CHAPTER

8

Application: The Costs of Taxation

Taxes are often a source of heated political debate. In 1776, the anger of the American colonists over British taxes sparked the American Revolution. More than two centuries later, the American political parties continue to debate the proper size and shape of the tax system. Yet no one would deny that some level of taxation is necessary. As Oliver Wendell Holmes, Jr., once said, "Taxes are what we pay for civilized society."

Because taxation has such a major impact on the modern economy, we return to the topic several times throughout this book as we expand the set of tools we have at our disposal. We began our study of taxes in Chapter 6. There we saw how a tax on a good affects its price and the quantity sold and how the forces of supply and demand divide the burden of a tax between buyers and sellers. In this chapter, we extend this analysis and look at how taxes affect welfare, the economic well-being of participants in a market. In other words, we see how high the price of civilized society can be.

The effects of taxes on welfare might at first seem obvious. The government enacts taxes to raise revenue and that revenue must come out of someone's pocket. As we saw in Chapter 6, both buyers and sellers are worse off when a good is taxed: A tax raises the price buyers pay and lowers the price sellers receive. Yet to understand more fully how taxes affect economic well-being, we must compare the reduced welfare of buyers and sellers to the amount of revenue the government raises. The tools of consumer and producer surplus allow us to make this comparison. Our analysis will show that the cost of taxes to buyers and sellers typically exceeds the revenue raised by the government.

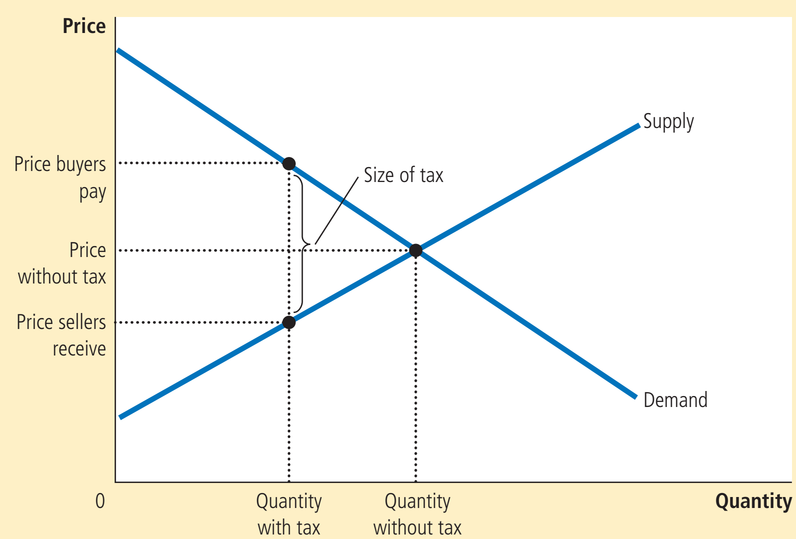
8-1 The Deadweight Loss of Taxation

We begin by recalling one of the surprising lessons from Chapter 6: The impact of a tax on a market outcome is the same whether the tax is levied on buyers or sellers of a good. When a tax is levied on buyers, the demand curve shifts downward by the size of the tax; when it is levied on sellers, the supply curve shifts upward by that amount. In either case, when the tax is enacted, the price paid by buyers rises, and the price received by sellers falls. In the end, the elasticities of supply and demand determine how the tax burden is distributed between producers and consumers. This distribution is the same regardless of how it is levied.

Figure 1 shows these effects. To simplify our discussion, this figure does not show a shift in either the supply or demand curve, although one curve must shift. Which curve shifts depends on whether the tax is levied on sellers (the supply curve shifts) or buyers (the demand curve shifts). In this chapter, we can keep the analysis general and simplify the graphs by not bothering to show the shift. The key result for our purposes here is that the tax places a wedge between the price buyers pay and the price sellers receive. Because of this tax wedge, the quantity sold falls below the level that would be sold without a tax. In other words, a tax on

FIGURE 1

The Effects of a Tax
A tax on a good places a wedge between the price that buyers pay and the price that sellers receive. The quantity of the good sold falls.



a good causes the size of the market for the good to shrink. These results should be familiar from Chapter 6.

8-1a How a Tax Affects Market Participants

Let's use the tools of welfare economics to measure the gains and losses from a tax on a good. To do this, we must take into account how the tax affects buyers, sellers, and the government. The benefit received by buyers in a market is measured by consumer surplus—the amount buyers are willing to pay for the good minus the amount they actually pay for it. The benefit received by sellers in a market is measured by producer surplus—the amount sellers receive for the good minus their costs. These are precisely the measures of economic welfare we used in Chapter 7.

What about the third interested party, the government? If T is the size of the tax and Q is the quantity of the good sold, then the government gets total tax revenue of $T \times Q$. It can use this tax revenue to provide services, such as roads, police, and public education, or to help the needy. Therefore, to analyze how taxes affect economic well-being, we use the government's tax revenue to measure the public benefit from the tax. Keep in mind, however, that this benefit actually accrues not to the government but to those on whom the revenue is spent.

Figure 2 shows that the government's tax revenue is represented by the rectangle between the supply and demand curves. The height of this rectangle is the size of the tax, T, and the width of the rectangle is the quantity of the good sold, Q. Because a rectangle's area is its height times its width, this rectangle's area is $T \times Q$, which equals the tax revenue.

"You know, the idea of taxation with representation doesn't appeal to me very much, either."

Welfare without a Tax To see how a tax affects welfare, we begin by considering welfare before the government imposes a tax. Figure 3 shows the supply-and-demand diagram and marks the key areas with the letters A through F.

Without a tax, the equilibrium price and quantity are found at the intersection of the supply and demand curves. The price is P_1, and the quantity sold is Q_1.

