above the equilibrium rent has no effect.
- A rent ceiling that is set below the equilibrium rent creates a housing shortage, increased search activity, and a black market.
- A rent ceiling that is set below the equilibrium rent is inefficient and unfair.

Working Problems 1 to 6 will give you a better understanding of a housing market with a rent ceiling.

A Labor Market with a Minimum Wage (pp. 131–133)

- A minimum wage set below the equilibrium wage rate has no effect.
- A minimum wage set above the equilibrium wage rate creates unemployment and increases the amount of time people spend searching for a job.
- A minimum wage set above the equilibrium wage rate is inefficient, unfair, and hits low-skilled young people hardest.

Working Problems 7 to 12 will give you a better understanding of a labor market with a minimum wage.

Taxes (pp. 133–138)

- A tax raises the price paid by buyers, but usually by less than the tax.
- The elasticity of demand and the elasticity of supply determine the share of a tax paid by buyers and sellers.

- The less elastic the demand or the more elastic the supply, the larger is the share of the tax paid by buyers.
- If demand is perfectly elastic or supply is perfectly inelastic, sellers pay the entire tax. And if demand is perfectly inelastic or supply is perfectly elastic, buyers pay the entire tax.

Working Problems 13 to 15 will give you a better understanding of taxes.

Production Quotas and Subsidies (pp. 139–141)

- A production quota leads to inefficient underproduction, which raises the price.
- A subsidy is like a negative tax. It lowers the price, increases the cost of production, and leads to inefficient overproduction.

Working Problems 16 and 17 will give you a better understanding of production quotas and subsidies.

Markets for Illegal Goods (pp. 142–143)

- Penalties on sellers increase the cost of selling the good and decrease the supply of the good.
- Penalties on buyers decrease their willingness to pay and decrease the demand for the good.
- Penalties on buyers and sellers decrease the quantity of the good, raise the price buyers pay, and lower the price sellers receive.
- Legalizing and taxing can achieve the same outcome as penalties on buyers and sellers.

Working Problem 18 will give you a better understanding of markets for illegal goods.

Key Terms

Black market, 128
 Minimum wage, 131
 Price cap, 128
 Price ceiling, 128

Price floor, 131
 Production quota, 139
 Rent ceiling, 128
 Search activity, 128

Subsidy, 140
 Tax incidence, 133

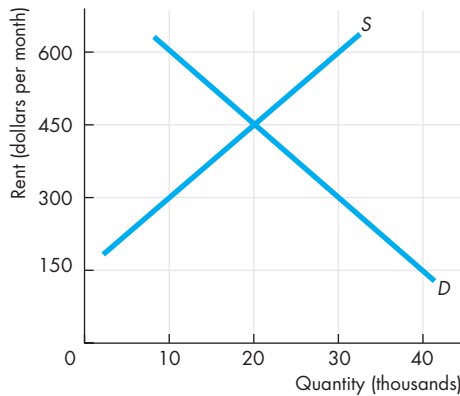


STUDY PLAN PROBLEMS AND APPLICATIONS

You can work Problems 1 to 18 in MyEconLab Chapter 6 Study Plan and get instant feedback.

A Housing Market with a Rent Ceiling (Study Plan 6.1)

Use the following graph of the market for rental housing in Townsville to work Problems 1 and 2.



- What are the equilibrium rent and equilibrium quantity of rental housing?
 - If a rent ceiling is set at \$600 a month, what is the quantity of housing rented and what is the shortage of housing?
- If a rent ceiling is set at \$300 a month, what is the quantity of housing rented, the shortage of housing, and the maximum price that someone is willing to pay for the last unit of housing available?

Use the following news clip to work Problems 3 to 6.

Capping Gasoline Prices

As gasoline prices rise, many people are calling for price caps, but price caps generate a distorted reflection of reality, which leads buyers and suppliers to act in ways inconsistent with the price cap. By masking reality, price caps only make matters worse.

Source: *Pittsburgh Tribune-Review*, September 12, 2005

Suppose that a price ceiling is set below the equilibrium price of gasoline.

