

operation of a prison). If the private sector bidders want to maximize profits, they have a strong incentive to restrain costs. Opponents typically question the size of financial savings and point to other social costs. Governments often use the threat of subcontracting as a way of limiting public sector wage demands.

Generally, however, it is important to distinguish between *provision* and *production* by the public sector because even if we agree that the public sector should be responsible for the *provision* of a service, the optimal method of *production* of that service will often include private firms. This section focuses on the issue of whether the public sector should *provide* a service. The basic rule is that if the benefit of a public good does not exceed its cost, we are better off without it.

PAYING FOR PUBLIC GOODS

Not everyone benefits equally from the provision of a given public good. For example, some people find fireworks displays highly entertaining, but others simply don't care about them, and still others actively dislike them. Ideally, it might seem that the most equitable method of financing a given public good would be to tax people in proportion to their willingness to pay for the good. To illustrate this approach, suppose Chen values a public good at \$100, Smith values the same good at \$200, and the cost of the good is \$240. Chen would then be taxed \$80, and Smith would be taxed \$160. The good would be provided, and each taxpayer in this example would reap a surplus equal to 25 percent of his tax payment: \$20 for Chen, \$40 for Smith.

In practice, however, government officials usually lack the information they would need to tax people in proportion to their willingness to pay for specific public goods. (Think about it: If you were asked how much you would be willing to pay to have a new hospital and you knew you would be taxed in proportion to the amount you responded, wouldn't you have an incentive to give a low number in order to pay low taxes, and let the cost be borne by those who say they are willing to pay?) Examples 14.1 to 14.3 illustrate some of the problems that arise in financing public goods and suggest possible solutions to these problems.

Will Prentice and Wilson buy a water filter?

EXAMPLE 14.1

Prentice and Wilson own adjacent summer cottages along an isolated stretch of shoreline on Lake Huron. Because of a recent invasion of zebra mussels, each must add chlorine to his water intake valve each week to prevent it from becoming clogged by the tiny mollusks. A manufacturer has introduced a new filtration device that eliminates the nuisance of weekly chlorination. The cost of the device, which has the capacity to serve both houses, is \$1000. Both owners feel equally strongly about having the filter. But because Wilson earns twice as much as Prentice, Wilson is willing to pay up to \$800 to have the filter, whereas its value to Prentice, a retired schoolteacher, is only \$400. Would either person be willing to purchase the device individually? Is it efficient for them to share its purchase?

Neither will purchase the filter individually because each has a reservation price that is below its selling price. But because the two together value the filter at \$1200, sharing its use would be socially efficient. If they were to do so, total economic surplus would be \$200 higher than if they did not buy the filter.

Since sharing the filter is the efficient outcome, we might expect that Prentice and Wilson would quickly reach agreement to purchase it. However, if Wilson proposes that they just split the cost of the filter equally, it will yield a net benefit to him of \$300 ($= \$800 \text{ benefit} - \500 cost) but Prentice will turn the idea down because he would incur a net cost of \$100 ($= \$400 \text{ benefit} - \500 cost). Without some agreement on the sharing of costs, the joint purchase and sharing of facilities



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is often easier proposed than accomplished. An additional hurdle is that people must incur costs merely to get together to discuss joint purchases. With only two people involved, those costs might not be significant. But if hundreds or thousands of people were involved, communication costs could be prohibitive.

With large numbers of people, the free-rider problem also emerges (see Chapter 11). After all, if there are thousands of people involved, the contribution of any one person is only a tiny percentage of the cost, so the project can go ahead without them. Thus, everyone knows that the project will either succeed or fail independently of any one person's contribution to it. Everyone thus has an incentive to withhold contributions—i.e., get a free ride—in the hope that others will pay.

Even when only a few people are involved, reaching agreement on a fair sharing of the total expense may be difficult. For example, Prentice and Wilson might be reluctant to disclose their true reservation prices to one another. Suppose Prentice can keep his own reservation price secret while getting Wilson to reveal that he would be willing to pay up to \$800 for the filter. Prentice could then announce that he is willing to pay \$205. He knows that the filter will be installed because Wilson will be better off paying \$795 than with no deal at all. If Prentice can follow this strategy successfully, he will be better off by \$195, and Wilson will be better off by \$5, compared to the “no deal” option. In total, the consumer surplus of installing the filter is \$200, and since Prentice pays much less than he would really have been willing to pay, he gets almost all of it.

