**CHAPTER 10**

**The Government in the Economy: Taxation and Regulation**

**I. Key Ideas**

In the United States, governments (federal, state, and local) tax citizens and corporations to correct market failures and externalities, raise revenues, redistribute funds, and finance operations.

Through direct regulation and price controls, governments can intervene to influence market outcomes.

Although government intervention sometimes creates inefficiencies, it often results in improved social well-being.

Weighing the trade-offs between equity and efficiency is one task of an economist.

It is up to each individual to decide when and where government intervention makes the most sense.

**II. Getting Started**

1. **The Big Picture**

The chapter provides a whirlwind tour of the role of government in the economy, starting with a difficult choice of how to vote in a hypothetical upcoming presidential election. The liberal candidate may stress market failures and how an altruistic government can intervene on behalf of suffering citizens, perhaps by using a tax to get polluters to understand the social costs of their actions. The conservative candidate may stress government failures and how meddling by self-interested politicians and bureaucrats creates a new set of problems. Most agree that the government exists to levy taxes, redistribute income, finance the provision of public goods, create and enforce laws, and correct market failures, such as monopolies and externalities. As we’ll see, personal preference regarding the trade-off between efficiency and equity will be a primary determinant of how one views the world and votes.

Budgets reveal a lot about priorities, so to better understand our current government, we follow the money, tracking the sources of tax revenues and how those dollars are spent at both the federal and subnational levels. Transfer payments (such as Society Security, Medicaid, Medicare, and food stamps), when coupled with our progressive federal income tax system (in which higher income citizens pay higher average tax rates than lower income citizens), provide a means of redistributing income and improving equity.

Next, we analyze excise taxes and find that tax incidence depends on relative price elasticities of supply and demand, not who the law specifies as the party that will pay the tax. To prove this, we show that a $2 tax on jambalaya buyers creates the same tax wedge —and the same tax incidence— as a $2 tax on jambalaya sellers. An excise tax typically results in deadweight loss (DWL), which means that the total cost of raising $1 in tax revenue is actually higher than $1. This unfortunate result—dubbed the “leaky bucket” by economist Arthur Okun— inspires us to consider other forms of taxes that generate less DWL. British Prime Minister Margaret Thatcher famously enacted a lump-sum poll tax, which involved zero DWL, but was regressive, so it increased income inequality; this reminds us of the efficiency-equity trade-off introduced in Chapter 7.

When the government is not satisfied with the free-market equilibrium price and/or quantity, it can regulate to influence the market outcome. Such regulation has upsides (it may improve income inequality) and downsides (it almost certainly causes deadweight loss). Market failures may warrant government intervention, but we should bear in mind non-market (government) failures, such as bureaucrats’ poor record of being consumer-friendly, incentives to seek and protect rents, corruption, and troubles due to the lack of a profit motive.

Ideologically, each of us must decide on his or her ideal mix of equity and efficiency, which is a normative question. Most nations try to reduce income inequality and offer welfare state programs to redistribute income. Two competing views on the role of government in the economy are consumer sovereignty (a Libertarian-style “let me be me”) and government paternalism (FDR and LBJ wanted a strong, helpful government). The proper scale and scope of government are complex questions that defy easy answers. Finally, we observe that privately funded expeditions to the North Pole and Northwest Passage are more successful than public expeditions, partly because private firms were better able to adapt to new technology and learn from the native population.

**Where We’ve Been**

Having just read about the triumphs of the competitive market and the invisible hand (in Chapter 7), the incentives domestic producers and consumers have to lobby government to seek favorable international trade policies (in Chapter 8), and the potential need for government to alleviate the problems of the overproduction of negative externalities, the overuse of common pool resources, and the under-provision of public goods (in Chapter 9), the reader should be primed to focus on government in Chapter 10. Here are some other connections to previous material:

