MICROECONOMIC ANALYSIS: MARKET EFFICIENCY AND MARKET FAILURE

The economic function left to state and local governments in the United States system is the allocation function, i.e., the determination of the amount and mix of local public services to be offered.¹

—ROY BAHL

HEADLINES

FROM THE DAYS OF ADAM SMITH, ECONOMISTS HAVE RECOGNIZED THAT A SYSTEM OF PERFECTLY COMPETITIVE MARKETS ENHANCES ECONOMIC WELL-BEING IN SEVERAL WAYS: BY PERMITTING RESOURCES, PRODUCTS, AND SERVICES TO GO TO THOSE WHO VALUE THEM MOST; BY PROVIDING INCENTIVES FOR COST SAVINGS AND INNOVATION IN THE PRODUCTION AND DISTRIBUTION OF GOODS AND SERVICES; AND BY FOSTERING LOW PRICES. YET, LIKE ADAM SMITH, TODAY’S ECONOMISTS ALSO RECOGNIZE THAT UNDER SOME LIMITED BUT IMPORTANT CIRCUMSTANCES, MARKETS DO NOT ALWAYS ACHIEVE THESE DESIRABLE ENDS. WHEN THEY DO NOT, APPROPRIATE GOVERNMENT ACTION CAN IMPROVE MARKETS’ FUNCTIONING AND SO INCREASE ECONOMIC WELL-BEING. . . .

ADAM SMITH PUBLISHED THE WEALTH OF NATIONS IN 1776, THE SAME YEAR THOMAS JEFFERSON WROTE THE DECLARATION OF INDEPENDENCE. SINCE THAT TIME . . . GOVERNMENT HAS WORKED IN PARTNERSHIP WITH THE PRIVATE SECTOR TO PROMOTE COMPETITION, DISCOURAGE EXTERNALITIES, AND PROVIDE PUBLIC GOODS.²

An important issue of microeconomics is when and why collective action, such as that by government, may be preferable to separate economic decision making by individual consumers and producers, usually referred to as the private market. In short, what is the economic rationale for government provision of some goods and services, and how can microeconomic tools be applied to evaluating the relative merits of government and private provision? As noted in Chapter 1, Richard Musgrave has argued that government’s economic role may include attaining a more efficient use of society’s resources, altering the distribution of resources, and achieving macroeconomic stabilization. However, the focus of microeconomic analysis and research concerning state and local governments has been on the first role—their effectiveness in directly providing goods and services.

Before the potential for government provision can be evaluated against society’s goals, you must understand the nature of economic efficiency and the reasons why government intervention may improve upon the results of private-market provision. This chapter reviews the basic microeconomic principles of market operation and economic efficiency, including why private markets may be efficient, the conditions under which private markets will not generate efficiency, the potential distributional concerns from private provision, and the ways government involvement generally in an economy (and not just state–local government) may improve efficiency or resource distribution compared to private markets.

THE EFFICIENCY OF THE MARKET

The concept of economic efficiency most often used in economics is called Pareto efficiency or optimality (named after the Italian economist Vilfredo Pareto [1848–1923] who proposed the definition), which states that an economy is efficient if it is not possible to make at least one person better off without making someone else worse off. This concept of economic efficiency is broader than the everyday use of the word efficiency. Economic efficiency includes the idea of technical or engineering efficiency, requiring that goods be produced at lowest cost, while also requiring that the type and quantity of goods and services are consistent with society’s desires.

The test for efficiency, then, is to search for changes to the current economic situation that can improve the welfare or economic conditions of some people, but not decrease the welfare of any others. The efficiency definition requires only that it be possible to make some consumers better off without hurting anyone and does not address the issue of how any change actually is to be accomplished. If, in fact, no one will be hurt by a change, then those who gain from that change have to compensate those who lose. This requires that the aggregate benefit be greater than the aggregate cost, so the net benefit can be used to compensate anyone who is hurt initially.

If such changes are possible, the economy is not efficient; if those changes are not possible, then the original situation is efficient. If the gain to society from one small change is called the marginal social benefit and the cost of the change is the
**marginal social cost**, then a general efficiency rule for evaluating changes can be stated as follows:

*If marginal social benefit equals marginal social cost, then the economy is efficient because there is no net gain from any change. If marginal social benefit is greater or less than marginal social cost, the economy is not efficient, and the proposed change would improve economic efficiency.*

Suppose, for example, that it is possible to produce more goods with the same resources by changing to a different (more efficient) production process. With more goods, the welfare of some (or even all) consumers could be improved at no cost to society. That economy was not producing goods efficiently. By “welfare,” economists mean the utility or satisfaction consumers receive from consumption. Because a consumer’s utility depends on preferences—individual likes and dislikes—each consumer is the sole judge of his or her own welfare. To put it another way, more goods will not improve a consumer’s welfare if that consumer does not like those goods.