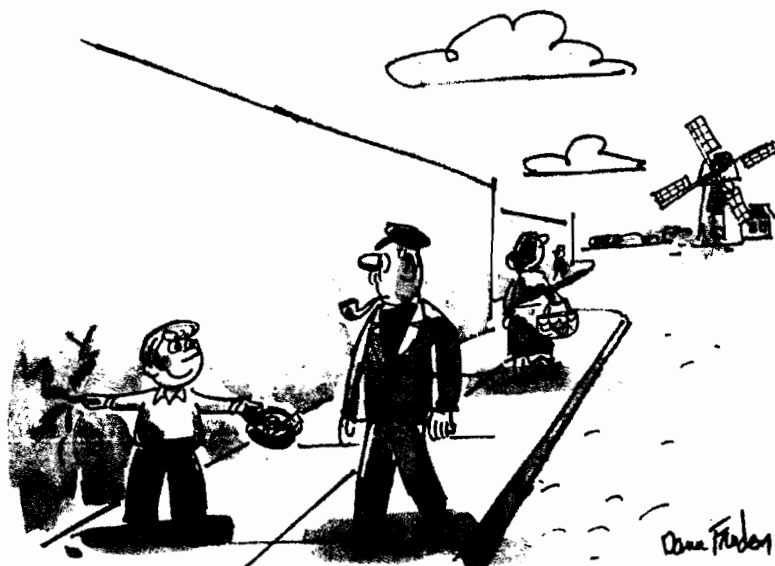
Of course, as soon as Wilson figures this out, he will understate his true willingness to pay. Since both Prentice and Wilson have an incentive to play games with each other and to understate their personal benefits, the filter may never be installed at all.

These practical concerns may lead us to empower government to buy public goods on our behalf. But as Example 14.2 makes clear, this approach does not eliminate the need to reach political agreement on how public purchases are to be financed.

EXAMPLE 14.2

Will the government buy the water filter if there is an “equal tax” rule?

Suppose Prentice and Wilson from Example 14.1 could ask the government to help broker the water filter purchase. And suppose that the government's tax



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policy must follow a “nondiscrimination” rule that prohibits charging any citizen more than his or her neighbour for a public good. Another rule is that public goods can be provided only if a majority of citizens approve of them. Will a government bound by these rules provide the filter that Prentice and Wilson want?

A tax that collects the same amount from every citizen is called a **head tax**. If the government must rely on a head tax, it must raise \$500 from Prentice and \$500 from Wilson. But since the device is worth only \$400 to Prentice, he will vote against the project, thus denying it a majority. So a democratic government would not provide the water filter if it must rely on a head tax.

head tax a tax that collects the same amount from every taxpayer

A head tax is an example of a **regressive tax** on income, one for which the proportion of a taxpayer’s income that is paid in taxes declines as the taxpayer’s income rises.

The point illustrated by Example 14.2 is not confined to the specific public good considered. It applies whenever taxpayers place significantly different valuations on public goods, as will almost always happen whenever people earn significantly different incomes. An equal tax rule under these circumstances will almost invariably rule out the provision of many worthwhile public goods.

As Example 14.3 suggests, one solution to this problem is to allow taxes to vary by income.

regressive tax a tax under which the proportion of income paid in taxes declines as income rises

Will the government buy the filter if there is a proportional tax on income?

Suppose that Prentice proposes that the government raise revenue by imposing a proportional tax on income to finance the provision of the water filter described in Example 14.1. Will Wilson, who earns twice as much as Prentice, support this proposal?

A **proportional income tax** is one under which all taxpayers pay the same percentage of their incomes in taxes. Under such a tax, Wilson would support Prentice’s proposal, because if he didn’t, each would fail to enjoy a public good whose benefit exceeds his share of its cost. Under the proportional tax on income, Prentice would contribute \$333 toward the \$1000 purchase price of the filter and Wilson would contribute \$667. The government would buy the filter, resulting in additional surpluses of \$67 for Prentice and \$133 for Wilson.

