DEADWEIGHT LOSS OF A SPECIFIC TAX WITH INCOME EFFECTS

We learned in Section 6.5 that when income effects are present we can't use an ordinary (also called uncompensated or Marshallian) market demand curve to measure consumer well-being or consumer surplus exactly. Nor can we determine the exact deadweight loss from taxation in that way. Using ordinary demand curves can give a reasonable approximation when income effects are small. But what if they are large?

How should we measure the deadweight loss in that case? We can think of the deadweight loss from a tax as the amount by which tax revenue falls short of the amount consumers and firms would be willing to pay to avoid the tax. Figure 15A.1(a) shows the deadweight loss from a tax of $2.50 per unit on a product for which income effects are large. For the sake of simplicity, we'll assume the supply curve is infinitely elastic at a price of $10. The market demand curve is labeled *D.* The equilibrium without the tax is point A; with the tax it is point B. The tax raises the amount consumers must pay by $2.50, to a total of $12.50, and lowers consumption from 1,500 to 1,000 units. It has no effect on the amount firms receive. Tax revenue is $2,500.

How much would consumers be willing to pay to avoid this tax? To answer that question, we've included a compensated market demand curve, labeled *C,* in the figure. This curve is the sum of consumers' individual compensated demand curves, when compensation is paid so as to provide each consumer with the same level of well-being she has with the tax. Since no compensation is paid when the price is $12.50, this compensated market demand curve *C* crosses the ordinary market demand curve *D* at a price of $12.50. In drawing these demand curves, we've assumed that the good in question is a normal good. As a result, the compensated demand curve shows a higher demand than the ordinary market demand curve at prices above $12.50 (at those prices, positive compensation is paid) and a lower demand at prices below $12.50 (at those prices, income is taken away from consumers to keep their well-being unchanged).

In Figure 15A.1(a), the amount consumers are willing to pay to avoid the tax (and lower the price from $12.50 to $10) is equal to the sum of the gray- and red-shaded areas in the figure. Since the tax revenue equals the gray-shaded area, the deadweight loss is the red-shaded area. Notice that this area is smaller than the deadweight loss we would calculate if we used the ordinary market demand curve instead. (If the good were an inferior good, the true deadweight loss would be greater than the one we would calculate using the ordinary market demand curve.)

When income effects are large, it is important to use compensated demand curves to calculate the deadweight losses when choosing between different taxes based on efficiency. Figure 15A.1(b) shows the market for another good with significant, but smaller, income effects (also a normal good). A tax of $5 per unit on that good would also raise

Figure 15A.1

The Deadweight Loss from a Tax with Income Effects. This figure shows the deadweight loss from a tax on two different goods with income effects on their demand. The ordinary market demand curves are labeled *D*. The compensated market demand curves, which include compensation to keep all consumers at the same level of well-being as with the tax, are labeled *C*. The red-shaded areas represent the deadweight loss from the tax. Since both taxes raise the same amount of revenue ($2,500), taxing the first good (which produces a smaller deadweight loss) is better than taxing the second one. This conclusion differs from the one we would draw by calculating the deadweight loss using the ordinary market demand curves.

(a) First good

(b) Second good
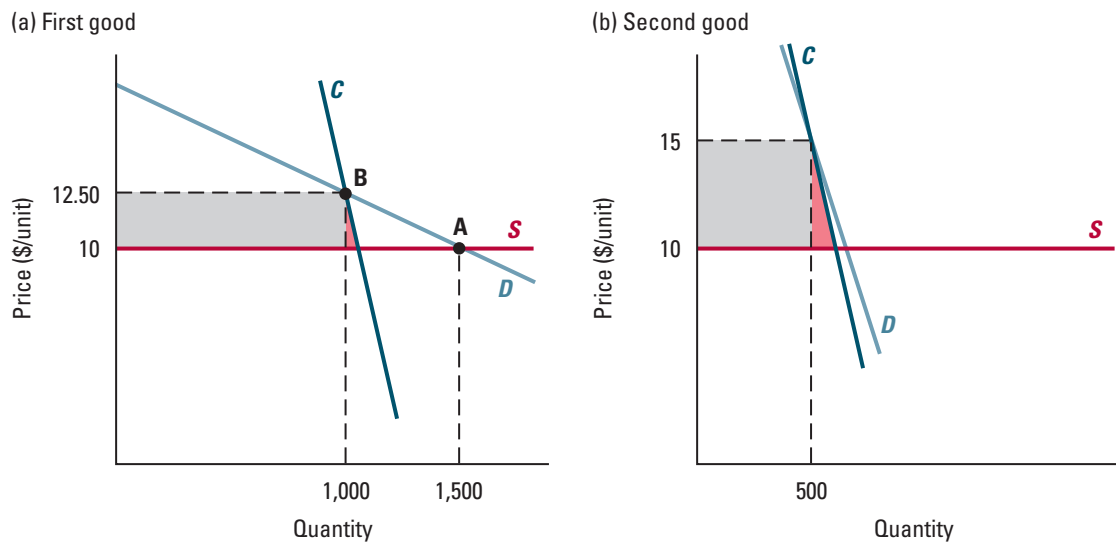
$2,500 of tax revenue (500 units at $5 per unit). Suppose we need to raise $2,500 by taxing one of these goods. If we used the ordinary market demand curves to measure the deadweight loss in each market, we would conclude that it is more efficient to tax the second good because the deadweight loss calculated from the ordinary demand curves is smaller for that good than for the first one. But in fact it's more efficient to tax the first good, because the true deadweight loss (indicated in each case by a red triangle) is smaller than for the second good.