As another example, suppose that society decides to allocate fewer resources to the military and to use the freed-up resources to produce more education. If consumers in aggregate value the increased amount of education more than the reduced military structure, the economy was not producing an efficient mix of consumer goods. The marginal benefit from providing more education is greater than the marginal cost. At least some consumers are made better off by the change, and any consumers who might be made worse off by the loss of military service could be compensated (and thus not hurt) because the gain to consumers in aggregate is positive.

This notion of economic efficiency has several advantages and one apparent weakness. The advantages are that value judgments about how much society “cares” for different types of consumers are not necessary and that no consumer need be opposed to changes to an inefficient economy. These both follow from the fact that if an economy is not Pareto efficient, no one need be hurt by a change to an efficient situation. The weakness of the definition is the narrow view of inefficiency. If a potential economic change must hurt even one consumer while making all others better off, by the Pareto definition that situation is efficient. Because of that narrowness of definition, achieving Pareto efficiency would not resolve all social issues, but there appears to be no shortage of situations that could be improved even by this narrow definition.

How do competitive markets satisfy this definition of efficiency? Although elegant mathematics is required to “prove” the efficiency of competitive equilibrium, the underlying principles are easily demonstrated. The long-run equilibrium of a competitive market is depicted in Figure 2.1a. The market demand for the product approximates the marginal benefit to consumers consuming this good or service; if producers act to maximize profits, the market supply corresponds to the marginal cost of producing the good or service. At the market equilibrium, the marginal cost of producing one more unit equals the marginal benefit—all the possible aggregate social gains from producing this good or service have been achieved. The equilibrium price $P^*$ is equal to both the marginal cost and the marginal benefit.

From the point of view of a typical firm in this competitive market, the equilibrium price also equals the lowest possible production cost per unit—that is, the
minimum of the average cost function (Figure 2.1b). At that price, firms are earning normal profits—that is, rates of return equal to those available elsewhere in the economy. Because investors are doing exactly as well in this business as they could in any other, there is no incentive for changes in output or prices.

The dollar magnitude of the gains to society from producing this good or service also can be approximated in Figure 2.1. **Consumer’s surplus** is defined as the difference between the marginal benefit to consumers from a unit of the product and the market price they actually pay, which is represented by area $ABP^*$ in Figure 2.1a. **Producer’s surplus** is defined as the difference between the price charged for the product and the marginal cost of producing a unit of the product, which is similarly represented by area $CBP^*$ in Figure 2.1a. The net gain to society from producing $Q^*$ units of this good or service can be measured by the sum of the producer’s and consumer’s surplus. This is nothing more than the difference between the marginal cost and marginal benefit for each unit, summed for all the units produced.

If marginal social cost does not equal marginal social benefit for the amount of a good or service provided, then the outcome is not efficient, as depicted in Figure 2.2. If 100 units of this product are produced and consumed, the marginal benefit or gain to society from unit 101 is $10, whereas the cost to society of producing unit 101 is only $5. Producing one more unit of this product (beyond 100) would provide society a net gain in welfare worth $5. Conversely, if the market fails to provide that unit 101, society effectively loses or foregoes that potential $5 welfare gain—the outcome is not efficient. Similarly, the marginal benefit is greater than the marginal cost for all the potential units of output between 100 and 200. If output and consumption is restricted to 100 units rather than the efficient quantity of 200, the welfare loss or welfare foregone by society can be measured by area $DEFG$, the sum of producer’s and consumer’s surplus.\(^3\)

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\(^3\)Area $DEFG$ is approximately equal to $250. $DEFG$ is approximately a triangle, the area of which is $\frac{1}{2}$ (base)(height) or $\frac{1}{2} \times 5 \times 100$ in this case.
The results in a competitive market when producers act to get the highest possible profits and consumers act to get the greatest possible satisfaction are as follows:

1. Marginal cost equals marginal benefit, with both equal to price.
2. Price equals the lowest possible production cost and producers earn normal profits.
3. Because price equals both marginal cost and marginal benefit in all competitive markets—that is, \( P^{c} = MC_{A} = MB_{A} \) and \( P^{c} = MC_{B} = MB_{B} \)—it follows that the relative prices of different products reflect the relative production costs and relative marginal benefits in consumption or

\[
\frac{P_{A}^{c}}{P_{B}^{c}} = \frac{MC_{A}}{MC_{B}} = \frac{MB_{A}}{MB_{B}}
\]

**Figure 2.2**

Efficiency requires equal marginal social cost and benefit

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**WHEN MARKETS ARE NOT EFFICIENT**

What might prevent provision through the private-market system from achieving economic efficiency? One possibility is that the marginal cost faced by producers does not reflect all the costs to society from additional production or that an individual consumer’s marginal benefit does not equal society’s benefit. If benefits accrue to other than the direct consumer or if private production costs do not reflect total social costs, then the competitive market choices may not be socially efficient choices. Although the competitive market sets marginal cost equal to marginal benefit, the costs and benefits are not properly measured. A second possibility is that a lack of competition, such as if economies of scale are present or entry
of firms is blocked, may prevent the market from reaching the “marginal cost equals marginal benefit” equilibrium.