* Chapter 1 *The Principles and Practice of Economics:* In an optimist’s view, the government is an economic actor that acts altruistically to maximize social welfare; in a pessimist’s view, government consists of self-interested individuals who may prioritize re-election, succumb to temptation and corruption, or focus on building a resume to land a nice private sector job.
* Chapter 2 *Economic Methods and Economic Questions:* The empirical methods and introduction to graphs is helpful in understanding Chapter 10’s figures on tax incidence and income inequality. Congress has taken up Chapter 2’s opening question on the value of college, and colleges have been forced to think carefully about assessment (how to measure learning).
* Chapter 3 *Optimization: Doing the Best You Can:* Chapter 3’s choice about how close to live to the city center is closely related to some of the issues covered in Chapter 10, such as taxes on property and gasoline, government spending on highways, and competitive market interventions such as apartment rent controls and minimum wages.
* Chapter 4 *Demand, Supply, and Equilibrium:* Chapter 4 asks what would happen if the government tried to dictate the price of gasoline. Chapter 10 revisits price ceilings in the context of apartment rent controls, and employs the S&D apparatus developed in Chapter 4.
* Chapter 5 *Consumers and Incentives:* Two ways to get smokers to quit are by giving them $100 monthly bribes (as in Chapter 5) and charging a tobacco tax (as in Chapter 10). Just as the buyer in Chapter 5 tries to maximize utility subject to a budget constraint, a budget-constrained government tries to purchase welfare-enhancing goods and services on behalf of its citizens. The price elasticity of demand is used to determine tax incidence.
* Chapter 6 *Sellers and Incentives:* The point about ignoring sunk costs and focusing on incremental costs holds true for government spending, too. The price elasticity of supply affects tax incidence. We use producer surplus to do welfare analysis of government policies. An ethanol subsidy affects the number of plants under construction or expansion; likewise, the government policies of Chapter 10 alter incentives and create winners and losers.
* Chapter 7 *Perfect Competition and the Invisible Hand:* To understand government policies in competitive markets, we first must understand the benchmark case of long-run competitive market equilibrium. The invisible hand finds a way; for instance, underground markets spring up when goods are banned. It is useful to contrast America’s capitalist economy (and our federal government’s priorities and budget) with North Korea’s command economy. Chapter 7 also introduces the equity-efficiency trade-off, which is revisited in Chapter 10.
* Chapter 8 *Trade:* When the government decides whether to directly produce a public good or outsource production, it ponders comparative advantage. Chapter 8 government policies such as import tariffs and quotas are related to Chapter 10 policies such as excise taxes and production quotas.
* Chapter 9 *Externalities and Public Goods:* Chapter 10 justifies government taxes as a way of financing public good provision and addressing negative externalities. Chapter 10 also returns to the topics of regulation and whether we believe that the government solution is better than just leaving a market alone. Finally, Exhibit 9.11, which shows the optimal amount of a public good to provide, can be adapted to shed light on several topics from Chapter 10, such as competing political parties and budget-maximizing bureaucrats.

**Where We’re Going**

This chapter establishes a basic background regarding how the government raises and spends taxpayer dollars, how some policies work, why there are non-market (government) failures as well as market failures, why redistributive programs that improve equity might sacrifice efficiency—and why that may be okay—and how we might frame the debate about our desired degree of government intervention. Armed with this background, the remaining microeconomic chapters have numerous opportunities to discuss the role of government, such as the following:

* Chapter 11 *Markets for Factors of Production:* A firm hiring workers may be affected by government policies involving the minimum wage, occupational licensing, immigration, health insurance, and retirement benefits. A firm interested in raising capital to finance its projects may be affected by the Fed, the Securities and Exchange Commission, and other capital market watchdogs.
* Chapter 12 *Monopoly:* The government uses antitrust law to try to limit conspiracies to monopolize and to keep electricity and other basic services affordable through natural monopoly regulation.
* Chapter 13 *Game Theory and Strategic Play:* The reason why a government often steps in to use taxes to finance the provision of public goods is that citizens have a private incentive to free ride: why pay for a good or service you can consume even if you don’t pay for it? When everyone thinks this way and no one pays, then we effectively have a prisoners’ dilemma.
* Chapter 14 *Oligopoly and Monopolistic Competition:* An oligopoly consists of a few firms that strategically interact, and we worry that they will attempt to reduce competition to boost profits, so a government response to this monopoly-style market failure is antitrust enforcement.
* Chapter 15 *Trade-offs Involving Time and Risk:* The government provides incentives to save with 401(k) and Roth individual retirement accounts. Determining the optimal amount to save this year depends critically on timing, risk tolerance, expected returns, and this decision impacts Social Security and other elements of the Welfare State.
* Chapter 16 *The Economics of Information:* We worry about the safety and quality of food, toys, and used cars due to the adverse selection (or hidden type) problem. The government can mitigate this problem through product safety regulation, which could involve inspection (e.g., USDA prime-grade beef), sharing information (e.g., through the Consumer Product Safety Commission), or lemons laws (i.e., the right to return a car that has required repeated repairs).
* Chapter 17 *Auctions and Bargaining:* The U.S. government allocates scarce resources and raises money by auctioning off parts of the electromagnetic spectrum for broadcasting signals. The U.S. government buys military equipment and bargains for favorable terms in its procurement contracts.
* Chapter 18 *Social Economics:* The government can provide tax incentives to encourage charitable giving. The government may be able to finance public good provision through private donations.

