NORMATIVE ANALYSIS OF PERFECT COMPETITION 11.3

passenger on plastic forks to accompany in-flight meals. Even if the cost of plastic forks doubled, it would have little effect on airline ticket prices or the amount of flying. Consequently, the output effect is significant in the airlines' derived demand for aviation fuel, but not in their derived demand for plastic forks.

TOTAL SURPLUS AS A MEASURE OF PERFORMANCE

Our measure of market performance is based on conventional supply and demand diagrams. Figure 11.22 depicts the supply and demand curves for wine, $S$ and $D$, respectively. As shown earlier, if the wine market is competitive, then in equilibrium $X_1$ gallons of wine are exchanged at a price of $p_1$ per gallon. What is the gain to consumers from being able to purchase that amount of wine at this price? Chapter 4 showed that the gain is equal to their consumer surplus, depicted graphically as the area below the demand curve and above the price for each unit that is purchased, shaded area $A$ in Figure 11.22. In the same way, the gain to producers from being able to sell quantity $X_1$ at a price per gallon of $p_1$ is their producer surplus, which is area $B$. From society's point of view, the total gain is the sum of the consumer and the producer surplus, or areas $A$ plus $B$. This sum of consumer and producer surplus is known as total surplus.

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5 In fact, a typical major airline spent a total of $5.86 per passenger on food in 1992 (Fabricant 1993, B1).

6 As noted in Chapter 4, consumer surplus is only an approximation to the welfare gain as long as income effects are not zero. We shall assume that income effects are sufficiently small that the approximation is adequate.
FIGURE 11.22
Total Surplus in the Wine Market

Consumer surplus is the area below the demand curve and above the price line, shaded area A. Producer surplus is the area above the supply curve and below the price line, shaded area B. Total surplus is the sum of areas A and B.

Total surplus can also be viewed as the total benefits derived from consumption of the good minus the total costs of producing it. The total benefit derived from consuming $X_1$ gallons of wine is the area under the willingness-to-pay schedule (the demand curve) up to the quantity consumed, the shaded area in Panel A of Figure 11.23. The total cost of producing $X_1$ gallons of wine is equal to the area under the marginal cost curve up to the quantity produced, the shaded area in Panel B. Taking the difference, total surplus is the shaded area in Panel C. Notice that this area equals the sum of areas A and B in Figure 11.22, as it should, since the areas in the two diagrams are measuring the same thing.

The same procedure can be used to compute the total surplus associated with any quantity of wine. It is the area under the demand curve and above the marginal cost curve up to the particular quantity consumed. Hence, we can associate with any level of output the amount of total surplus it generates.

Now that we have total surplus as a measure of market performance, a key question is whether total surplus is maximized at the competitive equilibrium. If some other allocation had a higher total surplus, then output level $X_1$ would not be efficient because it would be possible to make consumers and producers collectively better off. If, on the other hand, there is no alternative that leads to a higher level of total surplus, then the competitive equilibrium is efficient in this sense.

To see whether the competitive equilibrium maximizes total surplus, let’s begin by considering output level $X_a$ in Figure 11.24. $X_a$ is less than the competitive level. How do the corresponding levels of total surplus compare? That is, as we move from $X_a$ to $X_1$, does total surplus increase or decrease? We must consider both the incremental benefits and costs of the move. To consumers, the benefit of consuming the additional $X_1 - X_a$ gallons (ignoring, for the moment, the cost) is the area under the demand curve between $X_a$ and $X_1$. This area is equal to the sum of shaded areas $F$ and $G$ in the figure. Graphically, the cost of supplying the additional output is given by the area under the supply curve from $X_a$ to $X_1$, area $F$. The figure indicates that the gain in consumption benefits exceeds the additional cost by area $G$. Hence, total surplus is greater when the
FIGURE 11.23
Total Surplus Is Equal to Total Willingness to Pay Minus Total Cost

The total benefit derived from consuming $X_1$ gallons of wine is the shaded area in Panel A. The total cost of producing $X_1$ gallons of wine is the shaded area in Panel B. Taking the difference, total surplus is the shaded area in Panel C.