**Externalities**

One problem arises if consumption or production causes external effects—that is, if one person’s consumption or one firm’s production imposes costs or benefits on other consumers or producers. In essence, an externality exists if one economic agent’s action (consumption or production) affects another agent’s welfare outside of changes in market prices or quantities. For instance, in the course of production, one firm (a steel mill) may discharge pollutants into a river, thereby increasing production costs for a downstream firm (a brewer) who must clean the water before using it in production. The pollution is an external effect because it is outside of the steel market—that cost is involuntarily transferred from the steel producer and consumers to the beer producer and consumers. In essence, no market or other mechanism exists to assign a price for river pollution to be paid by the polluter.

Externalities create an efficiency problem because the external costs or benefits usually are not taken into account by the consumer or producer causing the external effect. If an activity creates external costs, then the producer or consumer underestimates the social cost of the activity and chooses too much of that activity from society’s viewpoint. If consumption or production generates benefits for others that are not considered, then the consumer or producer underestimates social benefits and chooses too little of that economic activity.

This issue is illustrated in Figure 2.3, which shows an individual’s marginal benefit (demand) and marginal cost (price) from consuming a particular good or service. Constant marginal cost is assumed only to simplify the illustration. The quantity selected by consumers who equate marginal cost to marginal private benefits (their benefits) is \( Q^1 \). Because each unit of this good purchased by one consumer generates benefits for others as well, the marginal benefit to society is greater than to the direct consumers alone. In that case, the efficient amount of consumption is \( Q^* \), where marginal private cost equals marginal social benefit.

Because the direct consumers underestimated benefits, an inefficiently low amount of consumption is selected from society’s viewpoint. When externalities are present, private choices by consumers and firms in private markets generally will not provide an economically efficient result. In this particular case, the benefits to other than direct consumers as a result of increasing consumption from \( Q^1 \) to \( Q^* \) are represented by area HIJK. The net gain to society from increasing consumption from \( Q^1 \) to the efficient amount is represented by the area HIK, which is the difference between marginal social benefit and marginal cost.

Government may be able to intervene and create incentives so that private choices of consumers and firms will be efficient in the presence of externalities, however. If there are external costs, a tax equal to the marginal external cost will force the consumer or firm to include all costs in the economic decision, and thus the efficient quantity will be selected. Similarly, inefficiencies caused by external benefits can be corrected by a government subsidy equal to the marginal external
benefit. If a consumer underestimates benefits by not considering those that accrue to others and thus chooses too little consumption, the subsidy will reduce private cost and induce an increase in consumption to the efficient amount. Returning to Figure 2.3, if marginal costs are reduced to $P^* - S$ by a subsidy of $S$ per unit, then the consumer is induced to choose consumption level $Q^*$. The externality has been eliminated, and the private market choice of the consumer is efficient.4

4This is precisely the rationale for many intergovernmental grants, to correct the externality that arises when state or locally provided public services provide benefits to nonresidents as well.
Externalities are common among the goods and services provided by state and local governments. Education, police and fire protection, transportation, and sanitation services all have benefits that accrue to those who are not direct consumers and to nonresidents of the communities providing those services. Negative externalities also are important for state and local governments because tax payments do not respect political boundaries. Nonresidents not only enjoy the benefits of services provided by a local government but also may pay part of that local government's costs through taxes.

**Public Goods**

The term *public goods* is used classically to refer to goods or services that exhibit two properties. Public goods are *nonrival*, meaning that one additional person can consume the good without reducing any other consumer's benefit; after the good or service is produced, the marginal cost of an additional consumer is zero. Public goods often are also said to be *nonexcludable*, meaning that it is not possible (at least at reasonable cost) to exclude consumers who do not pay the price from consuming the good or service. The traditional example of a good said to exhibit both properties is national defense. After a region is defended, there is no extra cost from adding one person to that region nor can any individual in the region be excluded from protection. Another example is a lighthouse. After a lighthouse is operating, an additional ship can be guided by the light while others are using it, and it could be very expensive to enforce a "lighthouse use fee" on ships that come in view of the light.5

If a good is nonrival, the marginal social cost of adding another consumer is zero, so efficiency requires a zero price. A zero price obviously does not provide revenue to cover any fixed costs, so these goods are not provided in an efficient amount by private firms. Examples of nonrival goods include several usually provided by state–local governments, such as an uncrowded street, bridge, or park. If a park is not crowded, then another person can enter and use the park without reducing the enjoyment or benefit of any other user. To charge a fee to enter a park in that case is not efficient because the fee might induce some people not to use the park. Because the resources (mostly land) for the park already have been set aside, use of that resource at less than capacity is wasteful or inefficient from the viewpoint of the entire society. Of course, the problem remains of deciding on the amount of park services to provide and paying for acquiring those services.

