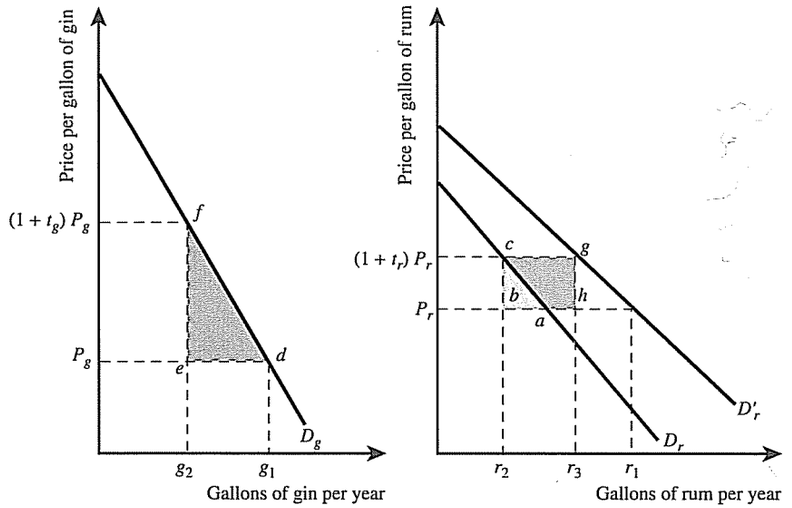
Figure 15.B
Excess burden of a tax in the presence of an existing tax
A tax on gin creates an excess burden of *efd*. The increase in the price of gin shifts the demand curve for rum to the right, because the goods are substitutes. The increase in demand for rum reduces the excess burden associated with the preexisting tax on rum by *cbhg*.



receive. This creates an excess burden in the gin market of *efd*. But this is not the end of the story. If gin and rum are substitutes, the increase in the consumers' price of gin induced by the gin tax shifts the demand curve for rum to the right, say to D'_r. Consequently, the quantity of rum demanded increases from r_2 to r_3, distance *cg*. For each bottle of rum purchased between r_2 and r_3, the amount that people pay $[(1 + t_r)P_r$ exceeds the social cost (P_r) by distance *cb*. Hence, there is a social gain of *cb* per bottle of rum times *cg* bottles, or area *cbhg*.

To summarize: Given that the tax on rum was already in place, the tax on gin creates an excess burden of *efd* in the gin market *and* simultaneously decreases excess burden by *cbhg* in the rum market. If *cbhg* is sufficiently large, the tax can actually reduce overall excess burden. This is an example of the theory of the second best, which states that in the presence of existing distortions, policies that in isolation would increase efficiency can decrease it and vice versa.

This discussion is a special case of the result that the excess burden of a *set* of taxes generally depends on the whole set of tax rates, as well as on the degree of substitutability and complementarity among the various commodities. Specifically, suppose that n commodities are subject to taxation. Let P_i be the before-tax price of the ith commodity; t_i the ad valorem tax on the ith commodity; and S_{ij}, the compensated response in the demand of the ith good with respect to a change in the price of the jth good. Then the overall excess burden is

$$-\tfrac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} t_i P_i t_j P_j S_{ij}$$

For example, in the two-good case just discussed, where the goods are g and r, the overall excess burden is

$$-\tfrac{1}{2}\,(t_r^2 P_r^2 S_{rr} + 2t_r P_r t_g P_g S_{rg} + t_g^2 P_g^2 S_{gg})$$

Chapter Sixteen

Efficient and Equitable Taxation

A nation may fall into decay through taxation in two ways. In the first case, when the amount of the taxes exceeds the powers of the nation and is not proportioned to the general wealth. In the second case, when an amount of taxation, proportioned on the whole to the powers of the nation, is viciously distributed.

—PIETRO VERRI

The US revenue system is under attack. Critics argue that it is inefficient, unfair, and unduly complicated. But when these critics offer proposals for reform, their ideas are generally assailed for the same reasons. How are we to choose? Our goal in this chapter is to establish a set of criteria for evaluating real-world tax systems. We begin by looking at efficiency and distributional considerations that fit squarely within the framework of conventional welfare economics. We then turn to other criteria that do not fit so neatly, but nevertheless have considerable importance and appeal.

▸ OPTIMAL COMMODITY TAXATION

In Florida, wireless phone bills are taxed at a rate of 18.06 percent; most other commodities (except for food, which is exempt) are taxed at a rate of 6 percent. Should wireless phone service be taxed at a higher rate than other things? This is just one example of a very general and very important economic policy question: At what rates should various goods and services be taxed? The purpose of the theory of optimal commodity taxation is to provide a framework for answering this question.

Of course, we can't find the "right" set of taxes without knowing the government's goal. At the outset, we assume that the only goal is to finance the state's expenditures with a minimum of excess burden and without using any lump sum taxes. We return later to issues that arise when distribution as well as efficiency matters.

To begin, consider the situation of Stella, a representative citizen who consumes only two commodities, X and Y, as well as leisure, l. The price of X is P_x, the price of Y is P_y, and the wage rate (which is the price of leisure) is w. The maximum number of hours per year that Stella can work—her **time endowment**—is fixed at $\overline{T}$. Think of $\overline{T}$ as the amount of time left over after sleep.) It follows that hours of work are $(\overline{T} - l)$—all time not spent on leisure is devoted to work. Income is the product of the wage rate and hours of work—$w(\overline{T} - l)$. Assuming that Stella

time endowment
The maximum number of hours an individual can work during a given period.

spends her entire income on commodities X and Y (there is no saving), her budget constraint is

$$w(\overline{T} - l) = P_x X + P_y Y \tag{16.1}$$

The left-hand side gives total earnings, and the right-hand side shows how the earnings are spent.

Equation (16.1) can be rewritten as

$$w\overline{T} = P_x X + P_y Y + wl \tag{16.2}$$

The left-hand side of (16.2) is the value of the time endowment. It shows the income that Stella could earn if she worked every waking hour.

Now suppose that it is possible to tax X, Y, and l at the same ad valorem rate, t. The tax raises the effective price of X to $(1 + t)P_x$, of Y to $(1 + t)P_y$, and of l to $(1 + t)w$. Thus, Stella's after-tax budget constraint is

$$w\overline{T} = (1 + t)P_x X + (1 + t)P_y Y + (1 + t)wl \tag{16.3}$$

Dividing through Equation (16.3) by $(1 + t)$, we have

$$\frac{1}{1 + t} w\overline{T} = P_x X + P_y Y + wl \tag{16.4}$$

Comparison of (16.3) and (16.4) points out the following fact: A tax on all commodities *including leisure,* at the same percentage rate, t, is equivalent to reducing the value of the time endowment from $w\overline{T}$ to $[1/(1 + t)] \times w\overline{T}$. For example, a 25 percent tax on X, Y, and l is equivalent to a reduction of the value of the time endowment by 20 percent. However, because w and $\overline{T}$ are fixed, their product, $w\overline{T}$, is also fixed; for any value of the wage rate, an individual cannot change the value of her time endowment. Therefore, a proportional tax on the time endowment is in effect a lump sum tax. From Chapter 15 we know that lump sum taxes have no excess burden. We conclude that a tax at the same rate on all commodities, *including leisure,* is equivalent to a lump sum tax and has no excess burden.

It sounds good, but there is a problem—putting a tax on leisure time is impossible. The only *available* tax instruments are taxes on commodities X and Y. Therefore, *some* excess burden generally is inevitable. The goal of optimal commodity taxation is to select tax rates on X and Y in such a way that the excess burden of raising the required tax revenue is as low as possible. It might seem that the solution to this problem is to tax X and Y at the same rate—so-called **neutral taxation.** We will see that, in general, neutral taxation is *not* efficient.

neutral taxation

Taxing each good at the same rate.

The Ramsey Rule

To raise the revenue with the least excess burden possible, how should the tax rates on X and Y be set? To minimize *overall* excess burden, the *marginal* excess burden of the last dollar of revenue raised from each commodity must be the same. Otherwise, it would be possible to lower overall excess burden by raising the rate on the commodity with the smaller marginal excess burden or by lowering the rate on the commodity with the larger marginal excess burden.

To explore the consequences of this typical example of marginal analysis, suppose for simplicity that for our representative consumer, X and Y are unrelated commodities—they are neither substitutes nor complements for each other. Hence,

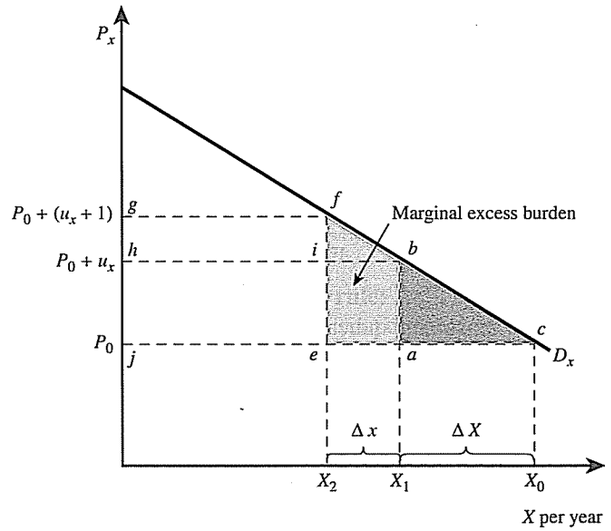


Figure 16.1
Marginal excess burden
Increasing the unit tax from u_x by one dollar leads to a marginal excess burden of *fbae* and to an increase in tax revenues of *gfih* − *bae*.

a change in the price of either commodity affects its own demand and not the demand for the other good. Figure 16.1 shows Stella's compensated demand for X, D_x. Assume that she can buy all the X she wants at the price P_0, so the supply curve of X is horizontal.

Suppose that a unit tax of u_x is levied on X, which lowers quantity demanded from X_0 to X_1, ΔX in the figure. As proven in Chapter 15, the excess burden of the tax is the area of triangle *abc*. Now suppose we raise the tax by 1, so it becomes $(u_x + 1)$. The total price is $P_0 + (u_x + 1)$; quantity demanded falls by Δx to X_2; and the associated excess burden is triangle *fec*. The marginal excess burden is the difference between the two triangles, trapezoid *fbae*. The area of the trapezoid is one-half its height (Δx) times the sum of its bases $[u_x + (u_x + 1)]$. Thus, the marginal excess burden is $\frac{1}{2}\,\Delta x[u_x + (u_x + 1)]$.

With a bit of algebra,[1] we can simplify this expression to obtain that the marginal excess burden is approximately ΔX:

$$\Delta X = \text{marginal excess burden} \tag{16.5}$$

Recall that excess burden minimization requires information on the marginal excess burden on the *last dollar* of revenue collected. Now that we know the marginal excess burden induced by the tax increase, we must compute the associated increase in revenues. Then all we have to do is divide the marginal excess burden by the change in revenues. By definition, this quotient is the marginal excess burden per incremental dollar of revenue collected.

To compute the change in tax revenues associated with raising the rate from u_x to $(u_x + 1)$, note that when the tax rate is u_x, tax revenues are $u_x X_1$ (the tax per unit times

[1] The area of the trapezoid is $\frac{1}{2}\,\Delta x(2u_x + 1)$ or $\Delta x u_x + (\frac{1}{2})\,\Delta x$, which we can approximate as $\Delta x u_x$ because the second term, which corresponds to triangle *fib* is relatively small and can be ignored. Now note that $1/\Delta x$ and $u_x/\Delta X$ are equal because both measure the slope (in absolute value) of D_x. Hence, $\Delta x u_x = \Delta X$, which is the marginal excess burden.

number of units sold). In Figure 16.1, this is rectangle *hbaj*. Similarly, when the tax rate is $(u_x + 1)$, tax revenues are *gfej*. Comparing these two rectangles, we see that when the tax goes up, the government gains area *gfih* but loses *ibae*. Thus, the change in revenues is *gfih* − *ibae*. Using algebra, this is $X_2 - (X_1 - X_2)u_x$. A bit of mathematical manipulation[2] leads us to the following approximation to the change in tax revenue:

$$X_1 - \Delta X = \text{marginal tax revenue} \tag{16.6}$$

Marginal excess burden per additional dollar of tax revenue is Equation (16.6) divided by (16.5) or

$$\frac{\Delta X}{X_1 - \Delta X}$$

Exactly the same reasoning indicates that if a unit tax of u_y is levied on Y, the marginal excess burden per last dollar of revenue is

$$\frac{\Delta Y}{Y_1 - \Delta Y}$$

Because the condition for minimizing overall excess burden is that the marginal excess burden per last dollar of revenue be the same for each commodity, we must set

$$\frac{\Delta X}{X_1 - \Delta X} = \frac{\Delta Y}{Y_1 - \Delta Y}$$

This implies

$$\frac{\Delta X}{X_1} = \frac{\Delta Y}{Y_1} \tag{16.7}$$

To interpret Equation (16.7), note that the *change* in a variable divided by its *total* value is just the percentage change in the variable. Hence, Equation (16.7) says that *to minimize total excess burden, tax rates should be set so that the percentage reduction in the quantity demanded of each commodity is the same*. This result, called the **Ramsey rule** (after its discoverer, Frank Ramsey [1927]), also holds even for cases when X, Y, and l are related goods—substitutes or complements.

Ramsey rule

To minimize total excess burden, tax rates should be set so that the tax-induced percentage reduction in the quantity demanded of each commodity is the same.

But why should efficient taxation induce equiproportional changes in quantities demanded rather than equiproportional changes in prices? Because excess burden is a consequence of distortions in *quantities*. To minimize total excess burden requires that all these changes be in the same proportion.

A Reinterpretation of the Ramsey Rule It is useful to explore the relationship between the Ramsey rule and demand elasticities. Let η_x be the compensated elasticity of demand for X. Let t_x be the tax rate on X, this time expressed as an ad valorem rate rather than a unit tax.[3] Now, by definition of an ad valorem tax, t_x is the percentage increase in the price induced by the tax. Hence, $t_x\eta_x$ is the

[2] Note that the expression for marginal tax revenue is equivalent to $X_2(u_x + 1) - X_1u_x = X_2 + u_x(X_2 - X_1)$. From Figure 16.1, $X_2 = X_1 - \Delta x$. Substituting gives us $X_1 - \Delta x - u_x\Delta x$. But $\Delta x = \Delta X/u_x$ (see previous footnote), giving us $X_1 - \Delta X(1 + u_x)/u_x$. Providing that u_x is large relative to 1, this can be approximated as $X_1 - \Delta X$, the expression in the text for marginal tax revenue.

[3] In a competitive market, any unit tax can be represented by a suitably chosen ad valorem tax, and vice versa. For example, suppose a commodity is subject to a unit tax of 5 cents, and the price paid by consumers is 50 cents. Then the resulting excess burden is the same as that associated with an ad valorem tax equal to 10 percent of the after-tax price.

percentage change in the price times the percentage change in quantity demanded when the price increases by 1 percent. This is just the percentage reduction in the demand for X induced by the tax. Defining t_y and η_y analogously, $t_y\eta_y$ is the proportional reduction in Y. The Ramsey rule says that to minimize excess burden, these percentage reductions in quantity demanded must be equal:

$$t_x\eta_x = t_y\eta_y \tag{16.8}$$

Now divide both sides of the equation by $t_y\eta_x$ to obtain

$$\frac{t_x}{t_y} = \frac{\eta_y}{\eta_x} \tag{16.9}$$

Equation (16.9) is the **inverse elasticity rule:** As long as goods are unrelated in consumption, tax rates should be inversely proportional to elasticities. That is, the higher is η_y relative to η_x, the lower should be t_y relative to t_x.[4] Efficiency does *not* require that all rates be set uniformly.

inverse elasticity rule

For goods that are unrelated in consumption, efficiency requires that tax rates be inversely proportional to elasticities.