1. **Number of Lectures**

As with most of these chapters, one could get through the material in a single lecture, but it would be nice to have a second lecture to delve into details and do a more complete job. A critical issue is whether students have been exposed to price controls and excise taxes, or whether they are seeing these models for the first time. In Chapter 10, one could spend a lot of time fleshing out the various government interventions in competitive markets. Here are the major topics and suggested time allocations:

* Should I vote Democrat or Republican? What does a typical government budget look like? At both federal and subnational levels, where does the money come from (tax receipts!), and where does it go? [5–10 mins.]
* What are transfer payments? How does the federal income tax work? How much in taxes do the very rich pay? Is this fair? What are some alternative tax systems? Is the progressive federal income tax system making a difference by reducing income inequality? [10–20 mins.]
* Tax incidence and the excise tax: Does incidence depend on what the law says? How is incidence related to the PED and PES? Are there other types of taxes that would not cause so much deadweight loss as an excise tax? [10–20 mins.]
* Regulation: What are the major types of government intervention in competitive markets? What are the typical effects of price controls (ceiling or floors)? [10 mins.]
* Government failures: What are the inefficiencies caused by bureaucracy, corruption, and black markets? [5–10 mins.]
* Why is there an equity-efficiency trade-off? [5 mins.]
* The role of government in the economy: On a spectrum between consumer sovereignty and paternalism, how much should the U.S. government intervene? Should the government “nudge” us in a desirable direction? [5 mins.]

1. **Opening Question and Evidence-Based Economics**

**“What is the optimal size of government?”**—The chapter starts with an interesting scenario that juxtaposes the stereotypical Democratic and Republican perspectives on government intervention. A student, who is watching TV to learn more about presidential candidates, finds that each side makes some compelling points, leaving the student torn when deciding how to vote. This is a common dilemma; there are numerous politically conflicted folks who describe themselves as “socially progressive, but fiscally conservative.” A reasonable person might find that political issues are rarely black and white but rather various shades of gray. This makes sense: if we imagine a voting system in which a simple majority wins, then each side tries to appeal to the median voter (think: 50 percent plus one of the voters makes up a voting majority), which encourages each side to adopt a moderate stance. Furthermore, each government policy creates winners and losers, so one’s perspective on government intervention depends on how one is affected by a particular policy. Finally, if tinkering with a competitive market creates deadweight loss, as well as other government (or non-market) failures, then we should think twice before altruistically minded intervention becomes troublesome meddling. In sum, the opening question prepares the reader to explore what programs the government offers, how it pays for its programs, who actually ends up paying taxes, how the government can intervene, why issues like bureaucracy and corruption complicate matters, how willing we might be to trade efficiency for equity, and where we might choose to locate on a spectrum between consumer sovereignty and government paternalism.

**III. Chapter Outline**

***10.1 Taxation and Government Spending in the United States***

There are multiple levels of government in the United States, including not only the federal government (mostly located in Washington, D.C.), but also the fifty state governments, and nearly 90,000 local governments, including those for counties, cities, towns, and villages. As Exhibit 10.1 shows, the government (broadly defined) sector has grown pretty consistently, with both taxes and spending (as percentages of national income) rising for most of the last century. When tax revenues (*T*) exceed government spending (*G*), we have a budget surplus, and when *T* = *G*, we have a balanced budget, but when *G* > *T*, as is normally the case, we have a budget deficit…and concerns about spending beyond our means. In order to understand the services governments provide and the way these services are paid for, we will take a close look at both tax revenues and government spending.