The potential for government involvement in providing nonrival goods seems obvious. The task is to collect revenue to cover the fixed costs of a service (the cost of acquiring and operating the park) while maintaining the price for each use of the service equal to zero, that is, equal to the marginal cost. Government can use general taxes to pay the fixed costs, and because those general taxes do not depend on a taxpayer's use of the service, the price for each use is zero.

It is worth noting that nonrival or public goods may be thought of as a special externality case. A nonrival good for which another consumer may be added at no

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5Coase (1974) provides evidence contradicting this example, suggesting that lighthouses are not good examples of nonexcludable goods. As discussed in the application at the end of this chapter, the possibility of market failure is only one aspect of potential government involvement in an economy.
cost to others is simply a good with a substantial benefit externality. Everyone can
benefit if only one consumer provides a nonrival good, so the external benefits are
large compared to the private benefits that go only to the buyer. From this view-
point, the major difference in an efficiency sense between a nonrival good and an
external benefit is the degree of public impact as compared to private impact.

If a good exhibits the nonexclusion property so that it is not feasible to charge
a price for consumption, then private firms also are unable to collect revenue to
cover costs. The tax power of government is needed to finance provision of these
goods. If a commodity is both nonrival and nonexcludable, then individual con-
sumers have no incentive to reveal their true demand for that good. Instead they
can be free riders, benefiting, without paying, from the amount of goods pur-
chased by others. Because all individuals have this incentive to understate their
true demand, the quantity of these goods provided usually is inefficiently low.
Even if the efficient quantity of these goods can be determined, efficient use of the
goods may require prices that preclude private provision, as noted previously.

**Increasing Returns to Scale**

A final efficiency problem for competitive markets occurs if production of some
commodities exhibits increasing returns to scale—that is, if a proportional change
in all production inputs causes a greater than proportional change in output. For
instance, if doubling the labor, land, and capital cause output to more than double,
then average production costs decrease as output increases. If

\[
\text{Total Cost} = (\text{Price}_{\text{Labor}}) \text{Labor} + (\text{Price}_{\text{Land}}) \text{Land} + (\text{Price}_{\text{Capital}}) \text{Capital}
\]

and

\[
\text{Average Cost} = \frac{\text{Total Cost}}{\text{Output}}
\]

and the amounts of labor, land, and capital are doubled, then total cost doubles; but
if twice as much of each input causes output to more than double, average cost falls.

A cost function reflecting increasing returns to scale is depicted in Figure 2.4. If
average cost is decreasing, then marginal cost must be less than average cost at all out-
put amounts (because average cost is decreased by more production if the extra cost
of producing one more unit is less than the existing average cost). The usual explana-
tion for this type of cost structure is the existence of fixed costs that are large compared
to variable costs. Because fixed costs must be paid regardless of the level of output, a
larger output allows those costs to be spread over more units, causing a decrease in
cost per unit. This situation often applies to public utilities, including communica-
tions, electricity, natural gas, water, sewer, or transit services, all of which have large
capital requirements even to serve a few customers. Industries with increasing
returns to scale are often called natural monopolies because it makes sense to have
only one producer rather than multiple producers duplicating the required infra-
structure. Why have two separate but parallel water pipes if one is sufficient?

When increasing returns to scale exists, producers cannot earn a positive profit
if price is equal to marginal cost (which is required for efficiency). With the
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Figure 2.4

Increasing returns to scale

Demand for the product as shown in Figure 2.4, efficiency requires a price equal to $P^1$. However, at that price and the resulting output $Q^1$, cost per unit is greater than revenue per unit, so the producer earns negative profits (that is, losses), and no firms would stay in business. In contrast, a price equal to average cost of $P^2$ allows producers to earn a normal profit or rate of return on investment, but output $Q^2$ is not efficient because too little of society’s resources are applied toward producing this good. The inescapable problem is that with increasing returns to scale, a price equal to marginal cost cannot generate enough revenue to cover total costs.

Government intervention may resolve this difficulty. One option is to have government become the producer. This is often done for water, sewer, and transit services, but less often for communications or electricity and gas production. The government can charge consumers a price equal to marginal cost and make up the revenue shortfall with general tax receipts. Also, sometimes more complicated pricing schemes can be used to cover the production-cost deficit while allowing the marginal price to equal marginal cost. This topic is expanded on in Chapter 8 by discussing how governments can set efficient user charges. An alternative to government production of goods with increasing returns to scale is regulated monopoly production, with government as the regulator. In that instance, government grants a firm a monopoly in the sale of the good and attempts to regulate the price so that the producer earns normal profits. In either case, the outcome cannot be efficient because the taxes or regulation create other efficiency problems, so the preferable choice depends on whether government production or regulation works better practically.

DISTRIBUTIONAL CONCERNS

The standard competitive market analysis also can be used to explain the distribution of resources. The markets determine the prices of various types of labor, land, and capital goods, and those prices together with the quantities of the inputs
supplied by individuals determine the resources available for market consump-
tion by each individual. If society values highly the ability to pass a football effectively and that skill is in short supply, then individuals with the skill will earn high wages and be able to enjoy substantial consumption. Of course, the same argument applies to other types of (more ordinary) skills as well. If individuals have different abilities and if the financial resources for and incentives to acquire skills are not the same for all, then substantial differences in income and welfare can arise.