EXAMPLE 14.3

proportional income tax a tax under which all taxpayers pay the same proportion of their incomes in taxes

The water filter in the previous example is not a pure public good. In this case, excludability is not a problem, since either Prentice or Wilson could buy the filter and not share its use. However, since the capacity of the filter is more than enough for both of them, not using it would be inefficient—their consumption is nonrivalrous. The water filter is thus best seen as a collective good, at the level of the neighbourhood.

In general, there are often aspects of “publicness” to many goods, the degree of which depends on the level of analysis. Housing is, for example, a private good for each household since it is both rival and excludable. However, although within families it is normal for bedrooms to be private, other rooms are typically common space. Furthermore, each house has some common attributes: for example, its location determines the travel times of all inhabitants and (unless each room has a separate thermostat) all the inhabitants enjoy (or tolerate) the same temperature, whatever that is. Thus, the common space, heating, location, and other aspects of the house can be seen as a “local public good” for family members. We can therefore see, at the family level, some of the problems of public goods provision and financing that are also present at the societal level. Just as equal contributions are often a poor way to pay for public goods, they are also often a poor way to share expenses within the household.



14.1

ECONOMIC NATURALIST

Why do spouses not contribute equally to joint purchases?

Suppose Frances earns \$2 000 000 per year while Marcel earns only \$20 000. Given that level of income, Frances as an individual would want to spend much more than Marcel would on housing, travel, entertainment, education for their children, and the many other items they consume jointly. What will happen if the couple adopts a rule that each must contribute an equal amount toward the purchase of such items?

This rule would constrain the couple to live in a small house, take only inexpensive vacations, and skimp on entertainment, dining out, and their children's education. It is therefore easy to see why Frances might find it attractive to pay considerably more than 50 percent for jointly consumed goods, because doing so would enable *both* of them to consume in the manner their combined income permits.

Public goods and jointly consumed private goods are different from individually consumed private goods in the following important way: *Different individuals are free to consume whatever quantity and quality of most private goods they choose to buy, but jointly consumed goods must be provided in the same quantity and quality for all persons.*

As in the case of private goods, people's willingness to pay for public goods normally increases with income. Wealthy individuals tend to assign greater value to public goods than low-income people do, not necessarily because the wealthy have different tastes but because they have more money. A head tax would result in high-income persons getting smaller amounts of public goods than they want. By increasing the total economic surplus available for all to share, a tax system that assigns a larger share of the tax burden to people with higher incomes makes possible a better outcome for both rich and poor alike. Indeed, virtually all industrialized nations have tax systems that are at least mildly progressive, which means that the proportion of income that is taxed actually rises with a family's income.

Progressive taxation and even proportional taxation of income have often been criticized as being unfair to the wealthy, who are forced to pay more than others for public goods that all consume in common. The irony in this charge, however, is that exclusive reliance on head taxes, or even proportional taxes, would curtail the provision of public goods and services that are of greatest value to high-income families. Studies have shown, for example, that the income elasticity of demand for public goods such as parks and recreation facilities, clean air and water, public safety, uncongested roads, and aesthetically pleasing public spaces is substantially greater than one. Failure to rely on progressive taxation would result in gross underprovision of such public goods and services.

progressive tax a tax in which the proportion of income paid in taxes rises as income rises

TABLE 14.2
A Summary of Different Types of Income Taxes

Head Tax	Same dollar amount paid by all taxpayers, regardless of income
Regressive Tax	Low-income taxpayers pay higher percentage of their income in tax than high income taxpayers
Proportional Tax	Same percentage of income paid by all taxpayers, regardless of income
Progressive Tax	Low-income taxpayers pay lower percentage of income in tax than high-income taxpayers

RECAP

PUBLIC GOODS

A public good is both nonrival and nonexcludable. Private firms typically cannot recover the costs of producing such goods because they cannot exclude nonpayers from consuming them. Nor would charging for a public good promote efficiency, since one person's consumption of the good does not diminish its availability for others.