- How does the price cap influence the quantity of gasoline supplied and the quantity demanded?
- How does the price cap influence
 - The quantity of gasoline sold and the shortage or surplus of gasoline?
 - The maximum price that someone is willing to pay for the last gallon of gasoline available on a black market?

- Draw a graph to illustrate the effects of a price ceiling set below the equilibrium price in the market for gasoline.
- Explain the various ways in which a price ceiling on gasoline that is set below the equilibrium price would make buyers and sellers of gasoline better off or worse off. What would happen to total surplus and deadweight loss in this market?

A Labor Market with a Minimum Wage (Study Plan 6.2)

(Study Plan 6.2)

Use the following data to work Problems 7 to 9.

The table gives the demand and supply schedules of teenage labor.

Wage rate (dollars per hour)	Quantity demanded (hours per month)	Quantity supplied (hours per month)
4	3,000	1,000
5	2,500	1,500
6	2,000	2,000
7	1,500	2,500
8	1,000	3,000

- Calculate the equilibrium wage rate, the number of hours worked, and the quantity of unemployment.
- If a minimum wage for teenagers is set at \$5 an hour, how many hours do they work and how many hours of teenage labor are unemployed?
- If a minimum wage for teenagers is set at \$7 an hour,
 - How many hours do teenagers work and how many hours are unemployed?
 - Demand for teenage labor increases by 500 hours a month. What is the wage rate paid to teenagers and how many hours of teenage labor are unemployed?

Use the following news clip to work Problems 10 to 12.

India Steps Up Pressure for Minimum Wage for Its Workers in the Gulf

Oil-rich countries in the [Persian] Gulf, already confronted by strong labor protests, are facing renewed pressure from India to pay minimum wages for unskilled workers. With five million immigrant workers in the region, India is trying to win better conditions for their citizens.

Source: *International Herald Tribune*, March 27, 2008

Suppose that the Gulf countries paid a minimum wage above the equilibrium wage to Indian workers.

10. How would the market for labor be affected in the Gulf countries? Draw a supply and demand graph to illustrate your answer.
11. How would the market for labor be affected in India? Draw a supply and demand graph to illustrate your answer. [Be careful: the minimum wage is in the Gulf countries, not in India.]
12. Would migrant Indian workers be better off or worse off or unaffected by this minimum wage?

Taxes (Study Plan 6.3)

13. The table gives the demand and supply schedules for chocolate brownies.

Price (cents per brownie)	Quantity demanded (millions per day)	Quantity supplied
50	5	3
60	4	4
70	3	5
80	2	6
90	1	7

- a. If brownies are not taxed, what is the price of a brownie and how many are bought?
 - b. If sellers are taxed 20¢ a brownie, what is the price? How many are sold? Who pays the tax?
 - c. If buyers are taxed 20¢ a brownie, what is the price? How many are bought? Who pays the tax?
14. **Luxury Tax Heavier Burden on Working Class, it Would Seem**

The Omnibus Budget Reconciliation Act of 1990 included a stern tax on “luxury items.” In 1990 the Joint Committee on Taxation projected that the 1991 revenue yield from the luxury taxes would be \$31 million. The actual yield was \$16.6 million. Why? Because —surprise!—the taxation changed behavior.

Source: *The Topeka Capital-Journal*, October 29, 1999

- a. Would buyers or sellers of “luxury items” pay more of the luxury tax?
 - b. Explain why the luxury tax generated far less tax revenue than was originally anticipated.
15. **How to Take a Gas Holiday**
High fuel prices will probably keep Americans closer to home this summer, despite the gas-tax “holiday” that would shave 18¢ off every gallon.

Source: *Time*, May 19, 2008

Would the price of gasoline that consumers pay fall by 18¢ a gallon? How would consumer surplus change? Explain your answers.

Production Quotas and Subsidies (Study Plan 6.4)

Use the following data to work Problems 16 and 17.