The intuition behind the inverse elasticity rule is straightforward. Efficient taxes distort decisions as little as possible. The potential for distortion is greater the more elastic the demand for a commodity. Therefore, efficient taxation requires that relatively high rates of taxation be levied on relatively inelastic goods.

The Corlett-Hague Rule Corlett and Hague [1953] proved an interesting implication of the Ramsey rule: When there are two commodities, efficient taxation requires taxing the commodity that is complementary to leisure at a relatively high rate. To understand this result intuitively, recall that *if* it were possible to tax leisure, a "first-best" result would be obtainable—revenues could be raised with no excess burden. Although the tax authorities cannot tax leisure, they *can* tax goods that tend to be consumed jointly *with* leisure, indirectly lowering the demand for leisure. If computer games are taxed at a very high rate, people buy fewer of them and spend less time at leisure. In effect, then, high taxes on complements to leisure provide an indirect way to "get at" leisure, and, hence, move closer to the perfectly efficient outcome that would be possible if leisure were taxable.

Equity Considerations

At this point you may suspect that efficient tax theory has unpleasant policy implications. For example, the inverse elasticity rule says inelastically demanded goods should be taxed at relatively high rates. Is this fair? Do we really want a tax system that collects the bulk of its revenue from taxes on insulin?

Of course not. Efficiency is only one criterion for evaluating a tax system; fairness is also important. In particular, it is widely agreed that a tax system should have

[4] A more careful demonstration requires a little calculus. Recall from Equation (15.3) that the excess burdens on commodities X and Y are $\frac{1}{2}\eta_xP_xXt_x^2$ and $\frac{1}{2}\eta_yP_yYt_y^2$, respectively. Then the total excess burden is $\frac{1}{2}\eta_xP_xXt_x^2 + \frac{1}{2}\eta_yP_yYt_y^2$. (We can just add up the two expressions because by assumption, X and Y are unrelated.) Now, suppose the required tax revenue is R. Then t_x and t_y must satisfy the relation $P_xXt_x + P_yYt_y = R$. Our problem is to choose t_x and t_y to minimize $\frac{1}{2}\eta_xP_xXt_x^2 + \frac{1}{2}\eta_yP_yYt_y^2$ subject to $R - P_xXt_x + P_yYt_y = 0$. Set up the Lagrangian expression

$$\mathcal{L} = \tfrac{1}{2}\eta_xP_xXt_x^2 + \tfrac{1}{2}\eta_yP_yYt_y^2 + \lambda[R - P_xXt_x - P_yYt_y]$$

where λ is the Lagrange multiplier. (The method of Lagrangian multipliers is covered in any intermediate calculus book.) Taking $\partial\mathcal{L}/\partial t_x$ yields $\eta_xt_x = \lambda$ and $\partial\mathcal{L}/\partial t_y$ yields $\eta_yt_y = \lambda$. Hence, $\eta_xt_x = \eta_yt_y$, and Equation (16.9) follows immediately.

vertical equity

Distributing tax burdens fairly across people with different abilities to pay.

vertical equity: It should distribute burdens fairly across people with different abilities to pay. The Ramsey rule has been modified to account for the distributional consequences of taxation. Suppose, for example, that the poor spend a greater proportion of their income on commodity X than do the rich, and vice versa for commodity Y. X might be bread, and Y caviar. Suppose further that the social welfare function puts a higher weight on the utilities of the poor than on those of the rich. Then even if X is more inelastically demanded than Y, optimal taxation may require a higher rate of tax on Y than X. True, a high tax rate on Y creates a relatively large excess burden, but it also tends to redistribute income toward the poor. Society may be willing to pay the price of a higher excess burden in return for a more equal distribution of income.

In general, the optimal departure from the Ramsey rule depends on two considerations. First is how much society cares about equality. If society cares only about efficiency—a dollar to one person is the same as a dollar to another, rich or poor—then it may as well strictly follow the Ramsey rule. Second is the extent to which the consumption patterns of the rich and poor differ. If the rich and the poor consume both goods in the same proportion, taxing the goods at different rates cannot affect the distribution of income. Even if society *has* a distributional goal, it cannot be achieved by differential commodity taxation.

Summary

If lump sum taxation were available, taxes could be raised without any excess burden at all. Optimal taxation would need to focus only on distributional issues. Lump sum taxes are not available, however, so the problem is how to raise tax revenue with as small an excess burden as possible. In general, minimizing excess burden requires that taxes be set so that the (compensated) demands for all commodities are reduced in the same proportion. For unrelated goods, this implies that tax rates should be set in inverse proportion to the demand elasticities. However, if society has distributional goals, departures from efficient taxation rules may be appropriate.

Application: Taxation of the Family

Under current federal income tax law, the fundamental unit of income taxation is the family.[5] A husband and wife are taxed on the sum of their incomes. Regardless of whether the wife or the husband earns an extra dollar, it is taxed at the same rate. Is this efficient? In other words, is the family's excess burden minimized by taxing each spouse's income at the same rate?

Imagine the family as a unit whose utility depends on the quantities of three "commodities": total family consumption, husband's hours of work, and wife's hours of work. Family utility increases with family consumption, but decreases with each spouse's hours of work. Each spouse's hours of work depend on his or her wage rate, among other variables. A tax on earnings distorts the work decision, creating an excess burden. (See Chapter 15, Figure 15.7.) How should tax rates be set so the family's excess burden is as small as possible?

Assume for simplicity that the husband's and wife's hours of work are approximately "unrelated goods"—an increase in the husband's wage rate has very little impact on the

[5] This section is based on Boskin and Sheshinski [1983].

wife's work decision, and vice versa. This assumption is consistent with much empirical research. Then application of the inverse elasticity rule suggests that a higher tax should be levied on the commodity that is relatively inelastically supplied. To enhance efficiency, whoever's labor supply is relatively inelastic should bear a relatively high tax rate. Numerous econometric studies suggest that husbands' labor supplies are considerably less elastic than wives'. Efficiency could therefore be gained if the current tax law were modified to give husbands higher marginal tax rates than wives.[6]

Again, we emphasize that efficiency is only one consideration in tax design. However, it is interesting that this result is consistent with the claims of some who have argued that on equity grounds, the relative tax rate on the earnings of working wives should be lowered. Chapter 17 contains a discussion of the actual tax treatment of married couples under US law.

▸ OPTIMAL USER FEES

So far we have assumed that all production occurs in the private sector. The government's only problem is to set the tax rates that determine consumer prices. Sometimes, the government itself is the producer of a good or service. In such cases, the government must directly choose a **user fee**—a price paid by users of a good or service provided by the government. As usual, we would like to determine the "best" possible user fee. Analytically, the optimal tax and user fee problems are closely related. In both cases, the government sets the final price paid by consumers. In the optimal tax problem, this is done indirectly by choice of the tax rate, while in the optimal user fee problem, it is done directly.

user fee

A price paid by users of a government-provided good or service.

When should the government choose to produce a good instead of purchasing it from the private sector? Government production may be appropriate when the use of some good or service is subject to continually decreasing average costs—the greater the level of output, the lower the cost per unit. Under such circumstances, it is unlikely that the market for the service is competitive. A single firm can take advantage of economies of scale and supply the entire industry output, at least for a sizable region. This phenomenon is often called **natural monopoly.** Examples are bridges, electricity, and cable television. In some cases, these commodities are produced by the private sector and regulated by the government (electricity); and in others they are produced by the public sector (bridges). Although we study public production here, many of the important insights apply to regulation of private monopolies.

natural monopoly

A situation in which factors inherent to the production process lead to a single firm supplying the entire industry's output.

Figure 16.2 measures the output of the natural monopoly, Z, on the horizontal axis, and dollars on the vertical. The average cost schedule is denoted AC_Z. By assumption, it decreases continuously over all relevant ranges of output. Because average cost is decreasing, marginal cost must be less than average. Therefore, the marginal cost curve (MC_Z), which shows the incremental cost of providing each unit of Z, lies below AC_Z. The demand curve for Z is represented by D_Z. The associated marginal revenue curve is MR_Z. It shows the incremental revenue associated with each level of output of Z.

To illustrate why decreasing average costs often lead to public sector production or regulated private sector production, consider what would happen if Z were produced by an unregulated monopolist. A monopolist seeking to maximize profits

[6] The important distinction here is not between *husband* and *wife* but between *primary earner* and *secondary earner*. In families where the wife has the lower supply elasticity, efficiency requires that she have the higher tax rate.

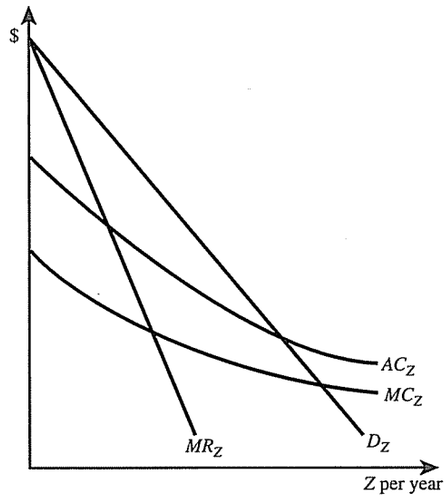


Figure 16.2
A natural monopoly
A natural monopoly's average cost schedule continuously decreases. This means that marginal cost lies below average cost at all levels of output.

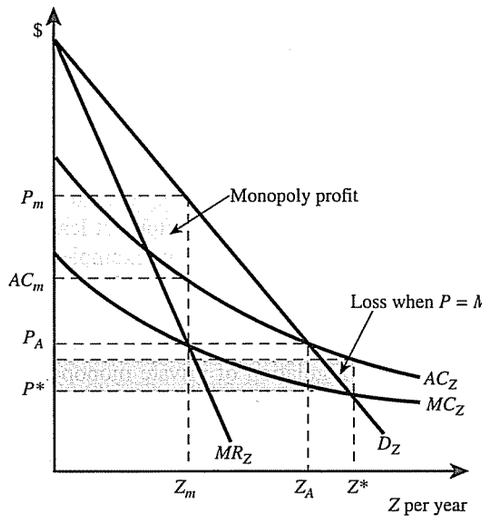


Figure 16.3
Alternative pricing schemes for a natural monopoly
The natural monopolist maximizes profit at Z_m with associated price P_m, which is inefficient. However, at the efficient output, Z^*, the price is so low that the firm cannot cover its costs.

produces up to the point that marginal revenue equals marginal cost, output level Z_m in Figure 16.3. The associated price, P_m, is found by going up to the demand curve, D_Z. Monopoly profits are equal to the product of number of units sold times the profit per unit and are represented geometrically by the light colored rectangle.

Is output Z_m efficient? According to the theory of welfare economics, efficiency requires that price equal marginal cost—the value that people place on the good must equal the incremental cost to society of producing it. At Z_m, price is *greater* than marginal cost. Hence, Z_m is inefficient. This inefficiency plus the fact that society

may not approve of the existence of the monopoly profits provide a possible justification for government taking over the production of Z.

The obvious policy prescription seems to be for the government to produce up to the point where price equals marginal cost. In Figure 16.3, the output at which $P = MC$ is denoted Z^*, and the associated price is P^*. There is a problem, however: at output Z^*, the price is less than the average cost. Price P^* is so low that the operation cannot cover its costs, and it suffers losses. The total loss is equal to the product of the number of units sold, Z^*, times the loss per unit, measured as the vertical distance between the demand curve and AC_Z at Z^*. Geometrically, the loss is the darker colored rectangle in Figure 16.3.

How should the government confront this dilemma? Several solutions have been proposed.

Average Cost Pricing By definition, when price equals average cost, there are neither profits nor losses—the enterprise just breaks even. The operation no longer has to worry about a deficit. Geometrically, this corresponds to the intersection of the demand and average cost schedules in Figure 16.3, where output is Z_A and price is P_A. However, note that Z_A is less than Z^*. Although average cost pricing leads to more output than at the profit-maximizing level, it still falls short of the efficient amount.

Marginal Cost Pricing with Lump Sum Taxes Charge $P = MC$, and make up the deficit by levying lump sum taxes. Charging $P = MC$ ensures efficiency in the market for Z; financing the deficit with lump sum taxes on the rest of society guarantees that no new inefficiencies are generated by meeting the deficit. However, there are two problems with this solution:

First, as previously noted, lump sum taxes are generally unavailable. The deficit has to be financed by distorting taxes, such as income or commodity taxes. If so, the distortion due to the tax may more than outweigh the efficiency gain in the market for Z.

Second, there is a widespread belief that fairness requires consumers of a publicly provided service to pay for it—the so-called **benefits-received principle.** If this principle is taken seriously, it is unfair to make up the deficit by general taxation. If the coast guard rescues me from a stormy sea, why should you pay for it?

benefits-received principle

Consumers of a publicly provided service should be the ones who pay for it.

A Ramsey Solution So far we have been looking at one government enterprise in isolation. Suppose that the government is running *several* enterprises, and as a group they cannot lose money, but any individual enterprise can. Suppose further that the government wants the financing to come from users of the services produced by the enterprises. By how much should the user fee for each service exceed its marginal cost?

Does this question sound familiar? It should, because it is essentially the same as the optimal tax problem. In effect, the difference between the marginal cost and the user fee is just the "tax" that the government levies on the commodity. And just as in the optimal tax problem, the government has to raise a certain amount of revenue—in this case, enough for the group of enterprises to break even. The Ramsey rule gives the answer—set the user fees so that demands for each commodity are reduced proportionately. This analysis, by the way, illustrates one of the nice features of economic theory. Often a framework that is developed to study one problem can be fruitfully applied to another problem that seems to be quite different.

Overview

Of the various possibilities for dealing with decreasing costs, which has the United States chosen? In most cases, both publicly owned and regulated private enterprises have selected average cost pricing. Although average cost pricing is inefficient, it is probably a reasonable compromise. It has the virtue of being fairly simple and adheres to the popular benefits-received principle. Some economists, however, argue that more reliance on Ramsey pricing would be desirable.

▸ OPTIMAL INCOME TAXATION

Thus far, we have assumed that a government can levy taxes on all commodities and inputs. We now turn to the question of how to design systems in which tax liabilities are based on people's incomes. Specifically, how progressive should the income tax be? There is hardly a more contentious issue in public finance. Nineteenth-century economist John McCulloch, who opposed progressive taxation, argued that once you abandon proportional taxation, "you are at sea without rudder or compass, and there is no amount of injustice and folly you may not commit." The goal of the theory of optimal income taxation is to provide a rudder, that is, to provide a systematic way for thinking about the "right" trade-off between equity and efficiency.

Edgeworth's Model

At the end of the 19th century, Edgeworth [1959/1897] examined the question of optimal income taxation using a simple model based on the following assumptions.

1. Subject to the revenues required, the goal is to make the sum of individuals' utilities as high as possible. Algebraically, if U_i is the utility of the ith individual and W is social welfare, the tax system should maximize
$$W = U_1 + U_2 + \cdots + U_n \tag{16.10}$$
where n is the number of people in the society.
2. Individuals have identical utility functions that depend only on their incomes. These utility functions exhibit diminishing marginal utility of income; as income increases, an individual becomes better off, but at a decreasing rate.
3. The total amount of income available is fixed.