FIGURE 11.24
Total Surplus in the Wine Market Is Greatest When Total Output Is at the Competitive Level

Total surplus in the wine market is greatest when total output is equal to the perfectly competitive equilibrium level $X^*$. Lowering output from $X^*$ to $X_1$ would lower total surplus by area $G$. Raising output from $X^*$ to $X_6$ would lower total surplus by area $J$.

The quantity of the good exchanged in the market is at the competitive equilibrium level rather than at $X^*$.

Compare the level of total surplus under the competitive equilibrium with the level of total surplus when total output is $X_1$. The same approach can be used to show that any other level of output below $X_1$ is also too small in the sense that total surplus would be higher at the competitive output level. In moving from a lower output level to $X_1$, the value of the additional output, as measured by consumers' willingness to pay, exceeds its cost.
Let’s consider an output level exceeding the competitive level, such as $X_1$ in Figure 11.24. To determine whether increasing output from $X_1$ to $X_h$ is desirable from society’s point of view, we must again consider its incremental benefits and costs. The benefit to consumers of the additional $X_h - X_1$ gallons is the area under the demand curve between $X_1$ and $X_h$, shaded in area $I$. The cost of supplying this additional quantity is the area under the supply curve from $X_1$ to $X_h$, the sum of areas $I$ and $J$. Hence, the cost to suppliers exceeds the gain to consumers by area $J$. That is, the net result of exchanging more than the equilibrium quantity is to lower total surplus. While allowing individuals to consume more wine does indeed increase their gross consumption benefits, this increase is not enough to offset the cost of producing the additional wine. The same argument can be used to show that any other output level greater than $X_1$ yields less total surplus.

We have seen that total surplus is lower whenever industry output is either less than or greater than the competitive equilibrium level. We conclude that, in a competitive market, total surplus is maximized at the equilibrium output level. This is an important finding. It tells us that under the conditions of perfect competition, markets do a good job (as measured by total surplus) of allocating society’s resources. Of course, this result does not guarantee that the conditions of perfect competition always hold. As we will see in the chapters following this one, they often do not. Even in those situations, however, this result is useful because it provides a benchmark against which to compare market performance under other conditions.

**Are Value Judgments Being Made?**

In addition to questioning whether the conditions of perfect competition really hold, you might also wonder about the validity of total surplus as a measure of market performance. Implicit in our use of total surplus is the claim that society is best off when the total surplus is maximized. But you might be worried that there is some kind of value judgment behind that claim. If you are, you are correct; there is. The value judgment is that a dollar to each person is given the same weight, whether that person is a consumer or producer, and whether rich or poor. When the price of a good rises, consumers lose surplus and the producers gain. Our total surplus measure is based on the net change in dollar benefits. Suppose that consumers lose $100 of surplus and producers gain $100 of profit. Total surplus is unchanged—the gains and losses exactly cancel one another, so “society” is neither better nor worse off. However, if consumers tend to be low-income households, and the producers are relatively wealthy individuals, you may well consider this transfer of income to be socially undesirable. The total surplus measure does not capture such distributional concerns.

Thus, maximizing total surplus leads to an outcome that is efficient, but not necessarily “fair.” In the light of this fact, is total surplus a useful measure of social well-being? The justification for this approach is that once total surplus is maximized, it can be redistributed later in accord with the community’s notions of fairness—make the pie as big as possible, and then worry about dividing it. Maximizing total surplus is a first step, with redistributing income a second. This procedure is reasonable as long as we believe that there would not be much of a shift in the supply and demand curves if income were redistributed fairly. When this condition is satisfied (as economists assume it is in most practical situations), the appropriate first step does not depend on the particular second step chosen. Hence, evaluating alternative allocations on the basis of the total amount of surplus they provide often is a sensible procedure.
Prices versus Quantities and Their Roles in Attaining Efficiency

We have been comparing the level of total surplus under competitive equilibrium with the surplus levels that would arise at different market quantities, but we have said nothing about prices. The reason for this is that if we know what the quantity is, then we have all the information needed to calculate total surplus.

