

>> The Market Strikes Back

BIG COUNTRY, SMALL IDEAS

THINK BIG, THEN THINK EVEN bigger.” This was Sir William Van Horne’s motto, and he certainly lived by it. Sir William’s vision, energy, and indomitable will were largely responsible for the successful completion, in five dramatic years, of the Canadian Pacific Railway. This railway played a fundamental role in the settlement and development of the Canadian West, and became the lifeline that united Canada’s vast territory. Its completion in 1885 fulfilled a dream—the vision of a nation stretching from the Pacific coast to the Atlantic Ocean.

Of course, its completion also meant that Van Horne’s pockets were bulging with money. And what better way to spend it than to build a luxury summer residence on his own 500-acre island and become a “gentleman farmer”?

So, the self-made millionaire equipped his summer residence with a gigantic livestock barn to house his prized herd of Dutch belted cattle, a creamery where the milk and butter were prepared for consumption, and a heated greenhouse where exotic plants, peach trees, and grape vines were grown. In this way, Sir William was able to provide himself and his guests (there were 17 bedrooms) with fresh milk, butter, fruits, and vegetables. And when he visited his Montreal residence, he had these provi-

sions sent to him by overnight rail—Canadian Pacific, naturally.

But if you have similar thoughts of becoming a gentleman farmer after you’ve made your nest egg, perhaps you should think again—especially if you actually want to sell your product on the market. While there’s nothing to stop you from making lots of money, government regulations might prevent you from becoming a producer of turkey, chicken, eggs, milk, butter, or cheese. All these products are protected by “marketing boards”, the main purpose of which is not to “market” the product,



The Van Horne mansion, Minister’s Island, New Brunswick: “Think big, then think even bigger”.

but to set a price floor for the producer and to impose quotas to prevent surplus production. Without a quota—which is an actual piece of paper giving you the right to produce a certain amount of the product—you can’t produce. And since they’re not giving any more away, to obtain the necessary quota you might have to pay several

What you will learn in this chapter:

- ▶ The meaning of **price controls** and **quantity controls**, two kinds of government intervention in markets
- ▶ How price and quantity controls create problems and make a market **inefficient**
- ▶ Why economists are often deeply sceptical of these attempts to control markets
- ▶ Who benefits and who loses from market interventions, and why they are used despite their well-known problems
- ▶ What an **excise tax** is and why its effect is similar to a quantity control
- ▶ Why the **deadweight loss** of a tax means that its true cost is more than the amount of tax revenue collected

hundred thousand dollars to an existing producer wanting out.

Agricultural quotas were imposed to help support and stabilize farm incomes, and to ensure quality control. Their result, however, has been to raise the price of some of the cheaper forms of protein, without actually benefiting many of the producers in those industries.

Quotas aren't that unusual. They are just one of many government policies that, in one way or another, try to prevail over the market forces of supply and demand. For example, to keep prices down, governments impose price ceilings; and to keep prices up, governments impose price floors.

In the previous chapter we learned the principle that a market moves towards equilibrium—that the market price rises or

falls to the level at which the quantity of a good people are willing to supply is equal to the quantity that other people want to buy. When governments try to defy that principle, the market strikes back in predictable ways. And our ability to predict what will happen when governments try to defy supply and demand shows the power and usefulness of supply and demand analysis itself.

In this chapter, we begin by examining what happens when governments try to control market prices, keeping the price in a market either below its equilibrium level (a *price ceiling*) or above it (a *price floor*). We then turn to schemes such as agricultural quotas that attempt to dictate the quantity of a good bought or sold, and, finally, consider the effects of taxes on sales or purchases.

Why Governments Control Prices

You learned in Chapter 3 that a market moves to equilibrium—that is, the market price moves to the level at which the quantity supplied equals the quantity demanded. But this equilibrium price does not necessarily please either buyers or sellers.

After all, buyers would always like to pay less if they could; and sometimes they can make a strong moral or political case that they ought to pay lower prices. For example, what if the equilibrium between supply and demand for oil leads to prices so high that lower-income homeowners can't afford to heat their homes in the winter? This might well create pressure for governments to impose limits on the price of heating oil. Or what if the equilibrium between the supply and demand for apartments leads to rental rates that an average working person can't afford? Again, the government might well find itself pressured to impose limits on the rents landlords can charge.

On the other hand, sellers would always like to get more money for what they sell, and sometimes they can make a strong moral or political case that they should receive higher prices. This is especially easy to do if the price in question is the price of labour (wages). For example, what if the equilibrium between the supply and demand for less-skilled workers leads to wage rates that are below the poverty level? In that case, a government might well find itself pressured to require employers to pay wage rates no lower than a given minimum wage. Similarly, if farmers find that prices for their produce are too low for them to survive, governments might be pressured into measures that support farm prices.

In other words, there is often a strong political demand for governments to intervene in markets. When a government intervenes to regulate prices, we say that it

imposes **price controls**. These controls typically take the form either of an upper limit, a **price ceiling**; or a lower limit, a **price floor**.

Unfortunately, it's not that easy to tell a market what to do. As we will now see, when a government tries to control prices—whether it legislates them *down* by imposing a price ceiling or *up* by imposing a price floor—there are certain predictable and unpleasant side effects.

Price controls are legal restrictions on how high or low a market price may go. They can take two forms: a **price ceiling**, a maximum price sellers are allowed to charge for a good, or a **price floor**, a minimum price buyers are allowed to pay for a good.

Using The Competitive Model

We should note an important caveat here: our analysis in this chapter considers only what happens when price controls are imposed on *competitive markets*—which, as you should recall from Chapter 3, are markets in which there are many buyers and sellers of the *same* good, and in which no buyer or seller can have a *noticeable* effect on the market price. When these conditions do not hold—for example, when a good is differentiated by brand or by quality, or when either buyers or sellers can have a noticeable effect on the price—price controls don't necessarily cause the same problems.

If we ended the discussion here, we would miss an important point: what constitutes a “noticeable” effect on price? And how similar do goods have to be to be called the “same” good? Even wheat has different strains of quality, and every landlord has some leeway with regard to the rent she charges.

To answer these questions, we should remember from Chapter 2 that a model is a simplification. All models abstract from some aspects of reality. As a result, economists sometimes disagree on which model is best applied to any given situation. But they try to resolve these disputes by appealing to the empirical evidence. All economists agree that the model that “best fits the facts” is the appropriate model to use.

This means that questions about what constitutes a noticeable effect, and how similar the goods have to be, are essentially empirical questions that depend upon what “facts” we are trying to explain. The questions we're asking, and the facts we're trying to explain, determine the appropriate model to use.

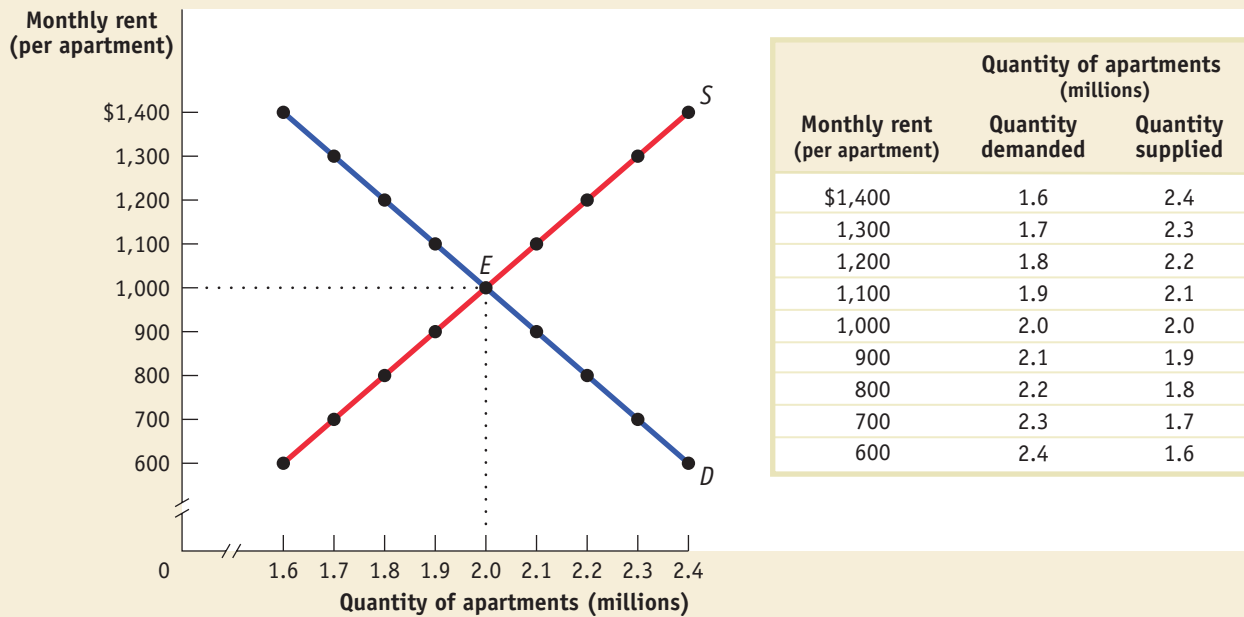
For example, the fact that landlords have some leeway over the rent they charge may be important for explaining differences in rents between apartments, but is probably unimportant for explaining average rents. Therefore, we can't use a competitive model to explain rental differences between apartments; but we should be able to use it to explain average rents and the effects of government-imposed rent ceilings. Whether we can or not depends on whether the model's predictions best fit the facts.

The key point is that we shouldn't judge the relevance of any model—and its associated predictions—by the “realism” of the assumptions it makes. Economists do not assume that the competitive model is relevant to a particular market simply because that market has a large number of buyers and sellers. We test the model's predictions against the facts we're trying to explain.

Price Ceilings

Price ceilings are typically imposed during crises—wars, harvest failures, natural disasters—because these events often lead to sudden price increases, which hurt many people but produce big gains for a lucky few. During World War II, for example, Canada imposed a general ceiling on prices, wages, and rents in an effort to control inflation and ensure a fair distribution of goods. These controls were dismantled in 1951.

Figure 4-1 The Market for Apartments in the Absence of Government Controls



Without government intervention, the market for apartments reaches equilibrium at point E with a market rent of \$1,000 per month and 2 million apartments rented. [>web...](#)

To see what can go wrong when a government imposes a price ceiling on a competitive market, consider Figure 4-1, which shows a simplified model of the market for apartments. For the sake of simplicity, we imagine that all apartments are exactly the same, and that they would therefore rent for the same price in an uncontrolled market. In this context, we will develop five key predictions from the competitive model.

But before we start, we need to emphasize an important point: price ceilings will have no effect if they are set *above* the equilibrium price. For example, suppose that, as Figure 4-1 illustrates, the equilibrium rental rate on apartments is \$1,000 per month, and that the local government now sets a rent ceiling of \$1,200 per month. Who cares? In this case, the price ceiling won't be binding—it won't actually constrain market behaviour—and it will have no effect.

In what follows, we shall assume that the price ceiling is set below the equilibrium price. In other words, our predictions relate to cases in which the price ceiling is **binding**.

A **binding** price ceiling is one that is set below the equilibrium price.

Price Ceilings: Five Key Predictions

The table in the figure shows the demand and supply schedules; the implied supply and demand curves are shown on the left. On the horizontal axis of the figure, we show the number of apartments rented; on the vertical axis, the monthly rent per apartment. You can see that in an unregulated market the equilibrium would be at point E : 2 million apartments would be rented for \$1,000 per month.

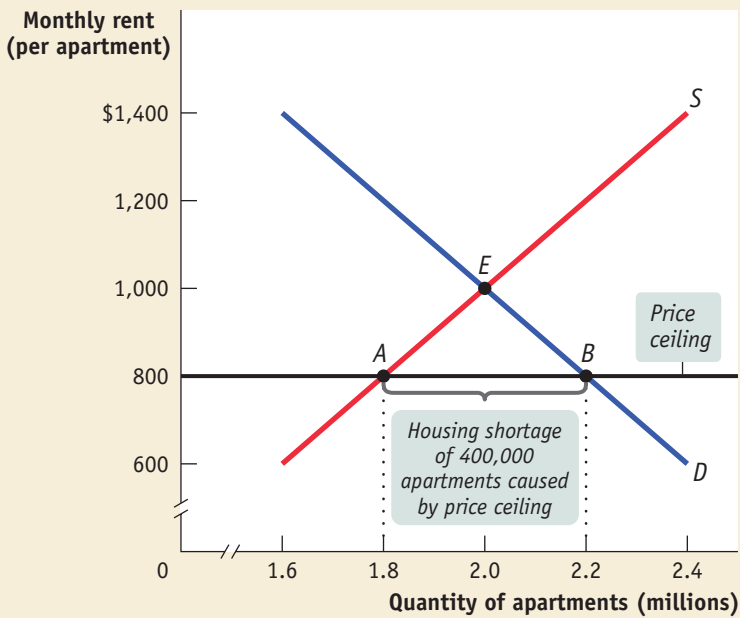
Now suppose that the government imposes a price ceiling, limiting rents to a price below the equilibrium price, say no more than \$800.