Edgeworth's assumptions are virtually identical to the assumptions behind the optimal income distribution model presented in Chapter 12 under "Rationales for Income Redistribution." There we showed that with these assumptions, maximization of social welfare requires that each person's marginal utility of income be the same. When utility functions are identical, marginal utilities are equal only if incomes are equal. The implications for tax policy are clear: Taxes should be set so that the after-tax distribution of income is as equal as possible. In particular, income should be taken first from the rich because the marginal utility lost is smaller than that of the poor. If the government requires more revenue even after obtaining complete equality, the additional tax burden should be evenly distributed.

Edgeworth's model, then, implies a radically progressive tax structure—incomes are leveled off from the top until complete equality is reached. In effect, marginal tax rates on high-income individuals are 100 percent. However, as stressed in Chapter 12, each of the assumptions underlying this analysis is subject to question. In recent decades, economists have investigated how Edgeworth's results change when certain of the assumptions are relaxed.

Modern Studies

One of the most vexing problems with Edgeworth's analysis is the assumption that the total amount of income available to society is fixed. According to this assumption, confiscatory tax rates have no effect on the amount of output produced. More realistically, suppose that individuals' utilities depend not only on income but on leisure as well. Then income taxes distort work decisions and create excess burdens (see Chapter 15). A society with an additive social welfare function thus faces an inescapable dilemma. On the one hand, it desires to allocate the tax burden to equalize the after-tax distribution of income. However, in the process of doing so, it reduces the total amount of real income available. An optimal income tax system—one that maximizes social welfare—must account for the costs (in excess burden) of achieving more equality. In Edgeworth's model, the cost of obtaining more equality is zero, which explains the prescription for a perfectly egalitarian outcome.

How does Edgeworth's result change when work incentives are taken into account? Stern [1987] studied a model similar to Edgeworth's, except that individuals choose between income and leisure. To simplify the analysis, Stern assumed that the tax revenues collected from a person are given by

$$\text{Revenues} = -\alpha + t \times \text{Income} \tag{16.11}$$

where α and t are positive numbers. For example, suppose that α = \$3,000 and t = 0.25. Then a person with an income of \$20,000 would have a tax liability of \$2,000 (= −\$3,000 + 0.25 × \$20,000). A person with an income of \$6,000 would have a tax liability of *minus* \$1,500 (= −\$3,000 + 0.25 × \$6,000). Such a person would receive a \$1,500 grant from the government.

In Figure 16.4, we graph Equation (16.11) in a diagram with income measured on the horizontal axis and tax revenues on the vertical. When income is zero, the tax burden is negative—the individual receives a grant from the government of α

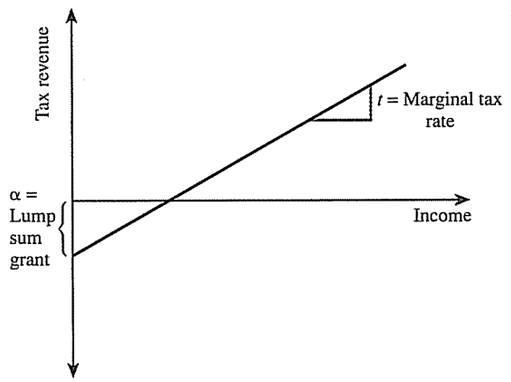


Figure 16.4
A linear income tax
Under a linear income tax, tax revenues are $-\alpha$ when income is zero, and tax revenues increase by t for each dollar increase in income.

dollars. Then, for each dollar of income, the individual must pay t dollars to the government. Thus, t is the *marginal* tax rate, the proportion of an additional dollar that must be paid in tax. Because the geometric interpretation of (16.11) is a straight line, it is referred to as a **linear income tax schedule.** In popular discussions, a linear income tax schedule is often called a **flat income tax.** Note that even though the marginal tax rate for a linear tax schedule is constant, the schedule is progressive in the sense that the higher an individual's income, the higher the proportion of income paid in taxes. (See Chapter 14.) Just how progressive depends on the precise values of α and t. Greater values of t are associated with more progressive tax systems. However, at the same time that high values of t lead to more progressiveness, they create larger excess burdens. The optimal income tax problem is to find the "best" combination of α and t—the values that maximize social welfare [Equation (16.10)] subject to the constraint that a given amount of revenue (above the required transfers) be collected.

linear income tax schedule

See flat income tax.

flat income tax

A tax schedule for which the marginal tax rate is constant throughout the entire range of incomes.

Stern [1987] finds that allowing for a modest amount of substitution between leisure and income, and with required government revenues equal to about 20 percent of income, a value of t of about 19 percent maximizes social welfare.[7] This is considerably less than the value of 100 percent implied by Edgeworth's analysis. Even quite modest incentive effects appear to have important implications for optimal marginal tax rates. Incidentally, Stern's calculated rate is also much smaller than the actual marginal tax rates found in many Western countries. For example, under the US federal personal income tax, the highest statutory marginal income tax rate in 2006 was 35 percent; at times it has been 90 percent.

More generally, Stern showed that the more elastic the supply of labor, the lower the optimal value of t, other things being the same. Intuitively, the cost of redistribution is the excess burden it creates. The more elastic the supply of labor, the greater the excess burden from taxing it. [See Equation (15.4).] More elastic labor supply therefore means a higher cost to redistribution, so that less should be undertaken.

Stern also investigated how alternative social welfare functions affect the results, focusing on the impact of giving different social weights to the utilities of the rich and the poor. In Equation (16.10), more egalitarian preferences are represented by assigning the utilities of poor people higher weights than utilities of the rich. An interesting extreme case is the maximin criterion, according to which the only individual who receives any weight in the social welfare function is the person with the minimum utility (see Chapter 12). Stern found that the maximin criterion calls for a marginal tax rate of about 80 percent. Not surprisingly, if society has extremely egalitarian objectives, high tax rates are called for. Even here, though, the rates fall short of 100 percent.

One limitation of Stern's analysis is that it constrains the income tax system to have only a single marginal tax rate. Gruber and Saez [2002] investigated a more general model that allowed for four marginal tax rates. The most interesting finding to emerge from their analysis is that people in higher-income brackets should face a *lower* marginal tax rate than people in the lower brackets. The intuition behind the result is that, by lowering the marginal tax rate on high-income people, they are induced to supply more labor, and the increased tax revenue can be used to lower the tax burdens on low-income individuals. Importantly, although marginal tax rates

[7] Specifically, the result reported here assumes the elasticity of substitution between leisure and income is 0.6. In Stern's model, this corresponds to a small positive elasticity of labor supply with respect to the net wage, about 0.1.

fall with income, average tax rates rise with income, so the optimal tax system is still progressive. Recently, a canton (state) in Switzerland actually implemented a tax system that imposes lower marginal tax rates on higher earners [Rabushka, 2003].

This cataloging of results may convey a somewhat false sense of precision as to what economists really know about the optimal tax system. After all, there are many controversial value judgments behind the additive social welfare that the optimal tax system seeks to maximize. Moreover, as explained in Chapter 18, there is substantial uncertainty about the behavioral elasticities that are crucial to analyzing the trade-off between efficiency and equity. Nevertheless, explicit calculations of optimal tax rates under alternative sets of assumptions are extremely informative. The contribution of the literature on optimal taxation is systematically to draw out the implications of alternative ethical and behavioral assumptions, thus facilitating coherent discussions of tax policy.

▸ POLITICS AND THE TIME INCONSISTENCY PROBLEM

Optimal taxation is a purely normative theory. It does not purport to predict what real-world tax systems look like, or to explain how these tax systems emerge. The theory pays little attention to the institutional and political setting in which tax policy is made. Holcombe [2002] argues that in the presence of real-world political institutions, policy recommendations based on optimal tax logic may actually reduce welfare.

Assume that in a certain society, there are three commodities, X, Y, and leisure. Labor is totally fixed in supply, and therefore, income is fixed. Currently, this society levies a tax on X, but its constitution forbids taxing Y. Viewing this situation, a student of optimal tax theory might say something like: "You are running an inefficient tax system. Because labor is totally fixed in supply, you could have no excess burden if you taxed X and Y at equal rates—an income tax. I recommend that you lower the tax on X and impose a tax at the same rate on Y. Set the rates so that the same amount of revenue is collected as before."

Suppose, however, that the citizens suspect that if they allow taxation of Y, their politicians will not lower the tax rate on X. Rather, they will simply take advantage of the opportunity to tax something new to make tax revenues as large as possible. As we saw in Chapter 6, certain theories of the public sector suggest that those who run the government can and will maximize tax revenues despite the wishes of the citizenry. Therefore, by constitutionally precluding the taxation of Y, the citizens may be rationally protecting themselves against an inefficiently large public sector. In other words, if citizens do not trust the government, what looks inefficient from the point of view of optimal commodity taxation may be efficient in a larger setting.[8] There is, in fact, some evidence that governments with tax systems that generate large excess burdens tend to grow more slowly than governments with efficient tax systems [Becker and Mulligan, 2003], although research on this matter is at a preliminary stage.

[8] Winer and Hettich [2004] provide further comparisons between optimal tax theory and an approach that takes politics into account.

Issues relating to these considerations may help explain, in part, the current controversy over the tax treatment of purchases made on the Internet. Proponents of Internet taxation argue that a good purchased in a store is essentially the same commodity as the same good purchased on the Internet. Taxing the former but not the latter distorts consumers' choices between the two modes of purchase, and hence creates an excess burden. Opponents argue that taxing Internet sales would simply fuel increases in the size of the public sector, which is already inefficiently large.

time inconsistency of optimal policy

When the government cannot implement an optimal tax policy because the policy is inconsistent with the government's incentives over time, and taxpayers realize this fact.

This discussion is related to the **time inconsistency of optimal policy,** which occurs when the government cannot implement an optimal tax policy because the stated policy is inconsistent with the government's incentives over time. Consider a proposal made by the government of Colombia in 2002. To put down a rebellion, a tax of 1.2 percent of the value of their capital would be levied on all individuals and businesses whose assets exceeded the equivalent of $60,000. Importantly, the tax was to be imposed only one time; it would not be repeated in the future. While capitalists presumably would not be pleased to pay the tax, it would appear to have no impact on their current incentives to save for the future. Such a tax is in effect a lump sum levy and therefore fully efficient.

There is a problem, however. The Colombian government has an incentive to renege on its promise that the tax would only be levied once and pull exactly the same trick next year, raising yet more revenue without an excess burden. Thus, the stated tax policy is inconsistent with the government's incentives over time. Even worse, the capitalists realize the government has an incentive to renege. They will change their saving behavior to reflect the expectation that the more they save now, the more they will be taxed next year. Because the expected tax changes behavior, it introduces an inefficiency.

In short, unless the government can *credibly* promise not to renege, it cannot conduct the fully efficient tax policy. To avoid this time inconsistency problem, the government must be able to commit itself to behave in certain ways in the future. How can this be done? One possible approach is to enact constitutional provisions forbidding the government to go back on its promises. However, as long as the government has an underlying incentive to renege, suspicions will remain, frustrating attempts to run an efficient policy. These considerations suggest that the credibility of the political system must be considered before making recommendations based on optimal tax theory.

▸ OTHER CRITERIA FOR TAX DESIGN

As we have seen, optimal taxation depends on the trade-off between "efficiency" and "fairness." However, the use of these concepts in optimal tax theory does not always correspond closely to lay usage. In the context of optimal tax theory, a fair tax is one that guarantees a socially desirable distribution of the tax burden; an efficient tax is one with a small excess burden. In public discussion, on the other hand, a fair tax is often one that imposes equal liabilities on people who have the same ability to pay, and an efficient tax system is one that keeps down administrative and compliance expenses. These alternative notions of fairness and efficiency in taxation are the subject of this section.

Horizontal Equity

horizontal equity

People in equal positions should be treated equally.

The American humorist Will Rogers once said, "People want *just* taxes more than they want *lower* taxes. They want to know that every man is paying his proportionate share according to his wealth." This criterion for evaluating a tax system is embodied in the economist's notion of **horizontal equity:** People in equal positions should be treated equally. To make horizontal equity an operational idea, one must define "equal positions." Rogers suggests wealth as an index of ability to pay, but income and expenditure might also be used.

Unfortunately, all of these measures represent the *outcomes* of people's decisions and are not really suitable measures of equal position. Consider two individuals, both of whom can earn $10 per hour. Mr. A chooses to work 1,500 hours each year, while Ms. B works 2,200 hours each year. A's income is $15,000 and B's is $22,000, so that in terms of income, A and B are not in "equal positions." In an important sense, however, A and B *are* the same, because their earning capacities are identical—B just happens to work harder. Thus, because work effort is at least to some extent under people's control, two individuals with different incomes may actually be in equal positions. Similar criticism would apply to expenditure or wealth as a criterion for measuring equal positions.

These arguments suggest that the individual's wage *rate* rather than income be considered as a candidate for measuring equal positions, but this idea has problems too. First, investments in human capital—education, on-the-job training, and health care—can influence the wage rate. If Mr. A had to go to college to earn the same wage that Ms. B is able to earn with only a high school degree, is it fair to treat them the same? Second, computing the wage rate requires division of total earnings by hours of work, but the latter is not easy to measure. (How should time spent on coffee breaks be counted?) Indeed, for a given income, it would be worthwhile for a worker to exaggerate hours of work to be able to report a lower wage rate and pay fewer taxes. Presumably, bosses could be induced to collaborate with their employees in return for a share of the tax savings.

utility definition of horizontal equity

A method of classifying people of "equal positions" in terms of their utility levels.

As an alternative to measuring equal position either in incomes or wage rates, Feldstein [1976] suggests it be defined in utilities. Hence, the **utility definition of horizontal equity:** (a) if two individuals would be equally well off (have the same utility level) in the absence of taxation, they should also be equally well off if there is taxation; and (b) taxes should not alter the utility ordering—if A is better off than B before taxation, he should be better off after.

To assess the implications of Feldstein's definition, first assume all individuals have the same preferences, that is, identical utility functions. In this case, individuals who consume the same commodities (including leisure) should pay the same tax, or, equivalently, all individuals should face the same tax schedule. Otherwise, individuals with equal before-tax utility levels would have different after-tax utilities.

Now assume that people have diverse tastes. For example, let there be two types of individuals, Gourmets and Sunbathers. Both groups consume food (which is purchased using income) and leisure, but Gourmets put a relatively high value on food, as do Sunbathers on leisure time. Assume further that before any taxation, Gourmets and Sunbathers have identical utility levels. If the same proportional income tax is imposed on everybody, Gourmets are necessarily made worse off than Sunbathers, because the former need relatively large amounts of income to support their food

habits. Thus, even though this income tax is perfectly fair judged by the traditional definition of horizontal equity, it is not fair according to the utility definition. Indeed, as long as tastes for leisure differ, *any* income tax violates the utility definition of horizontal equity.

Of course, the practical difficulties involved in measuring individuals' utilities preclude the possibility of having a utility tax. Nevertheless, the utility definition of horizontal equity has some provocative policy implications. Assume again that all individuals have the same preferences. Then it can be shown that *any* existing tax structure does not violate the utility definition of horizontal equity *if* individuals are free to choose their activities and expenditures.

To see why, suppose that in one type of job a large part of compensation consists of amenities that are not taxable—pleasant offices, access to a swimming pool, and so forth. In another occupation, compensation is exclusively monetary, all of which is subject to income tax. According to the traditional definition, this situation is a violation of horizontal equity, because a person in the job with a lot of amenities has too small a tax burden. But, if both arrangements coexist and individuals are free to choose, then the net after-tax rewards (including amenities) must be the same in both jobs. Why? Suppose that the net after-tax reward is greater in the jobs with amenities. Then individuals migrate to these jobs to take advantage of them. But the increased supply of workers in these jobs depresses their wages. The process continues until the *net* returns are equal. In short, although people in the different occupations pay unequal taxes, there is no horizontal inequity because of adjustments in the *before-tax* wage.