Does this mean that prices are unimportant? No, it does not. Prices play important roles in a competitive market. In competitive markets, consumers and producers make their consumption and production choices taking the market price as given. Prices convey information to suppliers and demanders, and they generate incentives guiding production and consumption. Thus, in competitive markets, prices affect quantity decisions and thus (indirectly) affect total surplus.

Another role for prices is to transfer income from consumers to producers. Unlike the other roles, this one does not really matter for efficiency—for a given quantity, a change in the price merely results in a transfer of surplus, not net creation or loss of surplus. Of course, consumers and producers are interested not just in the total amount of surplus, but also in their shares of the total. These shares depend on prices.

These roles of prices and their differing effects on total surplus (as well as its components, producer surplus and consumer surplus), can be seen by considering two examples. In the first example, government policy influences price directly. In the second, government policy has an indirect influence on price.

EVALUATING RENT CONTROL

What do New York, Paris, and Berkeley have in common? They all have rent control laws. In practice, rent control laws can be very complicated, but the main feature of such laws is that they stipulate maximum rents that landlords can collect from tenants. Supporters of rent control argue that the imposition of price ceilings helps tenants by ensuring that they can rent housing at low prices. Detractors, however, argue that rent control makes it impossible for any but a lucky few to obtain rental housing, and that in the end it actually reduces the amount of housing available. We can use the competitive model to get a handle on the effects of rent control.

To model the market for rental housing, think of each apartment as generating a certain amount of housing services. The quantity of housing services depends on such factors as the size of the apartment, the quality of the plumbing, and how well it is maintained. In Figure 11.25, $D$ is the demand for housing services in a particular city and $S$ is the supply. The demand curve for housing slopes downward because as the price per unit of housing services goes up, people want smaller, lower-quality apartments. The supply curve slopes upward because when the price of housing services goes up, landlords are induced to build more housing as well as to maintain better existing structures. From Figure 11.25 we see that in the absence of rent control, the competitive equilibrium quantity of housing services is $X_1$ and the market rental rate is $p_1$. What about surplus? Graphically, consumer surplus is the area below the demand curve and above the price line up to the market quantity. Hence, in the absence of rent control, consumer surplus is the sum of areas $A$ and $B$. Producer surplus is the area below the price line and above the supply curve up to the market quantity, the sum of areas $C$, $D$, and $E$ in Figure 11.25.
Now suppose that a rent ceiling of $\bar{p}$ is imposed, and that it is effectively enforced so that no one can cheat. Figure 11.25 indicates that when the price is $\bar{p}$, the quantity demanded is $X_b$. But at price $\bar{p}$, the most that suppliers will provide is $X_a$. Since $X_b$ is greater than $X_a$, there is a shortage of $X_b - X_a$ units of housing services.

How large is this gap? Just as with the minimum wage, the elasticity of demand and supply are important determinants of the size of the shortage. In the short run, the supply of housing may be quite inelastic—there is little else that landlords can do with their apartment buildings because rent control laws usually restrict owners’ ability to sell their buildings as condominiums. As long as the rental ceiling is greater than short-run average cost, landlords will continue to rent in the short run. In the long run, however, the quantity supplied is much more responsive to price. As existing buildings wear down, owners may be unwilling to undertake the needed maintenance. As old buildings are torn down, the land may be used for office buildings rather than for replacement apartments. Peterba (1984) has estimated the long-run price elasticity of supply for housing to be about 2.0. If this estimate is correct, it tells us that a rent control policy that keeps the price 10 percent below the free-market level would lead to a 20 percent fall in the total amount of rental housing supplied.

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7 Cheating can come in many forms. Shortly before Berkeley’s rent control law went into effect, one landlord founded the First National German American Sebastian Kneipp and Mineral Water Church. In order to become a tenant, you must become a member of the church—for a $1,200 fee that you pay to the landlord—and you must promise not to engage in “loud solo or choir singing” before 8:00 a.m. or after 10:00 p.m.” (Rauber 1990, 2).
We are now in a position to use this model to find out who benefits and who loses from rent control. In the absence of rent control, the price is $p_1$, and the market quantity is $X_1$. Under the rent control regime, the price falls to $\bar{p}$ and the quantity falls to $X_a$. These price and quantity changes lead to changes in producer, consumer, and total surplus.