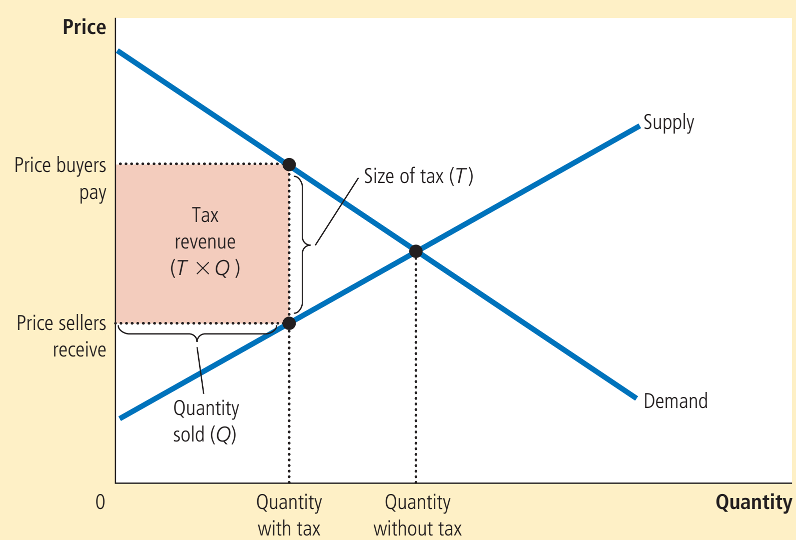


FIGURE 2

Tax Revenue

The tax revenue that the government collects equals $T \times Q$, the size of the tax T times the quantity sold Q. Thus, tax revenue equals the area of the rectangle between the supply and demand curves.

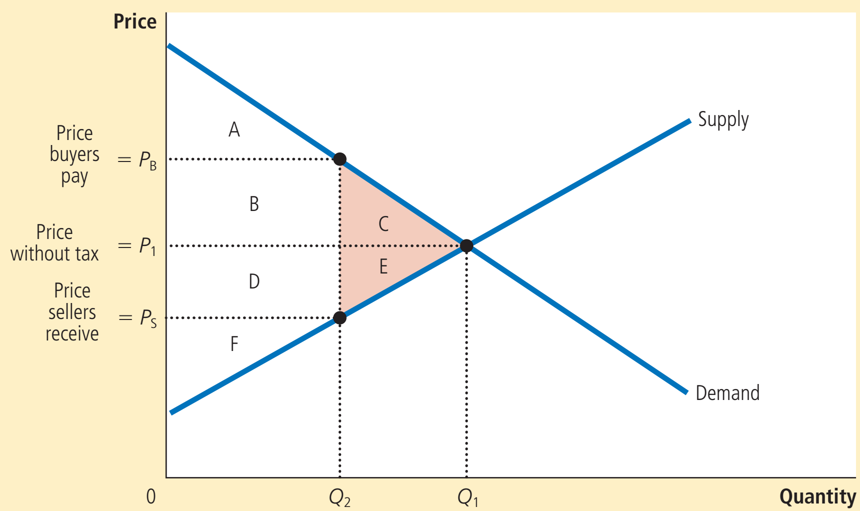
FIGURE 3

How a Tax Affects Welfare

A tax on a good reduces consumer surplus (by the area B + C) and producer surplus (by the area D + E). Because the fall in producer and consumer surplus exceeds tax revenue (area B + D), the tax is said to impose a deadweight loss (area C + E).

	Without Tax	With Tax	Change
Consumer Surplus	A + B + C	A	−(B + C)
Producer Surplus	D + E + F	F	−(D + E)
Tax Revenue	None	B + D	+(B + D)
Total Surplus	A + B + C + D + E + F	A + B + D + F	−(C + E)

The area C + E shows the fall in total surplus and is the deadweight loss of the tax.



Because the demand curve reflects buyers' willingness to pay, consumer surplus is the area between the demand curve and the price, A + B + C. Similarly, because the supply curve reflects sellers' costs, producer surplus is the area between the supply curve and the price, D + E + F. In this case, because there is no tax, tax revenue equals zero.

Total surplus, the sum of consumer and producer surplus, equals the area A + B + C + D + E + F. In other words, as we saw in Chapter 7, total surplus is the area between the supply and demand curves up to the equilibrium quantity. The first column of the table in Figure 3 summarizes these conclusions.

Welfare with a Tax Now consider welfare after the tax is enacted. The price paid by buyers rises from P_1 to P_B, so consumer surplus now equals only area A (the area below the demand curve and above the buyer's price). The price received by sellers falls from P_1 to P_S, so producer surplus now equals only area F (the area above the supply curve and below the seller's price). The quantity sold falls from Q_1 to Q_2, and the government collects tax revenue equal to the area B + D.

To compute total surplus with the tax, we add consumer surplus, producer surplus, and tax revenue. Thus, we find that total surplus is area A + B + D + F. The second column of the table summarizes these results.

Changes in Welfare We can now see the effects of the tax by comparing welfare before and after the tax is enacted. The third column of the table in Figure 3 shows the changes. The tax causes consumer surplus to fall by the area B + C and producer surplus to fall by the area D + E. Tax revenue rises by the area B + D. Not surprisingly, the tax makes buyers and sellers worse off and the government better off.