Both obstacles can be overcome by creating a government with the power to levy taxes. Even high-income citizens often favour progressive taxes, because proportional or regressive taxes may generate insufficient revenue to pay for the public goods those taxpayers favour.

14.2 THE OPTIMAL QUANTITY OF A PUBLIC GOOD

In the examples considered thus far, the question was whether to provide a particular public good and, if so, how to pay for it. In practice, we often confront additional questions about what level and quantity of a public good to provide.

Standard cost-benefit logic also applies to these questions. For example, according to the cost-benefit principle, Toronto will add another rocket to its Canada Day fireworks display if and only if the amount citizens would collectively be willing to pay to see the rocket is at least as great as its cost.

THE DEMAND CURVE FOR A PUBLIC GOOD

To calculate the socially optimal quantity of a public good, we must first construct the demand curve for that public good. The process for doing so differs in an important way from the one we use to generate the market demand curve for a private good.

For a private good, all buyers face the same price and each chooses the quantity they want to purchase at that price. Recall that to construct the demand curve for a private good from the demand curves for individual consumers, we place the individual demand curves side by side and add them horizontally. That is, for each of a series of fixed prices, we add the resulting quantities demanded on the individual demand curves. In Figure 14.1, for example, we add the individual demand curves for a private good, D_1 and D_2 [panels (a) and (b)], horizontally to obtain the market demand curve for the good D [panel (c)].

For a public good, all buyers necessarily consume the same quantity, although each may differ in terms of willingness to pay for additional units of the good.

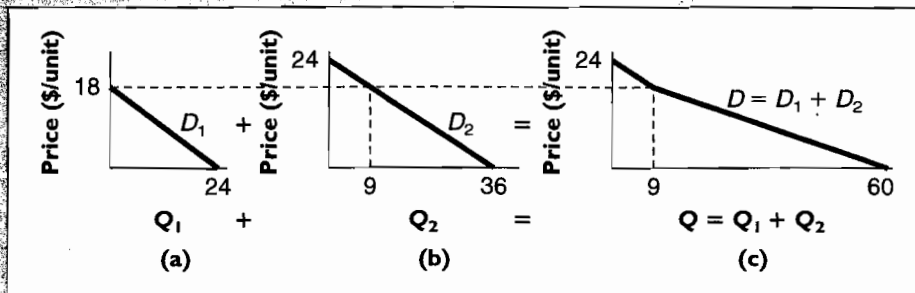
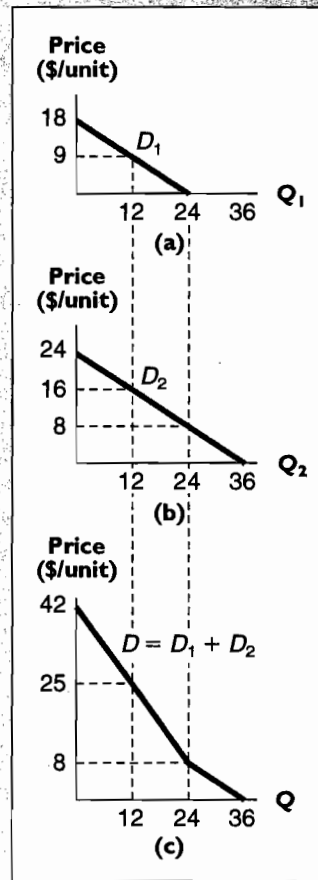


FIGURE 14.1
Generating the Market Demand Curve for a Private Good

To construct the market demand curve for a private good [panel (c)], we add the individual demand curves [panels (a) and (b)] horizontally.

Constructing the demand curve for a public good thus entails not horizontal summation of the individual demand curves but vertical summation. That is, for each of a series of quantity values, we must add the prices that individuals are willing to pay for an additional unit of the good. The curves D_1 and D_2 in Figure 14.2 panels (a) and (b) show individual demand curves for a public good by two different people. At each quantity, these curves tell how much the individual would be willing to pay for an additional unit of the public good. If we add D_1 and D_2 vertically, we obtain the total demand curve D for the public good [panel (c)].