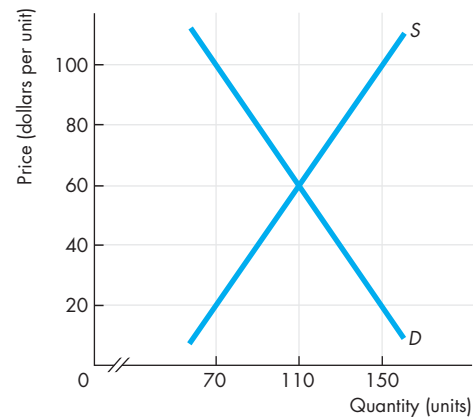
The demand and supply schedules for rice are

Price (dollars per box)	Quantity demanded (boxes per week)	Quantity supplied
1.20	3,000	1,500
1.30	2,750	2,000
1.40	2,500	2,500
1.50	2,250	3,000
1.60	2,000	3,500

16. Calculate the price, the marginal cost of rice, and the quantity produced if the government sets a production quota of 2,000 boxes a week.
17. Calculate the price, the marginal cost of rice, and the quantity produced if the government introduces a subsidy of \$0.30 a box.

Markets for Illegal Goods (Study Plan 6.5)

18. The figure illustrates the market for a banned substance.



Calculate the market price and the quantity consumed if a penalty of \$20 a unit is imposed on

- a. Sellers only.
- b. Buyers only.
- c. Both sellers and buyers.



ADDITIONAL PROBLEMS AND APPLICATIONS



You can work these problems in MyEconLab if assigned by your instructor.

A Housing Market with a Rent Ceiling

Use this news clip to work Problems 19 and 20.

Despite Protests, Rent Board Sets 7.25% Increase

New York's Rent Guidelines Board voted for a rent increase of up to 7.25 percent over the next two years on rent-stabilized apartments. A survey reported that last year costs for the owners of rent-stabilized buildings rose by 7.8 percent. In addition there is growing concern about the ability of the middle class to afford to live in New York City.

Source: *The New York Times*, June 28, 2006

19. a. If rents for rent-stabilized apartments do not increase, how do you think the market for rental units in New York City will develop?
 - b. Are rent ceilings in New York City helpful to the middle class? Why or why not?
20. a. Explain the effect of the increase in the rent ceiling on the quantity of rent-stabilized apartments.
 - b. Why is rent stabilization a source of conflict between renters and owners of apartments?

A Labor Market with a Minimum Wage

Use the following news clip to work Problems 21 and 22.

House Passes Increase in Minimum Wage to \$7.25

The rise in the federal minimum wage will boost the wages of the lowest-paid U.S. workers from \$5.15 to \$7.25 an hour. Republican leaders, backed by small-business and restaurant groups, argued that the higher minimum wage would cripple the economy, so it must be accompanied by tax cuts for small businesses.

Source: *The Washington Post*, January 11, 2007

21. On a graph of the market for low-skilled labor, show the effect of the increase in the minimum wage on the quantity of labor employed.
22. Explain the effects of the higher minimum wage on the workers' surplus and the firms' surplus. Does the labor market become more efficient or less efficient? Explain.

Taxes

23. Use the news clip in Problem 21.
 - a. Would a cut in the tax on small business profits offset the effect of the higher minimum wage on employment? Explain.

- b. Would a cut in the Social Security tax that small businesses pay offset the effect of the higher minimum wage on employment? Explain.

24. The demand and supply schedules for tulips are

Price (dollars per bunch)	Quantity demanded	Quantity supplied
(bunches per week)		
10	100	40
12	90	60
14	80	80
16	70	100
18	60	120

- a. If tulips are not taxed, what is the price and how many bunches are bought?
 - b. If tulips are taxed \$6 a bunch, what are the price and quantity bought? Who pays the tax?
25. **Cigarette Taxes, Black Markets, and Crime: Lessons from New York's 50-Year Losing Battle**
New York City has the highest cigarette taxes in the country. During the four months following the recent tax hike, sales of taxed cigarettes in the city fell by more than 50 percent as consumers turned to the city's bustling black market. The thriving illegal market for cigarettes has diverted billions of dollars from legitimate businesses and governments to criminals.