The change in total welfare includes the change in consumer surplus (which is negative), the change in producer surplus (which is also negative), and the change in tax revenue (which is positive). When we add these three pieces together, we find that total surplus in the market falls by the area C + E. *Thus, the losses to buyers and sellers from a tax exceed the revenue raised by the government.* The fall in total surplus that results when a tax (or some other policy) distorts a market outcome is called a **deadweight loss**. The area C + E measures the size of the deadweight loss.

deadweight loss
the fall in total surplus that results from a market distortion, such as a tax

To understand why taxes impose deadweight losses, recall one of the *Ten Principles of Economics* in Chapter 1: People respond to incentives. In Chapter 7, we saw that free markets normally allocate scarce resources efficiently. That is, in the absence of any tax, the equilibrium of supply and demand maximizes the total surplus of buyers and sellers in a market. When the government imposes a tax, it raises the price buyers pay and lowers the price sellers receive, giving buyers an incentive to consume less and sellers an incentive to produce less. As buyers and sellers respond to these incentives, the size of the market shrinks below its optimum (as shown in the figure by the movement from Q_1 to Q_2). Thus, because taxes distort incentives, they cause markets to allocate resources inefficiently.

8-1b Deadweight Losses and the Gains from Trade

To get some further insight into why taxes result in deadweight losses, consider an example. Imagine that Joe cleans Jane's house each week for $100. The opportunity cost of Joe's time is $80, and the value of a clean house to Jane is $120. Thus, Joe and Jane each receive a $20 benefit from their deal. The total surplus of $40 measures the gains from trade in this particular transaction.

Now suppose that the government levies a $50 tax on the providers of cleaning services. There is now no price that Jane can pay Joe that will leave both of them better off. The most Jane would be willing to pay is $120, but then Joe would be left with only $70 after paying the tax, which is less than his $80 opportunity cost. Conversely, for Joe to receive his opportunity cost of $80, Jane would need to pay $130, which is above the $120 value she places on a clean house. As a result, Jane and Joe cancel their arrangement. Joe goes without the income, and Jane lives in a dirtier house.

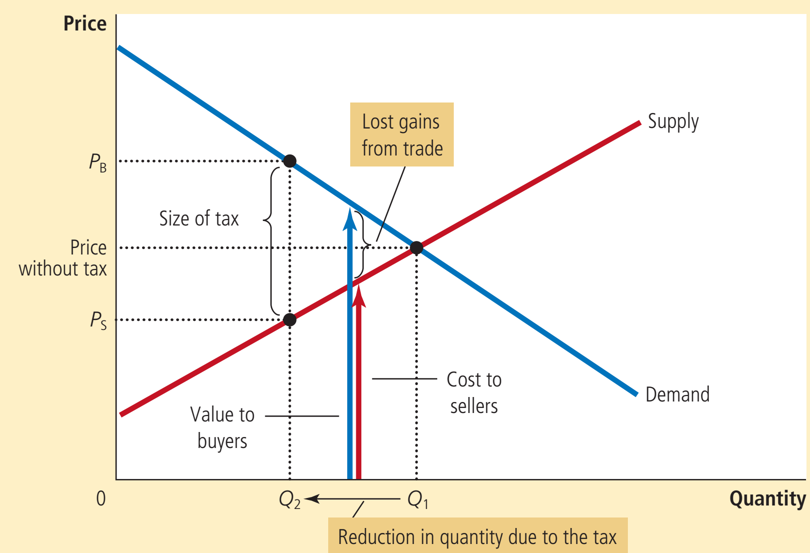
The tax has made Joe and Jane worse off by a total of $40 because they have each lost $20 of surplus. But note that the government collects no revenue from Joe and Jane because they decide to cancel their arrangement. The $40 is pure deadweight loss: It is a loss to buyers and sellers in a market that is not offset by an increase in government revenue. From this example, we can see the ultimate source of deadweight losses: *Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade.*

The area of the triangle between the supply and demand curves created by the tax wedge (area C + E in Figure 3) measures these losses. This conclusion can be seen more easily in Figure 4 by recalling that the demand curve reflects the value

FIGURE 4

The Source of a Deadweight Loss

When the government imposes a tax on a good, the quantity sold falls from Q_1 to Q_2. At every quantity between Q_1 and Q_2, the potential gains from trade among buyers and sellers are not realized. These lost gains from trade create the deadweight loss.



of the good to consumers and that the supply curve reflects the costs of producers. When the tax raises the price buyers pay to P_B and lowers the price sellers receive to P_S, the marginal buyers and sellers leave the market, so the quantity sold falls from Q_1 to Q_2. Yet as the figure shows, the value of the good to these buyers still exceeds the cost to these sellers. At every quantity between Q_1 and Q_2, the situation is the same as in our example with Joe and Jane. The gains from trade—the difference between buyers' value and sellers' cost—are less than the tax. As a result, these trades are not made once the tax is imposed. The deadweight loss is the surplus that is lost because the tax discourages these mutually advantageous trades.

Quick Quiz *Draw the supply and demand curves for cookies. If the government imposes a tax on cookies, show what happens to the price paid by buyers, the price received by sellers, and the quantity sold. In your diagram, show the deadweight loss from the tax. Explain the meaning of the deadweight loss.*