\(\nabla\) **Producers are worse off with rent control.** Producer surplus is the area below the new price line and above the supply curve up to the new market quantity, shaded area $E$ in Figure 11.25. In the absence of rent control, producer surplus was the sum of areas $C$, $D$, and $E$. Producer surplus has fallen, and the fall has two components. Shaded rectangle $C$ represents the loss to producers from having to rent $X_a$ apartments at a lower price under rent control. Area $D$ represents the loss from the fact that, at the lower rent, it is not worth supplying as many apartments as before.

\(\nabla\) **Some households are better off because of rent control.** Those consumers who are lucky enough to obtain apartments under rent control are better off by an amount equal to the reduction in rent times the number of units rented. The price falls from $p_1$ to $\bar{p}$ on $X_a$ units, so this gain to consumers is shaded rectangle $C$ in Figure 11.25.

\(\nabla\) **Some households lose from rent control.** There are people who would have been willing to pay the competitive price, $p_1$, and who would have gotten an apartment in a free market, but who do not get apartments when rent control is imposed and the quantity of housing supplied falls. The only effect of rent control on these people is to shut them out of the housing market. Their lost surplus is area $B$ in Figure 11.25.

While those people who get an apartment under the controlled price gain from rent control, landlords and people who are unable to obtain apartments lose. This contrast opens the obvious question: On balance, do the gains outweigh the losses? Is rent control a "good" policy?

Supporters of rent control in the city government of Berkeley tried to answer this question by conducting a survey of people living in rent-controlled apartments. Not surprisingly, these people favored rent control. As our surplus analysis tells us, these are exactly the people who gain from rent control. To measure the effects of rent control correctly, we have to compare the gains of these renters with the losses suffered by the landlords and those households who get frozen out of the rental market.

A total surplus measure provides a valuable framework for making this comparison. In terms of surplus analysis, our central question can be rephrased as: Does rent control raise or lower total surplus? To answer this question, we need to add up the effects on consumers and suppliers. As just discussed, those consumers who obtain apartments under rent control are better off by an amount equal to the reduction in rent times the number of units rented, area $C$. But this area does not represent a net gain to society because area $C$ is equal to the loss suffered by landlords from having to rent out $X_a$ apartments at the lower price. In other words, area $C$ is merely a transfer of income from landlords to this group of tenants—it does not represent any net change in total surplus. The only net effects of rent control are the losses suffered by those renters who are unable to obtain apartments as a result (area $B$) and the additional losses suffered by landlords from the reduction in the quantity of housing that they rent (area $D$). **As a result of rent**
control, total surplus falls by the sum of areas B and D.\textsuperscript{8} Intuitively, we see that people would have been willing to purchase the \( X_1 - X_s \) units of housing services eliminated by rent control at a price that producers would have been willing to accept. By eliminating these opportunities for mutually beneficial trade, rent control lowers total welfare.

NORMATIVE ANALYSIS OF A SALES TAX

Earlier, we saw that the relative price elasticities of supply and demand determine how the burden of a tax is split between buyers and sellers. Here, we will use our surplus analysis to say more about the overall burden of a tax.

Let’s look at the effects of the federal tax on wine. In the absence of any taxation, the equilibrium is at the intersection of the market supply and demand curves graphed in Figure 11.26. Prior to the imposition of the tax, the equilibrium price and quantity of wine are \( p_1 \) and \( X_1 \), respectively. The resulting total surplus is the sum of the shaded areas \( A, B, C, \) and \( E \).

Suppose that a unit tax of $3 per gallon of wine is imposed on each purchase. As shown in Figure 11.14, from the buyers’ perspective, this tax shifts the supply curve upward by $3, and the new equilibrium quantity is where the demand curve and the new supply curve cross, point \( e_2 \) in Figure 11.26. The after-tax equilibrium quantity is \( X_2 \).