If society is not satisfied with the distribution of resources that results from that process, the alternatives are either to alter it directly through transfer payments or subsidies or to reject the market as a means of allocating consumer goods either by altering prices or substituting an entirely different allocation mechanism. Of course, governments do all these things. State governments coordinate major transfer programs, such as Medicaid and food stamps, whereas the national government coordinates others, such as social security. Many states subsidize higher education services through public colleges and offer scholarships to needy students. In some states, nonmarket, public systems provide health-care services for lower income individuals.

These distributional concerns with the outcome of markets provide another reason for government activity. If society is unhappy with the resource distribution (income or wealth) among individuals, then the efficient prices for commodities may not be attractive. Theoretically, efficiency concerns should not dominate equity considerations, so the efficiency criterion may be relevant only if the socially desired distribution is achieved. The traditional economic solution is to transfer resources among individuals to attain the desired resource distribution and then allow markets to allocate goods. If the process of redistribution does not have any costs, then that path may be preferable. Redistribution is not without cost, however, because the taxes used to generate revenue and the receipt of transfer payments may alter behavior and create inefficiency, and because the institution for redistribution, usually government, is costly itself.

An alternative is to have the government provide these goods and services and to alter their prices. As Peter Steiner (1983) has noted, even if it is practical to charge fees for park use, school bus transportation, and school lunches, it may not be desirable if society desires to alter the pattern of consumption as well as increase the level of consumption for some individuals. In addition to these equity reasons, the society may want to alter the pattern of consumption for efficiency reasons because of the externalities involved.

EFFICIENT PROVISION OF PUBLIC GOODS

The rule for efficient provision of goods is that the marginal social cost should equal the marginal social benefit. For externalities or public goods, social costs and benefits will differ from the costs and benefits of the direct consumers. Because all individuals consume a pure public good simultaneously, the efficiency rule for
public goods is that the marginal costs to society should equal the sum of the marginal benefits of all consumers, which is the marginal social benefit.

To illustrate the application of this rule, consider a society with three different individuals (or groups of consumers), each with a different demand for the public good, as shown in Figure 2.5. Person A represents a small demand, Person B a medium demand, and Person C a high demand for this public good. A demand function for an individual shows the quantity demanded of every price, given that individual’s tastes and income and the prices of substitute and complementary goals. The benefits to society equal the benefits to all three consumers together. In the bottom part of Figure 2.5, the marginal benefits of individuals A, B, and C have
been added together to give the sum of marginal benefits for all three, labeled \( \Sigma_i MB_i \) which means \( MB_A + MB_B + MB_C \).

In calculating this aggregate marginal benefit function, the individuals’ marginal benefits are added vertically. For example, the demand by Person A shows that the marginal benefit of the first unit is $Z; the first unit of national defense, police protection, or whatever provides $Z worth of benefit to Person A. Similarly, the marginal benefit of the first unit of public good is $Y for both Persons B and C. The marginal benefit of the first unit to all three individuals (that is, society) is therefore $(Z + 2Y)$. The aggregate marginal benefit curve is calculated in that way for every unit of the public good. Although all three consumers receive the same level of public good, only Person C values additional units between \( Q_0 \) and \( Q_1 \).

The efficient amount of this public good is \( Q^* \), for which the marginal cost to society equals the sum of individuals’ marginal benefits. It is implicit in this rule that the marginal cost includes all the costs to the society, including opportunity costs generated by production (such as pollution). This rule is often called the Samuelson rule or Samuelson public goods equilibrium, reflecting economist Paul Samuelson’s work in deriving the condition. Although the rule was illustrated for a pure public good, the rule also applies to any good involving externalities (recall that public goods are just special cases of external benefits). If consumption of a good by an individual imposes costs on or creates benefits for other individuals, those costs and benefits must be included to satisfy the efficiency rule that marginal social costs must equal marginal social benefits.

**Methods of Government Provision**

An important topic of this book (and one to which we will return often) is how government might be able to achieve or provide for an efficient use of resources. Government can intervene in private markets in at least three ways: (1) by directly providing goods and services, (2) by creating incentives to alter economic decisions through the use of taxes and subsidies, and (3) by regulating private economic activity. Government in the United States, including state and local government, uses all three methods. Government is essentially the sole producer of some goods and services such as streets and highways and a parallel producer with the private sector of other services such as education, police and fire protection, and waste collection and disposal. A variety of taxes and subsidies are used in an attempt to curtail or expand different activities in view of their external effects. For example, intergovernmental grants, offered by states to localities and by the federal government to the state–local sector, are subsidies in the state–local government arena. In other cases, regulations are imposed on activities of the private sector, such as state regulation of public utilities or private schools, or on the activities of a different level of government, such as state regulation of local police agencies or local schools.