8-2 The Determinants of the Deadweight Loss

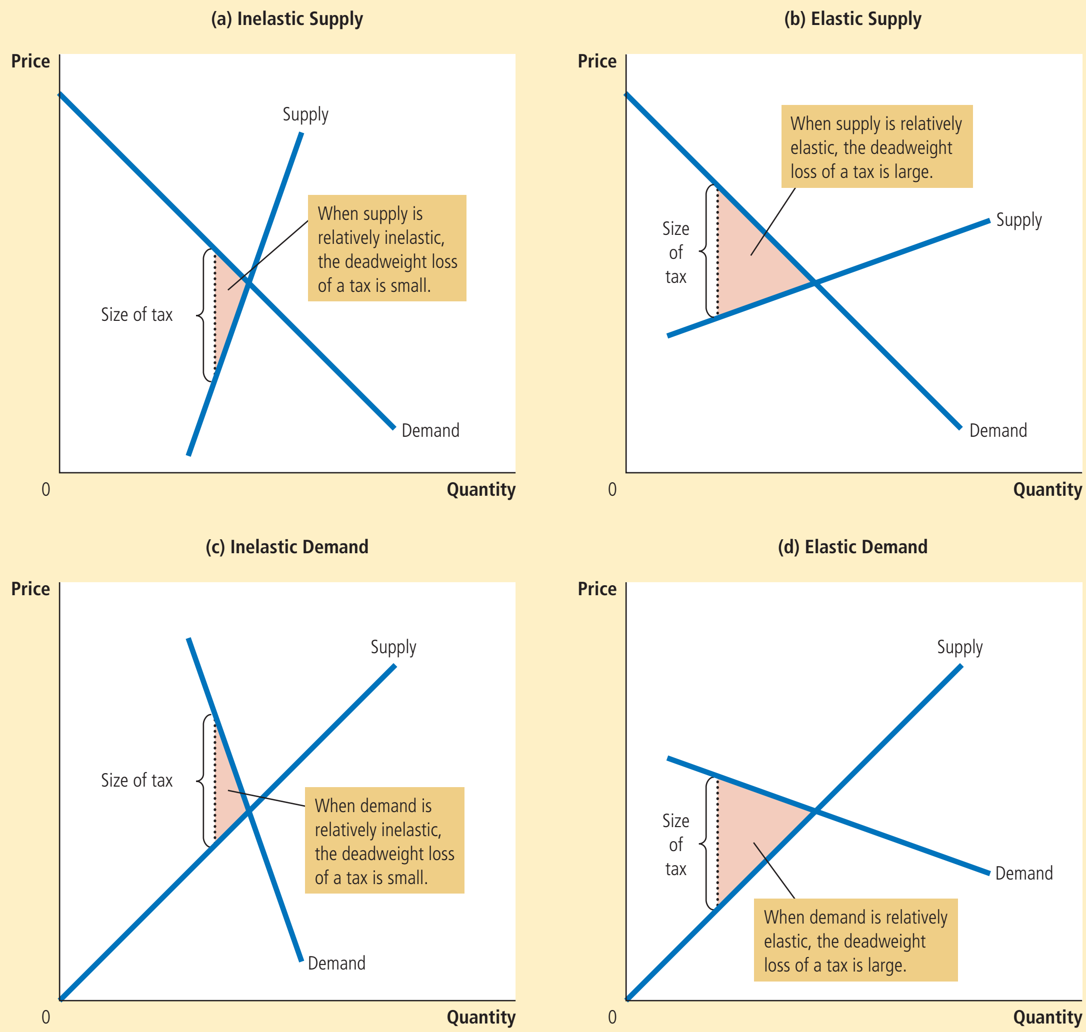
What determines whether the deadweight loss from a tax is large or small? The answer is the price elasticities of supply and demand, which measure how much the quantity supplied and quantity demanded respond to changes in the price.

Let's consider first how the elasticity of supply affects the size of the deadweight loss. In the top two panels of Figure 5, the demand curve and the size of the tax are the same. The only difference in these figures is the elasticity of the supply curve. In panel (a), the supply curve is relatively inelastic: Quantity supplied responds only slightly to changes in the price. In panel (b), the supply curve is relatively elastic: Quantity supplied responds substantially to changes in the

In panels (a) and (b), the demand curve and the size of the tax are the same, but the price elasticity of supply is different. Notice that the more elastic the supply curve, the larger the deadweight loss of the tax. In panels (c) and (d), the supply curve and the size of the tax are the same, but the price elasticity of demand is different. Notice that the more elastic the demand curve, the larger the deadweight loss of the tax.

FIGURE 5

Tax Distortions and Elasticities



price. Notice that the deadweight loss, the area of the triangle between the supply and demand curves, is larger when the supply curve is more elastic.

Similarly, the bottom two panels of Figure 5 show how the elasticity of demand affects the size of the deadweight loss. Here the supply curve and the size of the tax are held constant. In panel (c), the demand curve is relatively inelastic, and the deadweight loss is small. In panel (d), the demand curve is more elastic, and the deadweight loss from the tax is larger.

The lesson from this figure is apparent. A tax has a deadweight loss because it induces buyers and sellers to change their behavior. The tax raises the price paid by buyers, so they consume less. At the same time, the tax lowers the price received by sellers, so they produce less. Because of these changes in behavior, the equilibrium quantity in the market shrinks below the optimal quantity. The more responsive buyers and sellers are to changes in the price, the more the equilibrium quantity shrinks. Hence, *the greater the elasticities of supply and demand, the greater the deadweight loss of a tax.*

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The Deadweight Loss Debate

Supply, demand, elasticity, deadweight loss—all this economic theory is enough to make your head spin. But believe it or not, these ideas go to the heart of a profound political question: How big should the government be? The debate hinges on these concepts because the larger the deadweight loss of taxation, the larger the cost of any government program. If taxation entails large deadweight losses, then these losses are a strong argument for a leaner government that does less and taxes less. But if taxes impose small deadweight losses, then government programs are less costly than they otherwise might be.

So how big are the deadweight losses of taxation? Economists disagree on the answer to this question. To see the nature of this disagreement, consider the most important tax in the U.S. economy: the tax on labor. The Social Security tax, the Medicare tax, and much of the federal income tax are labor taxes. Many state governments also tax labor earnings. A labor tax places a wedge between the wage that firms pay and the wage that workers receive. For a typical worker, if all forms of labor taxes are added together, the *marginal tax rate* on labor income—the tax on the last dollar of earnings—is about 40 percent.

