

SUMMARY

- A tax on a good reduces the welfare of buyers and sellers of the good, and the reduction in consumer and producer surplus usually exceeds the revenue raised by the government. The fall in total surplus—the sum of consumer surplus, producer surplus, and tax revenue—is called the deadweight loss of the tax.
- Taxes have deadweight losses because they cause buyers to consume less and sellers to produce less, and these changes in behavior shrink the size of the market below the level that maximizes total surplus. Because the elasticities of supply and demand measure how much market participants respond to market conditions, larger elasticities imply larger deadweight losses.
- As a tax grows larger, it distorts incentives more, and its deadweight loss grows larger. Because a tax reduces the size of the market, however, tax revenue does not continually increase. It first rises with the size of a tax, but if the tax gets large enough, tax revenue starts to fall.

KEY CONCEPT

deadweight loss, p. 157

QUESTIONS FOR REVIEW

1. What happens to consumer and producer surplus when the sale of a good is taxed? How does the change in consumer and producer surplus compare to the tax revenue? Explain.
2. Draw a supply-and-demand diagram with a tax on the sale of a good. Show the deadweight loss. Show the tax revenue.
3. How do the elasticities of supply and demand affect the deadweight loss of a tax? Why do they have this effect?
4. Why do experts disagree about whether labor taxes have small or large deadweight losses?
5. What happens to the deadweight loss and tax revenue when a tax is increased?

PROBLEMS AND APPLICATIONS

1. The market for pizza is characterized by a downward-sloping demand curve and an upward-sloping supply curve.
 - a. Draw the competitive market equilibrium. Label the price, quantity, consumer surplus, and producer surplus. Is there any deadweight loss? Explain.
 - b. Suppose that the government forces each pizzeria to pay a \$1 tax on each pizza sold. Illustrate the effect of this tax on the pizza market, being sure to label the consumer surplus, producer surplus, government revenue, and deadweight loss. How does each area compare to the pre-tax case?
 - c. If the tax were removed, pizza eaters and sellers would be better off, but the government would lose tax revenue. Suppose that consumers and producers voluntarily transferred some of their gains to the government. Could all parties (including the government) be better off than they were with a tax? Explain using the labeled areas in your graph.
2. Evaluate the following two statements. Do you agree? Why or why not?
 - a. "A tax that has no deadweight loss cannot raise any revenue for the government."
 - b. "A tax that raises no revenue for the government cannot have any deadweight loss."
3. Consider the market for rubber bands.
 - a. If this market has very elastic supply and very inelastic demand, how would the burden of a tax on rubber bands be shared between consumers and producers? Use the tools of consumer surplus and producer surplus in your answer.
 - b. If this market has very inelastic supply and very elastic demand, how would the burden of a tax on rubber bands be shared between consumers and producers? Contrast your answer with your answer to part (a).

4. Suppose that the government imposes a tax on heating oil.
 - a. Would the deadweight loss from this tax likely be greater in the first year after it is imposed or in the fifth year? Explain.
 - b. Would the revenue collected from this tax likely be greater in the first year after it is imposed or in the fifth year? Explain.
5. After economics class one day, your friend suggests that taxing food would be a good way to raise revenue because the demand for food is quite inelastic. In what sense is taxing food a “good” way to raise revenue? In what sense is it not a “good” way to raise revenue?
6. Daniel Patrick Moynihan, the late senator from New York, once introduced a bill that would levy a 10,000 percent tax on certain hollow-tipped bullets.
 - a. Do you expect that this tax would raise much revenue? Why or why not?
 - b. Even if the tax would raise no revenue, why might Senator Moynihan have proposed it?
7. The government places a tax on the purchase of socks.
 - a. Illustrate the effect of this tax on equilibrium price and quantity in the sock market. Identify the following areas both before and after the imposition of the tax: total spending by consumers, total revenue for producers, and government tax revenue.
 - b. Does the price received by producers rise or fall? Can you tell whether total receipts for producers rise or fall? Explain.
 - c. Does the price paid by consumers rise or fall? Can you tell whether total spending by consumers rises or falls? Explain carefully. (*Hint*: Think about elasticity.) If total consumer spending falls, does consumer surplus rise? Explain.
8. This chapter analyzed the welfare effects of a tax on a good. Now consider the opposite policy. Suppose that the government *subsidizes* a good: For each unit of the good sold, the government pays \$2 to the buyer. How does the subsidy affect consumer surplus, producer surplus, tax revenue, and total surplus? Does a subsidy lead to a deadweight loss? Explain.
9. Hotel rooms in Smalltown go for \$100, and 1,000 rooms are rented on a typical day.
 - a. To raise revenue, the mayor decides to charge hotels a tax of \$10 per rented room. After the tax is imposed, the going rate for hotel rooms rises to \$108, and the number of rooms rented falls to 900. Calculate the amount of revenue this tax raises for Smalltown and the deadweight loss of the tax. (*Hint*: The area of a triangle is $\frac{1}{2} \times \text{base} \times \text{height}$.)

- b. The mayor now doubles the tax to \$20. The price rises to \$116, and the number of rooms rented falls to 800. Calculate tax revenue and deadweight loss with this larger tax. Are they double, more than double, or less than double? Explain.
10. Suppose that a market is described by the following supply and demand equations:

$$Q^S = 2P$$

$$Q^D = 300 - P$$

- a. Solve for the equilibrium price and the equilibrium quantity.
- b. Suppose that a tax of T is placed on buyers, so the new demand equation is

$$Q^D = 300 - (P + T)$$

Solve for the new equilibrium. What happens to the price received by sellers, the price paid by buyers, and the quantity sold?

- c. Tax revenue is $T \times Q$. Use your answer from part (b) to solve for tax revenue as a function of T . Graph this relationship for T between 0 and 300.
- d. The deadweight loss of a tax is the area of the triangle between the supply and demand curves. Recalling that the area of a triangle is $\frac{1}{2} \times \text{base} \times \text{height}$, solve for deadweight loss as a function of T . Graph this relationship for T between 0 and 300. (*Hint*: Looking sideways, the base of the deadweight loss triangle is T , and the height is the difference between the quantity sold with the tax and the quantity sold without the tax.)
- e. The government now levies a tax of \$200 per unit on this good. Is this a good policy? Why or why not? Can you propose a better policy?

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