Every attempt by subnational governments to improve economic efficiency, however, may not be successful. Government provision involves substantial transaction costs, including the administrative costs of the government structure itself; the compliance costs to taxpayers and voters of making economic decisions
collectively through government; and the information problems facing government in discerning the “public interest.” As Peter Steiner (1983) and Richard Nelson (1987) have argued, the fact that private markets fail to provide goods or services efficiently may be of little relevance if government also cannot provide them efficiently. In that case, a different or at least broader analytical framework than the basic microeconomics reviewed in this chapter is necessary to evaluate the role of government. Society would select government to provide some goods and services if government could better serve the public interest, which is not defined solely by economic efficiency. Private provision may be selected for some goods even though the market is inefficient if government provision would be too costly or create other problems; government provision may be selected in other cases even if private-market inefficiencies are insignificant or nonexistent if society seeks another objective, such as fairness or security.

Given these cautions about the emphasis on efficiency, one special government fiscal structure may generate the efficient outcome. At the efficient amount of output shown previously in Figure 2.5, $Q^*$, the marginal benefits to Persons A, B, and C are labeled $h_A$, $h_B$, and $h_C$, respectively. If these individuals were charged a “price” for this public good equal to $h_A$, $h_B$, and $h_C$, the amount of public good demanded by each individual is $Q^*$, the efficient amount. Every consumer demands the same amount of government service, which is the efficient amount.

The particular characteristic of this situation that generates the efficient result is that each consumer is being charged a price equal to marginal benefit at the efficient quantity. Although user fees equal to marginal benefits could perhaps accomplish this, it is more common in the provision of government goods for the “price” to be the taxes a consumer pays. In that case, each consumer’s taxes must equal marginal benefit, or at least the share of taxes paid by each individual should equal that person’s share of marginal benefits. The shares for each consumer are

$$S_A = h_A/(h_A + h_B + h_C)$$
$$S_B = h_B/(h_A + h_B + h_C)$$
$$S_C = h_C/(h_A + h_B + h_C)$$

These tax shares are much like prices because they show the amount each person must pay to increase government spending by $1. For example, if $h_A = 20$ percent, $h_B = 30$ percent, $h_C = 50$ percent, and spending is to increase $1, taxes must also increase by $1, with Person A paying $.20 more, Person B $.30 more, and Person C $.50 more. The price to Person C for another dollar’s worth of government service is $.50. If the shares equal marginal benefits, then each is willing to pay the price up to the efficient amount. This situation, with charges or tax shares equal to marginal benefit shares, is called a **Lindahl equilibrium** after the Swedish economist Erik Lindahl (1919–58). If consumers’ marginal costs reflect their marginal benefits, then the efficient amount of public good will be demanded. Of course, it is not a simple matter to implement that solution.

First, marginal benefits must be measured and assigned to individuals or at least groups of individuals. This may be an impossible or expensive task in part because
consumers have little incentive to reveal their true demand. What, for instance, are the marginal benefits by income class of increasing police service spending by $1? Second, as previously noted, it may not be appropriate to charge marginal prices if the marginal cost of another user is zero. Third, it may not be feasible to exclude consumers from use if they refuse to pay the price set by the government. The Lindahl equilibrium does offer the possibility of efficiency by converting taxes into a form of user charge with tax shares determined by benefit. This idea of benefit taxation and its efficiency properties is raised again in Chapters 5 and 14 concerning property taxes and in Chapter 8 with a more complete discussion of user charges.

APPLICATION TO STATE AND LOCAL GOVERNMENTS

The problems of public goods, externalities, and increasing returns to scale provide reasons for government action to improve the efficiency of the economy, and many, although certainly not all, state–local government activities can be explained by these reasons. On the other hand, state and local government intervention is not used for all local goods or services that involve externalities or public-good properties. Redistribution of society’s resources also can be a legitimate and explicit objective of government policy, and although state and local governments may be limited in carrying out redistribution programs, it seems clear that distribution and equity concerns influence many (if not most) state–local government fiscal decisions.

Despite these qualifications, the framework outlined in this chapter offers some explanation for the common fiscal activities and behavior of many state–local governments. Why is government, particularly state and local government, deeply involved in the education business? (As explained in Chapter 1, education is by far the largest subnational government budget category.) First, education produces external benefits such as the gains to all from a literate and educated populous and the information generated by research at educational institutions (which is usually considered a public good). Second, education has the potential to be an important mechanism for income redistribution by affecting earnings potential. Third, education benefits cannot generally be confined to a particular geographic area or industrial sector, so intergovernmental arrangements may be called for. The education case also may illustrate reasons for government provision other than the classic economic efficiency arguments. Public education may be a way of implementing a basic notion of fairness—equal opportunity for all—and it has been a primary way society transmits social values and informal rules of behavior.