What is the resulting level of total surplus? It is tempting to say “the sum of shaded areas \( A \) and \( B \).” If this answer were correct, then we would say that total surplus had fallen by the sum of areas \( C \) and \( E \). But this approach misses an important point—the tax revenues collected are not a true cost to society. The revenues are simply a transfer from wine producers and consumers to the govern-

\textsuperscript{8} Actually, the loss of total surplus from rent control could be even higher. In the figure, we have assumed that those who most desire apartments are the ones who get them. But with rent control, there is no guarantee that the consumers who value rental units the most are the ones who do, in fact, rent them.
ment. Put another way, when the government is involved in the market, even if only indirectly, we have to be sure to include government surplus in our calculation of total surplus for the market. The government's surplus is the tax revenue that it collects. Here, the tax revenue collected is equal to $3 times the number of gallons sold after the tax has been imposed, which is shaded area C in Figure 11.26. Since it is a pure transfer, area C represents neither a gain nor a loss in total surplus.

Where does all of this leave us? Since the total surplus is the area under the demand curve and above the marginal cost curve up to the market quantity, we see that after-tax total surplus is the sum of areas A, B, and C. Total surplus has fallen by area E. Intuitively, by distorting prices, the unit tax on wine induces consumers to buy, and producers to sell, less than the competitive equilibrium level of output. Consequently, even though producers would be willing to supply an additional \(X_1 - X_2\) gallons of wine for less than the amount that consumers would be willing to pay for them, these gallons are not produced and consumed.

By blocking these mutually beneficial trades, the tax lowers total surplus by area E. This loss above what is collected in tax revenue is known as the excess burden of the tax. This loss is also known as a deadweight loss because it is a loss to firms and households that is not offset by a gain to the government collecting the tax.\(^9\)

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**PROGRESS CHECK 11-8**

Draw a graph on which you show the change in consumer surplus that results from the imposition of the tax. Draw a second graph on which you show the change in producer surplus that results from the imposition of the tax.

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**SECTION RECAP**

Total surplus is an important measure of market performance. It is equal to the net difference between total consumption benefits (as measured by the area under the demand curve) and total production costs (as measured by the area under the supply curve). Total surplus is greatest when the quantity traded in the market is equal to the competitive equilibrium level. Any policy that distorts total output away from the competitive level will lower total surplus.

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**SUMMARY**

This chapter examines the perfect competition model, which provides a useful framework for analyzing the behavior of many important markets.

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The competitive model relies on four fundamental assumptions: (1) sellers are price takers; (2) sellers do not behave strategically; (3) entry into the market is free; and (4) buyers are price takers.

\(\n\)

The fundamental assumptions underlying the competitive model are most likely to be valid when: (a) there are many buyers; (b) there are many sellers; (c) the outputs of different suppliers are close substitutes; (d) buyers are well-informed about the available alternatives; and (e) new firms face neither technological nor legal barriers to their entering the market.

\(\n\)

In the short run, the number of firms in the industry

\(^9\) You may recall that we also used the term deadweight loss back in Chapter 4 to refer to the pure waste associated with a trade quota. In each case, it represents a loss for which there is no offsetting gain.
EQUITY

One of the nice things about Pareto efficiency is that it does not depend on measuring and comparing the amounts of utility obtained by individuals. All we need to know is whether making one individual better off would require making another worse off—not how "deserving" each person is. Nevertheless, it is not obvious that every Pareto efficient outcome is desirable. To see why, consult again the utility possibilities function \( UU \) from Figure 12.18. By definition, all points on \( UU \) are Pareto efficient, but they represent very different distributions of real income between Cain and Abel. Which point is best? The criterion of Pareto efficiency provides no way to choose among them.

If we want to choose a point, sooner or later we have to make interpersonal comparisons of utility, which requires that we introduce value judgments. To do so we postulate a social welfare function, which embodies society’s views on the relative deservedness of Cain and Abel. Imagine that, just as an individual's welfare depends upon the quantities of commodities he consumes, society's welfare is some function \( W \) of each individual's utility:

\[
Social \ welfare = W(U^C, U^A), \tag{12.18}
\]

where, as before, \( U^C \) is Cain’s level of utility, and \( U^A \) is Abel’s.