Figure 4-2 shows the effect of the price ceiling, represented by the line drawn at \$800. At the enforced rental rate of \$800, at point A on the supply curve, only 1.8 million apartments are offered for rent, 200,000 less than in the free-market situation. At the same time, more people would want to rent apartments at a monthly rate of \$800

Figure 4-2

The Effects of a Price Ceiling

The dark horizontal line represents the government-imposed price ceiling on rents of \$800 per month. This price ceiling reduces the quantity of apartments supplied to 1.8 million, point *A*, and increases the quantity demanded to 2.2 million, point *B*. This creates a persistent shortage of 400,000 units: 400,000 people who want apartments at the legal rent of \$800 but cannot get them.



than at the equilibrium rate of \$1,000. More people will decide to live on their own rather than share accommodation, and more people will decide that renting is a better option than buying. As shown at point *B* on the demand curve, at a rent of \$800 per month the number of apartments demanded rises to 2.2 million, 200,000 more than in the free-market situation, and 400,000 more than are actually available at the rate of \$800. So there is now a rental housing shortage, a persistent excess demand: at that rate, 400,000 more people want to rent than are actually able to find apartments.

#1: Shortages That Get Worse over Time So, our first key prediction is that binding price controls imposed on competitive markets lead to shortages. We can expand this prediction by delving a little deeper into the reason why the quantity of apartments supplied decreases at the ceiling price of \$800, and how long it takes for this decrease to occur.

The reduction in the quantity of apartments supplied most likely will not happen all at once. Given an existing number of apartment buildings, there may be *initially* only a small reduction in the number of apartments offered—caused, perhaps, by homeowners having less incentive to rent out a room or a basement. However, over time more reductions will occur. For example, given time, it is possible to convert apartment buildings to condominiums or to knock them down and build shopping malls. So, the full reduction in supply (of 200,000 units in our example) may take some time to occur. This means that the shortage of apartments generated by rent controls gets worse the longer the controlled price (the rent ceiling) stays below the equilibrium price.

#2: Inefficient Allocation to Consumers The housing shortage shown in Figure 4-2 is not merely annoying: like any shortage induced by price controls, it can be seriously harmful because it leads to *inefficiency*. In Chapter 1, we learned that an economy is efficient if there is no way to make some people better off without making others worse off. A market or an economy becomes **inefficient** when there are missed opportunities—ways that production or consumption could be rearranged that would make some people better off at no cost to anyone else.

A market or an economy is **inefficient** if there are missed opportunities: some people could be made better off without making other people worse off.

Price ceilings often lead to inefficiency in the form of **inefficient allocation to consumers**: people who want the good badly don't get it, while those who care relatively little about the good do get it.

Price ceilings typically lead to inefficiency in the form of **wasted resources**: people spend money and expend effort in order to deal with the shortages caused by the price ceiling.

Price ceilings often lead to inefficiency in that the goods being offered are of **inefficiently low quality**: sellers offer low-quality goods at a low price even though buyers would prefer a higher quality at a higher price.

In the case shown in Figure 4-2, at a price ceiling of \$800, 2.2 million people would like to rent an apartment, but only 1.8 million apartments are available. Of those 2.2 million who are seeking an apartment, some will be in desperate need of a place to live. For others the need will be less urgent, perhaps because they have alternative housing. An efficient allocation of apartments would reflect these differences: people who really want an apartment will get one, people who aren't all that anxious to have an apartment won't. In an inefficient distribution of apartments, the opposite will happen: some people who are not especially anxious to find an apartment will get one, even while some people who are very anxious to find an apartment are unable to do so. And because under rent control people usually get apartments through luck or personal connections, rent control generally results in an **inefficient allocation to consumers** of the few apartments available.

To see the inefficiency involved, imagine the plight of the Lees, a family with young children, who have no alternative housing and would be willing to pay up to \$1,500 for an apartment but are unable to find one. On the other hand, George is a retiree who lives most of the year in Florida, but still has a lease on the apartment he moved into 40 years ago. George pays \$800 per month for this apartment, but if the rent were even slightly more—say, \$850—he would give up the apartment and stay with his children when he returns to Canada.

This allocation of apartments—George has one and the Lees do not—is a missed opportunity: there is a way to make the Lees and George both better off at no additional cost. The Lees would be happy to pay George, say, \$1,200 a month to sublet his apartment, which he would happily accept since the apartment is worth no more to him than \$850 a month. George would be \$350 a month better off. The Lees, too, are \$300 a month better off since they would have been willing to pay up to \$1,500 for an apartment. So both would be made better off by this transaction—and nobody else would be hurt.

More generally, if people who really want apartments could sublet them from people who are less eager to stay in them, both those who gain apartments and those who trade their leases for more money would be better off. However, subletting is illegal under rent control because it would take place at prices above the price ceiling. But just because subletting is illegal doesn't mean it never happens. This illegal subletting is a kind of *black market activity*, which we will discuss in full shortly.

#3: Wasted Resources A third reason a price ceiling causes inefficiency is that it leads to **wasted resources**. Under rent control, the Lees will spend all their spare time for several months searching for an apartment. This time has an *opportunity cost* measured in terms of the foregone leisure or income they could have had if they hadn't had to search for an apartment for so long. If the market for apartments worked freely, the Lees would quickly find an apartment at \$1,000 and have spare time to enjoy themselves—an outcome that would make the Lees better off at no expense to anyone else. Again, rent control creates missed opportunities that are pure waste.

#4: Inefficiently Low Quality Our fourth prediction is that under a price ceiling, goods tend to be of **inefficiently low quality**. To see what we mean, consider the situation under rent control. Landlords facing rent control have no incentive to provide better conditions, since they cannot raise rents to cover their repair costs and are able to find tenants easily regardless of the conditions. In many cases, tenants would be willing to pay much more for improved conditions—for example, the repair and upgrade of an antiquated electrical system that cannot safely run air conditioners or computers—than it would cost for the landlord to provide them. But any additional payment for such improvements would be legally considered a rent increase, which is prohibited. This is a missed opportunity—some tenants would be happy to pay for better conditions, and landlords would be happy to provide them for payment. But this exchange could occur only if the market were allowed to operate freely.

#5: Black Markets And that leads us to our final prediction about the effects of price ceilings: they provide an incentive for *illegal activities*, specifically the emergence of **black markets**.

We have already described one kind of black market activity—illegal subletting by tenants. But there are others. Clearly, a building owner may be tempted to say to a potential tenant, “Look, you can have the place if you slip me an extra few hundred in cash each month.” And, if the tenant is one of those people who would be willing to pay much more than the legal maximum rent, he or she will be equally tempted to agree.

Figure 4-3 shows how to predict the likely size of these side-payments (or bribes). At the ceiling rent, 1.8 million apartments are supplied. But buyers are willing to pay up to \$1,200 a month for an apartment when supply is this low—\$400 more than the legal ceiling. So, we can expect side-payments as high as \$400 a month.

Ironically, the emergence of a black market may ameliorate the inefficiencies we have enumerated. On the black market, those who really need (or want) the commodity have the opportunity to back up that need with cash and acquire it. For example, on the black market, that illegal sublet between the Lees and George can occur.

But before we sing the praises of the black market, we need to emphasize that the bigger a black market, the more people who are breaking the law. And when laws are routinely flouted for personal gain, we can have the worst of all possible worlds.

Moreover, illegal activity worsens the position of those who try to be honest. If the Lees were scrupulous about not breaking the rent control law, while other families—families that may need an apartment less than the Lees do—were willing to go ahead and bribe the landlords, the Lees may *never* find an apartment.

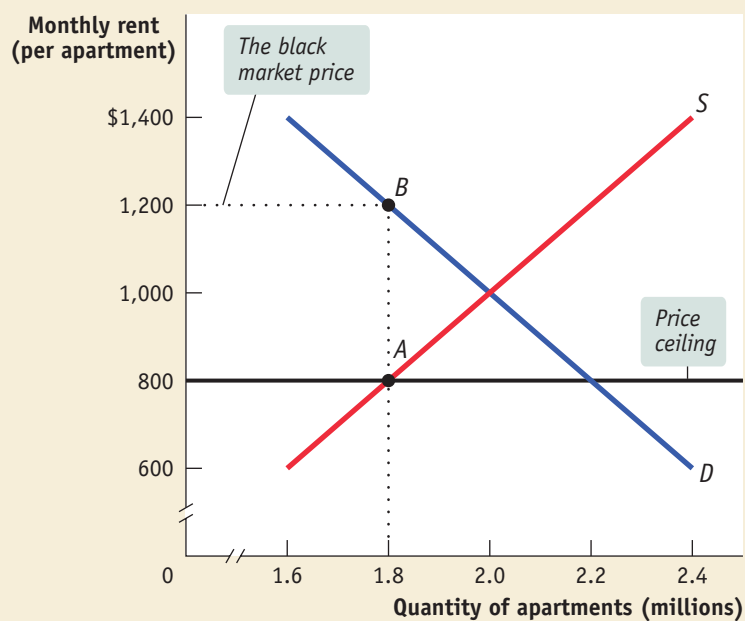
So, here is one way to think about our five predictions and to organize them in our minds: First, price ceilings lead to shortages (prediction 1). Next, the fundamental reason why shortages are bad is that they are inefficient, and this inefficiency manifests itself in three distinct ways (predictions 2, 3, and 4). Finally, whenever there are unsatisfied wants because of legal restrictions, crime will always arise to profit from them (prediction 5).

A **black market** is a market in which goods or services are bought and sold illegally—either because it is illegal to sell them at all or because the prices charged are prohibited by a price ceiling.

Figure 4-3

The Black Market Price

The price ceiling reduces the quantity of apartments supplied to 1.8 million, point A. From the demand curve, we see that the maximum willingness to pay for an apartment, at this quantity, is \$1,200 per month, point B. This is \$400 more than the legal ceiling rent. We predict bribes, or side-payments, of up to \$400 a month.



Comparing the Predictions to the Facts

How do our predictions compare to the facts? There is a rich array of data from which to choose. Price controls have been imposed on different commodities, in different countries, in different times.

During World War II, price ceilings were imposed on many commodities in both Britain and Canada—commodities such as meat, milk, eggs, sugar, and gasoline. In every case, shortages instantly developed, confirming prediction #1. In an attempt to avoid the costs associated with an inefficient distribution of these commodities amongst consumers (prediction #2) and the cost of the time wasted in searching for the good (prediction #3), families were issued ration coupons based on need. Despite the fact that the amount of ration coupons issued was approximately equal to the available supply, the rationing schemes did not succeed in avoiding these costs—they merely transferred the costs from private citizens to the government. Instead of individuals wasting time searching for the commodity, the government “wasted” time and labour issuing ration coupons.

Was it a pure waste, though? To the extent to which rationing succeeded in establishing a more equitable distribution of essential commodities, many would consider the cost of issuing ration coupons a worthwhile trade-off for the increased equity—at least in the short run during wartime. However, the fact that extensive black markets for rationed goods did exist in both countries (bearing out prediction #5) suggests that the aim of establishing a more equitable distribution was only partly achieved, and that not everyone bought into the “worthwhile trade-off” point of view. Finally, since the best cuts of meat were often sold on the black market, only lesser quality cuts were available to be sold legally, bearing out prediction #4.

As another example, when OPEC restricted oil supplies in 1979, leading to an approximate doubling of world prices, President Jimmy Carter responded to the public outcry in the U.S. by imposing price ceilings on gasoline. Again, the historical record bears out all the competitive model’s predictions. In particular, the price ceiling produced gasoline shortages, and millions of Americans ended up spending hours each week waiting in lines at gas stations. This wasn’t exactly what the public expected, despite the clear predictions from our model.

The above examples clearly vindicate the competitive model’s predictions. However, when applying the model to our main example, rent control, we encounter several difficulties in determining whether the model fits the facts.

The Distinct Nature of Housing Markets

First, in the context of the market for rental accommodation, the model predicts that the shortages may take time to develop, and the longer the rent control is in effect, the worse the shortages become. But this is only true if the rent control is binding, and remains equally binding through time.

For example, suppose we looked at the effects of rent control in Toronto in the 1990s; and suppose we obtained data on vacancy rates (which are an inverse measure of shortages), and we observed *increasing* vacancy rates over this period. This would suggest that any scarcity of apartments was not getting worse, but was moderating over time. Should we conclude that this violates prediction #1? It would be a mistake to do so, because the price ceiling may have become less binding throughout the 1990s. If maximum allowable rents increased relative to equilibrium rents, we would expect the shortage to moderate, not increase. But how do we know what equilibrium rents are, or how they move through time, when we don’t necessarily observe them?

One, imperfect, way of estimating whether the rent ceiling did become less binding is to compare maximum allowable rent increases with the province’s average rate of inflation. If we did this for Toronto, we would find that rent controls were relaxed over the 1990s. In 11 of the 13 years between 1991 and 2003, the maximum allowed rent increase exceeded Ontario’s rate of inflation. By contrast, in the 11 years prior to 1990,

this occurred only 3 times. Hence, the observation of increasing vacancy rates in Toronto during the 1990s is perfectly consistent with the predictions of the competitive model.

The second main difficulty we encounter is that rent controls are one of the more complicated types of price ceiling. Rarely does rent control simply stipulate a ceiling price for rents. That type of rent control occurred during World War II, but disappeared in Canada in 1951 with the general dismantling of price controls. More complicated controls were reintroduced in the 1970s, but this more modern legislation (known as “second-generation” rent control) is much more flexible than the rigid wartime price ceilings. For example, it commonly allows automatic rent increases geared to increasing costs, excludes luxury high-rent buildings, and provides incentives for landlords to maintain or improve quality. Often it allows for decontrol once the unit is vacated. Clearly, this is very different from a rigid rent freeze.