The size of the labor tax is easy to determine, but the deadweight loss of this tax is less straightforward. Economists disagree about whether this 40 percent labor tax has a small or a large deadweight loss. This disagreement arises because economists hold different views about the elasticity of labor supply.

Economists who argue that labor taxes do not greatly distort market outcomes believe that labor supply is fairly inelastic. Most people, they claim, would work full-time regardless of the wage. If so, the labor supply curve is almost vertical, and a tax on labor has a small deadweight loss.

Economists who argue that labor taxes are highly distorting believe that labor supply is more elastic. While admitting that some groups of workers may not change the quantity of labor they supply by very much in response to changes in labor taxes, these economists claim that many other groups respond more to incentives. Here are some examples:

- Many workers can adjust the number of hours they work—for instance, by working overtime. The higher the wage, the more hours they choose to work.
- Some families have second earners—often married women with children—with some discretion over whether to do unpaid work at home or paid work in the marketplace. When deciding whether to take a job, these second earners compare the benefits of being at home (including savings on the cost of child care) with the wages they could earn.
- Many of the elderly can choose when to retire, and their decisions are partly based on the wage. Once they are retired, the wage determines their incentive to work part-time.

- Some people consider engaging in illegal economic activity, such as the drug trade, or working at jobs that pay "under the table" to evade taxes. Economists call this the *underground economy*. In deciding whether to work in the underground economy or at a legitimate job, these potential criminals compare what they can earn by breaking the law with the wage they can earn legally.

In each of these cases, the quantity of labor supplied responds to the wage (the price of labor). Thus, these workers' decisions are distorted when their labor earnings are taxed. Labor taxes encourage workers to work fewer hours, second earners to stay at home, the elderly to retire early, and the unscrupulous to enter the underground economy.

The debate over the distortionary effects of labor taxation persists to this day. Indeed, whenever you see two political candidates debating whether the government should provide more services or reduce the tax burden, keep in mind that part of the disagreement may rest on different views about the elasticity of labor supply and the deadweight loss of taxation.


McNamee/Getty Images

"What's your position on the elasticity of labor supply?"

Quick Quiz *The demand for beer is more elastic than the demand for milk. Would a tax on beer or a tax on milk have a larger deadweight loss? Why?*

8-3 Deadweight Loss and Tax Revenue as Taxes Vary

Taxes rarely stay the same for long periods of time. Policymakers in local, state, and federal governments are always considering raising one tax or lowering another. Here we consider what happens to the deadweight loss and tax revenue when the size of a tax changes.

Figure 6 shows the effects of a small, medium, and large tax, holding constant the market's supply and demand curves. The deadweight loss—the reduction in total surplus that results when the tax reduces the size of a market below the optimum—equals the area of the triangle between the supply and demand curves. For the small tax in panel (a), the area of the deadweight loss triangle is quite small. But as the size of a tax rises in panels (b) and (c), the deadweight loss grows larger and larger.

Indeed, the deadweight loss of a tax rises even more rapidly than the size of the tax. This occurs because the deadweight loss is the area of a triangle, and the area of a triangle depends on the *square* of its size. If we double the size of a tax, for instance, the base and height of the triangle double, so the deadweight loss rises by a factor of 4. If we triple the size of a tax, the base and height triple, so the deadweight loss rises by a factor of 9.

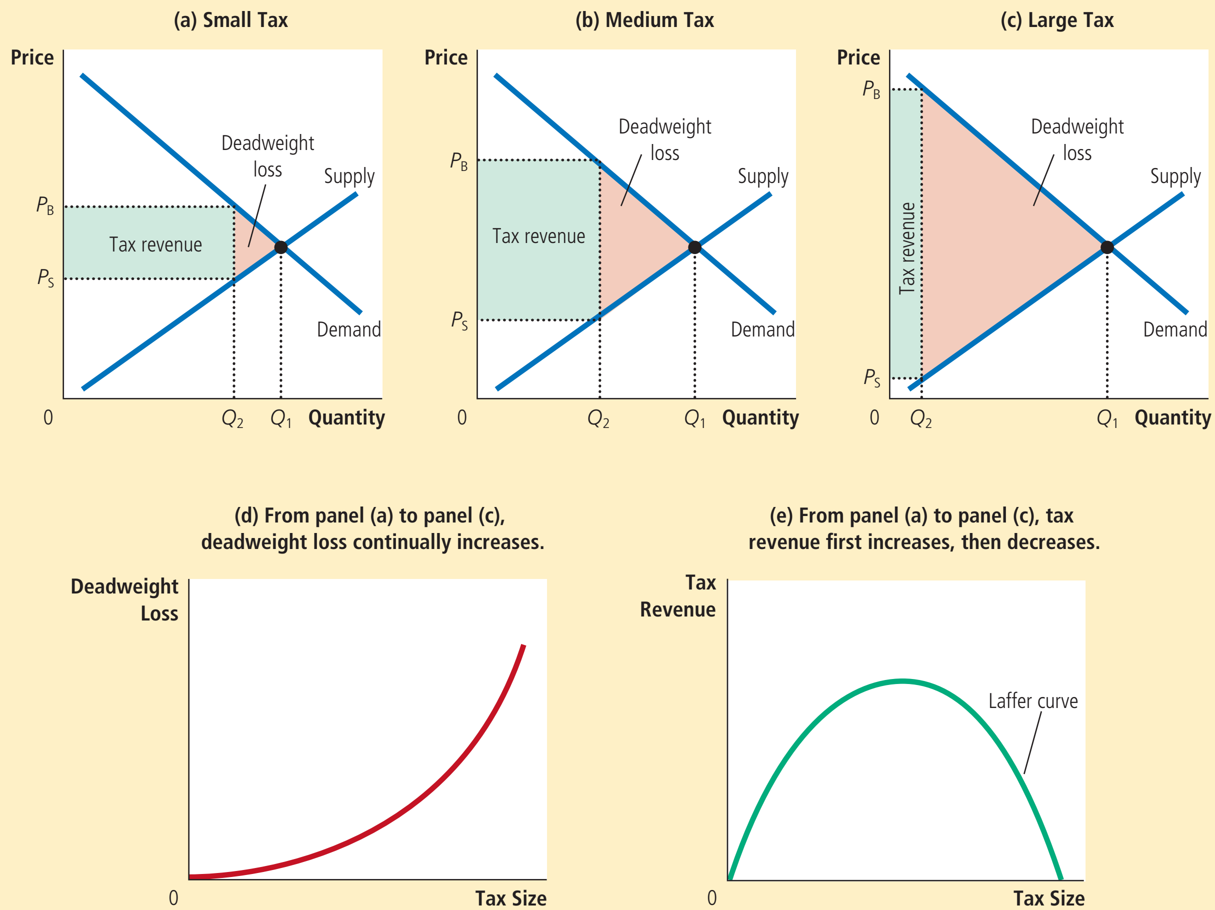
The government's tax revenue is the size of the tax times the amount of the good sold. As the first three panels of Figure 6 show, tax revenue equals the area of the rectangle between the supply and demand curves. For the small tax in panel (a), tax revenue is small. As the size of a tax increases from panel (a) to panel (b), tax revenue grows. But as the size of the tax increases further from panel (b) to panel (c), tax revenue falls because the higher tax drastically reduces the size of the market. For a very large tax, no revenue would be raised because people would stop buying and selling the good altogether.