Similar arguments can be made about police and fire protection. These services are, to a large degree, nonrival and to a somewhat lesser degree, nonexcludable. Substantial interjurisdictional externalities (or spillovers) also occur in the provision of these goods. Accordingly, almost every municipality or township in the United States provides services of this type. These services also are provided privately, however, in the form of private security guards at businesses, private security patrols in some neighborhoods, and privately purchased and owned equipment such as locks, burglar alarms, smoke detectors, and fire extinguishers.
Yet all these activities also generate external effects. Largely for the economic reasons, government takes a central but not an exclusive role in providing these services (see Application 2.1).

Transportation provides a final illustration. State and local governments finance, own, and operate transportation facilities such as streets and highways, airports, and public-transit systems. The economic efficiency arguments again provide some explanation. If uncrowded, these goods are nonrival, requiring a zero price for efficiency. Benefit spillovers among different jurisdictions providing the facilities also are common, requiring some coordinating mechanism. Although state and local governments provide these facilities, they seldom produce them; rather, governments usually contract with or buy from private firms, thereby taking advantage of any economies of scale in production.

**Application 2.1**

**PUBLIC AND PRIVATE PROVISION OF PUBLIC SAFETY**

Although the discussion in this chapter may seem to suggest that goods and services are provided either privately or by the public sector, in fact, it is more common for individuals and firms to purchase goods or services in the private market to complement services provided by government. In some cases, state and local governments purchase services from private firms to augment similar services the government produces directly. Public safety or police service is one area where joint public-private action is common.

Public provision of police services is usually called for because of substantial social (as opposed to private) benefits from the service (externalities), the difficulty of forcing consumers to pay for public safety benefits other than through government taxes (nonexclusion), and economies of scale in producing services. Certainly all these factors are important and help explain why most local and state governments in the United States provide police and other public safety services.

Some forms of public safety services do not meet these conditions; rather, the benefits are mostly private, exclusion is direct, and scale economies are minor, if they exist at all. Thus, individuals and firms privately purchase locks, safes, security lights, and alarm systems, all of which are private goods, providing benefits to the direct consumers. That doesn’t mean there is no connection between these goods and publicly provided police services, however, as they seem to complement each other. A security alarm is not likely to deter illegal entry or theft unless the criminal believes that the alarm will attract public safety officers with the power to make an arrest. On the other hand, locks, safes, video surveillance equipment, private neighborhood patrols, and other security devices may reduce the demand for publicly provided police service, freeing up resources for other public safety matters or even other government responsibilities.⁶

⁶For more discussion of these types of security expenditures and the economic relationship to public police services, see Clotfelter (1977).
The relationship between public police and private security workers is one important aspect of this issue. In fact, private security forces seem to outnumber public law enforcement staff (Sklansky, 1999). Based on 2002 Census data, approximately 575,000 private security guards worked in companies that specialize in providing security services and another 75,000 people worked as private investigators and employees of armored car services. In addition, there are an estimated 450,000 to 500,000 “in-house” security guards—workers hired solely for that purpose by firms or property owners—and about 120,000 employees of firms that install and monitor security and alarm systems. In contrast, the Department of Justice reported a total of about 700,000 state and local government police officers in 2000. So, the number of private security guards (1.2 to 1.3 million) is at least 70 to 80 percent greater than the number of public police officers.

Private security services may both complement and substitute for public safety services, depending on type. For instance, uses of private security guards to guard specific buildings or parking lots is similar in effect to locks and alarm systems installed by private owners, providing mostly private benefits to the direct users of the service. These uses complement but do not really replace public police.

Increasingly, however, private security forces are being used to substitute for or augment public police services, as well. In some cases, groups of individuals or businesses are contracting with private security firms to provide services in addition to those of local police. Such services commonly include patrolling, monitoring behavior, and providing information to public police, but usually do not include arrests or criminal investigation. For instance, businesses in Philadelphia’s commercial downtown did just that in 1991. Similarly, homeowners in some neighborhoods (often through a neighborhood association) hire private guards to patrol the neighborhood or staff entry centers, a trend that seems to be increasing partly due to the growth of gated communities. Sklansky (1999) reports that more than 800 private security guards patrol neighborhoods within the city boundaries of Los Angeles (a number equal to about one-tenth of the size of the LAPD). In an economic sense, one can think of the public police as providing a general social benefit, with the additional private service satisfying additional marginal private benefits (demand).

The growth of private security services and expenditures—both for traditional services such as alarm systems and for newer private security guards and patrols—also creates a number of challenges for public police agencies. False alarms are one major problem. Governing Magazine (1998) reports that there are about 7 million private electronic security systems in the United States that average about two alarms each per year. But 98 percent of those alarms are false, creating substantial direct costs for public police who respond to the alarm and diverting the time and attention of the public police away from actual criminal activity. Competition for workers is another issue. The growth of private security guards and patrols has made it more difficult for public police agencies to attract and retain police officers, driving up public safety costs.