* An interesting fact: According to the U.S. Census Bureau, there were 89,004 local governments in the United States in 2012 (https://www.census.gov/newsroom/releases/archives/governments/cb12-161.html).
* One might highlight a few things in Exhibit 10.1. First, tax revenues fall in recessions (e.g., the late 1930s and 2007–08). Second, government spending spikes during wars (e.g., the United States was embroiled in World War II from 1941 to 1945). Third, budget surpluses have been rare in the past 50 years, with the Clinton Administration’s surplus in the late 1990s being a notable exception.
* Why do we have federal, state, and local levels of government? A good answer is that we have market failures of different magnitudes. Focusing our attention on public goods, we use federal income taxes to finance national defense (which benefits the entire country), whereas we use local property or sales taxes to finance a Fourth of July fireworks display (which benefits mostly those within about a one-mile radius).
* As we turn to various taxes, it will help to remember that Tax Revenues = (Tax Rate) × (Tax Base). So, if the sales tax rate is 10 percent, and you buy a $50 shirt, then you will pay (and the government will collect) a sales tax of (0.10)($50) = $5. Interestingly, if someone claims to cut taxes, one should check whether the rate fell or the base shrank. If the government expanded the base from just clothing to both clothing and food, but then cut the rate from 10 percent to 9 percent, then people would pay a lower rate, but on more items; would you agree that this is a tax cut?!
* As a bit of practical advice, one might tell students that one can learn a lot about an organization by looking at its finances, whether such information takes the form of a local government’s budget, an insurance company’s premiums and claims, a university’s endowment, a nonprofit organization’s charitable donations and expenditures, or a mutual fund’s fees, portfolio, and returns. Moreover, watching how these financials change reveals something about changing priorities. One finds that what an organization says is not always what it does (i.e., how it spends), and that those who control the purse strings may be incredibly powerful.

**Where Does the Money Come From?**—The federal government collects roughly $19,300 from each person in the labor force using individual income taxes, social insurance taxes, corporate income taxes, and all other federal taxes. State and local governments get about 22 percent of their tax revenues from the federal government, and then collect the remaining 78 percent using a variety of taxes, including sales taxes, property taxes, and income taxes (both individual and corporate). Exhibits 10.2 and 10.3, which show tax receipts at the national and subnational levels for 2013, allow us to see the relative importance of each major type of tax in terms of generating revenue to fund government spending.

* To explain the federal taxes briefly and intuitively, one might provide a few details, such as the following:
  + Individual income: The Internal Revenue Service (IRS) expects you to file your standard 1040A form by April 15.
  + Social insurance: A good chunk of your last paycheck was withheld to pay for Social Security and Medicare; this is known as the FICA tax, short for Federal Insurance Contribution Act.
  + Corporate income: Just as you are taxed on your household income, a firm is taxed on its profits. In 2014, several well-known corporations tried to relocate their headquarters to Ireland to take advantage of much lower corporate income tax rates in what were known as tax inversion deals.
  + All other taxes: Excise taxes are sometimes known as sin taxes because they tend to be levied on alcohol, cigarettes, gambling, sugary soda, gasoline, and other controversial goods that might cause social problems.
* Rather than getting mired in the minutiae of state and local public finance, it might suffice to tell students that most states rely on sales taxes and individual income taxes, whereas local governments tend to rely heavily on property taxes.
* The book lists the states that do not have an individual income tax (namely, Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming). Students might find it interesting that the following states do not have a sales tax: Alaska, Delaware, Montana, New Hampshire, and Oregon. There is no value-added tax in the United States, but there is one in Canada known as the Goods and Services Tax, or GST.

**Why Does the Government Tax and Spend?**—Governments levy taxes to generate revenues in order to satisfy these four basic goals: to raise enough money to finance the provision of public goods, to redistribute income through transfer payments and progressive tax systems, to cover the government payroll (i.e., to finance government operations), and to correct market failures and externalities.