Fortunately for us, there is one city where the rigid wartime controls were not abolished in the 1950s—New York City. Let’s first see how the competitive model’s predictions fare there, before trying to evaluate the effect of more complicated second-generation controls in Canada.

The Singular Case of New York City Of all the cities that imposed rent controls during World War II, only New York City retained them. This is what makes New York’s experience unique and valuable—it shows us the consequences of having a rigid form of rent control for a very long period of time. The effects in New York have been devastating—and have strongly borne out the competitive model’s predictions concerning the effects of a rigid rent freeze.

In any market, the extent of a shortage can be gauged by the size of the black market, since there would be no need for a black market if there were no shortage. And New York is infamous for its bribes. In fact, they are so widespread that people felt the need to coin the term “key-money” as a euphemism for these bribes. Moreover, talking about key-money allows a pretence to be maintained that the money is actually paying for something—like the cutting of a new key. But “new keys” in New York can be very expensive—in fact, they can run into thousands of dollars.

Another easily observable fact about New York is the deteriorating quality of its rental housing stock. Apartments are notoriously badly maintained, rarely painted, subject to frequent electrical and water problems, and sometimes even hazardous to inhabit. But the problems go far beyond that. The quality of some buildings has deteriorated to the point where entire city blocks in the Harlem and Bronx districts have been abandoned by landlords as unprofitable. This abandonment has caused social havoc, since the buildings attract crime and drugs.

In sum, New York’s experience prompted Swedish economist Assar Lindbeck to quip, “rent ceilings are the most effective means yet for destroying cities, even more effective than the hydrogen bomb.”

FOR INQUIRING MINDS

WHY RENT CONTROL PERSISTS IN NEW YORK

Given the unpleasant consequences, why does rent control persist in New York?

One answer is that while price ceilings may have adverse effects, they do benefit some people. While hundreds of thousands of New Yorkers have worse housing than they would in the absence of rent controls, tens of thousands get much cheaper housing than they would if the controls were lifted. And those who bene-

fit from the controls are typically better organized and more vocal than those who lose.

Indeed, one of the ironies of New York’s rent control system is that some of the biggest beneficiaries are not the working-class families the system was intended to help, but affluent and powerful tenants whose families have lived for many decades in choice apartments that would now command very high rents.

Rent Controls in Canada Because rent control is under provincial jurisdiction, Canada's experience with it has been quite diverse. All the provinces ceded to the federal government's request to reintroduce rent control in the mid-1970s as part of its general wage and price controls. But when that came to an end in 1978, some provinces moved quickly to decontrol, some moved to voluntary arbitration schemes, and some moved to "permanent" mandatory controls. By 1988, six of the ten provinces had abolished mandatory controls. The four that didn't were Manitoba, Ontario, PEI, and Nova Scotia.

This remaining rent control is all "second-generation"—meaning that it is relatively flexible and allows, for example, automatic rent increases geared to increasing costs. What effects has this legislation had?

In reviewing the empirical evidence, Richard Arnott (1995) suggests that, in comparison with other factors affecting the housing market—like tax policy related to housing, local real estate cycles, changes in the national and regional economy, and major government housing programs—the effects of second-generation rent controls in Canada have been almost imperceptible.

The one exception to this is Ontario, and in particular the city of Toronto. Ontario suffered from poorly designed legislation, especially throughout the 1970s and 1980s. Generally speaking, the maximum allowed rent increase in Ontario did not keep up with costs in this early period. Moreover, Ontario was the only province that controlled the rent of luxury units and failed to exempt new construction from rent control. The situation got so bad that in the early 1980s Ontario found it necessary to pass legislation prohibiting the demolition of rental property or its conversion to condominiums. Moreover, vacancy rates were the lowest of any province across Canada. Some even compared Toronto's experience with rent control during this period to the situation in New York.

However, this comparison is no longer valid today. While rent control remains nominally in effect in Ontario, its influence has been moderated by two factors. First, the maximum allowed rent increase has generally exceeded the rate of inflation since 1990, lessening the extent to which rent control is binding. Second, the Progressive Conservative government of Mike Harris implemented significant reforms in June 1998. In particular, rental units built after 1998 will never be subject to rent control, and vacant apartments now become decontrolled. These changes have effectively begun the process of decontrol in Ontario.

So the message of this section is that second-generation rent controls are not the same as a rigid rent freeze, and we shouldn't judge their effects by the experience of New York. Apparently, their effects in Canada have been almost imperceptible.

Could Second-Generation Rent Control Be Beneficial? The traditional economics answer to this question is 'no'. If the controls are binding (and cause rents to fall below their equilibrium values), they cause efficiency losses. If the controls are not binding (so that the legal rent exceeds the equilibrium rent), then the controls are redundant—in which case a level of bureaucracy (the rent control board) is being maintained for no reason, and hence there is still an efficiency loss.

However, in recent years some housing economists have begun to challenge the orthodox view. [See Arnott (1995) "Time for Revisionism on Rent Control?" *Journal of Economic Perspectives*.] Remember, our five predictions apply only when price controls are imposed on *competitive markets*, and the market for apartments has some *non-competitive* elements. Because apartments differ in location and other attributes, and tenants face high costs searching for an alternative apartment and moving to it, landlords have some ability to influence the price. In addition, there is a lack of information about who is a good landlord (and who is a good tenant). Because of these features, *moderate* and *well-designed* rent control *could* be beneficial. It can prevent, for example, uninformed tenants from being taken advantage of by an unscrupulous landlord.

But it is one thing to say that it is *theoretically possible* to design legislation that improves over the unrestricted free market solution. It is altogether another to say that this legislation has actually been implemented in any given jurisdiction. If you come across any, do let us know!

economics in action

Alternatives to Rent Controls in Canada

In practice, there are better ways to provide affordable housing than to implement rent control. Even though most provinces have now abandoned rent control, all provinces in Canada try to provide affordable housing for low-income families. They do this through social assistance programs: public housing, cooperative housing, shelter allowances, or rental supplements.

However, the system has been under increasing stress since 1993 as a result of cuts in federal spending. For every public housing unit, there is usually a family on a waiting list needing to get in. As a result, the effort nowadays is to try to use existing units more effectively as a *temporary* stopgap, and to give the occupants of the units the skills necessary to move towards self-sufficiency. The aim is to avoid the often-encountered situation in which people born in public housing are now raising their own families there. ■

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>> QUICK REVIEW

- > Price controls take the form of either legal maximum prices—*price ceilings*—or legal minimum prices—*price floors*.
- > A price ceiling below the equilibrium price benefits successful buyers, but causes predictable adverse effects such as persistent *shortages*, which lead to three types of *inefficiencies*: *inefficient allocation to consumers*, *wasted resources*, and *inefficiently low quality*.
- > Price ceilings also produce *black markets*, as buyers and sellers attempt to evade the price restriction.

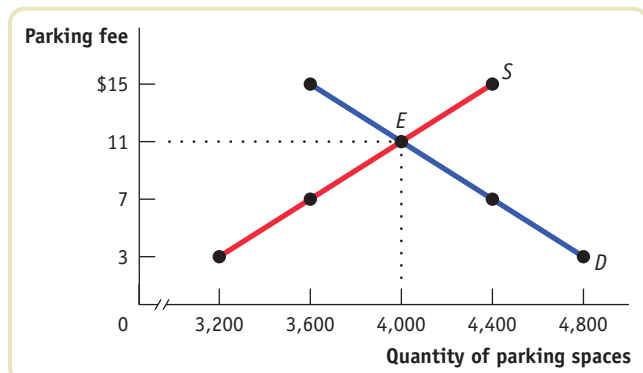
>> CHECK YOUR UNDERSTANDING 4-1

- Homeowners near McGill University's stadium used to rent out spaces in their driveways at a going rate of \$11 to fans who had no other place to park. A new town ordinance now sets a maximum parking fee of \$7.

Use the accompanying supply and demand diagram to show how each of the following corresponds to a price-ceiling concept.

- Some homeowners think that it's not worth the hassle to rent out spaces.
- Some fans who used to carpool to the game now drive there alone.
- Some fans can't find parking and leave without seeing the game. Explain how each of the following phenomena arises from the price ceiling.
 - Determined fans arrive several hours early to find parking.
 - Family or friends of homeowners near the stadium regularly attend games, even if they aren't big fans. But some serious fans have given up because of the parking situation.
 - Some homeowners rent spaces for more than \$7 but pretend that the buyers are friends or family.

- True or False? Explain your answer. Compared to a free market, price ceilings at a price below the equilibrium price do the following:
 - Increase quantity supplied.
 - Make some people who want to consume the good worse off.
 - Make all producers worse off.



Price Floors

Sometimes governments intervene to push market prices up instead of down. Just as price ceilings are often imposed because they benefit some influential buyers of a good, price floors are often imposed because they benefit influential *sellers*.

For example, Europe's Common Agricultural Policy (CAP)—born out of the 1957 Treaty of Rome that created the European Economic Community—was an intensely political scheme designed to keep French farmers happy in exchange for Germany's winning a bigger market for its industrial goods. Price floors form the cornerstone of this agricultural policy, and are set at levels that support the incomes of farmers.

Historically, there have also been price floors on services such as air travel. These were phased out in Canada in the early 1980s.

Finally, if you have ever worked in a fast-food restaurant you are likely to have encountered a price floor: all provinces in Canada maintain a lower limit on the hourly wage—that is, a floor on the price of labour. This price floor on labour is called the **minimum wage**.

The **minimum wage** is a legal floor on the wage rate, which is the market price of labour.

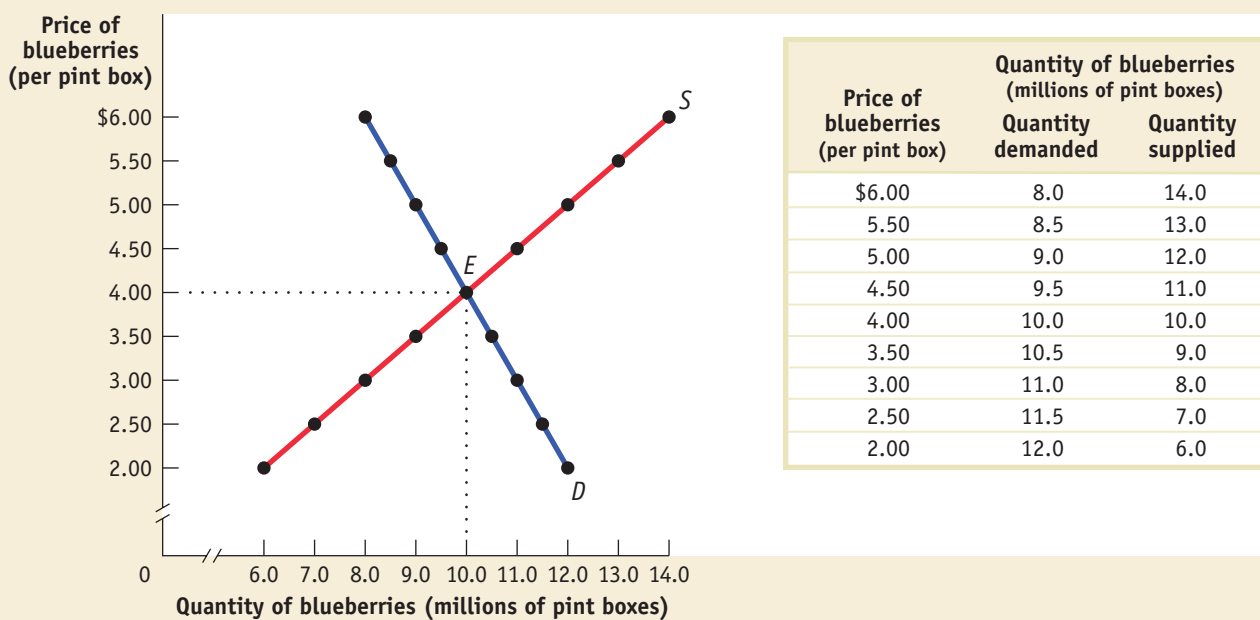
Just like price ceilings, price floors are intended to help some people. The problem is that when they are imposed on competitive markets, our model predicts that there will be undesirable side effects. Let's consider in detail the predictions of our competitive model and then see if these predictions fit the facts.

Price Floors: Five Key Predictions

Figure 4-4 shows hypothetical supply and demand curves for blueberries. Left to itself, the market would move to equilibrium at *E*, with 10 million pint boxes of blueberries bought and sold at a price of \$4 per pint box.

But now suppose that the government, in order to help blueberry growers, imposes a price floor on blueberries of \$5 per pint box. Its effects are shown in Figure 4-5, where the line drawn at \$5 represents the price floor.