The last two panels of Figure 6 summarize these results. In panel (d), we see that as the size of a tax increases, its deadweight loss quickly gets larger. By contrast, panel (e) shows that tax revenue first rises with the size of the tax, but as the tax increases further, the market shrinks so much that tax revenue starts to fall.

FIGURE 6

How Deadweight Loss and Tax Revenue Vary with the Size of a Tax

The deadweight loss is the reduction in total surplus due to the tax. Tax revenue is the amount of the tax times the amount of the good sold. In panel (a), a small tax has a small deadweight loss and raises a small amount of revenue. In panel (b), a somewhat larger tax has a larger deadweight loss and raises a larger amount of revenue. In panel (c), a very large tax has a very large deadweight loss, but because it has reduced the size of the market so much, the tax raises only a small amount of revenue. Panels (d) and (e) summarize these conclusions. Panel (d) shows that as the size of a tax grows larger, the deadweight loss grows larger. Panel (e) shows that tax revenue first rises and then falls. This relationship is sometimes called the Laffer curve.



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The Laffer Curve and Supply-Side Economics

One day in 1974, economist Arthur Laffer sat in a Washington restaurant with some prominent journalists and politicians. He took out a napkin and drew a figure on it to show how tax rates affect tax revenue. It looked much like panel (e) of our Figure 6. Laffer then suggested that the United States was on the downward-sloping side of this curve. Tax rates were so high, he argued, that reducing them would actually increase tax revenue.

Most economists were skeptical of Laffer's suggestion. The idea that a cut in tax rates could increase tax revenue was correct as a matter of economic theory, but there was more doubt about whether it would do so in practice. There was little evidence for Laffer's view that U.S. tax rates had in fact reached such extreme levels.

Nonetheless, the *Laffer curve* (as it became known) captured the imagination of Ronald Reagan. David Stockman, budget director in the first Reagan administration, offers the following story:

> [Reagan] had once been on the Laffer curve himself. "I came into the Big Money making pictures during World War II," he would always say. At that time the wartime income surtax hit 90 percent. "You could only make four pictures and then you were in the top bracket," he would continue. "So we all quit working after four pictures and went off to the country." High tax rates caused less work. Low tax rates caused more. His experience proved it.

When Reagan ran for president in 1980, he made cutting taxes part of his platform. Reagan argued that taxes were so high that they were discouraging hard work. He argued that lower taxes would give people the proper incentive to work, which would raise economic well-being and perhaps even tax revenue. Because the cut in tax rates was intended to encourage people to increase the quantity of labor they supplied, the views of Laffer and Reagan became known as *supply-side economics*.

Economists continue to debate Laffer's argument. Many believe that subsequent history refuted Laffer's conjecture that lower tax rates would raise tax revenue. Yet because history is open to alternative interpretations, other economists view the events of the 1980s as more favorable to the supply siders. To evaluate Laffer's hypothesis definitively, we would need to rerun history without the Reagan tax cuts and see if tax revenues were higher or lower. Unfortunately, that experiment is impossible.

Some economists take an intermediate position on this issue. They believe that while an overall cut in tax rates normally reduces revenue, some taxpayers may occasionally find themselves on the wrong side of the Laffer curve. Other things being equal, a tax cut is more likely to raise tax revenue if the cut applies to those taxpayers facing the highest tax rates. In addition, Laffer's argument may be more compelling when considering countries with much higher tax rates than the United States. In Sweden in the early 1980s, for instance, the typical worker faced a marginal tax rate of about 80 percent. Such a high tax rate provides a substantial disincentive to work. Studies have suggested that Sweden would indeed have raised more tax revenue if it had lowered its tax rates.

Economists disagree about these issues in part because there is no consensus about the size of the relevant elasticities. The more elastic supply and demand are in any market, the more taxes distort behavior, and the more likely it is that a tax cut will increase tax revenue. There is no debate, however, about the general lesson: How much revenue the government gains or loses from a tax change cannot be computed just by looking at tax rates. It also depends on how the tax change affects people's behavior.