*Raising Revenues*

* The government also uses some taxes to modify behavior; excise taxes on alcohol, tobacco, gambling, and sugary soda may discourage their consumption and reduce the related social harms caused by addicts.
* Another angle: we could divide government expenditures into those that are nondiscretionary (automatic, mandated) and those that are discretionary (determined by Congressional debate). Students are often surprised by how much of our total federal spending is nondiscretionary and not up for debate.
* One might encourage students to explore the historical tables at <https://www.whitehouse.gov/omb/budget/Historicals> or do an online search for “federal government spending” to see how their tax dollars are spent on various government programs. Once we know how the government uses our dollars, we can be better prepared to vote and participate in debates on tax systems and spending priorities.
* When one hears complaints about paying taxes, it can be reassuring to look online and find out what public services our government provides. Indeed, one might think of taxes as the price citizens pay for such government services. If we are critical of how a government is using its budget, sometimes we have the option to pick up and move to a location that might provide a more preferable “tax and spending” combination; there is a famous public finance paper by Charles Tiebout about people who “vote with their feet.” We also have the opportunity to elect public officials, though elections might be few and far between, and candidates typically campaign using a platform based on many ideologically driven plans. Moreover, we might find ourselves caught between a rock and a hard place if there are only two candidates, and neither seems to best represent our interests. We could show this by returning temporarily to Chapter 9 and adapting Exhibit 9.13 as follows: Suppose *Q*optimal = 4, but the liberal, “high taxes, high spending” candidate promises to expand public services to *Q*liberal = 6, and the conservative, “low taxes, low spending” candidate promises to cut public services to *Q*conservative = 2. Here, either candidate will move us away from equilibrium and generate deadweight loss (the area between the S&D curves over the range defined by the quantity discrepancy)!
* If students could remember only one, big picture sentence about taxes and government spending, here’s a good candidate: The federal government pays for national defense, Social Security, Medicare, and Medicaid using the individual income tax (due April 15!) and the FICA tax found on our paychecks; state governments often use a sales tax to finance state universities; and local governments typically use a property tax to fund public schools.

*Redistributing Funds*—In a nutshell, the way the government redistributes income is by using progressive tax systems to tax the rich more and then using transfer payments to give the poor more.. This section provides four exhibits to frame a whirlwind tour of individual income taxes and to inspire a discussion on whether the current federal tax code should be reformed (and if so, how). First, Exhibit 10.6 shows how one can use taxable income to determine an individual’s marginal tax rate and his/her average tax rate, allowing the reader to understand the basic idea of a progressive income tax system. Second, Exhibit 10.7 shows that the top 1 percent of Americans (by income) pay nearly 30 percent of federal taxes; one wonders whether this is too much or not enough. Third, Exhibit 10.8 allows us to compare and contrast progressive, proportional, and regressive taxes to determine what seems fair. Finally, Exhibit 10.9 shows that government redistribution has significantly reduced income inequality between the top 1 percent and the bottom 20 percent.

* We observe that the federal government spends a large part of its budget on national defense and international security, Social Security, safety net programs (e.g., Earned Income Tax Credit, foods stamps), Medicare (health insurance for the old), Medicaid (health insurance for the poor), and CHIP (children’s health insurance). It is not unreasonable to say that based on its spending patterns, the federal government acts primarily to protect the young, old, poor, unemployed, and disadvantaged.
* Here is a great opportunity to link economics with political science and history, and to prime students for a discussion about the proper role of government in the economy. Historically, the two major expansions of the U.S. federal government were Franklin Delano Roosevelt’s Great Depression-era New Deal, which launched Social Security, and Lyndon Baines Johnson’s Great Society, which launched Medicare and Medicaid in the mid-1960s. Ronald Reagan blamed “Big Government” for some of America’s macroeconomic troubles in the late 1970s and tried to cut taxes and government spending in the 1980s.

**Letting the Data Speak: Understanding Federal Income Tax Brackets**—Most adult Americans are familiar with April 15, the typical deadline for filing federal income taxes with the IRS. Exhibit 10.6 shows us the tax brackets for a single individual filing taxes for 2015. This LTDS box shows how to compute marginal and average tax rates; we use the latter to determine whether a tax is progressive, proportional, or regressive.