Figure 4-4 The Market for Blueberries in the Absence of Government Controls



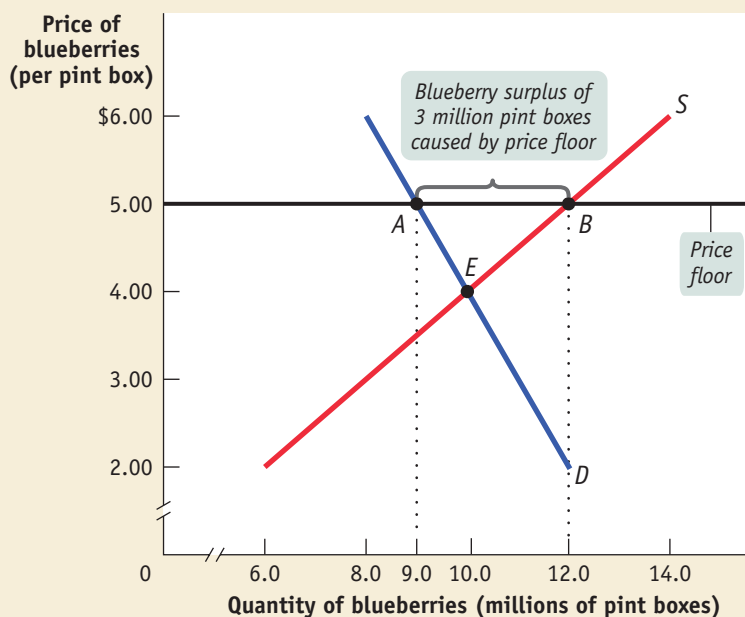
Without government intervention, the market for blueberries reaches equilibrium at a price of \$4 per pint box, with

10 million pint boxes of blueberries sold. [>web...](#)

Figure 4-5

The Effects of a Price Floor

The dark horizontal line represents the government-imposed price floor of \$5 per pint box of blueberries. The quantity of blueberries demanded falls to 9 million boxes, while the quantity supplied rises to 12 million pint boxes, generating an unwanted surplus of 3 million pint boxes. [>web...](#)



#1: Surplus production At a price of \$5 per pint box, growers would want to supply 12 million boxes (point B on the supply curve), while consumers would want to buy only 9 million boxes (point A on the demand curve). Thus, there would be a surplus—a persistent excess supply—of 3 million pint boxes of blueberries.

Does a price floor always lead to an unwanted surplus? No: just as in the case of a price ceiling, the floor may not be binding—that is, it may be irrelevant. If the equilibrium price of blueberries were \$4 per pint, while the floor is set at only \$3.50, the floor has no effect.

But suppose that a price floor is binding: what happens to the unwanted surplus? With agricultural products, governments invariably buy up the surplus production at the floor price. What happens to it next depends on government policy. But one thing is certain: this surplus must not be subsequently resold on the domestic market, or it will depress the price below the floor. So, the surplus may be stored, destroyed, given away as foreign aid, or sold abroad at a lower price.

When the government is not prepared to purchase the unwanted surplus, a price floor means that would-be sellers cannot find buyers. This is what happens in the case of the minimum wage. The competitive model predicts that when the *minimum wage* is above the equilibrium wage rate, some people who are willing to work will not be able to find employers willing to give them jobs. In other words, it leads to unemployed workers.

#2: Inefficient Allocation Of Sales Among Sellers The persistent unwanted surplus that results from a price floor creates missed opportunities—inefficiencies—that resemble those created by the shortage that results from a price ceiling.

Like a price ceiling, a price floor can lead to an *inefficient allocation*—but in this case an **inefficient allocation of sales among sellers** rather than an inefficient allocation to consumers.

Price floors lead to **inefficient allocation of sales among sellers**: those who would be willing to sell the good at the lowest price are not always those who manage to sell it.

Of course, this wouldn't occur if the government stepped in to buy the entire surplus. In that case, all sellers would find a buyer.

But suppose that it doesn't. For example, in the case of the minimum wage, there may be some job seekers who really want to work but cannot find a job and others who have a job but are almost indifferent between working and not working. This is an inefficient allocation. Whereas, without a minimum wage, those who really want to work would be able to offer their services at a lower wage, and those who are indifferent between working and not working would cease to work at the lower wage.

#3: Wasted Resources Like a price ceiling, a price floor generates inefficiency by *wasting resources*. In this case, however, it is sellers who must waste time and effort searching for a buyer.

For example, in the context of the minimum wage, would-be workers may have to spend many hours searching for jobs or waiting in line in the hope of getting jobs.

In the context of agricultural products, such a search for a buyer is not necessary when the government buys up the surplus. But this just transfers the waste to the government, which must bear the cost of storing and disposing of the surplus.

#4: Inefficiently High Quality We saw that when there is a price ceiling, suppliers produce products that are of inefficiently low quality: buyers prefer higher quality products and are willing to pay for them, but sellers refuse to raise the quality of their products because the price ceiling prevents them from being compensated for it. This same logic applies to price floors, but in reverse: suppliers offer **inefficiently high quality**.

How can this be? Isn't high quality a good thing? Yes, but only if it is worth the cost. Suppose that suppliers spend a lot to make their goods of very high quality, but that this quality is not worth all that much to consumers, who would rather receive the money spent on that quality in the form of a lower price. Then this represents a missed opportunity: suppliers and buyers could make a mutually beneficial deal in which buyers got goods of somewhat lower quality for a much lower price.

#5: Illegal Activity Finally, like price floors, price ceilings can provide an incentive for *illegal activity*—only in this case it is sellers who will be bribing buyers.

Comparing the Predictions to the Facts

To sum up, a price floor creates various negative side-effects:

- An artificially-induced *surplus* of the good;
- Inefficiency that arises from the artificially-induced surplus, which can manifest itself in three ways—an inefficient allocation of sales among sellers, wasted resources, and an inefficiently high level of quality offered by suppliers;
- Temptation to engage in illegal activity, particularly bribery and corruption of government officials.

How well do these predictions fit the facts? Let's begin by considering price floors imposed on agricultural commodities, where the government buys up any unsold production at the floor price. This was the method employed by European Community in the 1970s for commodities such as butter, milk, and grains. The result? It soon found itself the proud owner of a so-called "butter mountain", which was followed in the 1980s with a "grain mountain", and then

Price floors often lead to inefficiency in that goods of **inefficiently high quality** are offered: sellers offer high-quality goods at a high price, even though buyers would prefer a lower quality at a lower price.

a “milk lake”. Similarly, the United States government has at times found itself warehousing thousands of tons of butter, cheese, and other farm products. So, in the context of a variety of agricultural commodities, prediction #1 is supported by the facts.

What about the associated inefficiencies? As we have noted above, when the government commits itself to buying up the surplus production, all sellers will find a buyer; so it is difficult to argue that there will be an inefficient distribution of sales among sellers, or that sellers waste time and effort finding a buyer. Similarly, there is no need for sellers to produce an inappropriately high quality of the good in order to attract buyers. Instead, the inefficiency manifests itself in the tax dollars spent accumulating an unwanted surplus that may end up being either destroyed or thrown away because of spoilage—and this is pure waste. Moreover, this waste causes great political embarrassment, given the food shortages that exist in many parts of Africa. To avoid these occurrences, government officials have to spend time and effort disposing of the unwanted goods. Some governments, such as the European Union, end up paying exporters to sell products at a loss overseas. In the United States, the government has paid farmers to not produce the products at all.

Only when the surplus production is not sold will sellers waste time and effort finding buyers, and react by producing excessive quality. A good example comes from the days when trans-Atlantic airfares were set artificially high by international treaty. Surplus production manifested itself in empty seats. Forbidden to compete for customers by offering lower ticket prices, airlines tried to attract more customers by providing expensive services, like lavish in-flight meals—food that went largely uneaten. At one point, the regulators tried to restrict this practice by defining maximum service standards—for example, that a “snack service” should consist of no more than a sandwich. One airline then introduced what it called a “Scandinavian Sandwich”, a towering affair, forcing the convening of another conference to define “sandwich”. All of this was wasteful, especially considering that what passengers really wanted was less food and lower airfares.

Finally, if sellers are still unable to attract buyers they may resort to illegal behaviour. For example, workers desperate for jobs might agree to work off the books for employers who conceal their employment from the government—or who bribe the government inspectors. This practice is known in Europe as “black labour”, and is especially common in Southern European countries, including Italy and Spain.

“Black Labour” in Southern Europe The best-known example of a price floor is the minimum wage rate. While there is some controversy over the effects of small increases in the minimum wage (as we will discuss in the next section), most economists believe that if the minimum wage is increased to a sufficiently high level, there will be adverse employment effects, especially on the least-skilled workers. This prediction is borne out in many European countries, where minimum wages, as a proportion of average weekly wages, have been set much higher than in Canada. The higher minimum wage in these countries is exacerbated by significantly higher payroll taxes than in Canada, which further increases the cost of hiring labour. (Payroll taxes make the actual cost of hiring a worker higher than the worker’s pay cheque.)

The result is that in Europe the minimum wage is well above the wage rate that would make the quantity of labour supplied by workers equal to the quantity of labour demanded by employers. This results in high unemployment—an artificially induced surplus of millions of workers, especially young workers, who seek jobs but cannot find them.

In countries where the enforcement of labour laws is lax, however, there is a second, entirely predictable result: widespread evasion of the law. In both Italy and

Spain, officials believe that there are hundreds of thousands, if not millions, of workers who are employed by companies that pay them less than the legal minimum, fail to provide the required health or retirement benefits, or both. In many cases the jobs are simply unreported: Spanish economists estimate that about a third of the country's reported unemployed are actually working at unreported jobs in the black labour market. In fact, Spaniards waiting to collect cheques from the unemployment office have been known to complain about the long lines that keep them from getting back to work!

Employers in these countries have also found legal ways to evade the wage floor. For example, Italy's labour regulations apply only to companies with 15 or more workers. This gives a big cost advantage to small Italian firms, many of which remain small in order to avoid having to pay higher wages and benefits. And sure enough, in some Italian industries there is an astonishing proliferation of tiny companies. For example, one of Italy's most successful industries is the manufacture of fine woollen cloth, centred in the Prato region. The average textile firm in that region employs only four workers!

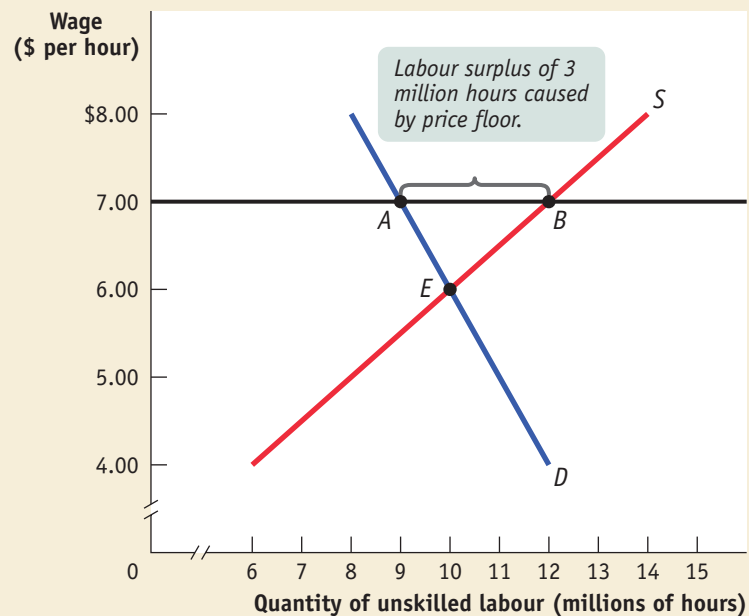
Some Controversy over the Effects of Minimum Wages We should not conclude without mentioning that there is currently a controversy in the economics profession about whether small increases in the minimum wage above the equilibrium do have negative employment effects. This controversy partly reflects the work of David Card and Alan Krueger (much of which is summarized in their book *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton University Press, 1995), which has set off a heated debate, and eroded the consensus on the issue.

Looking at Figure 4-6, you may well think to yourself that adverse employment effects *must* occur as long as the minimum wage is binding (meaning that it is above

Figure 4-6

The Effects of a Minimum Wage

The dark horizontal line represents the minimum wage of \$7 an hour. The competitive model predicts that this will cause a decrease in the amount of labour demanded to 9 million hours of labour, while increasing the amount of labour supplied to 12 million hours. The surplus labour—3 million labour hours—is unemployed.



the equilibrium wage of \$6). This certainly is the prediction of the competitive model. But the question is whether the competitive model is the best framework to use when analysing minimum wage effects. Even though there may be large numbers of buyers and sellers of unskilled labour, the market may have some non-competitive elements. Like the housing market, the good in question is not identical. All jobs are slightly different—as are workers. Moreover, information is difficult to acquire, and finding the right job can involve a costly search process. This may give employers some ability to influence the market price. Of course, whether this matters or not is an empirical question.

There is another difference between labour markets and the markets for grain, butter, or blueberries: labour cares how much it sells for, whereas blueberries do not. This means that labour might work harder if it is paid better, and might be less inclined to shirk and less inclined to change jobs. These effects might stimulate demand for labour, but these are issues that Figure 4-6 does not incorporate. But again, whether they are important or not is an empirical matter.

Interestingly, at this point the empirical debate has not been resolved. Neumark and Wascher (*Industrial and Labour Relations Review*, 2004) observe that evidence is mixed for almost every country in the world, including the United States, France, the United Kingdom, New Zealand, and Portugal.

Only in Canada has the evidence been consistent—showing significant and increasingly important negative employment effects of minimum wages. But even here, new work by McDonald and Myatt (2005) suggests that whether minimum wages do have a negative employment effect in Canada depends crucially on the overall state of the economy. When the overall unemployment rate is low, only a very small effect is found.