We assume that the value of social welfare increases as either \( U^C \) or \( U^A \) increases. That is, society is better off when any of its members becomes better off. Note that we have said nothing about how society manifests these preferences. Under some conditions, members of society may not be able to agree on how to rank each other’s utilities, and the social welfare function will not even exist. For the moment, we simply assume that it does exist.

Just as an individual’s utility function for commodities leads to a set of indifference curves for those commodities, so does a social welfare function lead to a set of indifference curves between people’s utilities. A typical set of social indifference curves is depicted in Figure 12.20. The downward slope of the curves indicates that if Abel’s utility decreases, the only way to maintain a given level of social welfare is to increase Cain’s utility, and vice versa. The slopes of the indifference curves represent value judgments about how much society cares about the utilities of the two individuals. Social welfare increases as we move toward the northeast, reflecting the fact that increases in any individual’s utility increase social welfare, other things being the same.

In Figure 12.21, the social indifference curves are superimposed upon the utility possibilities curve from Figure 12.18. Point \( a \) is not as desirable as point \( b \) (point \( b \) is on a higher social indifference curve than point \( a \)) even though point \( a \) is Pareto efficient and point \( b \) is not. Here, society’s value judgments, embodied in the social welfare function, favor a more equal distribution of real income, inefficient though it may be. Of course, point \( c \) is preferred to either of these. It is both efficient and "fair."

Now, the First Welfare Theorem indicates that a competitive system with a complete set of markets leads to some allocation on the utility possibilities curve. There is no reason, however, that it will be the particular point that maximizes social welfare. We conclude that, even if the economy generates a Pareto-

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8 Social welfare functions that depend only upon the utilities of individuals are sometimes referred to as “utilitarian” social welfare functions because of their association with the utilitarian social philosophers of the 19th century.
depend on s. All we making it is not consultation, all distributions personal s. To do s on the individual's society's

(12.18)

or $U^A$ s better prefer-re- degree on not even set of lead social curves level of of the cares move utility on the point b at a is tied in some, it is with a curve. aizes retro-

times arian

FIGURE 12.20
Social Indifference Curves
Social indifference curves indicate the rate at which society is willing to trade off one person's level of utility for the other person's.

FIGURE 12.21
Maximizing Social Welfare
A particular Pareto-efficient allocation of resources need not be socially desirable. Point b is not Pareto efficient, yet it is preferred to point a, which is Pareto efficient.

efficient allocation of resources, government intervention may be necessary to achieve a "fair" distribution of utility. Chapter 18 discusses what kind of criteria the government might use to determine whether a particular distribution is "fair."

BUYING INTO WELFARE ECONOMICS
Welfare economics provides the basis for the normative work in mainstream economics, and it is the framework used to organize the rest of this book. The theory, however, is not uncontroversial.
First of all, the underlying outlook is highly individualistic, with a focus on people's utilities and how to maximize them. This is brought out starkly in the formulation of the social welfare function, Equation (12.18). The viewpoint expressed in that equation is that the goal of a society is to make its members as happy as possible. However, other societal goals are possible—to maximize the power of that state, to glorify God, and so on. Welfare economics does not have much to say to people with such goals.

Because welfare economics puts people's preferences at center stage, it requires that these preferences be taken seriously; that people know best what gives them satisfaction. A contrary view, deeply ingrained in popular culture, is that big businesses manipulate our tastes—we want what corporations say we should want. If one believes that individuals' preferences are ill-formed or corrupt, a theory that shows how to maximize their utility is ethically irrelevant.

Another possible problem with welfare economics is its concern with results. Situations are evaluated in terms of the allocation of resources, and not of how the allocation was determined. Perhaps a society should be judged by the processes used to arrive at the allocation, not the end results. Are people free to enter contracts? Are public processes democratic? To the extent this view is valid, welfare economics lacks any normative significance.