Some suggest that certain tax advantages available only to the rich are sources of horizontal inequity. According to the utility definition, this notion is wrong. If these advantages are open to everyone with high income, and all high-income people have identical tastes, then the advantages may indeed reduce tax progressiveness, but they have no effect whatsoever on horizontal equity.

We are led to a striking conclusion: Given common tastes, a preexisting tax structure cannot involve horizontal inequity. Rather, all horizontal inequities arise from *changes* in tax laws. This is because individuals make commitments based on the existing tax laws that are difficult or impossible to reverse. For example, people may buy larger houses because of the preferred tax treatment for owner-occupied housing. When the tax laws are changed, their welfare goes down, and horizontal equity is violated. As one congressman put it, "It seems unfair to people who have done something in good faith to change the law on them."[9] These observations give new meaning to the dictum, "The only good tax is an old tax."

The fact that tax changes may generate horizontal inequities does not necessarily imply that they should not be undertaken. After all, tax changes may improve efficiency and/or vertical equity. However, the arguments suggest that it might be appropriate to ease the transition to the new tax system. For example, if it is announced that a given tax reform is not to go into effect until a few years subsequent to its passage, people who have based their behavior on the old tax structure will be able to make at least some adjustments to the new regime. The problem of finding fair processes for changing tax regimes—known as **transitional equity**—is very difficult, and not many results are available on the subject.

transitional equity

Fairness in changing tax regimes.

[9] See Rosenbaum [1986].

The very conservative implications of the utility definition of horizontal equity should come as no great surprise, because implicit in the definition is the notion that the pretax status quo has special ethical validity. (Otherwise, why be concerned about changes in the ordering of utilities?) However, it is not at all obvious why the status quo deserves to be defended. A more general feature of the utility definition is its focus on the *outcomes* of taxation. In contrast, some have suggested that the essence of horizontal equity is to put constraints on the *rules* that govern the selection of taxes, rather than to provide criteria for judging their effects. Thus, horizontal equity excludes capricious taxes, or taxes based on irrelevant characteristics. For example, we can imagine the government levying special lump sum taxes on people with red hair, or putting very different taxes on angel food and chocolate cakes. The **rule definition of horizontal equity** would presumably exclude such taxes from consideration, even if they had desirable efficiency or distributional effects. In this sense, provisions in the US Constitution that rule out certain kinds of taxes can be interpreted as an attempt to guarantee horizontal equity. (See Chapter 1.)

rule definition of horizontal equity

The rules that govern the selection of taxes are more important for judging fairness than the outcomes themselves.

However, identifying the permissible set of characteristics on which to base taxation is a problem. Most people would agree that religion and race should be irrelevant for purposes of determining tax liability. On the other hand, there is considerable disagreement as to whether or not marital status should influence tax burdens (see Chapter 17). And even with agreement that certain characteristics are legitimate bases for discrimination, the problem of how much discrimination is appropriate still remains. Everyone agrees that serious physical impairment should be taken into account in determining personal tax liability. But how bad must your vision be to qualify for special tax treatment as blind? And by what amount should your tax bill be reduced?

We are forced to conclude that horizontal equity, however defined, is a rather amorphous concept. Yet it has enormous appeal as a principle of tax design. Notions of fairness among equals, regardless of their vagueness, will continue to play an important role in the development of tax policy.

Costs of Running the Tax System

An implicit assumption in the models we have been studying is that collecting taxes involves no costs. This is clearly false. The tax authorities require resources to do their job. Taxpayers incur costs as well, including outlays for accountants and tax lawyers, as well as the value of time spent filling out tax returns and keeping records.

The costs of administering the income tax in the United States are fairly low. For example, the Internal Revenue Service spends only about 44 cents to raise each $100 in taxes. However, the compliance costs of personal income taxation are quite substantial. These compliance costs include the time spent on tax preparation and the cost of such items as professional advice and preparation manuals. Survey evidence suggests that the total compliance cost of the income tax is about 10 percent of revenues [Kaplow, 2006, p. 70], or about $141 billion in 2005.

Clearly, the choice of tax and subsidy systems should take account of administrative and compliance costs. Even systems that appear fair and efficient (in the excess burden sense) might be undesirable because they are excessively complicated and expensive to administer. Consider the possibility of taxing output produced in the home—housecleaning, child care, and so on. As suggested in Chapter 15, the

fact that market work is taxed but housework is not creates a sizable distortion in the allocation of labor. Moreover, taxing differentially on the basis of choice of workplace violates some notions of horizontal equity. Nevertheless, the difficulties involved in valuing household production would create such huge administrative costs that the idea is infeasible.

Unfortunately, administrative problems often receive insufficient attention. A classic case was the federal luxury tax on new jewelry enacted in 1990. The tax applied only to the portion of the price that exceeded $10,000, and only items worn for adornment were subject to the tax. As one commentator noted, the tax was an administrative nightmare: "loose gems and repairs aren't taxed; market value after a major modification is. Thus, . . . you may be taxed if you have gems from your grandma's brooch put in a new setting. But you won't be if you replace a $30,000 diamond lost from a ring; that's a repair."[10] The costs to the Internal Revenue Service of collecting the luxury tax may have exceeded the revenues collected! The tax was finally repealed in 1993.

Obviously, no tax system is costless to administer; the trick is to find the best trade-off between excess burden and administrative costs. For example, administering a sales tax system in which each commodity has its own rate might be very cumbersome, despite the fact that this is the general tack prescribed by the Ramsey rule. Any reductions in excess burden that arise from differentiating the tax rates must be compared to the incremental administrative costs.

Tax Evasion

We now turn to one of the most important problems facing any tax administration—cheating. To begin, one must distinguish between tax avoidance and tax evasion. **Tax avoidance,** which John Maynard Keynes once called "the only intellectual pursuit that carries any reward," is changing your behavior so as to reduce your tax liability. There is nothing illegal about tax avoidance:

tax avoidance

Altering behavior in such a way as to reduce your legal tax liability.

> Over and over again courts have said that there is nothing sinister in so arranging one's affairs so as to keep taxes as low as possible. Everybody does so, rich or poor; and all do right, for nobody owes any public duty to pay more than the law demands . . . To demand more in the name of morals is mere cant [Judge Learned Hand, *Commissioner* v. *Newman*, 1947].

POLICY PERSPECTIVE

Architectural Tax Avoidance

People have always been very creative when it comes to avoiding taxes. Consider, for example, the events that transpired in 1696, when King William III of England decided that he needed to raise more money. He couldn't use an income tax, because it was widely viewed as a violation of personal liberty. Instead, he opted for a tax on windows. Because wealthier people have larger houses, and larger houses have more windows, this tax would tend to target the well off. King William may not have anticipated a simple way to avoid the tax—brick up the windows on one's

[10] See Schmedel [1991].

home. This centuries old example of tax avoidance is still on display in some houses in England (see top picture below).

Other architectural quirks are also products of tax avoidance. For example, in the 18th century, the government of Brazil levied a tax on *finished* churches. To avoid the tax, some churches at the time were built with one of their towers missing (see bottom picture below). Similarly strange—but predictable—consequences followed from a 17th-century law in Holland, which levied a tax based on the width of one's house: the wider the house, the bigger the tax bill. The people of Amsterdam responded by building houses that were tall, deep, and narrow (see picture on p. 372).

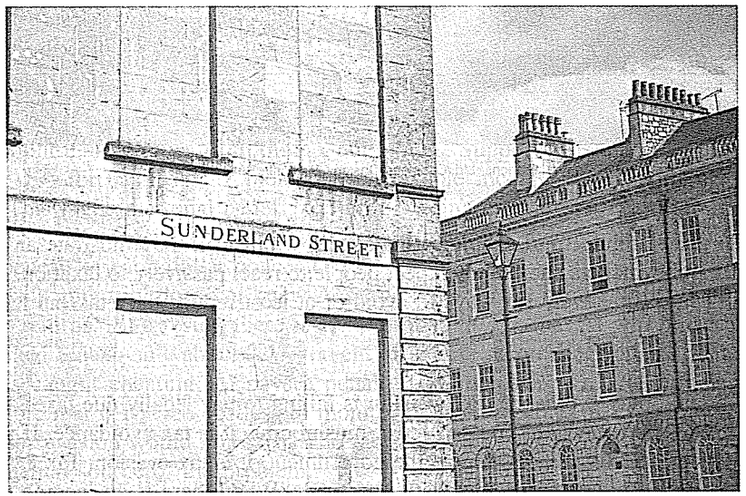


Photo courtesy of Age Fotostock.

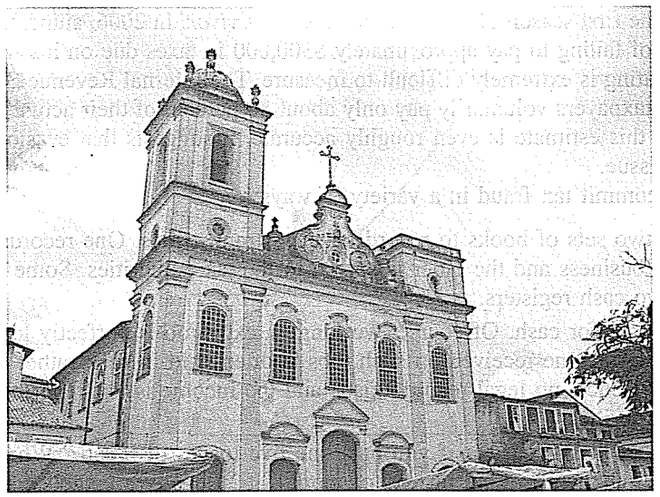


Photo courtesy of Jonathan Meer.

While these architectural examples may seem whimsical, they illustrate an important truth: policymakers should not expect people to react passively to taxation. Rather, they will search creatively for ways to avoid or at least reduce their tax burden.

tax evasion

Not paying taxes legally due.

In contrast to tax avoidance, **tax evasion** is failing to pay legally due taxes. If a tax on mushrooms is levied and you sell fewer mushrooms, it is tax avoidance. If you fail to report your sales of mushrooms to the government, it is tax evasion. Tax evasion is not a new problem. Centuries ago Plato observed, "When there is an income tax, the just man will pay more and the unjust less on the same amount of income." In recent years, however, tax evasion has received an especially large amount of public attention. A case that received international notice was that of Richard Hatch, who was the winner of the first season of the television show *Survivor*. In 2006, authorities accused Mr. Hatch of failing to pay approximately $300,000 in taxes due on his winnings.

Tax cheating is extremely difficult to measure. The Internal Revenue Service estimates that taxpayers voluntarily pay only about 80 percent of their actual income tax liability. If this estimate is even roughly accurate, it suggests that evasion is a very important issue.

People commit tax fraud in a variety of ways:

- Keep two sets of books to record business transactions. One records the actual business and the other is shown to the tax authorities. Some evaders use two cash registers.
- Moonlight for cash. Of course, working an extra job is perfectly legal. However, the income received on such jobs is often paid in cash rather than by check. Hence, no legal record exists, and the income is not reported to the tax authorities.
- Barter. "I'll fix your car if you bake me five loaves of bread." When you receive payment in kind instead of money, it is legally a taxable transaction. However, such income is seldom reported.

- Deal in cash. Paying for goods and services with cash and checks made out to "cash" makes it very difficult for the Internal Revenue Service to trace transactions.

At one time, tax evasion was associated with millionaires who hid their capital in Swiss bank accounts. The current image of a tax evader may well be a repairer whose income comes from "unofficial" work not reported for tax purposes, or a parent who evades taxes on wages paid to a baby-sitter. Indeed, people who pay maids, nannies, and other household employees more than roughly $1,500 per year are obligated to pay Social Security taxes for them, yet fewer than 0.25 percent of all households pay this "nanny tax" [Herman, 2004b]. The feeling that "everyone is doing it" is widespread.

We first discuss the positive theory of tax evasion, and then turn to the normative question of how public policy should deal with it.

Positive Analysis of Tax Evasion Assume Al cares only about maximizing his expected income. He has a given amount of earnings and is trying to choose R, the amount that he hides from the tax authorities. Suppose Al's marginal income tax rate is 0.3; for each dollar shielded from taxable income, his tax bill falls by 30 cents. This is the marginal benefit to him of hiding a dollar of income from the tax authorities. More generally, when Al faces a marginal income tax rate t, the marginal benefit of each dollar concealed is t.

The tax authority does not know Al's true income, but it randomly audits all taxpayers' returns. As a result, there is some probability, ρ, that Al will be audited. (In the United States, only about 0.77 percent of federal income tax returns are audited.) If he is caught cheating, Al pays a penalty that increases with R at an increasing rate. Note that if it were costless to monitor Al every second of every day, opportunities for evasion would not exist. The fact that such monitoring is infeasible is the fundamental source of the problem.

Assuming that Al knows the value of ρ and the penalty schedule, he makes his decision by comparing the marginal costs and benefits of cheating. In Figure 16.5, the

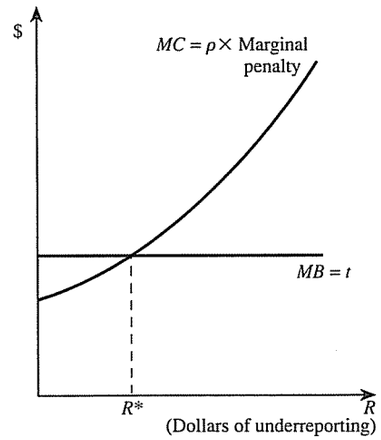


Figure 16.5
Tax evasion is positive
Given this tax rate, probability of being audited, and marginal penalty if caught cheating, the optimal amount of cheating is R^*, which is positive.

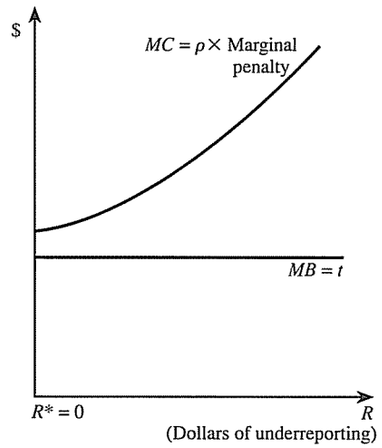


Figure 16.6
Tax evasion is zero
Given this tax rate, probability of being audited, and marginal penalty if caught cheating, the optimal amount of cheating is zero.

amount of income not reported is measured on the horizontal axis, and dollars on the vertical. The marginal benefit (*MB*) for each dollar not reported is *t*, the amount of tax saved. The expected marginal cost (*MC*) is the amount by which the penalty goes up for each dollar of cheating (the marginal penalty) times the probability of detection. For example, if the additional penalty for hiding the thousandth dollar is $1.50 and the probability of detection is 1 in 3, then the *expected* marginal penalty is 50 cents. The "optimal" amount of cheating is where the two schedules cross, at R^*. R^* is optimal in the sense that *on average* it is the policy that maximizes Al's income. In a world of uncertainty, finding the best policy in this "expected value" sense is a reasonable way to proceed. It is possible, of course, that not cheating at all will be optimal. For the individual in Figure 16.6, the marginal cost of cheating exceeds the marginal benefit for all positive values of *R*, so the optimum is equal to zero.