To conclude, no one doubts that if the minimum wage were increased high enough, jobs would be lost and unemployment created. The debate is whether this conclusion holds true for small increases in the minimum wage above the equilibrium level. At stake is whether the competitive model is entirely appropriate to analyse all aspects of the labour market.

economics in action

If Minimum Wages Are Not a Good Way of Helping Labour, Then What Is?

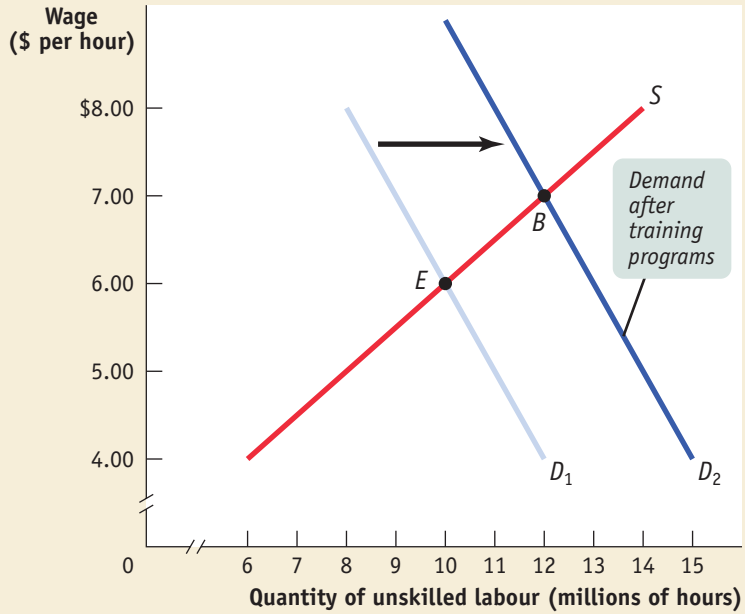
Minimum wages in Canada are, on average, lower in terms of purchasing power than at any time in the last 30 years. They vary from a low of \$5.90 an hour in Alberta to a high of \$8.50 an hour in Nunavut (as of July 2004), and average around \$7.00 an hour. Working 40 hours a week, 52 weeks a year at minimum wage pretty much guarantees an income below the poverty line. While many minimum-wage earners are young people from well-off families, more than 40 percent of minimum-wage earners come from poor households. (See Nicole Fortin and Thomas Lemieux, “Income Redistribution in Canada: Minimum Wages Versus Other Policy Instruments”, in *Public Policies in a Labour Market in Transition*, edited by W. C. Riddell and F. St-Hilaire, 2004.) So, should minimum wages be increased?

One could certainly make a case for increasing the minimum wage. First, a small increase may not adversely affect the number of jobs available, especially in the context of low overall unemployment. Second, even if it did reduce the available jobs, it would still succeed in increasing the incomes of those who retain their jobs. This benefit may more than offset the cost of some young part-time workers being forced out of the labour market and some older full-time workers being forced onto welfare. Indeed, Fortin and Lemieux calculate that an increase in the minimum wage has

Figure 4-7

The Effects of Job Training Schemes

If workers receive job training that makes them more productive, firms will be willing to hire more labour at all wage rates. In this way, the hourly wage can be increased to, say, \$7 an hour, while avoiding lost jobs and unemployment. In this example, the number of jobs increases to 12 million labour hours. **>web...**



>> QUICK REVIEW

- > The most familiar price floor is the *minimum wage*. Price floors are also commonly imposed on agricultural goods.
- > A price floor above the equilibrium price benefits successful sellers, but causes predictable adverse effects such as a persistent *surplus*, which leads to three kinds of inefficiencies: *inefficient allocation of sales among sellers, wasted resources, and inefficiently high quality*.
- > Price floors encourage illegal activity such as workers who work “off the books”, often leading to official corruption.

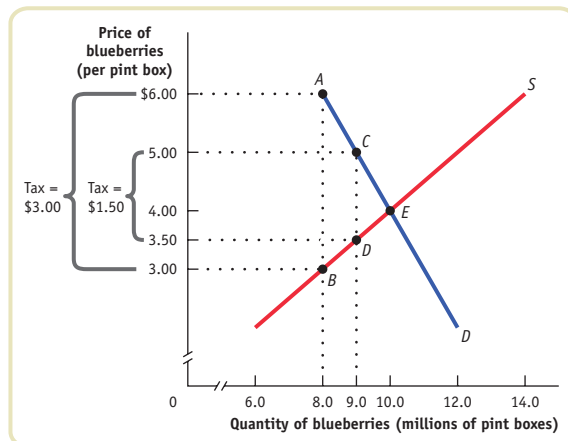
about the same impact on the economy as does an increase in all government transfer programs combined.

But can't we do better? Isn't it possible to help some workers without hurting others? The answer is 'yes', and the way to do that is through job training programs targeted specifically to low-income workers. If it is possible to make workers more productive, firms will be willing to hire more workers at any given wage. In other words, the demand for labour will shift out to the right, as shown in Figure 4-7. This figure shows that job training schemes can increase the equilibrium wage for less skilled workers and at the same time increase, rather than reduce, the number of jobs available. ■

>> CHECK YOUR UNDERSTANDING 4-2

1. The provincial government mandates a price floor for gasoline of \$1.30 per litre. Assess the following statements and illustrate your answer using the accompanying figure:

- a. Proponents of the law claim that it will increase the income of gas station owners. Opponents claim that it will hurt gas station owners as they lose customers.
- b. Proponents claim that consumers will be better off because gas stations will provide better service. Opponents claim that consumers will be generally worse off because they prefer to buy gas at cheaper prices.
- c. Proponents claim that they are helping gas station owners without hurting anyone else. Opponents claim that consumers are hurt and that they will end up doing things like driving across the provincial or international borders or buying gas on the black market.



Controlling Quantities

We have seen that in an attempt to help farmers, the European Union established price floors for many agricultural commodities and bought up the resulting surpluses. We have also seen that this led to costly and embarrassing consequences—“mountains” of stored produce, much of which ended up being thrown away. The United States has tried to avoid this consequence of price floors by paying farmers not to produce. However, this has led to the comic (and very inefficient!) situation where farmers can make more money by *not* producing than they can by producing. Canada’s approach has been to restrict the production of the supported commodity through quotas.

In general, governments try to regulate not only prices but also quantities. A **quota** is a form of **quantity control**. The total amount of the good that can be transacted under the quantity control is called the **quota limit**. Unlike price controls that can set upper or lower limits on prices, quantity controls always set an upper (not a lower) limit on quantities. Typically, the government limits quantity in a market by issuing **quota-licenses**—which are actual pieces of paper giving you the right to produce a certain amount of the product.

There are many examples of quantity controls, ranging from limits on the number of taxis that are allowed to operate in a metropolitan area, to limits on the quantity of salmon that West Coast fishers are allowed to catch. Some attempts to control quantities are undertaken for good economic reasons, some for bad ones; in many cases, as we will see, quantity controls introduced to address a temporary problem become politically hard to remove later because the beneficiaries don’t want them to stop, even after the original reason for their existence is long gone. But whatever the reasons for such controls, they have certain predictable—and usually undesirable—economic consequences.

Canadian Agricultural Quotas

In Canada, the most important example of the use of quantity controls is in agriculture. In the early 1970s “marketing boards” were created for turkey, chicken, eggs, milk, butter, and cheese—the main purpose of which was not to “market” the product, but to set a price floor for the producer and to impose quotas to prevent surplus production. The idea was to help support and stabilize farm incomes, and ensure quality control.

Because poultry and dairy products are mobile across provincial and national borders, the schemes operate nationally under a set of federal/provincial agreements. The Canadian Dairy Commission sets national prices and determines provincial quotas for milk, butter, and cheese products; the National Farm Products Council does the same for eggs and poultry. Foreign imports are prevented with the use of high tariff barriers.

The marketing boards eliminate all competition. Competition among provinces is avoided since quotas are always stated in terms of market share (percentage of the total market), and these shares haven’t been changed since the scheme was introduced in the 1970s. So, if the national body deemed that production must be lowered to maintain the floor price, all provinces would suffer the same percentage decrease in production. The provincial marketing boards would then pass on these percentage reductions to its own registered producers.

Competition between producers is also eliminated, since the producer is guaranteed the same price whether his output is sold to the public or to food processors, or ends up being destroyed. Competition with new producers is likewise eliminated, since new producers can only enter the market if they buy a quota from an existing producer.

So, high prices and the elimination of risk explain why farmers generally like the marketing boards. But consumers pay for these gains to farmers in the form of

A **quantity control** or **quota** is an upper limit on the quantity of some good that can be bought or sold. The total amount of the good that can be legally transacted is the **quota limit**.

A **quota-license** gives its owner the right to supply a certain quantity of the good.

higher prices. We can estimate the extent of these higher prices in two ways: first, by the size of the tariffs required to keep out imports; and second, by the value of the quota itself. Since tariffs in some cases are as high as 300 percent, and since quota rights to become an average-size chicken producer (for example) can cost as much as half a million dollars, both methods suggest that Canadian consumers pay inflated prices for their cheapest sources of protein.

The Anatomy of Quotas

To understand why agricultural quotas are worth so much money, let's consider the market for milk, shown in Figure 4-8. The table in the figure shows hypothetical supply and demand schedules in terms of millions of litres of milk per week. The equilibrium, indicated by point *E* in the figure and by the shaded entries in the table, is a price of \$1 per litre, with 13 million litres bought per week.

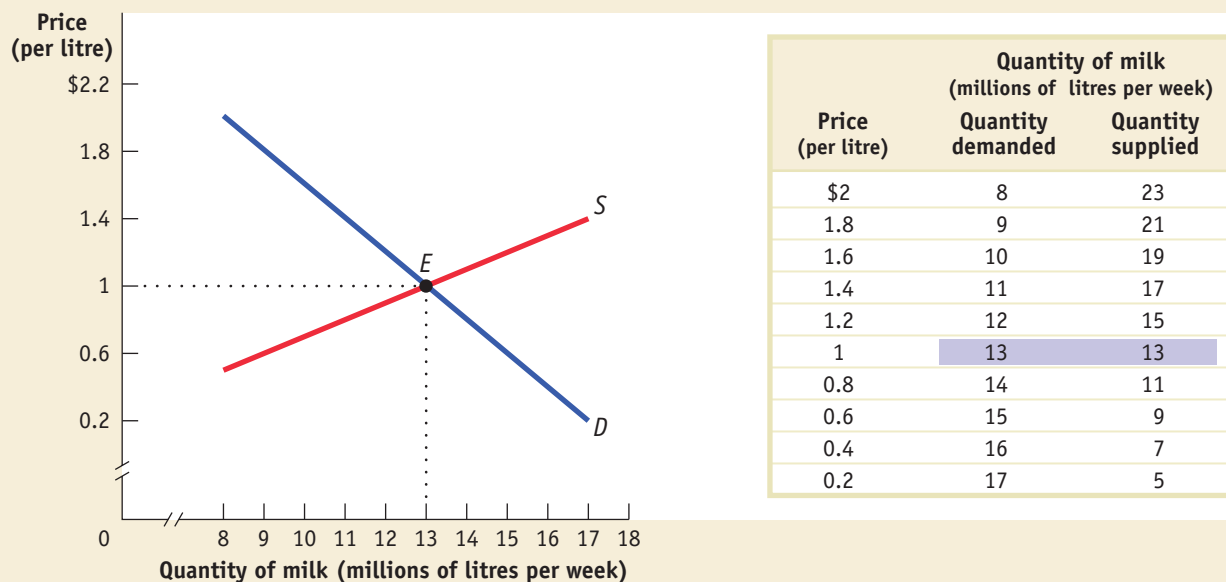
Until now, we have derived the demand curve by answering questions of the form: "How many litres of milk will customers want to buy if the price is \$1 per litre?" But it is possible to reverse the question and ask instead: "At what price will consumers want to buy 13 million litres of milk?" The price consumers are willing to pay for a given quantity is known as the **demand price** of that quantity. You can see from the demand schedule in Figure 4-8 that the demand price of 13 million litres is \$1.00 per litre, the demand price of 15 million litres is \$0.60, and so on.

Similarly, we have derived the supply curve by answering questions of the form: "How many litres of milk would dairy farmers supply at a price of \$1 per litre?" But we can also reverse this question to ask: "At what price will suppliers be willing to supply 13 million litres?" The price at which suppliers will supply a given quantity is the **supply price** of the quantity. We can see from the supply schedule in Figure 4-8 that the supply price of 13 million litres is \$1 per litre, the supply price of 15 million litres is \$1.20, and so on.