More generally, people's attitudes towards markets are heavily influenced by factors that have little to do with welfare economics. Roman Catholic tradition has long been hostile to capitalism. Is this because the Church Fathers believe that private markets are unlikely to reach the utility possibilities frontier? Of course not. Their concern is not the allocation of resources, but the effect of the system on people's spiritual well-being. They believe that a selfish spirit pervades market economies, and such selfishness is corrosive to the human soul. As Pope Pius XI wrote, "Free competition, though within its limits, is productive of good results, cannot be the ruling principle of the economic world. It is necessary that economic affairs be brought... into subjection to a true and effective guiding principle."

Indeed, even some defenders of market systems have reluctantly concluded that they lack a moral basis. According to journalist Andy Rooney (1989), the market's "only strength is that it works... It seems sad and a sort of spiritual defeat for us all that an economic system based on doing all for No. 1 is more successful than one based on a noble idea."

However, market enthusiasts are not willing to concede the ethical high ground. Some view the market system as having moral appeal because it is the only method of social organization that views the welfare of the individual as an end in itself, not merely a means to some other end. Moreover, philosophers such as Montesquieu argued that because markets disperse decision making, they help check the power of tyrants, enhance personal liberty, and break the stale cake of custom. A number of observers have stressed the links between economic and political freedom: "You can't tell people to think freely about pig production and nothing else" (Samuelson 1987, 54).

A striking example was the 1992 revolution against a corrupt dictatorship in Thailand. The dictatorial regime had allowed markets to operate, apparently hoping that economic growth without political freedom would produce stability. But, as a journalist noted, "The protests seem to arise from a system that works very well economically and then fosters yearnings for political participation—for freedom of expression as well as freedom from hunger, for votes as well as motorcycles" (Kristof 1992, p. A2).
In short, ideology and politics play crucial roles in conditioning people’s attitudes towards markets. Generally, people who put a high weight on personal freedom and whose moral codes emphasize self-responsibility favor free markets, in which individuals make their own decisions and then live with the consequences. Those who view competitive behavior as distressing and favor fraternal and cooperative approaches to problem solving look upon markets with less approval.

We conclude that a great advantage of welfare economics is that it provides a coherent framework for thinking about the desirability of alternative allocations of resources. Because virtually every important public policy problem involves some kind of reallocation of resources, having such a framework is invaluable. Nevertheless, ideological factors that lie outside the realm of welfare economics can and do influence people’s views on economic issues.

SECTION RECAP

The assumptions behind the First Welfare Theorem do not hold completely in real world economies. The theorem assumes that all consumers and firms are price takers, but in certain markets, firms or individuals are price makers. The theorem also assumes that a market exists for each and every commodity. However, when asymmetric information or externalities are present, markets may break down. Hence, there is no reason to believe that the real world allocation of resources is necessarily efficient. Even if it were, government intervention might be appropriate to secure a “fair” distribution of real income. Welfare economics provides an extremely useful framework for evaluating public policy measures whose ostensible purposes are to enhance efficiency and/or increase fairness.

SUMMARY

The circular flow model presented in Chapter 1 illustrated that the various sectors of an economy are intricably linked together. This chapter reinforced and formalized that insight by discussing general equilibrium analysis, which shows how prices and quantities in all markets are simultaneously determined. A second section introduced welfare economics, providing a framework for determining whether the outcomes generated by an economy are in some sense socially desirable.

Supply and demand analysis indicates that if markets are linked, then a shift in the supply or demand curve in one market can influence price and output in the others. The markets for commodities are linked if one of them is an input into the production of another, or if the two commodities are substitutes or complements in consumption or production.

For a set of prices to be consistent with general equilibrium, every firm must be maximizing profits given its technology, every consumer must be maximizing utility subject to his or her budget constraint, and supply must equal demand for each commodity.

Both the one-person economy with production and the pure exchange model illustrate the role of the price system as a coordinator of economic activity.

Welfare economics defines a set of criteria for evaluating economic outcomes. An important criterion is Pareto efficiency, which describes an allocation such that the only way to make one person better off is to make another person worse off.