The model predicts that cheating decreases when marginal tax rates go down. This is because a lower value of *t* decreases the marginal benefit of evasion, shifting down the marginal benefit schedule so the intersection with marginal cost occurs at a lower value of *R*. This prediction is consistent with anecdotal evidence. Consider, for example, the case of the Baltic Republic of Estonia, which recently replaced its system of high and increasing marginal tax rates with a flat income tax of 26 percent. The former Prime Minister, Mart Laar, said that this reform reduced evasion dramatically because "in the real world rich people find a way to avoid high taxes. With a flat tax, they stop worrying about sheltering their income or working in the gray economy" [Tierney, 2006]. The model's prediction is also borne out by econometric studies. For example, Fisman and Wei [2004] find that high tariffs in China lead to substantial tax evasion. According to their estimates, a 1 percent increase in the tax rate on imports induces importers to increase the amount of taxes they evade by 3 percent.

Although this model yields useful insights, it ignores some potentially important considerations.

Psychic Costs of Cheating Simply put, tax evasion may make people feel guilty. One way to model this phenomenon is by adding psychic costs to the marginal cost schedule. For very honest people, the psychic costs are so high they would not cheat even if the expected marginal penalty were zero.

Risk Aversion Figures 16.5 and 16.6 assume people care only about expected income, and that risk per se does not bother them. To the extent that individuals are risk averse, their decisions to engage in what is essentially a gamble may be modified. (Chapter 9 discusses choice under uncertainty.)

Work Choices The model assumes the only decision is how much income to report. The type of job and the amount of before-tax income are taken as given. In reality, the tax system may affect hours of work and job choices. For example, high marginal tax rates might induce people to choose occupations that provide substantial opportunities for evading taxation, the so-called **underground economy.** This includes economic activities that are legal but easy to hide from the tax authorities (home repairs) as well as work that is criminal per se (prostitution, selling drugs). The size of the underground economy is inherently very difficult to measure. The estimates reported by Friedman et al. [2000] place it at 14 percent of Gross Domestic Product in the United States. For Britain, the figure is 7 percent, and for Russia 42 percent. Davis and Henrekson [2004] examined data from a group of developed countries in the 1990s and found that when marginal tax rates increase, so does the probability of participating in the underground sector. This finding is consistent with journalistic reports of what transpired in New York City after cigarette taxes there raised the price per pack to about $7.50. The tax increase fueled a thriving black market in low-tax cigarettes from other states, and the sellers included not only veteran black marketers, "but also amateurs seeking extra income" [Fairclough, 2002, p. B1].

underground economy
Those economic activities that are either illegal, or legal but hidden from tax authorities.

Changing Probabilities of Audit In our simple analysis, the probability of an audit is independent of both the amount evaded and the size of income reported. However, in the United States, audit probabilities depend on occupation and the size of reported income. This complicates the model but does not change its essential aspects.

Clearly, cheating is a more complicated phenomenon than Figures 16.5 and 16.6 suggest. Nevertheless, the model provides us with a useful framework for thinking about the factors that influence evasion decisions. As already suggested, it is difficult to do empirical work on tax evasion. Consequently, it is not known whether high fines or frequent audits are more effective ways of deterring cheating. One tentative result that emerges from several econometric studies is that for most groups a heightened threat of audit increases reported income, but the magnitude of the effect is small [Blumenthal et al., 2001].

Normative Analysis of Tax Evasion

Most public discussions of the underground economy assume that it is a bad thing and that policy should be designed to reduce its size. Although possibly correct, this proposition is worth scrutiny.

An important question in this context is whether or not we care about the welfare of tax evaders. In the jargon of welfare economics, do the utilities of participants in the underground economy belong in the social welfare function? Assume for the moment that they do. Then under certain conditions, the existence of an underground economy raises social welfare. For example, if the supply of labor is more elastic to the underground economy than to the regular economy, optimal tax theory suggests

that the former be taxed at a relatively low rate. This is simply an application of the inverse elasticity rule, Equation (16.9). Alternatively, suppose that participants in the underground economy tend to be poorer than those in the regular economy. In fact, many observers believe that the underground economy is a crucial part of life in American inner cities. To the extent society has egalitarian income redistribution objectives, leaving the underground economy intact might be desirable.

Consider now the policy implications when evaders are given no weight in the social welfare function, and the goal is simply to eliminate cheating at the lowest administrative cost possible. Figure 16.5 suggests a straightforward way to accomplish this objective. The expected marginal cost of cheating is the product of the penalty rate and the probability of detection. The probability of detection depends on the amount of resources devoted to tax administration; if the Internal Revenue Service has a big budget, it can catch a lot of cheaters. However, even if the tax authorities have a small budget so that the probability of detection is low, the marginal cost of cheating can still be made arbitrarily high if the penalty is large enough. If only one tax evader were caught each year, but he or she were publicly hanged for the crime, the *expected* cost of tax evasion would deter many people. The fact that such a draconian policy has never been seriously proposed in the United States indicates that existing penalty systems try to incorporate *just retribution*. Contrary to the assumptions of the utilitarian framework, society cares not only about the end result (getting rid of cheaters) but also the processes by which the result is achieved.

▸ OVERVIEW

Traditional analysis of tax systems elucidated several "principles" of tax design: taxes should have horizontal and vertical equity, be "neutral" with respect to economic incentives, be administratively easy, and so on. Public finance economists have now integrated these somewhat ad hoc guidelines with the principles of welfare economics. The optimal tax literature *derives* the criteria for a good tax using an underlying social welfare function.

On some occasions, optimal tax analysis has corrected previous errors. For example, it may *not* be efficient for all tax rates to be the same (neutral). Furthermore, optimal tax theory has clarified the trade-offs between efficiency and equity in tax design. As a by-product, the various definitions of "equity" have been scrutinized.

The result of this work is not a blueprint for building a tax system, if for no other reason than the economic theory forming the basis for optimal tax theory has its own problems (see Chapter 3). In this context two comments are cogent: (1) Optimal tax theory generally ignores political and social institutions. An "optimal" tax may easily be ruined by politicians or be overly costly to administer. (2) While the optimal tax approach indicates that the concept of horizontal equity is difficult to make operational, the fact remains that *equal treatment of equals* is an appealing ethical concept. Horizontal equity is difficult to integrate with optimal tax theory because of the latter's focus on outcomes rather than processes.

Thus, optimal tax theory has used the tools of welfare economics to add analytical strength to the traditional discussion of tax design. Nevertheless, it is wedded to the utilitarian welfare approach in economics. As such, it is open to criticisms concerning the adequacy of this ethical system.

Summary

- Efficient commodity tax theory shows how to raise a given amount of revenue with a minimum of excess burden.
- The Ramsey rule stipulates that to minimize excess burden, tax rates should be set so that the proportional reduction in the quantity demanded of each good is the same.
- When goods are unrelated in consumption, the Ramsey rule implies that relative tax rates should be inversely related to compensated demand elasticities.
- Choosing optimal user fees for government-produced services is quite similar to choosing optimal taxes.
- Income taxation is a major source of revenue in developed countries. Edgeworth's early study of optimal income taxes indicated that after-tax incomes should be equal. However, when the excess burden of distorting the leisure-income trade-off is included, marginal tax rates of far less than 100 percent are optimal.
- Tax systems may be evaluated by standards other than those of optimal tax theory. Horizontal equity, the costs of administration, incentives for tax evasion, and political constraints all affect the design of tax systems.
- Traditional definitions of horizontal equity rely on income as a measure of "equal position" in society. However, income as conventionally measured is inadequate in this context. The utility definition is more precise, but has radically different policy implications and contains an inherent bias toward the pretax status quo. Other definitions of horizontal equity focus on the rules by which taxes are chosen.
- The costs of running a tax system are ignored in most theoretical analyses. However, administrative and compliance costs affect the choice of tax base, tax rates, and the amount of tax evasion.

Discussion Questions

1. According to estimates by Goolsbee and Petrin [2004], the elasticity of demand for basic cable service is −0.51, and the elasticity of demand for direct broadcast satellites is −7.40. Suppose that a community wants to raise a given amount of revenue by taxing cable service and the use of direct broadcast satellites. If the community's goal is to raise the money as efficiently as possible, what should be the ratio of the cable tax to the satellite tax? Discuss briefly the assumptions behind your calculation.
2. In 2002, the US federal government levied a tax of 3 percent on that part of a car's price exceeding $40,000. (For example, the tax liability on a $50,000 car would be 0.03 × ($50,000 − $40,000), or $300.) Discuss the efficiency, equity, and administrability of this "luxury car tax."
3. "Peter the Great at one time levied a tax upon beards. He held that the beard was a superfluous and useless ornament. The tax is said to have been proportional according to the length of the beard and progressive according to the social position of its possessor" [Groves, 1946, p. 51]. Evaluate Peter's beard tax from the standpoint of optimal tax theory and from the standpoint of horizontal equity.
4. In recent years, farmers in China have been protesting their tax treatment by the government. They have many complaints, including a fee that "is collected for production of 'special products' like nuts, even when none are grown" [Eckholm, 1999, p. A10]. Evaluate this nut tax from the viewpoints of both optimal tax theory and horizontal equity.

5. Diagram a market for a natural monopolist and label the excess burden that results if this firm produces the profit-maximizing output. Now show the excess burden that results if the firm is required by law to charge average cost.
6. Suppose that Sharlene faces a marginal income tax rate of 35 percent, and if she cheats on her taxes, there is a 2 percent chance that she will be caught. Suppose also that the marginal penalty of tax evasion is $10I$, where I is the amount of unreported income (in thousands of dollars). How much income will Sharlene fail to report?
7. The government provides patents to pharmaceutical companies that allow them to charge high prices for the drugs they develop for some years. If a company succeeds in developing an effective drug, the patent protection can result in high profits, especially because the marginal cost of drug production is low. Some propose that the government raise revenue by levying a one-time tax on these profits. Would this be an efficient way to raise tax revenue? Include in your answer the concept of the "time inconsistency of optimal policy."
8. Indicate whether each of the following statements is true, false, or uncertain, and explain why:
   a. A proportional tax on all commodities including leisure is equivalent to a lump sum tax.
   b. Efficiency is maximized when all commodities are taxed at the same rate.
   c. Average cost pricing for a natural monopoly allows the enterprise to break even, but the outcome is inefficient.
   d. Tom's workplace provides free access to a fitness room; Jerry's does not. Horizontal equity requires that Tom be taxed on the value of having access to the fitness room.

Part Five

THE UNITED STATES REVENUE SYSTEM

The next five chapters describe and analyze the major sources of revenue in the US fiscal system. This involves some bad news and some good news. The bad news is that it is hard to know just how long the descriptive material will be correct. Despite the fact that there were major changes in the tax system in 1986, 1990, 1993, 1997, 2001, and 2003, important modifications are under consideration, and a number of "reforms" are likely to occur in the future. The good news is that after seeing the tools of public finance applied to the existing tax institutions, the reader will be able to analyze any new taxes that may arise. Moreover, we discuss some major proposed revisions for each of the existing taxes.

Describing each tax individually is the only feasible expositional technique. Nevertheless, keep in mind that the various taxes do interact. For example, the tax rate on dividends depends on both the individual and corporate income taxes. More generally, failure to consider more than one tax at a time gives a misleading picture of the overall magnitude of the tax burden.

Chapter Seventeen

THE PERSONAL INCOME TAX

It's income tax time again, Americans: time to gather up those receipts, get out those tax forms, sharpen up that pencil, and stab yourself in the aorta.

—DAVE BARRY

adjusted gross income (AGI)

Total income from all taxable sources less certain expenses incurred in earning that income.

taxable income

The amount of income subject to tax.

Several years ago, the chairman of the House Ways and Means Committee, Bill Archer, declared that he wanted to "pull the current income tax code out by its roots and throw it away so it can never grow back." The personal income tax that so vexed Representative Archer (and millions of other Americans) is the workhorse of the federal revenue system. In 2005, almost 174 million income tax returns were filed, which generated $972 billion in revenue, about 45 percent of federal revenues.[1] This chapter discusses problems associated with designing a personal income tax system, the efficiency and equity of the US system, and why so many people want to replace it.

Since its inception in 1913, the income tax code has been revised many times. Our discussion devotes special attention to explaining and evaluating the changes that have been made in recent years.

▸ BASIC STRUCTURE

Americans file an annual tax return that computes their previous year's tax liability. The return is due every April 15. The calculation of tax liability requires a series of steps summarized in Figure 17.1. The first step is to compute **adjusted gross income (AGI),** defined as total income from all taxable sources less certain expenses (the "above-the-line" deductions) incurred in earning that income. Taxable sources include (but are not limited to) wages, dividends, interest, business and farm profits, rents, royalties, prizes, and even the proceeds from embezzlement.

exemption

When calculating taxable income, an amount per family member that can be subtracted from adjusted gross income.

deductions

Certain expenses that may be subtracted from adjusted gross income in the computation of taxable income.

Not all of AGI is taxed. The second step is to convert AGI to **taxable income**—the amount of income subject to tax. This is done by subtracting various amounts called **exemptions** and **deductions** from AGI. Deductions and exemptions are discussed more carefully later.

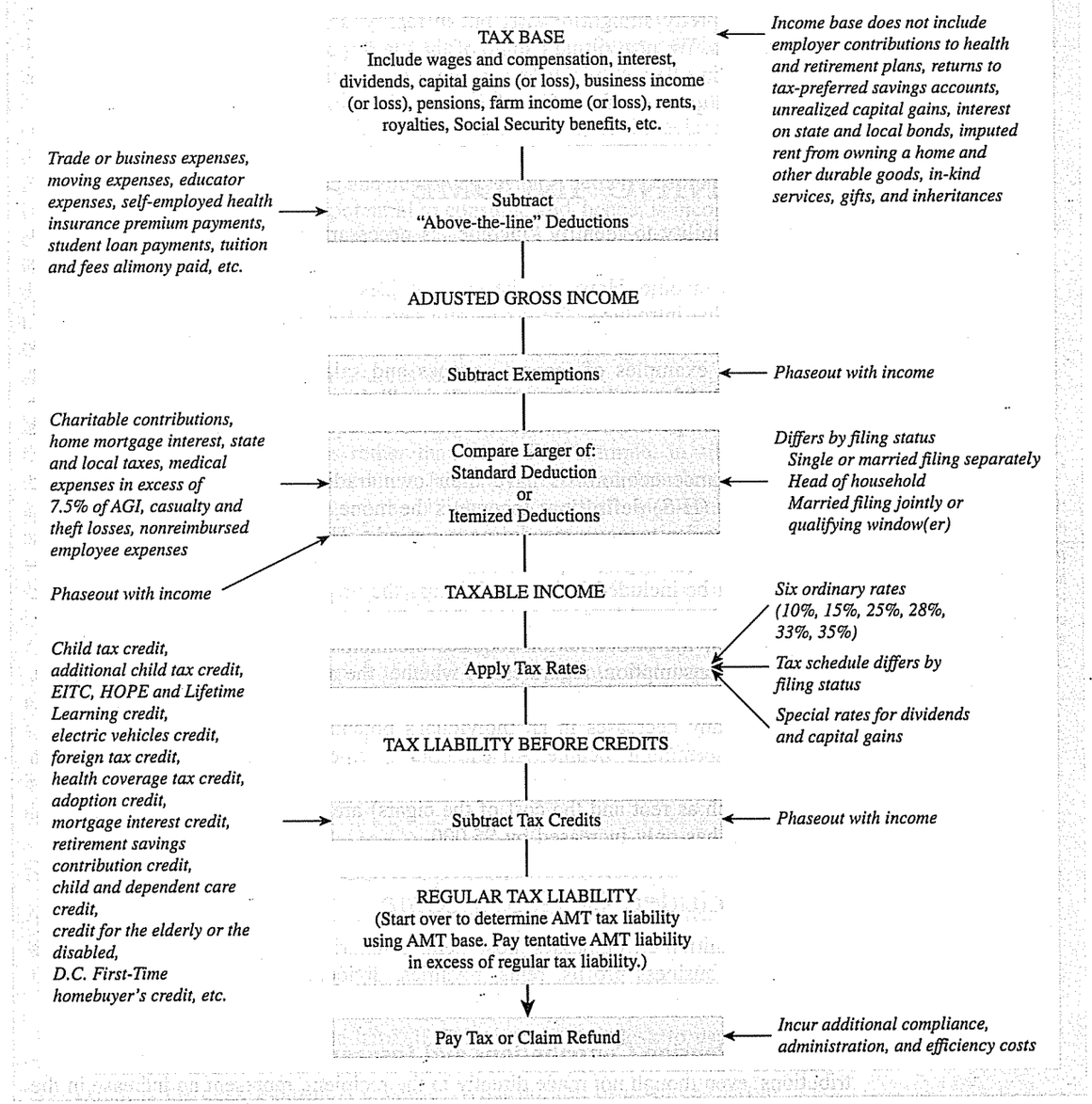
rate schedule

The tax liability associated with each level of taxable income.