FIGURE 14.2
Generating the Demand Curve for a Public Good
 To construct the demand curve for a public good [panel (c)], we add the individual demand curves [panels (a) and (b)] vertically.



EXERCISE 14.1

Bill and Tom are the only demanders of a public good. If Bill's demand curve is $P_B = 6 - 0.5Q$ and Tom's is $P_T = 12 - Q$, construct the demand curve for this public good.

In Example 14.4, we see how the demand curve for a public good might be used in conjunction with information about costs to determine the optimal level of parkland in a city.

EXAMPLE 14.4

What is the optimal quantity of urban parkland?

The city government of a new planned community must decide how much parkland to provide. The marginal cost curve and the public demand curve for urban parkland are as shown in Figure 14.3. Why is the marginal cost curve upward sloping and the demand curve downward sloping? Given these curves, what is the optimal quantity of parkland?

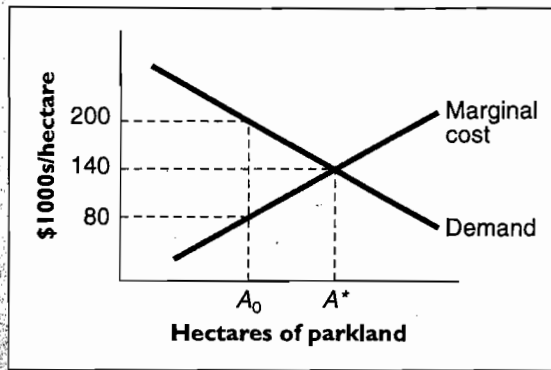


FIGURE 14.3
The Optimal Quantity of Parkland

The optimal number of hectares of urban parkland is A^* , the quantity at which the public's willingness to pay for additional parkland is equal to the marginal cost of parkland.



**INCREASING
OPPORTUNITY
COST**

The marginal cost schedule for urban parkland is upward sloping because the city acquires the cheapest parcels of land first, and only then turns to more expensive parcels. Likewise, the marginal willingness-to-pay curve is downward sloping because of the law of diminishing marginal utility. Just as people are generally willing to pay less for their fifth hot dog than for their first, they are also willing to pay less for the 101st hectare of parkland than for the 100th hectare. Given these curves, A^* is the optimal quantity of parkland. For any quantity less than A^* , the benefit of additional parkland exceeds its cost, which means that total economic surplus can be made larger by expanding the amount of parkland. For example, at A_0 , the community would be willing to pay \$200 000 for an additional hectare of urban parkland, but its cost is only \$80 000. Similarly, for any quantity of parkland in excess of A^* , the community would gain more than it would lose by selling off some parkland.

PRIVATE PROVISION OF PUBLIC GOODS

One advantage of using the government to provide public goods is that once a tax collection agency has been established to finance a single public good, it can be expanded at relatively low cost to generate revenue for additional public goods. Another advantage is that because government has the power to tax, it can summarily assign responsibility for the cost of a public good without endless haggling over who bears what share of the burden. And in the case of goods for which non-payers cannot be excluded, the government may be the only feasible provider.

However, governments are not the exclusive providers of public goods in any society. Indeed, many public goods are routinely provided through private channels. The challenge, in each case, is to devise a scheme for raising the required revenues.

Funding by Donation In 2002 Canadians gave \$5.8 billion (about 0.5 percent of GDP) to private charities, many of which provide public goods to their communities. People also volunteer their time on behalf of organizations that provide public goods. As well, when you paint your house, mow your lawn, or plant a flower garden, you are enhancing the quality of life in your neighbourhood, and in that sense you are voluntarily providing a public good to your neighbours.

Furthermore, many Canadians voluntarily donate their time, as well as their money, to activities that benefit their community, rather than themselves personally. In everything from coaching youth soccer to providing meals on wheels to housebound seniors, Canadians depend heavily on the voluntary motivation of concerned citizens.

Why do people voluntarily provide their time and money to worthy causes? If we think of individuals as utility maximizing, the answer will be that the