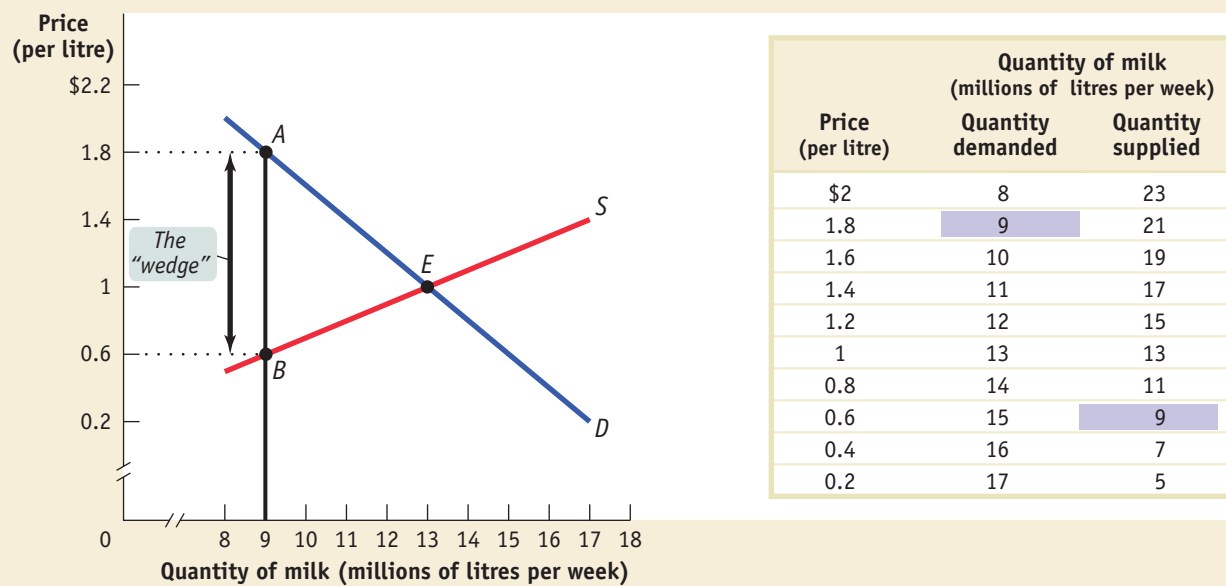
The **demand price** of a given quantity is the price at which consumers will demand that quantity.

The **supply price** of a given quantity is the price at which producers will supply that quantity.

Figure 4-8 The Market for Litres of Milk in the Absence of Government Controls



Without government intervention, the market reaches equilibrium with 13 million litres consumed per week, at a price of \$1 per litre.

Figure 4-9 Effect of a Quota on the Market for Milk

The table shows the demand price and the supply price corresponding to each quantity: the price at which that quantity would be demanded and supplied, respectively. The government imposes a quota of 9 million litres, represented by the dark vertical line. The price paid by consumers rises to \$1.80 per litre, the demand price of 9

million litres, shown by point A. The supply price of 9 million litres is only \$0.60 per litre, shown by point B. The difference between these two prices is the quota rent per litre per week, the earnings that accrue to the owner of a quota. The quota rent drives a wedge between the demand price and the supply price. [>web...](#)

Now, suppose the milk marketing board limits production to 9 million litres of milk per week. Figure 4-9 shows consumers must be at point A on the demand curve, corresponding to the shaded entry in the demand schedule: the demand price of 9 million litres of milk is \$1.80 per litre. Meanwhile, milk producers must be at point B on the supply curve, corresponding to the shaded entry in the supply schedule: the supply price of 9 million litres of milk is \$0.60 per litre.

But how can the price paid by consumers be \$1.80 while the price received by milk producers is \$0.60? The answer is that in addition to the market for milk, there will also be a market for milk quotas. Quota-holders may not always want to produce milk. In this event, they can sell their quotas to others for a fee. So we need to consider two sets of transactions here, and hence two prices: (1) transactions in milk, and the price at which these will occur; and (2) transactions in milk quotas, and the price at which these will occur. It will turn out that since we are looking at two markets, the prices \$1.80 and \$0.60 will both be right.

To see how this works, consider how much a prospective producer would be willing to pay for the right to produce a litre of milk. The supply price of a litre of milk is \$0.60, yet that litre will sell for \$1.80. So, the value of the right to produce that litre is the difference between these two prices. And the price of a quota will exactly equal this value. How can we be sure of that? Because competition among new entrants to acquire quotas will drive their price up until it exactly equals what they are worth.

In our example, the value of a quota allowing a producer to sell one litre of milk is \$1.20 per week (\$1.80 minus \$0.60). Now we can see why quotas are worth so much money. Over the course of a year, this one-litre quota is worth \$62.40

A quantity control or quota drives a **wedge** between the demand price and the supply price of a good; that is, the price paid by buyers ends up being higher than that received by sellers. The difference between the demand and supply price at the quota limit is the **quota rent**, the earnings that accrue to the holder of the quota-license from ownership of the right to sell the good. It is equal to the market price of the quota when quotas are traded.

(52 weeks at \$1.20 per week). But since a quota never expires, there is also a second year, and a third year, and so on indefinitely. And the price of a quota will reflect this difference in the selling price and the cost of production for all this future production.

Moreover, a moderately sized dairy operation would produce upwards of 9,000 litres a week. We now see why, in real life, the quotas associated with a moderately sized dairy operation would cost about \$1.5 million.

The reason a quota is valuable comes back to the difference between the demand price of the quantity transacted and the supply price of the quantity transacted. The quota drives a **wedge** between these two prices, illustrated by the double arrow in Figure 4-9. This wedge has a special name: the **quota rent**. The quota rent is the earnings that accrue to the holder of the quota-license from ownership of a valuable commodity, the right to sell the good. This is precisely the amount that a new entrant has to pay for a quota on a per-litre, per-week basis.

So, a new entrant into the dairy business would make \$1.80 per litre of milk per week. But \$1.20 of this is going to pay for the cost of buying the quota. All the new entrant really makes is \$0.60 per litre, per week. Only the original recipients of quotas—when they were given away back in the 1970s—receive any benefit from the quota system in terms of increased income.

The Costs of Quotas

Like price controls, quantity controls can have some undesirable side effects. The first is the by-now familiar problem of *inefficiency* due to missed opportunities: quantity controls prevent mutually beneficial transactions from occurring—transactions that would benefit both buyers and sellers. Looking back at Figure 4-9, you can see that starting at the quota limit of 9 million litres, individuals would be willing to pay at least \$1.60 per litre for an additional 1 million litres and that milk producers would be willing to produce that milk as long as they get at least \$0.70 per litre. Thus, this is milk that would have been consumed if the quota limit were not in place. The same is true for the next 1 million litres: individuals are willing to pay at least \$1.40 per litre when the number of litres is increased from 10 to 11 million, and milk producers are willing to produce that milk as long as they get at least \$0.80 per litre. Again, this milk would have been consumed without the quota limitation, and again it represents missed opportunities.

Generally, *as long as the demand price of a given quantity exceeds the supply price, there is a missed opportunity*. A buyer would be willing to buy the good at a price that the seller would be willing to accept, but such a transaction does not occur because the quota forbids it.

And because there are transactions that people would like to make but are not supposed to, quantity controls generate an incentive to engage in manoeuvres to evade them or even to break the law. This means that the marketing boards must not only set the quotas but also enforce them. They must investigate cases in which farmers illegally supply milk to stores and supermarkets, or illegal egg producers package their eggs in the discarded boxes of a legal producer. In sum, quantity controls typically create the following undesirable side effects:

- Inefficiencies, or missed opportunities, in the form of mutually beneficial transactions that don't occur
- Incentives for illegal activities

The Future of Quotas

So agricultural quotas are inefficient, generate incentives for illegal activity, raise the prices of inexpensive sources of protein, and don't even benefit many of the producers in the industry. Why don't we just abolish them?

>>CHECK YOUR UNDERSTANDING 4-3

1. Suppose that Figure 4-8 gives the supply and demand for milk, but that the quota is set at 10 million litres per week instead of 9 million. Find the following and indicate them on Figure 4-8:
 - a. The price of a litre of milk
 - b. The quota rent
2. Illustrate the answer to the following using Figure 4-8.
 - a. Suppose the quota limit is further increased to 12 million litres. What happens to the quota rent?
 - b. Assume that the quota limit is 12 million litres. Suppose demand falls due to a health scare about hormones given to dairy cattle adversely affecting humans. What is the smallest decrease in demand that would result in the quota no longer having an effect on the market?

A Surprise Parallel: Taxes

To provide the services we want, from national defence to public parks, governments must collect taxes. But taxes impose costs on the economy. Among the most important roles of economics is tax analysis: figuring out the economic costs of taxation, determining who bears those costs, and suggesting ways to change the tax system that will reduce the costs it imposes. It turns out that the same analysis that we have just used to understand quotas can be used, with hardly any modification, to make a preliminary analysis of taxes too.

Why a Tax Is Like a Quota

Suppose that the supply and demand curves for milk were exactly as shown in Figure 4-8. Again, this means that in the absence of government action, the equilibrium price of a litre of milk will be \$1, and 13 million litres will be bought and sold.

Now suppose that instead of imposing a quota on the number of rides, the government imposes an **excise tax**—a tax on sales of a particular good or service. Specifically, it charges milk producers \$1.20 for each litre they sell. What is the effect of the tax?

From the point of view of a milk producer, the tax means that he or she doesn't get to keep all of the price: if a customer pays a \$2 a litre, \$1.20 goes in tax, so the producer gets only \$0.80. This increases the *supply price* corresponding to any given number of litres produced—for example, dairy farmers will now require a price of \$2.20 to supply as many litres as they would have been willing to supply at a price of \$1 in the absence of the \$1.20 tax.

So, the tax on sales shifts the supply curve up by the amount of the tax. This is shown in Figure 4-10, where S_1 is the supply curve before the tax is imposed, and S_2 is the supply curve after the tax is imposed. The market equilibrium moves from E , where the price is \$1 per litre and 13 million litres are bought and sold, to A , where the price is \$1.80 per litre and 9 million litres are bought and sold. A is, of course, on both the demand curve D and the new supply curve S_2 .

But how do we know that 9 million litres will be supplied at a price of \$1.80? Because the price *net of the tax* is \$0.60, and the pre-tax supply price of 9 million litres is \$0.60, as shown by point B in Figure 4-10.

Does all this look familiar? It should. The equilibrium with a \$1.20 tax on a litre of milk, which reduces the quantity bought and sold to 9 million litres, looks just like the equilibrium with a quota of 9 million litres, which leads to a quota rent of \$1.20. Just like a quota, the tax *drives a wedge* between the demand price and the supply price.

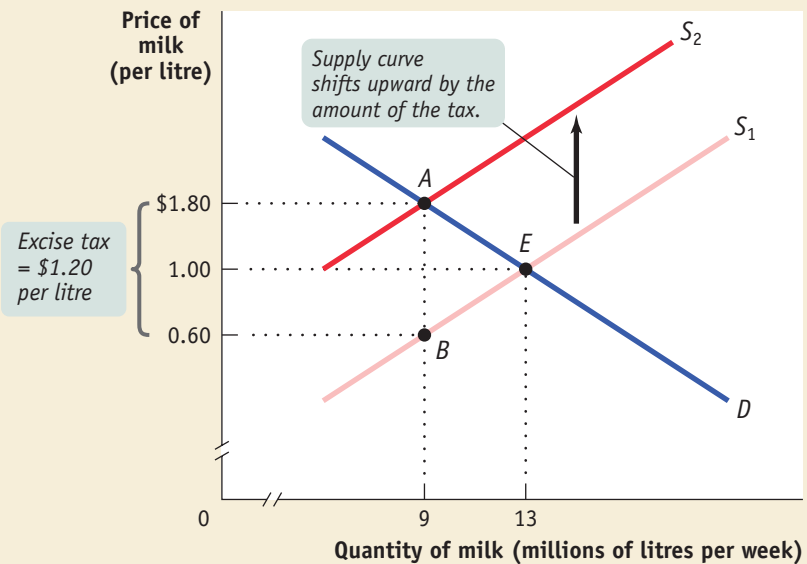
The only difference is that instead of paying \$1.20 towards the cost of a quota, producers pay a \$1.20 tax to the government. In fact, there is a way to make an excise tax and a quota completely equivalent. Imagine that instead of issuing a limited number of quotas, the government simply rented them at \$1.20 per litre per week. This \$1.20 quota rent charged by the government would, for all practical purposes, be a \$1.20 excise tax.

An **excise tax** is a tax on sales of a particular good or service.

Figure 4-10

Effect of an Excise Tax Levied on the Sales of Milk

S_1 is the supply curve before the tax. After the government requires producers to pay a tax of \$1.20 for every litre they produce, the supply curve shifts up by \$1.20, to the new supply curve S_2 . This means that the price producers receive net of tax is \$0.60, represented by point B on the old supply curve S_1 . And the price paid by consumers is \$1.80, represented by point A on the new supply curve S_2 . The tax drives a wedge between the demand price, \$1.80, and the supply price, \$0.60.



Who Pays an Excise Tax?

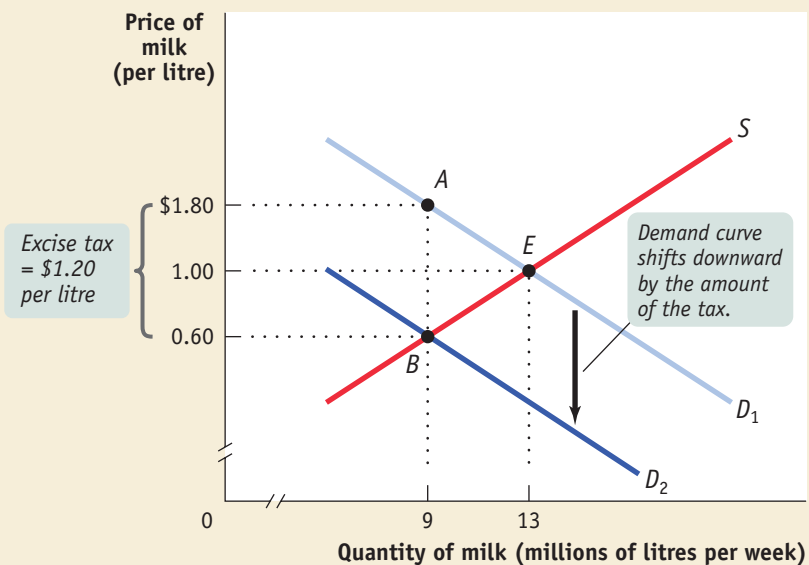
We have just imagined a tax that must be paid by the *sellers* of a good. But what would happen if the tax was instead paid by the *buyers*—if, say, to buy a litre of milk you had to pay a special \$1.20 tax?