The next step is to calculate the amount of tax due by applying the tax rates to the taxable income. A **rate schedule** indicates the tax liability associated with each level of taxable income. Different types of taxpayers face different tax rate schedules. For example, husbands and wives who file tax returns together—joint returns—have different rates than single people. The final step is to subtract tax credits (discussed later) to arrive at the regular tax liability.

[1] Computed from Congressional Budget Office [2006b].

Figure 17.1 Computation of federal personal income tax liability
Taxpayers must follow a complicated set of steps to compute their tax liability.



Source: President's Advisory Panel on Federal Tax Reform [2005, p. 24].

For most taxpayers, some tax is withheld out of each paycheck during the year. The amount they actually pay on April 15 is the difference between the tax liability and the accumulated withholding payments. If more has been withheld than is owed, the taxpayer receives a refund.

It sounds pretty straightforward, but in reality, complications arise in every step of the process. We now discuss some of the major problems. If you are interested in the excruciating details of the law, an online searchable version of the tax code is available at http://www.fourmilab.ch/ustax/ustax.html.

▸ DEFINING INCOME

Clearly, the ability to identify "income" is necessary to operate an income tax. A natural way to begin this section would be to discuss and evaluate the tax code's definition of income. However, the law provides no definition. The constitutional amendment that introduced the tax merely says, "The Congress shall have power to lay and collect taxes on incomes, from whatever source derived." While the tax law does provide examples of income—wages and salaries, rents, dividends, and so on—the words "from whatever source derived" do not really provide a useful standard for deciding whether or not the exclusion of certain items from taxation is appropriate.

Haig-Simons (H-S) definition of income

Money value of the net increase in an individual's power to consume during a period.

Public finance economists have their own traditional standard, the so-called **Haig-Simons (H-S) definition:** Income is the money value of the net increase in an individual's power to consume during a period.[2] This equals the amount actually consumed during the period plus net additions to wealth. Net additions to wealth—saving—must be included in income because they represent an increase in *potential* consumption.

Importantly, the H-S criterion requires the inclusion of *all* sources of potential increases in consumption, regardless of whether the actual consumption takes place, and regardless of the form in which the consumption occurs. The H-S criterion also implies that any decreases in an individual's potential to consume should be subtracted in determining income. An example is expenses that are incurred to earn income. If the gross revenues from Juliet's cigar store are $100,000, but business expenses (such as rent and the cost of the cigars) are $95,000, then Juliet's potential consumption has only increased by $5,000.

Items Included in H-S Income

The H-S definition encompasses those items ordinarily thought of as income: wages and salaries, business profits, rents, royalties, dividends, and interest. However, it also includes certain unconventional items:

Employer Pension Contributions and Insurance Purchases Pension contributions, even though not made directly to the recipient, represent an increase in the potential to consume. In the same way, even if compensation is paid to an employee in the form of a certain commodity (such as an insurance policy) instead of cash, it is still income.

[2] Named after Robert M. Haig and Henry C. Simons, economists who wrote in the first half of the 20th century.

Transfer Payments, Including Social Security Retirement Benefits, Unemployment Compensation, and Welfare Any receipt, be it from the government or an employer, is income.

Capital Gains Increases in the value of an asset are referred to as **capital gains,** decreases as **capital losses.** Suppose Brutus owns some shares of Microsoft stock that increase in value from $10,000 to $12,500 over the course of a year. Then he has enjoyed a capital gain of $2,500. This $2,500 represents an increase in potential consumption, and hence, belongs in income.[3] If Brutus sells the Microsoft stock at the end of the year, the capital gain is said to be **realized;** otherwise it is **unrealized.** From the H-S point of view, it is absolutely irrelevant whether a capital gain is realized or unrealized. It represents potential to consume and, hence, is income. If Brutus does not sell his Microsoft stock, in effect he chooses to save by reinvesting the capital gain in Microsoft. Because the H-S criterion does not distinguish between different uses of income, the fact that Brutus happens to reinvest is irrelevant. All the arguments for adding in capital gains apply to subtracting capital losses. If Casca's Disney stock decreases in value by $4,200 during a given year, this $4,200 should be subtracted from other sources of income.

capital gain (loss)

An increase (decrease) in the value of an asset.

realized capital gain

A capital gain resulting from the sale of an asset.

unrealized capital gain

A capital gain on an asset not yet sold.

Income in Kind Some people receive part or all of their incomes in kind—in the form of goods and services rather than cash. For example, in addition to his salary, former General Electric executive Jack Welsh received floor-level seats to the New York Knicks, courtside seats at the US Open, access to a Manhattan apartment, and satellite TV at his four homes, among other things. Less exotically, farmers provide field hands with food and corporations such as Google give their employees subsidized lunches or access to company fitness centers. One important form of income in kind is the annual rental value of owner-occupied homes. A homeowner receives a stream of services from a dwelling. The net monetary value of these services—**imputed rent**—is equal to the rental payments that would have been received had the owner chosen to rent the house out, after subtracting maintenance expenses, taxes, and so on.

imputed rent

The net monetary value of the services a homeowner receives from a dwelling.

In all these cases, from the H-S point of view, it makes no difference whether benefits are received in monetary form or in the form of goods and services. They are all income.

Some Practical and Conceptual Problems

A number of difficulties arise in attempts to use the Haig-Simons criterion as a basis for constructing a tax system.

- Clearly, only income *net of business expenses* increases potential consumption power. But distinguishing between consumption expenditures and costs of obtaining income can be hard. If Calpurnia buys a desk to use while working at home, but the desk is also a beautiful piece of furniture, to what extent is the desk a business expense? What portion of a "three-martini lunch" designed to woo a client is consumption and what portion is business? (According to current law, the answer to the latter question is 50 percent is consumption. Fifty percent of business meal expenses are deductible.)

[3] Only the real value of capital gains constitutes income, not gains due merely to inflation. This issue is discussed later.

- Capital gains and losses may be very difficult to measure, particularly when they are unrealized. For assets that are traded in active markets, the problem is fairly manageable. Even if Brutus does not sell his Microsoft shares, it is easy to determine their value at any time by consulting the financial section of the newspaper. It is not nearly as simple to measure the capital gain on a piece of art that has appreciated in value.
- Imputed income from durables also presents measurement difficulties. For example, it may be hard to estimate the market rent of a particular owner-occupied dwelling. Similarly, measuring the imputed rental streams generated by other durables such as utility vehicles, compact disk players, and motor boats is not feasible.
- In-kind services are not easy to value. One important example is the income produced by people who do housework rather than participate in the market. These services—housecleaning, cooking, child care, and so forth—are clearly valuable. However, even though markets exist for purchasing these services, it would be difficult to estimate whether a given homemaker's services were equal to the market value.

Evaluating the H-S Criterion

We could list numerous other difficulties involved in implementing the H-S criterion, but the main point is clear. No definition of income can make the administration of an income tax simple and straightforward. Arbitrary decisions about what should be included in income are inevitable. Nevertheless, the Haig-Simons criterion is often regarded as an ideal toward which policymakers should strive: Income should be defined as broadly as is feasible, and all sources of income received by a particular person should be taxed at the same rate.

Why is the H-S criterion so attractive? There are two reasons:

Fairness Recall the traditional definition of horizontal equity from Chapter 16—people with equal incomes should pay equal taxes. For this dictum to make any sense, the tax base must include *all* sources of income. Otherwise, two people with identical abilities to pay could end up with different tax liabilities.

On the other hand, one can argue that as long as people's abilities to earn income differ, the H-S criterion cannot produce fair outcomes. Suppose that Popeye is endowed with a lot of brains, and Bluto with a lot of brawn. Suppose further that the work done by brawny people is less pleasant than that available to brainy individuals. In that case, if Bluto and Popeye have the same *income,* then Popeye has more *utility*. Is it fair to tax them as equals?

Efficiency Defenders of the criterion argue that it has the virtue of *neutrality*—it treats all forms of income the same, and hence, does not distort the pattern of economic activity. Thus, for example, it is argued that the failure to tax imputed rent from owner-occupied housing leads to excessive investment in housing, other things being the same.

It is doubtless true that many departures from the Haig-Simons criterion create inefficiencies. But it does *not* follow that equal tax rates on all income, regardless of source, would be most efficient. Consider income from rent on unimproved land. The supply of such land is perfectly inelastic, and hence, no excess burden would be created by taxing it at a very high rate.[4] An efficient tax system would tax the returns to such land at higher rates than other sources of income, and *not* tax all sources at the same rate, as dictated by the H-S criterion. More generally, the optimal tax literature discussed in Chapter 16 suggests that as long as lump sum taxes are ruled out, efficiency is enhanced when relatively high tax rates are imposed on those activities with relatively inelastic supply. "Neutrality," in the sense of equal tax rates on all types of income, generally does *not* minimize excess burden.

Where does this leave us? McLure [2002] points out that we cannot be sanguine about the possibilities for using optimal tax theory as a framework for designing the tax base, noting that optimal tax rules "generally ignore the administrative difficulty of implementation, as well as the fact that a vast amount of information is required to put them into practice." It would be unwise, therefore, to abandon the Haig-Simons criterion altogether. On the other hand, there is no reason to regard the criterion as sacred. Departures from it should be considered on their merits and should not be viewed prima facie as unfair and inefficient.

▸ EXCLUDABLE FORMS OF MONEY INCOME

We have seen that some income sources that would be taxable according to the Haig-Simons criterion are omitted from the tax base for practical reasons. In addition, several forms of income that would be administratively relatively easy to tax are partially or altogether excluded from adjusted gross income.

Interest on State and Local Bonds

The interest earned by individuals on bonds issued by states and localities is not subject to federal tax. From the H-S point of view, this exclusion makes no sense—interest from these bonds is as much an addition to potential consumption as is any other form of income. The exclusion originally followed from the view that it would be unconstitutional for one level of government to levy taxes on the securities issued by another level of government. However, many constitutional experts now believe such taxation would be permissible.

In the absence of legal restrictions, the exclusion of state and local interest might be justified as a powerful tool for helping states and localities to raise revenues. If investors do not have to pay federal tax on interest from state and local bonds, they should be willing to accept a lower before-tax rate of return than they receive on taxable bonds. Suppose Caesar faces a tax rate of 35 percent on additional income, and the rate of return on taxable securities is 15 percent. Then as long as the rate of return on state and local securities exceeds 9.75 percent, Caesar prefers them to taxable securities, other things being the same.[5] More generally, if t is an individual's marginal tax rate and r is the rate of return on taxable securities, he is willing to

[4] This fact has long been recognized. See George [1914].

[5] In particular, it is assumed the two types of securities are perceived as being equally risky. The demand for assets whose risks differ is discussed in Chapter 18.

purchase nontaxable securities as long as their return exceeds $(1 - t)r$. Hence, state and local governments can borrow funds at rates lower than those prevailing on the market. In effect, the revenue forgone by the Treasury subsidizes borrowing by states and localities.

Unfortunately, tax-exempt bonds are an expensive way to help state and local governments. To see why, assume there are two taxpayers, Caesar, who faces a 35 percent tax rate on additional income, and Brutus, who faces a 15 percent rate. If the market rate of return on taxable bonds is 15 percent, Caesar's after-tax return is 9.75 percent and Brutus's is 12.75 percent. To induce *both* Caesar and Brutus to buy something other than taxable bonds, the net rate of return must therefore be at least 12.75 percent. Suppose a town issues tax-exempt bonds yielding just slightly more than 12.75 percent, and both Caesar and Brutus purchase the bonds. Some of the tax break is "wasted" on Caesar—he would have been willing to buy the bond at any yield greater than 9.75 percent, yet he receives 12.75 percent.

What is the net effect on government revenues? Suppose that the town borrows \$100 from Brutus at the interest rate of 12.75 percent instead of the market rate of 15 percent. This saves the town \$2.25 in interest payments. On the other hand, the US Treasury loses \$2.25 (= 0.15 × \$15) in income tax revenue. In effect, the Treasury has provided a \$2.25 subsidy to the town. Now, if the town borrows \$100 from Caesar, it still saves only \$2.25. But the Treasury loses \$5.25 (= 0.35 × \$15) in tax revenues. Thus, about \$3.00 of the tax break is not translated into a gain for the town.

In short, the net effect of tax-exempt bonds is zero only for those investors who are just on the margin of choosing tax-exempt versus taxable securities. For all others, the subsidy to the state and local borrower is outweighed by the revenue lost at the federal level.

Why not eliminate the interest exclusion and subsidize states and localities with direct grants from the federal government? The main reason is political. A direct subsidy to states and localities would be just another item in the federal budget, an item whose existence might be jeopardized by the vagaries of the political climate. Indeed, if the subsidy were made explicit, rather than buried in the tax law, voters might decide it was not worthwhile. Hence, state and local officials have lobbied intensively—and successfully—to maintain this exclusion.

Some Dividends

Under legislation passed in 2003, dividend income is not taxed at the same rate as ordinary income. Rather, it is taxed at a maximal rate of 15 percent. To see the justification for the partial exclusion, note that dividends are paid by corporations, and corporations are subject to a separate tax on their incomes. Hence, in the absence of an exclusion, dividends are taxed twice, once at the individual level and once at the corporate level. The idea behind taxing dividends at a lower rate for individuals is to ameliorate this double taxation to some extent. The issues associated with dividend taxation are discussed further in Chapter 19.

Capital Gains

As we will see later in the chapter, statutory marginal tax rates on ordinary income (for example, wages and interest) go as high as 35 percent. Under current law, the maximum capital gains rate in 2006 is 15 percent, provided that the asset is held more

than one year.[6] Capital gains on assets held less than a year are taxed as ordinary income. Capital losses—decreases in the value of an asset—can be offset against capital gains. Suppose Antony realizes a gain of \$6,000 on asset *A*, but a loss of \$2,000 on asset *B*. Then Antony is treated as if his capital gains are only \$4,000. Moreover, capital losses in excess of capital gains (up to a limit of \$3,000) can be subtracted from ordinary income. Suppose that in the example just given, asset *B* had lost \$8,200. Then Antony could reduce his capital gains liability to zero and still have \$2,200 in losses left over. He could reduce his ordinary taxable income by this amount.