Quick Quiz *If the government doubles the tax on gasoline, can you be sure that revenue from the gasoline tax will rise? Can you be sure that the deadweight loss from the gasoline tax will rise? Explain.*

IN THE NEWS

The Tax Debate

In 2012, during and after President Obama's reelection campaign, a prominent policy debate centered on whether to increase taxes, particularly on higher-income taxpayers. In these two opinion pieces, prominent economists present both sides of the issue.

High Tax Rates Won't Slow Growth

By Peter Diamond and Emmanuel Saez

The share of pre-tax income accruing to the top 1% of earners in the U.S. has more than doubled to about 20% in 2010 from less than 10% in the 1970s. At the same time, the average federal income tax rate on top earners has declined significantly. Given the large current and projected deficits, should the top 1% be taxed more? Because U.S. income concentration is now so high, the potential tax revenue at stake is large.

But will taxable incomes of the top 1% respond to a tax increase by declining so much that revenue rises very little or even drops? In other words, are we already near or beyond the peak of the famous Laffer Curve, the revenue-maximizing tax rate?

The Laffer Curve is used to illustrate the concept of taxable income "elasticity,"—i.e., that taxable income will change in response to a change in the rate of taxation. Top earners can, of course, move taxable income between years to subject them to lower tax rates, for example, by changing the timing of charitable donations and realized capital gains. And some can convert earned income into capital gains, and avoid higher taxes in other ways. But existing studies do not show much change in actual work being done.

According to our analysis of current tax rates and their elasticity, the revenue-maximizing top federal marginal income tax rate would be in or near the range of 50%–70% (taking into account that individuals face additional taxes from Medicare and state and local taxes). Thus we conclude that raising the top tax rate is very likely to result in revenue increases at least until we reach the 50% rate that held during the first Reagan administration, and possibly until the 70% rate of the 1970s. To reduce tax avoidance opportunities, tax rates on capital gains and dividends should increase along with the basic rate. Closing loopholes and stepping up enforcement would further limit tax avoidance and evasion.

But will raising top tax rates significantly lower economic growth? In the postwar U.S., higher top tax rates tend to go with higher economic growth—not lower. Indeed, according to the U.S. Department of Commerce's Bureau of Economic Analysis, GDP annual growth per capita (to adjust for population growth) averaged 1.68% between 1980 and 2010 when top tax rates were relatively low, while growth averaged 2.23% between 1950 and 1980 when top tax rates were at or above 70%.

Neither does international evidence support a case for lower growth from higher top taxes. There is no clear correlation between economic growth since the 1970s and top tax-rate cuts across Organization for Economic Cooperation and Development countries.

For example, from 1970 to 2010, real GDP annual growth per capita averaged 1.8% and 2.03% in the U.S. and the U.K., both of which dramatically lowered their top tax rates during that period, while it averaged 1.72% and 1.89% in France and Germany, which kept high top tax rates during the period. While in no way does this prove that higher top tax rates actually encourage growth, there is not good evidence from the aggregate data supporting the view that higher rates slow growth.

One cannot evaluate the ultimate growth effects of raising more revenue without identifying what is done with the revenue. If part of the revenue is used to reduce the federal debt, more of savings go into capital investment, enhancing growth. The fact that those paying higher taxes will reduce their savings somewhat does not fully offset this effect as some of their higher taxes would come out of consumption.

If some of the additional revenue is used for public investments with a high return, such as education, infrastructure and research, it raises growth further. The neglect of public investment over the last few decades suggests that the returns could be quite high.

Large losses in efficiency come when people are limited in their ability to finance good investment opportunities. Surveys show difficulty of borrowing as an issue for start-ups. And higher education is influenced by the finances of parents, and the earnings premium for higher education is very high. Access to investment financing is a much bigger issue for low earners than for high earners. By the time Bill Gates got rich, Microsoft was not likely to have trouble financing investments. Hence, increasing tax rates on the already rich might not hurt growth as much as increasing tax rates on the soon-to-be rich.

By itself, a suitable increase in the taxation of top earners will not solve our unsustainable long-term fiscal trajectory. But that is no reason not to use this tool to contribute to addressing this problem.

Mr. Diamond is professor emeritus at MIT and a Nobel laureate in economics. Mr. Saez is a professor of economics at UC Berkeley.

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Taxes Are Much Higher Than You Think

By Edward C. Prescott and Lee E. Ohanian

President Obama argues that the election gave him a mandate to raise taxes on high earners, and the White House indicates that he won't compromise on this issue as the so-called fiscal cliff approaches.

But tax rates are already high—much higher than is commonly understood—and increasing them will likely further depress the economy, especially by affecting the number of hours Americans work.

Taking into account all taxes on earnings and consumer spending—including federal, state and local income taxes, Social Security and Medicare payroll taxes, excise taxes, and state and local sales taxes—Edward Prescott has shown (especially in the *Quarterly Review of the Federal Reserve Bank of Minneapolis*, 2004) that the U.S. average marginal effective tax rate is around 40%. This means that if the average worker earns $100 from additional output, he will be able to consume only an additional $60.

Research by others (including Lee Ohanian, Andrea Raffo and Richard Rogerson in the *Journal of Monetary Economics*, 2008, and Edward Prescott in the *American Economic Review*, 2002) indicates that raising tax rates further will significantly reduce U.S. economic activity and by implication will increase tax revenues only a little.

High tax rates—on both labor income and consumption—reduce the incentive to work by making consumption more expensive relative to leisure, for example. The incentive to produce goods for the market is particularly depressed when tax revenue is returned to households either as government transfers or transfers-in-kind—such as public schooling, police and fire protection, food stamps, and health care—that substitute for private consumption.