The answer is shown in Figure 4-11. If a milk consumer must pay a \$1.20 tax on each litre, this means that a price of \$0.60 a litre is in effect a price of \$1.80 a litre.

Figure 4-11

Effect of an Excise Tax Levied on Purchases of Milk

D_1 is the demand curve before the tax. After the government requires consumers to pay the \$1.20 tax per litre, the demand curve shifts down by \$1.20 to the new demand curve D_2 . Producers again receive, net of tax, \$0.60, represented by point B , while consumers again pay a total price of \$1.80, represented by point A . The *incidence* of the tax is exactly the same as in Figure 4-10; this shows that who officially pays a tax is irrelevant when answering the question of who bears the burden of the tax.



That is, the price buyers pay must be \$1.20 lower in order for the number of litres of milk demanded post-tax to be the same number as that demanded pre-tax. So, the demand curve shifts *down*, from D_1 to D_2 , by the amount of the tax. This shifts the equilibrium from E to B , where the market price is \$0.60 per litre and 9 million litres are bought and sold. In this case, \$0.60 is the supply price of 9 million litres, while \$1.80 is the demand price—but in effect, buyers do pay \$1.80 when the tax is included. So it is just as if consumers were on their original demand curve at point A .

If you compare Figures 4-10 and 4-11, you will immediately notice that they show the same price effect. In each case, buyers pay an effective price of \$1.80 per litre, sellers receive an effective price of \$0.60 a litre, and 9 million litres are bought and sold. *It doesn't seem to make any difference who officially pays the tax.*

This insight is a general one in analyzing taxes: the **incidence** of a tax—that is, who *really* bears the burden of the tax—is often not a question you can answer by asking who actually writes the cheque to the government. In this particular case a \$1.20 per litre tax on milk is reflected in a rise of \$0.80 in the price paid by buyers and a fall of \$0.40 in the price received by sellers; so the incidence of the tax is mostly paid by buyers. This incidence is the same regardless of whether the cheque to the tax man is made out by buyers or by sellers.

Buyers don't always pay most of the incidence of an excise tax; to understand what determines how it is split, it's necessary to use information about the supply and demand curves.

The **incidence** of a tax is a measure of who really pays it.

The Revenue from an Excise Tax

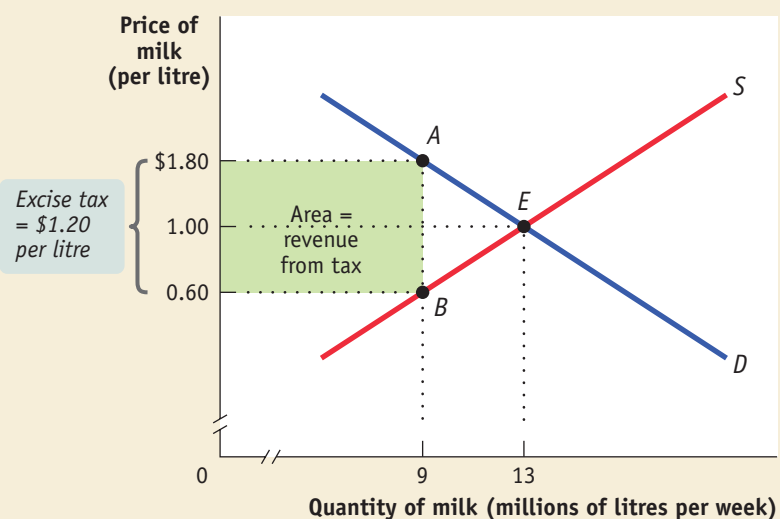
While both buyers and sellers lose from an excise tax, the government does collect revenue—which is the whole point of the tax. How much revenue does the government collect? The answer is that the revenue is equal to the area of the shaded rectangle in Figure 4-12.

To see why this is the revenue collected by a \$1.20 per litre tax on milk, notice that the *height* of the rectangle is \$1.20. This is the amount of the tax per litre; it is also, as we have seen, the size of the wedge that the tax drives between the supply price and

Figure 4-12

The Revenue from an Excise Tax

The government revenue collected by this excise tax is equal to the area of the shaded rectangle. In this case, it is \$1.20 per litre \times 9 million litres = \$10.8 million.



the demand price. Meanwhile, the *width* of the rectangle is 9 million litres, which is the equilibrium number of litres given that \$1.20 tax.

The revenue collected by the tax is

$$\text{Revenue} = \$1.20 \text{ per litre} \times 9 \text{ million litres} = \$10.8 \text{ million}$$

But the area of the rectangle is

$$\text{Area} = \text{height} \times \text{width} = \$1.2 \times 9 \text{ million} = \$10.8 \text{ million}$$

This is a general principle: *the revenue collected by an excise tax is equal to the area of the rectangle whose height is the wedge that the tax drives between the supply and demand curves, and whose width is the quantity bought and sold under the tax.*

The Costs of Taxation

What is the cost of a tax? You might be inclined to answer that it is the money taxpayers pay to the government. But suppose that the government used that money to provide services everyone wants, or for that matter simply handed out the money to taxpayers. Would we then say that the tax didn't cost anything?

No—because a tax, like a quota, prevents mutually beneficial transactions from occurring. Consider Figure 4-12 once more. With a \$1.20 per litre tax on milk, consumers pay \$1.80 per litre, while producers receive only \$0.60 per litre. There are therefore some potential consumers who would be willing to drink milk if the price were only, say, \$1.40 per litre; and there are producers who would be willing to supply those litres for a price of, say, \$0.80. If those producers and consumers could be brought together, this would be a mutually beneficial transaction. But such a deal would be illegal, because the \$1.20 tax would not have been paid.

More broadly, we know that the tax reduces consumption by 4 million litres of milk each week. This milk would have been consumed in the absence of the tax, to the mutual benefit of the consumers and producers.

So an excise (or sales) tax imposes additional costs, in the form of inefficiency, over and above the money actually paid in taxes. This inefficiency occurs because the tax discourages mutually beneficial transactions. This is referred to as the **excess burden** or **deadweight loss** from a tax. And all real-world taxes do impose some excess burden, although badly designed taxes impose bigger excess burdens than well-thought-out taxes.

Economists sometimes say that the real cost of a tax is not the taxes that people pay but the taxes that they *don't* pay. What they mean is that people change their behaviour in order to avoid taxes—for example, by going hungry instead of drinking a glass of milk—and in so doing miss opportunities for mutual benefit.

One final point: like all of the other government policies analyzed in this chapter, taxes create incentives for illegal activity. The following Economics in Action explains how excise taxes on cigarettes have given rise to a substantial smuggling business. And, of course, even seemingly respectable people have been known to be a bit creative with their income taxes.

The **excess burden** or **deadweight loss** from a tax is the extra cost in the form of inefficiency that results because the tax discourages mutually beneficial transactions.

economics in action

When A Canadian Tax Became Too High

Cigarettes have long been subject to excise taxes. But from 1982 to 1993, as the anti-smoking movement gained political power, cigarette taxes in Canada rose from an average of \$0.59 to \$3.86 per pack. Governments saw this as a way of raising more revenue, while discouraging a bad habit.

However, U.S. sales taxes (which are a state rather than a federal matter) remained relatively low. In particular, the states bordering Canada had much lower taxes than we did. For example, in early 1994 the state of Michigan had a tax rate of only \$0.25 per pack. This divergence created an opportunity for those who didn't mind breaking the law. By 1994, organized crime was conducting massive smuggling operations into Canada. Violence increased, merchants suffered, and in one year alone the federal and provincial governments lost over \$2 billion in tax revenues. Estimates suggested that nearly one in three cigarettes in Canada was contraband. This led to a fall in the average price paid for cigarettes, which undermined the government's health policy objectives of reducing tobacco consumption—particularly among youth.

By 1994, shaken by the crime explosion and lost tax revenues, Canadian Prime Minister Jean Chrétien said the cigarette tax threatened “the very fabric of Canadian society”. Even the Federal Health Minister argued that a tax cut was needed to force children to rely on regular stores for their cigarettes, where purchases could be better controlled. As a result, in July 1994 federal and provincial cigarette taxes were slashed (by around \$1.40 a pack). This, combined with an increase in taxes in Michigan (from \$0.25 to \$0.75 a pack) essentially eliminated cigarette smuggling into Canada.

>> QUICK REVIEW

- ▶ Like a quota, an *excise tax* drives a wedge between the demand price and the supply price.
- ▶ The *incidence* of an excise tax does not depend on who officially pays the tax, the buyer or the seller.
- ▶ Like a quota, an excise tax creates inefficiency by preventing mutually beneficial transactions between buyers and sellers. This *excess burden*, or *deadweight loss* from a tax means that its true cost is always larger than the amount paid in taxes.
- ▶ Also like quotas, taxes create an incentive for illegal activity.

>> CHECK YOUR UNDERSTANDING 4-4

Use Figure 4-4 to answer the following questions.

- a. What amount of excise tax generates the same level of inefficiency as a quota of 9 million pint boxes of blueberries?
- b. What quota level generates the same level of inefficiency as an excise tax of \$3.00 per pint box of blueberries?
- c. In questions a. and b., find how the burden of an excise tax is split between buyers and sellers. That is, explain how much of the tax is paid by buyers and how much is paid by sellers in each case.

• A LOOK AHEAD •

In the last two chapters, we have gotten a first taste of how economic models help us understand the real world. As we've seen, supply and demand—a simple model of how markets work—can be used to understand and predict the effects of everything from bad weather to misconceived government policies.

In the chapters to come, we'll see how models—including supply and demand, but others as well—can shed light on a wide variety of economic phenomena and issues.

SUMMARY

1. Governments often intervene in markets in attempts to “defy” supply and demand. Interventions take the form of *price controls* or *quantity controls*. But they generate predictable and undesirable side effects, consisting of various forms of inefficiency and illegal activity.
2. A *price ceiling*—a maximum market price—below the equilibrium price benefits buyers but creates shortages: because price is maintained below the equilibrium price, it increases the quantity demanded and reduces the quantity supplied compared to the equilibrium quantity. This leads to predictable problems: *inefficiencies* in the form of *inefficient allocation to consumers*, *wasted resources*, and *inefficiently low quality*.

It also encourages illegal activity as people turn to *black markets* to get the good. Because of these problems, price ceilings have generally lost favour as an economic policy tool. But some governments continue to impose them, either because they don't understand the effects or because the price ceilings benefit some influential group.

3. A *price floor*—a minimum market price—above the equilibrium price benefits sellers but creates persistent surplus: because price is maintained above the equilibrium price, it reduces the quantity demanded and increases the quantity supplied compared to the equilibrium quantity. This leads to predictable problems:

inefficiencies in the form of *inefficient allocation of sales among sellers*, *wasted resources*, and *inefficiently high quality*. It also encourages illegal activity and black markets. The most well known kind of price floor is the minimum wage law, but price floors are also commonly applied to agricultural products.

4. **Quantity controls**, or *quotas*, limit the quantity of a good that can be bought or sold. The amount allowed for sale is called the *quota limit*. The government issues *licenses* to individuals, the right to sell a given quantity of the good. The owner of a license earns a *quota rent*, earnings that accrue from the right to sell the good. It is equal to the *demand price* at the quota limit—what consumers are willing to pay for that amount—and to the *supply price* at the quota limit, what suppliers are willing to accept for that amount. Economists say that a quota drives a *wedge*

between the demand price and the supply price, and this wedge is equal to the quota rent. Quantity controls generate inefficiency in the form of mutually beneficial transactions that don't occur, as well as encouraging illegal activity.

5. **Excise taxes**—taxes on the purchase or sale of a good—have effects similar to quotas. They raise the price paid by buyers and reduce the price received by sellers, driving a wedge between the two. The *incidence* of the tax—the division of higher prices to consumers and lower prices to sellers—does not depend upon who officially pays the tax. Excise taxes cause inefficiency because they prevent some mutually beneficial transactions. This inefficiency is the *excess burden* or *deadweight loss* caused by the tax. Excise taxes also encourage illegal activity in attempts to avoid the tax.