In addition to the fact that capital gains are taxed at preferential rates, their treatment departs from the H-S criterion in several important ways:

Only Realizations Taxed Unless a capital gain is actually realized—the asset is sold—no tax is levied. In effect, the tax on a capital gain is deferred until the gain is realized. The mere ability to postpone taxes may not seem all that important, but its consequences are enormous.[7] Consider Cassius, who purchases an asset for \$100,000 that increases in value by 12 percent each year. After the first year, it is worth \$100,000 × (1 + 0.12) = \$112,000. After the second year, it is worth \$112,000 × (1 + 0.12) = \$100,000 × $(1 + 0.12)^2$ = \$125,440. Similarly, by the end of 20 years, it is worth \$100,000 × $(1 + 0.12)^{20}$ = \$964,629. If the asset is sold at the end of 20 years, Cassius realizes a capital gain of \$864,629 (= \$964,629 − \$100,000). Assume that the tax rate applied to *realized* capital gains is 15 percent. Then Cassius' tax liability is \$129,694 (= \$864,629 × 0.15), and his net gain (measured in dollars 20 years from now) is \$734,935 (= \$864,629 − \$129,694).

Now assume that the 15 percent capital gains tax is levied *as the capital gains accrue*, regardless of whether they are realized. At the end of the first year, Cassius has \$110,200 [= \$100,000 × (1 + 0.102)]. (Remember, \$1,800 of the \$12,000 gain goes to the tax collector, leaving him with only a 10.2 percent gain.) Assuming that the \$10,200 after-tax gain is reinvested in the asset, at the end of two years, Cassius has \$110,200 × (1 + 0.102) = \$100,000 × $(1.102)^2$ = \$121,440. Similarly, by the end of 20 years, he has \$100,000 × $(1.102)^{20}$ = \$697,641. Cassius' after-tax capital gain is \$597,641 (= \$697,641 − \$100,000). Comparing this to the previous amount of \$734,935 makes clear that the seemingly innocent device of letting the gains accrue without tax makes a big difference. This is because the deferral allows the investment to grow geometrically at the before-tax rather than the after-tax rate of interest. In effect, the government gives the investor an interest-free loan on taxes due.

It should now be clear why a favorite slogan among tax accountants is "taxes deferred are taxes saved." Many very complicated tax shelter plans are nothing more than devices for deferring payment of taxes.

Because only realized capital gains are subject to tax, taxpayers who are considering switching or selling capital assets must take into account that doing so will create a tax liability. Consequently, they may be less likely to change their portfolios. This phenomenon is referred to as the **lock-in effect,** because the tax system tends to lock investors into their current portfolios. This leads to a misallocation of capital, because it no longer flows to where its return is highest. Several econometric studies have examined the tax treatment of capital gains, and a common finding is that the realization-based system for taxing capital gains does in fact produce a lock-in effect [Ivkovich et al., 2005].

lock-in effect

The disincentive to change portfolios that arises because an individual incurs a tax on realized capital gains.

[6] Individuals in the lowest tax brackets are taxed at 5 percent on capital gains.

[7] At this point, it may be useful to review the discussion of interest compounding from Chapter 8 under "Present Value."

Gains Not Realized at Death Capital gains are not taxed at death. Suppose Octavius purchases an asset for $1,000. During Octavius's lifetime, he never sells the asset, and when he dies, it is worth $1,200. Under current US law, the $200 capital gain is not subject to the income tax when Octavius dies. Moreover, when Octavius, Jr. (Octavius's heir) gets around to selling the asset, his computation of capital gains is made as if the purchase price were $1,200, not $1,000. In effect, then, capital gains on assets held to death of the owner are never subject to the income tax. This provision is whimsically referred to as the *Angel of Death loophole.*

Evaluation of Capital Gains Rules We conclude that in terms of the Haig-Simons criterion, the tax treatment of capital gains is unsatisfactory. The criterion requires that all capital gains be taxed, whether realized or unrealized. In contrast, the system generally taxes realized gains preferentially, and unrealized capital gains accrue without taxation. If the asset is held until death of the owner, capital gains escape taxation altogether. While the US tax treatment of capital gains may seem light by the standard of the H-S criterion, it is rather heavy compared to several other countries. In the Netherlands and Germany, for example, capital gains on securities are generally totally exempt from taxation.

The optimal tax literature provides no more justification for preferential treatment of capital gains than the Haig-Simons criterion.[8] However, several rationalizations have been proposed for preferential treatment of this form of capital income. Some argue that capital gains are not regular income, but rather windfalls that occur unexpectedly. Fairness requires that such unexpected gains not create a tax liability. Moreover, because investing requires the sacrifice of abstaining from consumption, it is only fair to reward this sacrifice. However, it could just as well be asserted that *labor* income should be treated preferentially, because it involves the unpleasantness of work, while those who receive capital gains need only relax and wait for their money to flow in. Ultimately, it is impossible to argue convincingly that production of one source of income or another requires more sacrifice and should therefore be treated preferentially.

Another justification for preferential taxation of capital gains is that it is needed to stimulate capital accumulation and risk taking: "What makes this country's economy so vibrant is its participants' willingness to take chances, innovate, acquire financing, hire new people and break old molds. Every increase in capital gains taxes . . . is a direct tax on this vitality" [Prescott, 2005b, p. A14]. In Chapter 18, we deal at some length with the question of how taxation affects saving and risk-taking incentives. For now, we merely note that although there is some preliminary evidence that decreases in capital gains tax rates induce more individuals to become entrepreneurs [Gompers and Lerner, 1999], it is not clear that special treatment for capital gains does increase saving and risk taking.

Some promote preferential treatment of capital gains because it helps counterbalance inflation's tendency to increase the effective tax rate on capital gains. As we see later, under existing tax rules, inflation does produce an especially heavy burden on capital income. But arbitrarily taxing capital gains at a different rate is not the best way to deal with this problem.

Finally, we stress that a full picture of the tax treatment of capital income requires taking into account that much of this income is generated by corporations, and

[8] However, under certain conditions, optimal tax theory suggests that *no* forms of capital income should be taxed. See Chapter 21.

corporations are subject to a separate tax system of their own. The overall tax rate on capital income thus depends on the personal *and* corporate rates. We return to this issue in Chapter 19.

Employer Contributions to Benefit Plans

Employers' contributions to their employees' retirement funds are not subject to tax. Neither does the government tax the interest that accrues on the pension contributions over time. Only when the pension is paid out at retirement are the principal and interest subject to taxation. Similarly, employer contributions to medical insurance plans are not included in income.

As already argued, pensions and health insurance should be counted as income according to the Haig-Simons criterion. Similarly, the interest on pension funds should be taxable as it accrues. However, including such items in the tax base appears to be politically infeasible. In 2005, the President's Advisory Panel on Federal Tax Reform [2005] recommended scaling back the tax preference for employer-provided health insurance. This proposal has not been pursued by either political party.

Some Types of Saving

Under certain circumstances, people can save in a variety of tax-favored forms for their retirement or for some other specified purposes. In this section, we list and describe the main plans.

Using an **Individual Retirement Account (IRA),** an individual without a pension at work can deposit up to $4,000 per year (scheduled to increase to $5,000 in 2008) in a *qualified account.* (A qualified account includes most of the usual forms of saving: savings accounts, money market funds, etc.) The money so deposited is deductible from adjusted gross income. In addition, single workers with pensions at work can make fully deductible contributions to IRAs if their AGIs are below $50,000 (for married couples, AGI must be below $75,000).[9] Just as in an employer-managed pension fund, the interest that accrues is untaxed. Tax is due only when the money is paid out at retirement. Penalties are imposed if money is withdrawn early, unless it is spent on certain approved items such as education expenses. In 2002, IRA tax deductible contributions were $9.5 billion.

Like a conventional IRA, the **Roth IRA** (named after former Senator William Roth) permits a $4,000 per year contribution. The contribution is *not* tax deductible. However, the funds in the account accumulate tax free, and unlike the conventional IRA, there is no tax when the money is withdrawn. The phaseout for the Roth IRA begins at $95,000 for individuals and $150,000 for couples.

With a **401(k) plan,** named for the section of the Internal Revenue Code that authorizes it, an employee can earmark a portion of his or her salary each year, and no income tax liability is incurred on that portion. The limit on contributions is $15,000 in 2006.

A **Keogh Plan** is available only to self-employed individuals. Such individuals can exclude from taxation 20 percent of their net business income up to a maximum contribution of $44,000. Again, participants are allowed the powerful advantage of tax-free accrual of interest.

[9] These figures are for 2006.

Individual Retirement Account (IRA)

For qualified individuals, a savings account in which the contributions are tax deductible and the interest accrues tax free, provided the funds are held until retirement. On withdrawal, both contributions and accrued interest are subject to tax.

Roth IRA

A tax-preferred savings vehicle. Contributions are not tax deductible, but funds accumulate tax free.

401(k) plan

A savings plan under which an employee can earmark a portion of his or her salary each year, with no income tax liability incurred on that portion.

Keogh Plan

A savings plan that allows self-employed individuals to exclude some percentage of their net business income from taxation if the money is deposited into a qualified account.

Education Savings Account

A tax-preferred savings vehicle. Contributions are not tax deductible, but funds accumulate tax free. Funds may be withdrawn to pay for higher education expenses of a child.

An **Education Savings Account** allows eligible families to make a $2,000 per year nondeductible contribution per child; the funds accumulate tax free, and the phaseouts are the same as for the Roth IRA. When the money is withdrawn, it can be used only to pay for qualified higher education expenses of the child.

An important reason for the existence of the various tax-favored saving options is to stimulate saving. However, it is not clear how aggregate saving is affected. People may merely shuffle around their portfolios, reducing their holdings of some assets and depositing them into retirement accounts. This is a very contentious issue in the literature. However, some recent studies favor the view that tax-favored saving options stimulate at least some new saving (see, for example, Benjamin [2003]). In any case, it is clear that the existence of plans for the preferential treatment of retirement saving represents another departure from the H-S criterion. And it is an important departure: About 39 percent of household financial assets are now held in tax-preferred savings accounts.[10]

Even many proponents of tax-favored saving options are dismayed by the complexity associated with the existence of a variety of plans, each with its own eligibility rules, contribution limits, and so on. In 2003, the Bush administration proposed replacing all the existing plans with two new ones. One, a *Lifetime Savings Account,* would essentially be a Roth IRA with a contribution limit of $7,500 per year, but with penalty-free withdrawals at any time and no income limits. The other, an *Employee Retirement Savings Account,* would be like a conventional IRA with a $7,500 limit per year, but could only be used for retirement saving. While advocates of the Bush plan praised its relative simplicity and believed that it would enhance saving, critics argued that it would not increase saving very much, and that only relatively wealthy people would benefit. The proposal never became law.

Gifts and Inheritances

Although gifts and inheritances represent increases in the beneficiaries' potential consumption, these items are not subject to the federal income tax. Instead, separate tax systems cover gifts and estates (see Chapter 21).

▸ EXEMPTIONS AND DEDUCTIONS

In terms of Figure 17.1, we have now completed the computation of adjusted gross income. Once AGI is determined, certain subtractions are made to find taxable income. The two principal subtractions are exemptions and deductions, which we discuss in turn.

Exemptions

A family is allowed an exemption for each of its members. The exemption—$3,300 in 2006—is adjusted annually for inflation. For example, in 2006 a husband and wife with three dependent children could claim five exemptions and subtract $16,500 from AGI. However, exemptions are phased out for people with AGIs above certain levels. For joint returns, personal exemptions are reduced by 2 percentage points for

[10] Computed by authors using data from the Federal Reserve Board's *Flow of Funds Accounts of the United States,* June 6, 2006.

each $2,500 (or fraction thereof) by which AGI exceeds $225,750.[11] Suppose, for example, that our family of five has an AGI of $250,000. Subtracting $225,750 from $250,000, dividing the result by $2,500, and rounding up to the nearest whole number gives us 10. Hence, the family loses 20 percent (= 10 × 2 percent) of its exemptions. Because 20 percent of $16,500 is $3,300, the family can subtract only $13,200 in determining its taxable income. The phaseout is scheduled to be eliminated gradually beginning in 2006. Yes, there will be a phaseout of the phaseout.

Why are there exemptions? Some argue that they adjust ability to pay for the presence of children. Raising children involves certain nondiscretionary expenses, and taxable income should be adjusted accordingly. However, as most parents can tell you, if the exemption is really there to compensate for the expenses of child rearing, $3,300 is much too little. Moreover, it is not clear why expenses involving children should be considered nondiscretionary in the first place. Given the wide availability of contraceptive methods, many would argue that raising children is the result of conscious choice. If one couple wishes to spend its money on European vacations while another chooses to raise a family, why should the tax system reward the latter?[12] On the other hand, certain people's religions rule out effective birth-control methods, and for them, children are not a *choice* as the term is conventionally defined.

Exemptions can also be viewed as a method of providing tax relief for low-income families. The higher the exemption, the greater adjusted gross income must be before *any* income tax is due. Consider a family of four with an AGI of $13,200 or less. When this family's $13,200 in exemptions is subtracted from AGI, the family is left with zero taxable income, and hence, no income tax liability. More generally, the greater the exemption level, the greater is the progressivity with respect to average tax rates. This effect is reinforced when exemptions are phased out for high-income families.

Deductions

The other subtraction allowed from AGI is a deduction. There are two kinds: **Itemized deductions** are subtractions for specific expenditures cited in the law. The taxpayer must list each item separately on the tax return and be able to prove (at least in principle) that the expenditures have been made. In lieu of itemizing deductions, the taxpayer can take a **standard deduction,** which is a fixed amount that requires no documentation. Taxpayers can choose whichever deduction minimizes their tax liability.

itemized deduction

A specific type of expenditure that can be subtracted from adjusted gross income in the computation of taxable income.

standard deduction

Subtraction of a fixed amount from adjusted gross income that does not require documentation.

Deductibility and Relative Prices Before cataloging itemizable expenditures, let us consider the relationship between deductibility of expenditures on an item and its relative price. Suppose that expenditures on commodity Z are tax deductible. The price of Z is $10 per unit. Suppose further that Cleopatra's marginal tax rate is 35 percent. Then, whenever Cleopatra purchases a unit of Z, it only costs her $6.50. Why? Because expenditures on Z are deductible, purchasing a unit lowers Cleopatra's taxable income by $10. Given a 35 percent marginal tax rate, $10 less of taxable income saves Cleopatra $3.50 in taxes. Hence, her effective price of a unit Z is $10 minus $3.50, or $6.50.

[11] For singles, the beginning of the phaseout range is $150,500. The beginnings for the phaseouts are adjusted annually for inflation.

[12] If there are positive externalities involved in raising children, then a subsidy might be appropriate (see Chapter 5).

More generally, if the price of Z is P_Z and the individual's marginal tax rate is t, allowing deduction of expenses on Z lowers Z's effective price from P_Z to $(1 - t)P_Z$. This analysis brings out two important facts:

- Because deductibility changes the relative price of the commodity involved, in general, we expect the quantity demanded to change.
- The higher the individual's value of t, the greater the value to her of a given dollar amount of deductions and the lower the effective price of the good.[13]

Itemized Deductions We now discuss some of the major itemized deductions. The list is far from inclusive; consult any tax guide for further details.

Unreimbursed Medical Expenses That Exceed 7.5 Percent of AGI The justification is that large medical expenses are nondiscretionary and therefore do not really contribute to an individual's ability to pay. It is hard to say to what extent health care expenditures are under an individual's control. A person suffering a heart attack does not have much in the way of choice. On the other hand, individuals can choose how often to visit their doctors and whether or not to have elective surgery. Moreover, individuals can substitute preventive health care (good diet, exercise, etc.) for formal medical services.

Finally, most people can insure themselves against large medical expenditures (see Chapter 9). Under some insurance plans, the first portion of medical expenses is met entirely by the insured, but after a point, some proportion is paid by the insurance company and the rest by the individual. In effect, by allowing deduction of some medical expenses, the tax system provides a kind of social health care insurance. The terms of this "policy" are that the amount the individual pays entirely on his or her own is 7.5 percent of AGI, and after that the Treasury pays a share equal to the marginal tax rate. The pros and cons of providing social health insurance were discussed in Chapters 9 and 10.