* **[Optional]** The instructor willing to spend a few more minutes on this can give students a good idea of how to compute taxable income, which is then plugged into the tax brackets in Exhibit 10.6. To do this, define the following:
  + Personal Income (*PI*) = Wages, salaries, tips, interest, dividends, capital gains, employer contributions to pension or insurance, some retirement savings, gifts
  + Personal Exemptions (*PE*) = A PE reduces your tax by subtracting a fixed amount for you, your spouse, and each of your dependents. In 2017, the personal exemption was $4,050 per person, so a married couple with two children would have *PE* = $4,050(4) = $16,200, whereas a single individual with no dependents would have PE = $4,050(1) = $4,050.
  + Standard Deduction (*SD*) = An amount you are allowed to subtract from your income instead of itemizing deductions (see below); in 2017, *SD* = $6,350 for an individual.
  + Itemized Deductions (*ID*) = The sum of property and state income taxes, mortgage interest, charitable donations, medical expenses, business use of home/car, business expenses, educational expenses, losses, etc. The big question is whether they sum to more than $6,350 (for an individual in 2017), because if not, the taxpayer would choose the standard deduction.
  + Then, to compute your Taxable Income, start with your personal income, subtract your personal exemption, and then subtract only the larger of the two types of deductions {standard or itemized}. In other words, use this formula: *TI* = *PI* – *PE* – max {*SD*, *ID*}
* Once we have your taxable income, we slice it into parts, and you pay a different marginal tax rate on each slice according to the brackets in Exhibit 10.6. So if *TI* = $30,000, then you will pay a 10 percent rate on the first $9,225 and a 15 percent rate on the remaining $30,000 – $9,225 = $20,775. This will give you a *total tax bill* of (0.10)($9,225) + (0.15)($20,775) = $922.50 + $3,116.25 = $4,038.75.
* *Common Mistakes or Misunderstandings:* Students often mistakenly assume that you simply use your TI to identify one bracket and then apply that one marginal rate. It is incorrect to say that a person with TI = $30,000 falls into the 15 percent bracket and will pay a tax bill of ($30,000)(0.15) = $4,500.
* Your *marginal tax rate* is the tax rate you pay on your last dollar of taxable income. If TI = $30,000, then your MTR = 15%.
* Your *average tax rate* is found by dividing your total tax bill by your taxable income. Here, *ATR* = *TTB*/*TI* = $4,038.75/$30,000 = 13.4625%.
* If your *ATR* rises with income, then the tax system is *progressive*. If ATR does not vary with income, then the tax system is *proportional*. If ATR falls with income, then the tax system is *regressive*. We can use this to analyze a variety of taxes. For example, we might observe that a tax on cigarettes is regressive because a pack-a-day smoker who pays a $2 tax per pack will pay a cigarette tax bill of $730. If his *TI* = $30,000, his *ATR* is about 2.4 percent, whereas if his *TI* = $300,000, his *ATR* is about 0.24 percent. Intuitively, the poor spend a larger percentage of their taxable income on cigarettes and, thus, on tobacco taxes. Back in the LTDS box, the second column shows that the *MTR* is increasing with taxable income, so we can guess that this tax is going to be progressive without even doing the math.
* Numerous online resources are available to help students answer their general tax questions. E.g., try https://turbotax.intuit.com/tax-tools/all-articles-and-videos/.

*Redistributing Funds [continued]*

* Exhibit 10.7 shows the distribution of income and federal taxes in 2015, by income quintiles (a quintile is one-fifth of the population, so there are five groups, each representing 20 percent of the population). The top quintile is broken down further, so we can focus on the top 10 percent, top 5 percent, or top 1 percent. This is an incredibly useful trio of bar graphs because we can use it to determine, say, the middle class’ share of national income (they make 11.57 percent) and share of federal taxes (they pay 6.61.1 percent). We observe that the top 10 percent of people by income make 44.1 percent of national income and pay 61 percent of federal taxes. One might ask students whether they think that this is fair. What have they heard about the top 1 percent from, say, the Occupy Wall Street movement? What percentage of the federal taxes should the top 1 percent pay? One might stress that this sort of debate is centuries old (so don’t expect everyone to agree on a simple solution) and there may be alternative definitions of fairness, as we see in Exhibit 10.8.
* Exhibit 10.8 compares and contrasts three alternative tax systems. In the progressive system, which operates like the U.S. individual income tax, wealthy Family C pays 30 times as much tax as poor Family A. Under the proportional (or “flat”) tax, all families pay the same, 20 percent tax rate, so wealthy Family C pays just 10 times as much tax as poor Family A. Finally, if all families were charged a $2,000 poll tax, then wealthy Family C would pay an *ATR* of 2 percent while poor Family A would pay an *ATR* of 20 percent. So what is fair? Should the rich pay more, should everyone pay the same constant marginal tax rate, or should everyone pay the same tax bill? Each of the three tax systems treats Family C very differently!
* Exhibit 10.9 shows that the progressive federal tax system has consistently reduced inequality between the Top 1 percent and the Lowest 20 percent since 1979. In 2010, the pre-tax income ratio was 16.2%/3.9% ≈ 4.15, whereas the post-tax income ratio was 12.1% / 4.7% ≈ 2.57. There is still substantial income inequality—this has been a common news item in 2014—but the federal tax system appears to be working to reduce such inequality.