KEY TERMS

Price controls, p. xx

Price ceiling, p. xx

Price floor, p. xx

Inefficient, p. xx

Inefficient allocation to consumers, p. xx

Wasted resources, p. xx

Inefficiently low quality, p. xx

Black markets, p. xx

Minimum wage, p. xx

Inefficient allocation of sales among sellers, p. xx

Inefficiently high quality, p. xx

Quantity control, p. xx

Quota, p. xx

Quota limit, p. xx

License, p. xx

Demand price, p. xx

Supply price, p. xx

Wedge, p. xx

Quota rent, p. xx

Excise tax, p. xx

Incidence, p. xx

Excess burden, p. xx

Deadweight loss, p. xx

PROBLEMS

1. Suppose it is decided that rent control in Toronto will be abolished and that market rents will now prevail. Assume that all rental units are identical and are therefore offered at the same rent. To address the plight of low-income residents who may be unable to pay the market rent, an income supplement will be paid to all low-income households equal to the difference between the old controlled rent and the new market rent.
- Use a diagram to show the effect on the rental market of the elimination of rent control. What will happen to the quality and quantity of rental housing supplied?
 - Use a second diagram to then show the additional effect of the income supplement policy on the market. What effect does the income supplement policy have on the market rent and quantity of rental housing supplied in comparison to your answers to part a?
 - Are tenants better or worse off as a result of these policies? Are landlords better or worse off as a result of these policies?
 - From a political standpoint, why do you think cities have been more likely to resort to rent control rather than a policy of income supplements to help low-income people pay for housing?

2. In order to ingratiate himself with voters, the mayor of Gotham City decides to lower the price of taxi rides in the city. Assume, for simplicity, that all taxi rides are the same distance and therefore cost the same. The following table shows the demand and supply schedules for taxi rides.

Fare (\$ per ride)	Quantity demanded (millions of rides per year)	Quantity supplied (millions of rides per year)
\$7.00	10	12
6.50	11	11
6.00	12	10
5.50	13	9
5.00	14	8
4.50	15	7

- a. Assume that there are no restrictions on the number of taxi rides that can be supplied in the city (i.e., there is no medallion system). Find the market equilibrium price and quantity.

- b. Suppose that the mayor sets a price ceiling of \$5.50. How large is the shortage of rides? Illustrate with a diagram. Who loses and who benefits from this policy?
- c. Suppose that the stock market crashes and, as a result, people in Gotham City are poorer. This reduces the quantity of taxi rides demanded by 6 million rides per year at any given price. What effect will the mayor's new policy have now? Illustrate with a diagram.
- d. Suppose that the stock market rises and the demand for taxi rides returns to normal (that is, returns to the demand schedule given in the table). The mayor now decides to ingratiate himself with taxi drivers. He announces a policy in which operating licences are given to existing taxi drivers; the number of licences is restricted so that only 10 million rides per year can be given. Illustrate the effect of this policy on the market, and indicate the resulting price and quantity transacted. What is the quota rent per ride?
3. Suppose that Gotham City controls the price of bread, set at a predetermined price that is above the market price.
- a. Draw a diagram that shows the effect of the policy. Will the policy act as a price ceiling or a price floor?
- b. What kinds of inefficiencies are likely to arise when the controlled price of bread is above the market price?
- Suppose that for a one-year period a poor wheat harvest causes a leftward shift in the supply of bread and therefore an increase in the market price of bread. Bakers now find that the controlled price of bread is below the market price.
- c. Draw a diagram that shows the effect of the price control on the market for bread during this one-year period. Did the policy act as a price ceiling or a price floor?
- d. What kinds of inefficiencies do you think occurred during this period? Explain in detail.
4. The accompanying table shows the demand and supply schedules for blueberries. Suppose the Canadian government decides that the incomes of blueberry farmers should be maintained at a level that allows the traditional family blueberry business to survive. The government therefore implements a price floor of \$1 per quart. It does this by buying surplus blueberries until the price is \$1 per quart.

Price (\$ per quart)	Quantity demanded (millions of quarts per year)	Quantity supplied (millions of quarts per year)
1.20	550	850
1.10	600	800
1.00	650	750
0.90	700	700
0.80	750	650

- a. How many surplus blueberries will be produced as a result of this policy?
- b. What will be the cost to the government of this policy?
- c. Since blueberries are an important part of the Canadian diet, the government decides to provide the surplus blue-

berries it purchases to elementary schools at a price of only \$0.60 per quart. Assume that schools will buy any amount of blueberries available at this low price. But parents now reduce their purchases of blueberries at any price by 50 million quarts per year because they know that their children are getting blueberries at school. How much will the blueberry program now cost the government?

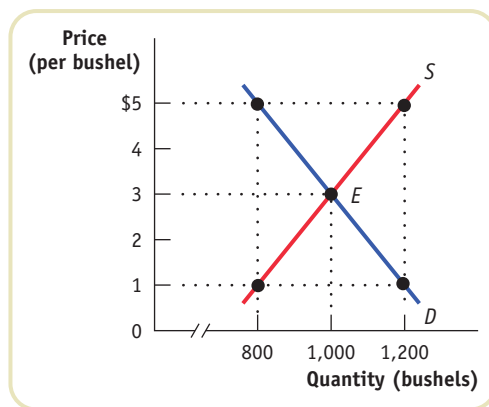
- d. Give two examples of inefficiencies arising from wasted resources that are likely to result from this policy. What is the missed opportunity in each case?
5. As noted in the text, European governments tend to make greater use of price controls than does the Canadian government. For example, the French government sets minimum starting yearly wages for new hires who have completed *le bac*, a diploma roughly equivalent to a high school diploma. The demand schedule for new hires with *le bac* and the supply schedule of new job seekers with *le bac* are given in the accompanying table. The price here—given in euros, the currency used in France—is the same as the yearly wage.

Wage (per year)	Quantity demanded (new hires per year)	Quantity supplied (new job seekers per year)
45,000	200,000	325,000
40,000	220,000	320,000
35,000	250,000	310,000
30,000	290,000	290,000
25,000	370,000	200,000

- a. In the absence of government interference, what is the equilibrium wage and number of graduates hired per year? Illustrate with a diagram. Will there be anyone who seeks a job at the equilibrium wage who is unable to find one—that is, will there be anyone who is involuntarily unemployed?
- b. Suppose the French government sets a minimum yearly wage of 35,000 euros. Is there any involuntary unemployment at this wage? If so, how much? Illustrate with a diagram. What if the minimum wage is set at 40,000 euros? Also illustrate with a diagram.
- c. Given your answer to part b and the information in the table, what do you think is the relationship between the level of involuntary unemployment and the level of the minimum wage set by the government? Who benefits from such a policy? Who loses? What is the missed opportunity here?
6. Until recently, the standard number of hours worked per week for a full-time job in France was 40 hours, just as in Canada. But in response to social unrest over high levels of involuntary unemployment, the French government instituted a 35-hour workweek—a worker could not work more than 35 hours per week even if both the worker and employer wanted it. The motivation behind this policy was that if current employees worked fewer hours, employers would be forced to hire more new workers. Assume that it is costly to employers to train new workers. French employers were greatly opposed to this

policy and threatened to move their operations to neighbouring countries that did not have such employment restrictions. Can you explain their attitude? Give an example of both an inefficiency and an illegal activity that are likely to arise from this policy.

7. Suppose the Canadian government is considering the use of price supports to provide income assistance to Canadian wheat farmers. It has two schemes in mind. Scheme A uses price floors, which it will maintain by buying up the surplus wheat production. Scheme B uses target prices in combination with quotas. In Scheme B, the government limits overall production and gives the farmer an amount equal to the difference between the market price and the target price for each unit sold. Consider the market for wheat depicted in the accompanying diagram:



- a. If the government sets a price floor of \$5.00, how many bushels of wheat are produced? How many are purchased by consumers? By the government? How much income do wheat farmers earn? How much does the program cost the government?
- b. Suppose the government sets a target price of \$5.00 and a quota of 1,000 bushels. How many bushels of wheat are purchased by consumers and at what price? By the government? How much revenue do wheat farmers receive? How much does the program cost the government?
- c. Which program costs wheat consumers more? Which program costs the government more? Explain.
- d. What are the inefficiencies that arise in each case?
8. The waters off the Pacific coast were once teeming with salmon. Now, due in part to overfishing by the commercial fishing industry, the stocks of salmon are seriously depleted. Since 1985, under the Pacific Salmon Treaty, the United States and Canada have tried to agree on quotas to allow fish stocks to recover. Canada's quota limits the amount of salmon caught per year by all Canada-licensed fishing boats. As soon as the Canadian fishing fleet meets the quota limit, the salmon fishery is closed down for the rest of the year. The following table gives hypothetical demand and supply schedules for salmon caught in Canada. Suppose the quota is set at 7 million kilograms.

Price of salmon (per kilogram)	Quantity of salmon (millions of kilograms per year)	
	Quantity demanded	Quantity supplied
\$20	6	15
18	7	13
16	8	11
14	9	9
12	10	7

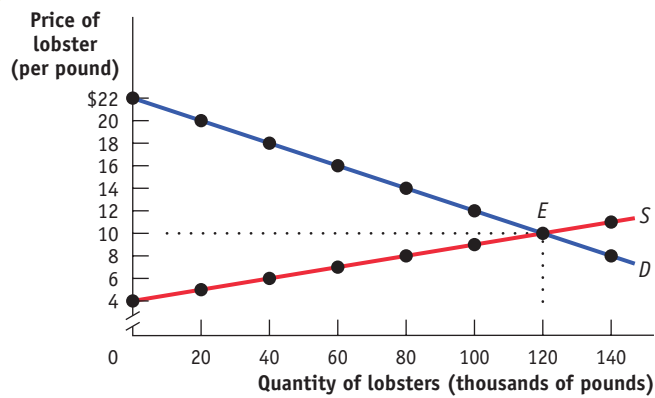
- a. Use a diagram to show the effect of this policy on the market for Canadian salmon in 1991.
- b. How do you think fishermen will change how they fish in response to this policy?
- c. Use your diagram from part a to show an excise tax that achieves the same reduction in the amount of salmon caught as the quota. What is the amount of the tax per kilogram?
- d. What kinds of activities do you think an excise tax will tempt people to engage in?
- e. The excise tax is collected from the fishermen, who protest that they alone are bearing the burden of this policy. Why might this protest be misguided?
9. Since the Auto Pact was abandoned in February 2001 as a result of a World Trade Organization ruling, Canada has had free trade in cars and trucks. Suppose, however, that the government decides it would like to help Canadian truck manufacturers compete against foreign imports. It could do this by imposing a quota on the number of foreign trucks imported into Canada, or it could impose an excise tax on each foreign truck sold in Canada. Hypothetical demand and supply schedules for imported trucks are given in the following table:

Price (\$ per truck)	Quantity demanded (hundreds of trucks)	Quantity supplied (hundreds of trucks)
\$32,000	100	400
31,000	200	350
30,000	300	300
29,000	400	250
28,000	500	200
27,000	600	150

- a. In the absence of government interference, what is the price of an imported truck? How many are sold in Canada? Illustrate with a diagram.
- b. Suppose the Canadian government adopts a quota, allowing no more than 20,000 foreign trucks to be imported. What is the effect on the market for these trucks? Illustrate using your diagram from part a and explain.
- c. Now suppose that, instead of a quota, the government imposes an excise tax of \$3,000 per truck. Illustrate the effect of this excise tax in your diagram from part a. How many trucks will now be purchased and at what price? What will the foreign automaker receive per truck?

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- d. Calculate the government revenue raised by the excise tax in part c. Then illustrate it on your diagram from that part. Do you think the government, from a revenue standpoint, prefers an excise tax or a quota?
- e. Explain how the government policy, whether it be a quota or an excise tax, benefits Canadian truck manufacturers. Whom does it hurt? What is the missed opportunity here, and how does it reflect inefficiency?
10. To preserve the Atlantic lobster fisheries, quota restrictions limit harvests. To catch lobster, one must have a lobster fishing licence. Today, about 12,000 licences are active in the Atlantic community, and each licence permits between 250 and 400 traps per season (depending on the exact lobster fishing area). Suppose that these restrictions limit the catch in Atlantic Canada to 80,000 pounds of lobster a year. The accompanying figure shows hypothetical demand and supply curves for pounds of Atlantic lobsters.



- a. In the absence of quotas, what are the equilibrium price and quantity?
- b. What is the *demand price* at which consumers wish to purchase 80,000 pounds of lobsters?
- c. What is the *supply price* at which suppliers are willing to supply 80,000 pounds of lobsters?
- d. What is the *quota rent* per pound of lobster when 80,000 pounds are sold?

- e. Find an excise tax that achieves the same reduction in the harvest of lobsters as the quota system. Show it on the figure. What is the government revenue collected from this tax?
- f. Explain a transaction that benefits both buyer and seller but is prevented by the quota restriction. Explain a transaction that benefits both buyer and seller but is prevented by the excise tax.
11. In each of the following cases involving taxes, explain: 1) whether the incidence of the tax falls more heavily on consumers or producers, 2) why government revenue raised from the tax is not a good indicator of the true cost of the tax, and 3) what missed opportunity or inefficiency, arises.
- a. The government imposes an excise tax on the sale of all college textbooks. Before the tax was imposed, 1 million textbooks were sold every year at a price of \$50. After the tax is imposed, 600,000 books are sold yearly; students pay \$55 per book, while publishers receive \$30 per book.
- b. The government imposes an excise tax on the sale of all airplane tickets. Before the tax was imposed, 3 million airplane tickets were sold every year at a price of \$500. After the tax is imposed, 1.5 million tickets are sold every year; travelers pay \$550 per ticket, while airlines receive \$450 per ticket.
- c. The government imposes an excise tax on the sale of all toothbrushes. Before the tax, 2 million toothbrushes were sold yearly at a price of \$2.00. After the tax is imposed, 800,000 toothbrushes are sold yearly; consumers pay \$1.75 per toothbrush, while producers receive \$1.25 per toothbrush.