State and Local Income and Property Taxes Under current law, state and local income and property taxes are deductible. In 2005, these deductions amounted to $56 billion. State and local sales taxes are *not* deductible.

Those who support deductibility argue that state and local taxes represent nondiscretionary decreases in ability to pay. An alternative view is that they are simply user fees. A person pays state and local taxes in return for benefits such as public schools, police protection, and so forth. Some people choose to live in jurisdictions that provide a lot of such services, and they pay relatively high amounts of tax; others opt for low-service, low-tax jurisdictions. To the extent this description is accurate, there is no particular reason to allow deductibility of state and local taxes.

On the other hand, if state and local taxes are not user fees, it may be appropriate to regard them as decreases in ability to pay.[14] Unfortunately, it is very difficult to determine what proportion of state and local taxes are user fees for public services.

[13] Note that these observations apply more generally to expenditures on any items that are excluded from the tax base, not just deductions. For example, the value of excluding interest from municipal bonds increases with the marginal tax rate, other things being the same. So do the values of fringe benefits such as employer-provided health insurance.

[14] But not necessarily! If the taxes are capitalized into the value of property, the current owners may not be bearing any of their burden. (See Chapter 14.)

This deduction can also be considered a way to help state and local governments finance themselves. For people who itemize on their federal tax returns, the deduction lowers the effective cost of state and local tax payments. This may increase political support for tax increases at the state and local levels. Why isn't a more direct method of subsidy used? As was true for the interest exemption for state and local bonds, political considerations are an important part of the explanation. A subsidy hidden in the tax code may be easier to maintain than an explicit subsidy.

Certain Interest Expenses Some payments of interest are deductible and others not:

- Interest paid on consumer debt such as credit card charges and car loans is *not* deductible.
- Certain individuals who have paid interest on qualified education loans may deduct up to $2,500 for such interest expenses.[15] This deduction is available even to taxpayers who do not itemize.
- Deductions for interest on debt incurred to purchase financial assets cannot exceed the amount of income from these assets. Suppose, for example, that your investment income was $10,000, but the associated interest expenses were $25,000. All you can deduct on your tax return is $10,000. The remaining $15,000 cannot be used to shelter other sources of income from taxation.
- Interest on home mortgages is subject to special treatment. Mortgage interest for the purchase of up to two residences is deductible, up to a limit of the interest on a $1 million purchase or improvement. Also deductible is interest on a *home equity loan*—a loan for which the home serves as collateral and whose proceeds can be used to finance any purchase (except securities that generate tax-free income). For example, one can obtain a home equity loan and use the money to buy a car. In effect, then, the law allows homeowners to deduct interest on consumer loans, but denies this privilege to renters. There is, in fact, evidence that some consumers shuffle consumer debt into mortgage debt to take advantage of this provision [Maki, 2001]. However, deductible interest on home equity loans is limited to the interest on $100,000 of debt.

Do these rules make sense in terms of the Haig-Simons criterion? For a business investment, it is pretty clear that interest should be deductible. It is a cost of doing business, and hence should not be subject to income tax. There is more controversy with respect to consumer interest. Some argue that it is perfectly appropriate to deduct consumer interest payments because they represent decreases in an individual's potential consumption. Others argue that interest on consumer loans should be regarded merely as a higher price one pays to obtain a commodity sooner than would otherwise be possible. Whatever view is taken, it is hard to justify a system that makes the opportunity to deduct consumer interest depend arbitrarily on one's status as a homeowner.

Tax Arbitrage The deductibility of interest together with the exemption of certain types of capital income from taxation can lead to lucrative opportunities for smart investors. Assume that Caesar, who has a 35 percent tax rate, can borrow all the money he wants from the bank at a rate of 15 percent. Assuming that Caesar satisfies the

[15] The deduction is phased out starting at an AGI of $100,000 for couples.

criteria for deductibility of interest, for every dollar of interest paid, his tax bill is reduced by 35 cents. Hence, Caesar's effective borrowing rate is only 9.75 percent. Suppose that the going rate of return on tax-exempt state and local bonds is 11 percent. Then Caesar can borrow from the bank at an effective rate of 9.75 percent and lend to states and localities at 11 percent. The tax system appears to have created a "money machine" that can be cranked to generate infinite amounts of income. The process of taking advantage of such opportunities is referred to as *tax arbitrage*.

This example overstates the potential returns to tax arbitrage, because in real-world capital markets, people cannot borrow arbitrarily large sums of money. Moreover, there is a tendency for competition among those who engage in tax arbitrage to reduce the return to that activity. For example, as more and more arbitrageurs buy municipal bonds, their rate of return goes down. If everyone had a 35 percent marginal tax rate, in equilibrium we would expect the return on municipals to fall until it was exactly 65 percent of the rate on taxable bonds. At that point, there would be no net advantage to owning municipals. Still, some opportunities for gain are present. The tax authorities realized this many years ago and made it illegal to deduct interest from loans whose proceeds are used to purchase tax-exempt bonds. But it is not easy to prove that someone is breaking this rule. Given that money can be used for many different purposes, how can it be proved that a given loan was "for" municipal bond purchases rather than for some other purpose? This very simple scam illustrates some important general lessons:

- Interest deductibility in conjunction with preferential treatment of certain capital income can create major money-making opportunities. This is one reason why countries such as Canada do not allow the deductibility of mortgage interest.
- High-income individuals are particularly likely to benefit from these opportunities. This is because they tend to face relatively high tax rates and to have good access to borrowing.
- The tax authorities can certainly declare various tax arbitrage schemes to be illegal, but it is hard to enforce these rules. Moreover, clever lawyers and accountants are always on the lookout for new tax arbitrage opportunities. The Internal Revenue Service is usually right behind them trying to plug the loopholes. In the process, many inefficient investments are made, and a lot of resources are spent on tax avoidance and tax administration.

Charitable Contributions Individuals can deduct the value of contributions made to religious, charitable, educational, scientific, or literary organizations. Gifts of property are deductible, but personal services are not. In most cases, total charitable deductions cannot exceed 50 percent of adjusted gross income. In 2005, individuals recorded charitable deductions of nearly $200 billion.

Some argue that charitable donations constitute a reduction in taxable capacity and, hence, should be excluded from taxable income. However, as long as the contributions are voluntary, this argument is unconvincing. If people don't receive as much satisfaction from charity as from their own consumption, why make the donations in the first place? Probably the best way to understand the presence of the deduction is as an attempt by the government to encourage charitable giving.

Has the deduction succeeded in doing so? The deductibility provision changes an individual's "price" for a dollar's worth of charity from $1 to $(1 − t), where t is the taxpayer's marginal tax rate. The effectiveness of the deduction in encouraging giving therefore depends on the price elasticity of demand for charitable contributions. If the price elasticity is zero, charitable giving is unaffected. The deduction is just a bonus for those who would give anyway. If the price elasticity exceeds zero, then giving is encouraged.

Many econometric studies have estimated the elasticity of charitable giving with respect to its after-tax price. Typically, a regression is estimated in which the dependent variable is the amount of charitable donations, and the explanatory variables are: (1) the "price" of charitable donations (one minus the marginal tax rate); (2) income; and (3) personal characteristics of individuals that might influence their decisions to give, such as age and marital status. Recent studies suggest that the price elasticity of demand for donations is less than one, perhaps around 0.5 [Greene and McClelland, 2001]. If correct, this figure suggests that the deduction has a substantial effect on giving. Consider an individual with a marginal tax rate of 35 percent. The deductibility of charitable donations lowers the price of giving from $1 to 65 cents, a reduction of 35 percent. With an elasticity of 0.5, this increases charitable donations by 17.5 percent. Note, however, that with an elasticity less than one, the amount that giving increases is less than the revenue that the Treasury loses.

The deduction is controversial apart from its effectiveness in stimulating donations. Whether the government should be subsidizing gifts to private charities can be questioned. Opponents argue that allowing deduction of contributions to churches and synagogues constitutes a violation of the principle of separation of church and state. On the other hand, proponents believe that in the absence of the deduction, many institutions now funded privately would be forced to scale back their activities or close. The current decentralized system stimulates a variety of activities and, hence, promotes the goal of a pluralistic society.

Deductions and Complexity Every deduction requires rules to determine which expenditures qualify and which do not. Designing such rules is difficult, even for such apparently straightforward deductions as medical expenditures. Consider the case of a severely obese woman who lost more than 100 pounds and developed "a mass of loose-hanging skin which spanned the width of her abdomen and spilled over onto her upper thighs." She had surgery to correct the problem and deducted the expense. The Internal Revenue Service disallowed the deduction, saying that it was cosmetic. But the Tax Court ruled for the woman, saying that the sagging skin was an after-effect of the disease [Herman, 2002, p. A1].

Issues also arise in determining allowable charitable deductions. Donations to fraternities and sororities are not deductible. Donations to universities are deductible. What's the proper treatment of a gift to a university that is to be used for constructing a facility for holding sorority meetings? (Under current law, it is deductible.) Or consider the deductibility of wild game that is hunted and then donated to natural history museums. How should such contributions be valued for tax purposes? Currently, these trophies are frequently appraised at many times their market value, leading to big tax deductions for wealthy hunters [Kaufman, 2005].

The fact that itemized deductions increase complexity does not necessarily mean that they are a bad thing. However, complexity is a factor that needs to be taken into account when assessing the costs and benefits of any particular deduction.

Deductions versus Credits As already noted, the higher an individual's marginal tax rate, the greater the value of a deduction of a given dollar amount. In contrast,

tax credit

A subtraction from tax liability (as opposed to a subtraction from taxable income).

a **tax credit** is a subtraction from tax liability (*not* taxable income), and hence, its value is independent of the individual's marginal tax rate. A tax credit of $100 reduces tax liability by $100 whether an individual's tax rate is 15 percent or 35 percent. Subtracting tax credits is the last stage in computing one's tax liability. (See Figure 17.1.)

Current law allows a variety of tax credits. A family receives a $1,000 per child tax credit, sometimes referred to as the *kiddie tax credit.*[16] Credits are also allowed for some college expenses. For example, for the first two years of college, there is a credit of up to $1,500 per student, known as the Hope credit. There is also a Lifetime Learning credit of up to $2,000 per tax return for all years of college. Both the kiddie tax credit and the college credits are subject to phaseouts, as is another credit for certain child care expenses. In terms of dollars involved, the most important tax credit is the earned income tax credit that was described in Chapter 13.

Some argue that deductions and exemptions should be converted into credits. For example, the deduction of mortgage interest payments could be changed to a credit for some percentage of the value of interest paid. With a 20 percent interest credit, individuals could subtract from their tax bills an amount equal to one-fifth of their interest payments. Proponents of credits argue that they are fairer than deductions. Under a regime of tax deductions, a poor person (with a low marginal tax rate) benefits less than a rich person (with a high marginal tax rate) even if they both have identical interest expenses. With a credit, the dollar benefit is the same.

The choice between deductions and credits should depend at least in part on the purpose of the exclusion. If the motivation is to correct for the fact that a given expenditure reduces ability to pay, a deduction is appropriate. If the purpose is mainly to encourage certain behavior, it is unclear whether credits or deductions are superior. A credit reduces the effective price of the favored good by the *same* percentage for all individuals; a deduction decreases the price by *different* percentages for different people. If people differ with respect to their elasticities of demand, it may make sense to present them with different effective prices. For example, it is ineffective to give *any* subsidy to someone whose elasticity of demand for the favored good is zero.

Itemized Deduction Phaseout Otherwise allowable itemized deductions are reduced by 2 percent of the amount by which AGI exceeds $150,500. However, the reduction cannot be more than 80 percent of the total of itemized deductions.[17] Consider, for example, a family with AGI of $200,000, mortgage interest of $15,000, and local property taxes of $5,000. In the absence of the phaseout, the family would be allowed to deduct $20,000. Because AGI exceeds $150,500 by $49,500, its itemized deduction must be reduced by $990 (= $49,500 × 0.02). Hence, only $19,010 of deductions are allowed.

The Standard Deduction Itemized deductions are listed separately on the individual's tax return, and in principle each one requires documentation (such as receipts) to prove that the expenditure has indeed been made. All this record-keeping increases the administrative cost of the system. To simplify tax returns, the standard deduction was introduced in 1944. It is a fixed amount available to all taxpayers. Each household can choose between taking the standard deduction or itemizing, depending

[16] For married couples, the credit is phased out starting at an AGI of $110,000. For singles, it is phased out starting at an AGI of $75,000.

[17] In computing the 80 percent maximum, medical expenses and investment interest are excluded. The threshold is adjusted annually for inflation.

on which offers the greater advantage. The standard deduction in 2006 was $10,300 for joint filers and $5,150 for singles.[18] The standard deduction is adjusted annually for inflation. About 67 percent of tax returns now use the standard deduction.

Impact on the Tax Base

How does the presence of exemptions and deductions influence the size of the tax base? In 2004, AGI was about $6.8 trillion. After completing all the subtractions from AGI, taxable income was only $4.6 trillion, a reduction of about 32 percent. Hence, deductions and exemptions are quite large relative to the size of the potential tax base.

Tax Expenditures

Failure to include a particular item in the tax base results in a loss to the Treasury. Suppose that as a consequence of not taxing item *Z*, the Treasury loses $1 billion. Compare this to a situation in which the government simply hands over $1 billion of general revenues to those who purchase item *Z*. In a sense, these activities are equivalent as both subsidize purchases of *Z*. It just so happens that one transaction occurs on the expenditure side of the account and the other on the revenue side. The former is a **tax expenditure,** a revenue loss caused by the exclusion of some item from the tax base. The list of tax expenditures has more than 140 items. Estimates of the total revenue loss from tax expenditures for 2005 exceed $750 billion [US Office of Management and Budget, 2006, Table 19-1].

tax expenditure

A loss of tax revenue because some item is excluded from the tax base.

The law requires that an annual tax expenditure budget be compiled by the Congressional Budget Office. A major intent of the law is to raise public consciousness of the symmetry between a *direct* subsidy for an activity via an expenditure and an *implicit* subsidy through the tax system. However, the notion of a tax expenditure budget has been subject to several criticisms.

First, a serious technical problem arises in the way the computations are made. It is assumed that in the absence of a deduction for a given item, all the expenditures currently made on it would flow into taxable income. Given that people are quite likely to adjust their behavior in response to changes in the tax system, this is not a good assumption, so the tax expenditure estimates may be quite far off the mark.

Second, the tax expenditure budget is simply a list of items exempt from taxation. However, to characterize an item as exempt, you must first have some kind of criterion for deciding what ought to be included. As we have seen, no rigorous set of principles exists for determining what belongs in income. One person's loophole is someone else's appropriate adjustment of the tax base. Hence, considerable arbitrariness is inevitably involved in deciding what to include in the tax expenditure budget.

Finally, the tax expenditure concept has been attacked on philosophical grounds:

> [L]urking behind the concept of the tax expenditure is a more sinister premise, which is a point not just about national accounting practices but about political philosophy and political economics. It is the subtle disposition to think of all income as virtual state property, and forbearance to tax away every last penny of it as itself a tax expenditure [Fried, 1995, p. C7].

Defenders of the tax expenditure concept argue that the concept does not really carry this ideological baggage. It is merely an attempt to force recognition of the fact that the tax system is a major method for subsidizing various activities. Moreover, the

[18] A joint filer who is elderly (over 65) or blind is entitled to a $1,000 deduction above the standard deduction.