In the 1950s, when European tax rates were low, many Western Europeans, including the French and the Germans, worked more hours per capita than did Americans. Over time, tax rates that affect earnings and consumption rose substantially in much of Western Europe. Over the decades, these have accounted for much of the nearly 30% decline in work hours in several European countries—to 1,000 hours per adult per year today from around 1,400 in the 1950s.

Changes in tax rates are also important in accounting for the increase in the number of hours worked in the Netherlands in the late 1980s, following the enactment of lower marginal income-tax rates.

In Japan, the tax rate on earnings and consumption is about the same as it is in the U.S., and the average Japanese worker in 2007 (the last nonrecession year) worked 1,363 hours—or about the same as the 1,336 worked by the average American.

All this has major implications for the U.S. Consider California, which just enacted higher rates of income and sales tax. The top California income-tax rate will be 13.3%, and the top sales-tax rate in some areas may rise as high as 10%. Combine these state taxes with a top combined federal rate of 44%, plus federal excise taxes, and the combined marginal tax rate for the highest California earners is likely to be around 60%—as high as in France, Germany and Italy.

Higher labor-income and consumption taxes also have consequences for entrepreneurship and risk-taking. A key factor driving U.S. economic growth has been the remarkable impact of entrepreneurs such as Bill Gates of Microsoft, Steve Jobs of Apple, Fred Smith of FedEx and others who took substantial risk to implement new ideas, directly and indirectly creating new economic sectors and millions of new jobs.

Entrepreneurship is much lower in Europe, suggesting that high tax rates and poorly designed regulation discourage new business creation. *The Economist* reports that between 1976 and 2007 only one continental European startup, Norway's Renewable

Energy Corporation, achieved a level of success comparable to that of Microsoft, Apple and other U.S. giants making the Financial Times Index of the world's 500 largest companies. . . .

The economy now faces two serious risks: the risk of higher marginal tax rates that will depress the number of hours of work, and the risk of continuing policies such as Dodd-Frank, bailouts, and subsidies to specific industries and technologies that depress productivity growth by protecting inefficient producers and restricting the flow of resources to the most productive users.

If these two risks are realized, the U.S. will face a much more serious problem than a 2013 recession. It will face a permanent and growing decline in relative living standards. . . .

Economic growth requires new ideas and new businesses, which in turn require a large group of talented young workers who are willing to take on the considerable risk of starting a business. This requires undoing the impediments that stand in the way of creating new economic activity—and increasing the after-tax returns to succeeding.

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8-4 Conclusion

In this chapter we have used the tools developed in the previous chapter to further our understanding of taxes. One of the *Ten Principles of Economics* discussed in Chapter 1 is that markets are usually a good way to organize economic activity. In Chapter 7, we used the concepts of producer and consumer surplus to make this principle more precise. Here we have seen that when the government imposes taxes on buyers or sellers of a good, society loses some of the benefits of market efficiency. Taxes are costly to market participants not only because taxes transfer resources from those participants to the government but also because they alter incentives and distort market outcomes.

The analysis presented here and in Chapter 6 should give you a good basis for understanding the economic impact of taxes, but this is not the end of the story. Microeconomists study how best to design a tax system, including how to strike the right balance between equality and efficiency. Macroeconomists study how taxes influence the overall economy and how policymakers can use the tax system to stabilize economic activity and to achieve more rapid economic growth. So as you continue your study of economics, don't be surprised when the subject of taxation comes up yet again.

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. 159*

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?

Quick Check Multiple Choice

1. A tax on a good has a deadweight loss if
   a. the reduction in consumer and producer surplus is greater than the tax revenue.
   b. the tax revenue is greater than the reduction in consumer and producer surplus.
   c. the reduction in consumer surplus is greater than the reduction in producer surplus.
   d. the reduction in producer surplus is greater than the reduction in consumer surplus.

2. Jane pays Chuck $50 to mow her lawn every week. When the government levies a mowing tax of $10 on Chuck, he raises his price to $60. Jane continues to hire him at the higher price. What is the change in producer surplus, change in consumer surplus, and deadweight loss?
   a. $0, $0, $10
   b. $0, −$10, $0
   c. +$10, −$10, $10
   d. +$10, −$10, $0

3. Eggs have a supply curve that is linear and upward-sloping and a demand curve that is linear and downward sloping. If a 2 cent per egg tax is increased to 3 cents, the deadweight loss of the tax
   a. increases by less than 50 percent and may even decline.
   b. increases by exactly 50 percent.
   c. increases by more than 50 percent.
   d. The answer depends on whether supply or demand is more elastic.

4. Peanut butter has an upward-sloping supply curve and a downward-sloping demand curve. If a 10 cent per pound tax is increased to 15 cents, the government's tax revenue
   a. increases by less than 50 percent and may even decline.
   b. increases by exactly 50 percent.
   c. increases by more than 50 percent.
   d. The answer depends on whether supply or demand is more elastic.

5. The Laffer curve illustrates that, in some circumstances, the government can reduce a tax on a good and increase the
   a. deadweight loss.
   b. government's tax revenue.
   c. equilibrium quantity.
   d. price paid by consumers.

6. If a policymaker wants to raise revenue by taxing goods while minimizing the deadweight losses, he should look for goods with __________ elasticities of demand and __________ elasticities of supply.
   a. small, small
   b. small, large
   c. large, small
   d. large, large

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 socks 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. Consider now 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 ½ × base × 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 to 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 ½ × base × 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 on this good of $200 per unit. Is this a good policy? Why or why not? Can you propose a better policy?

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