Source: Cato Institute, February 6, 2003

 - a. How has the market for cigarettes in New York City responded to the high cigarette taxes?
 - b. How does the emergence of a black market impact the elasticity of demand in a legal market?
 - c. Why might an increase in the tax rate actually cause a decrease in the tax revenue?

Production Quotas and Subsidies

Use the following news clip to work Problems 26 to 28.

Congress Passes Farm Bill, Defies Bush

Congress sent the White House a huge \$290 billion-election-year farm bill which contained \$40 billion for farm subsidies and almost \$30 billion to farmers to idle their land. Bush has threatened to veto the bill, saying it is irresponsible and too generous to wealthy corporate farmers in a time of record crop prices.

Source: CNN, May 15, 2008

26. a. Why does the federal government subsidize farmers?
 b. Explain how a subsidy paid to cotton farmers affects the price of cotton and the marginal cost of producing it.
27. Explain how a subsidy paid to cotton farmers affects the consumer surplus and the producer surplus from cotton. Does the subsidy make the cotton market more efficient or less efficient? Explain.
28. a. How would a payment to cotton farmers to idle their land influence the supply of cotton?
 b. How would a payment to cotton farmers to idle their land affect the consumer surplus and the producer surplus from cotton? Explain.

Markets for Illegal Goods

29. The table gives the demand and supply schedules for an illegal drug.

Price (dollars per unit)	Quantity demanded (units per day)	Quantity supplied
50	500	300
60	400	400
70	300	500
80	200	600
90	100	700

- a. If there are no penalties on buying or selling the drug, what is the price and how many units are consumed?
 b. If the penalty on sellers is \$20 a unit, what are the price and quantity consumed?
 c. If the penalty on buyers is \$20 a unit, what are the price and quantity consumed?

Economics in the News

30. After you have studied *Reading Between the Lines* on pp. 144–145 answer the following questions.
- a. In what ways do employers break laws in the underground labor market described in the news article?
 b. How does a tax on labor change the equilibrium level of employment and the wage rate paid by employers?
 c. How does a minimum wage law make tax evasion more likely to occur?
 d. How can the minimum wage law and tax law be enforced more effectively?
 e. Use the analysis of a market for an illegal good (on pp. 142–143) to explain how stiffer

penalties would change the quantity of labor traded and change the wage rate in the underground economy.

Use the following news clip to work Problems 31 to 33.

Coal Shortage at China Plants

Chinese power plants have run short of coal, an unintended effect of government-mandated price controls designed to shield the public from rising global energy costs. Beijing has also frozen retail prices of gasoline and diesel. That helped farmers and the urban poor, but it has spurred sales of gas-guzzling luxury cars and propelled double-digit annual growth in fuel consumption. At the same time, oil refiners are suffering heavy losses and some have begun cutting production, causing fuel shortages.

Source: CNN, May 20, 2008

31. a. Are China's price controls described in the news clip price floors or price ceilings?
 b. Explain how China's price controls have created shortages or surpluses in the markets for coal, gasoline, and diesel.
 c. Illustrate your answer to part (b) graphically by using the supply and demand model.
32. Explain how China's price controls have changed consumer surplus, producer surplus, total surplus, and the deadweight loss in the markets for coal, gasoline, and diesel.
33. Show on a graph the change in consumer surplus, producer surplus, total surplus, and the deadweight loss in the markets for coal, gasoline, and diesel.
34. On December 31, 1776, Rhode Island established wage controls to limit wages to 70¢ a day for carpenters and 42¢ a day for tailors.
- a. Are these wage controls a price ceiling or a price floor? Why might they have been introduced?
 b. If these wage controls are effective, would you expect to see a surplus or a shortage of carpenters and tailors?
35. **Drivers Feel the Pinch as Diesel Hits \$4 a Gallon**
 "The high price of gasoline is hurting our economy," said Mark Kirsch, a trucker, who organized a rally in Washington. "It's hurting middle-class people."
 Source: *The Washington Post*, April 29, 2008
 Explain to truck drivers why a cap on the price of gasoline would hurt middle-class people more than the high price of gasoline hurts.