**Choice & Consequence: The Government Budget Constraint**—Deciphering the U.S. federal budget is a little more complicated than understanding tax revenues (cash inflows) and government spending (cash outflows), because fiscally savvy politicians know how to play financing games. For example, they may offer a generous spending plan that is financed by borrowing, thereby passing the buck and shifting the burden to future taxpayers. Sometimes, as in the case of Social Security, today’s spending may increase “unfunded liabilities,” which creates future debt or liabilities but does not show up as current borrowing based on current accounting standards. When there is little transparency, voters and other citizens cannot make fully-informed decisions.

*Financing Operations*—The government collects taxes to pay its bills, especially the salaries of elected and appointed public officials, as well as those in the sizable bureaucracy.

* Unlike Wall Street financiers, who may receive a six-figure annual bonus, government bureaucrats tend to be paid a fixed salary based on qualifications. Students may have heard of the U.S. civil service pay scale— known as General Service (GS)—and know that a college graduate with a bachelor’s degree might be hired at the GS-5 level. Absent the profit motive, government workers may pursue other objectives, such as maximizing prestige or clout, and these are often linked to the size of one’s budget because a larger budget allows one to afford more workers, equipment, etc. Consequently, a self-interested bureaucrat who derives satisfaction from his budget might have a personal incentive to inflate government spending. For example, in the context of public good provision, a budget-maximizing, bureaucratic decision maker may attempt to slide all the way down the demand curve in Exhibit 9.13 (from Chapter 9) to a quantity of 8 units of the public good, which is far greater than the socially optimal quantity of 4.

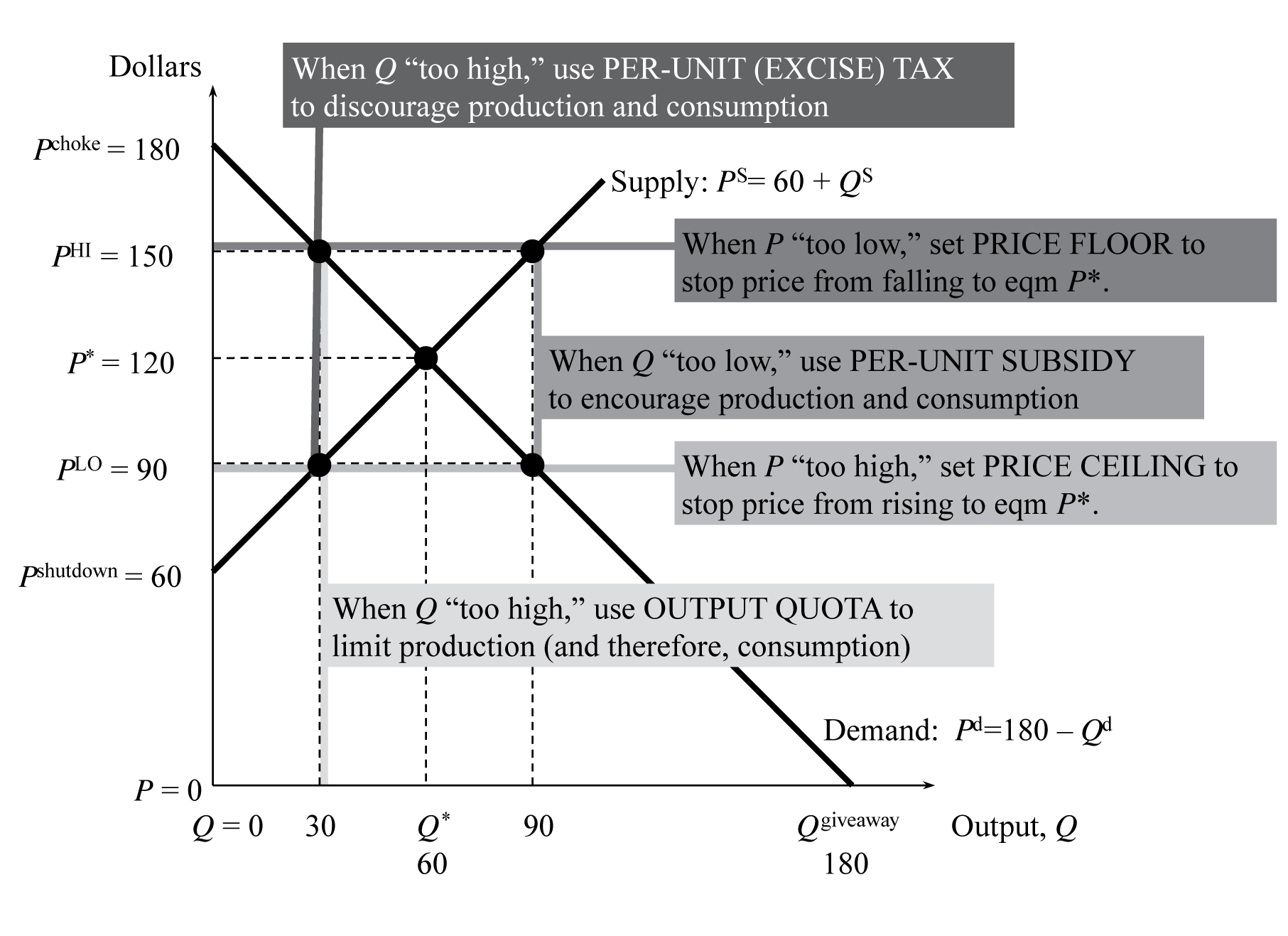
*Correcting Market Failures and Externalities*—A fourth reason to levy taxes is to modify incentives of those who generate negative externalities. Recall from Chapter 9 that a Pigouvian tax tricks a private decision maker into internalizing an externality and choosing the socially optimal output level (e.g., see Exhibit 9.8). The authors point out that while this use of taxes makes sense in theory, such taxes are rare in practice (or at least they generate relatively little in tax revenues).