In a few instances, private security guards or firms are actually replacing public police, at least for some services. Some public police agencies are hiring private guards or security
firms, without true police power, to provide such functions as patrolling parks, transporting prisoners, directing traffic, enforcing parking rules, or providing a security presence in government buildings. In essence, public police agencies that do this are changing the way public safety services are produced similar to the way in which other services (such as medicine) divide tasks among specialized groups of workers (physicians, physicians’ assistants, nurses). Such changes often reflect pressures to produce public services at lower cost, as discussed in Chapter 7.

In a few other cases, private security forces may completely replace public police. Sussex, N.J. replaced its local police force in 1993 with private security guards under contract to the city. Although driven partly by cost considerations, such complete privatization moves also create new issues for government to resolve—how to specify the contracted-for service, monitor the performance of the private supplier, and enforce details of the contract if the contractor fails to comply.

The increasing private provision of public safety services challenges the conventional economic efficiency arguments used to support government provision. If police services really are nonrival and nonexcludable, then why do businesses or individuals voluntarily offer to pay for such services? Interestingly, in a historical sense, private security provision and private security forces once were the norm. In the United States, it was only in the late 1800s and early part of this century that serious civil liberty concerns were raised about private security forces, fueling an increase in public police services. Clifford Shearing (1992) notes that private police began to be perceived as protecting the private interests of the firms that employed them—particularly as a result of the role of private security forces in violent conflicts with emerging labor unions—rather than some general public interest. Since the 1960s, however, such concerns seem to have become less important, at the same time that cost considerations and demand for security have become more important. As a result, private security services have grown in importance again.

Application 2.1—Public and Private Provision of Public Safety

Some important aspects of microeconomics are reviewed in this chapter. An economy is Pareto efficient if it is not possible to make at least one person better off without making someone else worse off. Market efficiency requires that marginal social benefits equal marginal social costs.

Public goods are nonrival, meaning that one additional person can consume the good without reducing any other consumer’s benefit. After a nonrival good is produced, the marginal social cost of another consumer is zero, so efficiency requires a zero price.

An externality exists if one economic agent’s action (consumption or production) affects another agent’s welfare outside of the market. When externalities are
present, private choices by consumers and firms in private markets generally will not provide an economically efficient result. Government may be able to intervene and create incentives through the use of taxes, subsidies, or regulations so that private choices of consumers and firms will be efficient in the presence of externalities.

If production of some commodities exhibits increasing returns to scale, it is impossible to have a single price equal to marginal cost (which is required for efficiency) and have the producer earn a profit. Government may resolve this difficulty either by becoming the producer or by regulating monopoly production.

Many, although not all, state–local government activities can be explained by the problems of public goods, externalities, and increasing returns to scale. Redistribution of society’s resources also can be a legitimate and explicit objective of government policy.

DISCUSSION QUESTIONS

1. In parts of the country where snow is a regular occurrence, local government almost always provides snow removal from public streets, but seldom provides snow removal from public sidewalks. Sidewalk clearing is either left to individual choice or regulated by the government, perhaps by requiring that property owners clear the walks along their property. Yet the theoretical aspects of these two services are the same. What factors might explain why local governments typically do not plow sidewalks or, from the other point of view, why localities do not simply require property owners to clear snow from streets along their property? What does this imply about the standard externality/public goods argument justifying government intervention?

2. “For an efficient amount of a public good to be provided, the marginal cost of producing another unit of that good must equal the marginal benefit to each individual who consumes the good.” Is this statement true or false, and why?

3. Suppose your university is considering building new parking lots on campus. The following table shows the marginal benefit to students, faculty/staff, and visitors for one to five new lots. The table also gives the total cost of acquiring/constructing those lots.

<table>
<thead>
<tr>
<th>No. of Lots</th>
<th>Students</th>
<th>Faculty/Staff</th>
<th>Visitors</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$75,000</td>
<td>$37,500</td>
<td>$12,500</td>
<td>$30,000</td>
</tr>
<tr>
<td>2</td>
<td>$60,000</td>
<td>$35,000</td>
<td>$5,000</td>
<td>$70,000</td>
</tr>
<tr>
<td>3</td>
<td>$45,000</td>
<td>$30,000</td>
<td>$0</td>
<td>$120,000</td>
</tr>
<tr>
<td>4</td>
<td>$25,000</td>
<td>$25,000</td>
<td>$0</td>
<td>$180,000</td>
</tr>
<tr>
<td>5</td>
<td>$5,000</td>
<td>$20,000</td>
<td>$0</td>
<td>$250,000</td>
</tr>
</tbody>
</table>
Assuming that the lots will not be completely full so that students, staff, and visitors can use them simultaneously, derive the aggregate demand curve or social marginal benefit for parking lots. What is the efficient number of additional lots? If this university builds the efficient number of lots, how should the costs be divided among students, faculty/staff, and visitors?

4. Explain why the existence of benefit spillovers across jurisdiction boundaries could lead the jurisdictions to provide too little of that service from society’s viewpoint. If the service in question is public safety, what might be the nature of common benefit spillovers?

SELECTED READING