In order for an allocation to be Pareto efficient, every consumer must have the same marginal rate of substitution between any two goods (consumption efficiency); every producer must have the same marginal rate of technical substitution between any two inputs (production efficiency); and the marginal rate of substitution in consumption must equal the marginal rate of transformation in production (allocation efficiency).
According the First Fundamental Theorem of Welfare Economics, if all households and firms are price takers and there is a market for every commodity, then the allocation of resources will be Pareto efficient. Under these conditions, competitive markets also lead to efficiency in situations involving the allocation of resources over time, and the allocation of resources under uncertainty.

The Second Fundamental Theorem of Welfare Economics tells us that, provided all individuals' indifference curves are convex to the origin, any given Pareto-efficient outcome can be realized as a general competitive equilibrium for some set of prices and initial endowments of resources.

To the extent the assumptions behind the First Welfare Theorem do not hold, real world economies will produce inefficient outcomes. When firms have market power, for example, prices may exceed marginal costs. Moreover, in the presence of externalities and asymmetric information, markets for certain commodities may not exist.

A Pareto-efficient allocation of resources may not be socially desirable if the associated distribution of real income is deemed to be unfair. The social welfare function introduces ethical considerations by showing how society is willing to trade off utility among its members.

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**D I S C U S S I O N  Q U E S T I O N S**

12.1 Consult Figure 12.2, which models the general equilibrium effects of a minimum wage. Show graphically how much the gainers gain, and how much the losers lose. Are the losses or the gains greater? Explain. Use your answers to evaluate the following claim: "Legislators like the minimum wage because it helps the poor, and it does not cost the government anything, because the expense is borne by businesses."

12.2 In the 1970s, the United States was contemplating gasoline rationing. Under the proposed plan (which was never implemented), people would be issued ration coupons; each coupon would entitle them to purchase a gallon of gasoline at a price set by the government. An important feature of the plan was that the coupons would be tradeable. Use a pure exchange model to show how the competitive price of the ration coupons would be determined. (For simplicity, you may assume that the gasoline price set by the government was zero. That is, all a person would need for each gallon of gasoline was one coupon.)

12.3 Your airplane crashes in the Pacific Ocean. You land on a desert island with one other passenger. A box containing 100 little bags of peanuts also washes up on the island. The peanuts are the only thing to eat.

In this economy with two people, one commodity, and no production, represent the possible allocations in a diagram, and explain why every allocation is Pareto efficient. Is every allocation fair?

12.4 Several years ago, executives of PepsiCo, Inc. were surprised when the government of the former Soviet Union "proposed a scheme to pay for soft-drink syrup with obsolete submarines. The Soviets thought the subs might be sold by Pepsi and turned into a chain of floating restaurants. Pepsi took the deal—but sold the subs for scrap" ("Pepsi and a Sub," *Newsweek* 1989). Use an Edgeworth Box to illustrate this transaction. (Assume there are only two goods involved, *subs* and *Pepsi*.)

12.5 Consider an economy which has two inputs, capital and labor, each of which is fixed in total supply. Assume further that the inputs are allocated across two firms, one of which produces guns, and the other butter.

a. State the condition for a production-efficient allocation of capital and labor.

b. Use your answer to part (a) to prove that with production efficiency, the ratio of the marginal physical products of capital and labor in gun production must equal the ratio of the marginal physical products of capital and labor in butter production.

c. Former Soviet leader Mikhail Gorbachev stated, "It is particularly important that actual pay of every worker be closely linked to his personal contribution to the end result, and that no limit be set on it." Use the results from part (b) to explain why Gorbachev's condition is necessary for production efficiency.

*Hint*: An input's "contribution to the end result" is its marginal revenue product.

12.6 "Before 1980, black peasant farmers in Zimbabwe were forbidden to bring their crops to markets. With the end of white minority rule in 1980, this all changed" (Parente and Prescott 1991, p. 3). Keep this quote in mind as you consider a farmer who can grow cotton and/or corn, but has no access to markets. Show how