* We might also add in the use of *sin taxes* to discourage the consumption of controversial goods and services, such as alcohol, tobacco, gasoline, and gambling. During the past several years, we have heard growing concerns about obesity, and more cities are trying to tax high-caloric foods such as sugary sodas. We analyze such excise taxes in the upcoming section on tax incidence.

**Letting the Data Speak: Reducing Inequality the Scandinavian Way**—Some nations have different preferences than the United States when it comes to the equity-efficiency tradeoff. The five Scandinavian countries (Denmark, Norway, Sweden, Finland, and Iceland) use a progressive tax system to finance generous transfer programs. As a result, they have much lower inequality than the U.S., as measured by the Gini coefficient and the poverty rate and shown in Exhibit 10.10. Interestingly, the starting points for these two inequality measures are similar in Scandinavia and the U.S., but their taxes and transfers are more effective at leveling the playing field.

**Taxation: Tax Incidence and Deadweight Losses**—The term *tax incidence* means the way that the burden of a tax is distributed across buyers and sellers. A person new to economics would probably guess that the person who bears the tax burden is the person who is specified as the taxpayer by law. However, we can dispel this myth by using microeconomics to compare the results of a $2 tax on buyers and a $2 tax on sellers. As the authors show in detail with Exhibits 10.11 and 10.12, welfare analysis generates identical results: the incidence on consumers, incidence on producers, and deadweight loss are the same regardless of whether the $2 tax is officially levied on buyers or on sellers!

* To motivate a per-unit tax, suppose that the government thinks the competitive equilibrium output is too high. In fact, to motivate any of the major government interventions, one can begin with a competitive market in equilibrium and say that the government might think the price or the quantity is either too high or too low. One might show a graphic like this:



* *Teaching Tip:* To analyze a per-unit tax, start with the idea of the *tax wedge*, which will give you the option to bypass completely the issue of whether to shift the supply curve upward or the demand curve downward. For lumberjacks, a wedge is a tool used to split wood by driving two sides apart. By analogy, a per-unit tax can be used to create a gap between the price that buyers actually pay and the price that sellers actually get to keep. Price Paid by Buyers – Price Received by Sellers = Per-Unit Tax Collected by Government = Tax Wedge. To solve this type of problem, we use the fact that there will always be only one output level, but that there are two different prices in this market, *P*PAID and *P*RECD, and they differ exactly by the per-unit tax, *T*. Thus, there are several conditions that must hold (we have assumed some nice functions, so we can find specific answers):
  + *P*PAID is on the demand curve: *P*PAID = 180 – *Q*d.
  + *P*RECD is on the supply curve: *P*RECD = 60 + *Q*s.
  + There is a unique quantity: *Q*d = *Q*s = *Q*TAX.
  + The two prices differ by the tax: *P*PAID = *P*RECD + *T*.

There are two basic types of problems we can now solve.

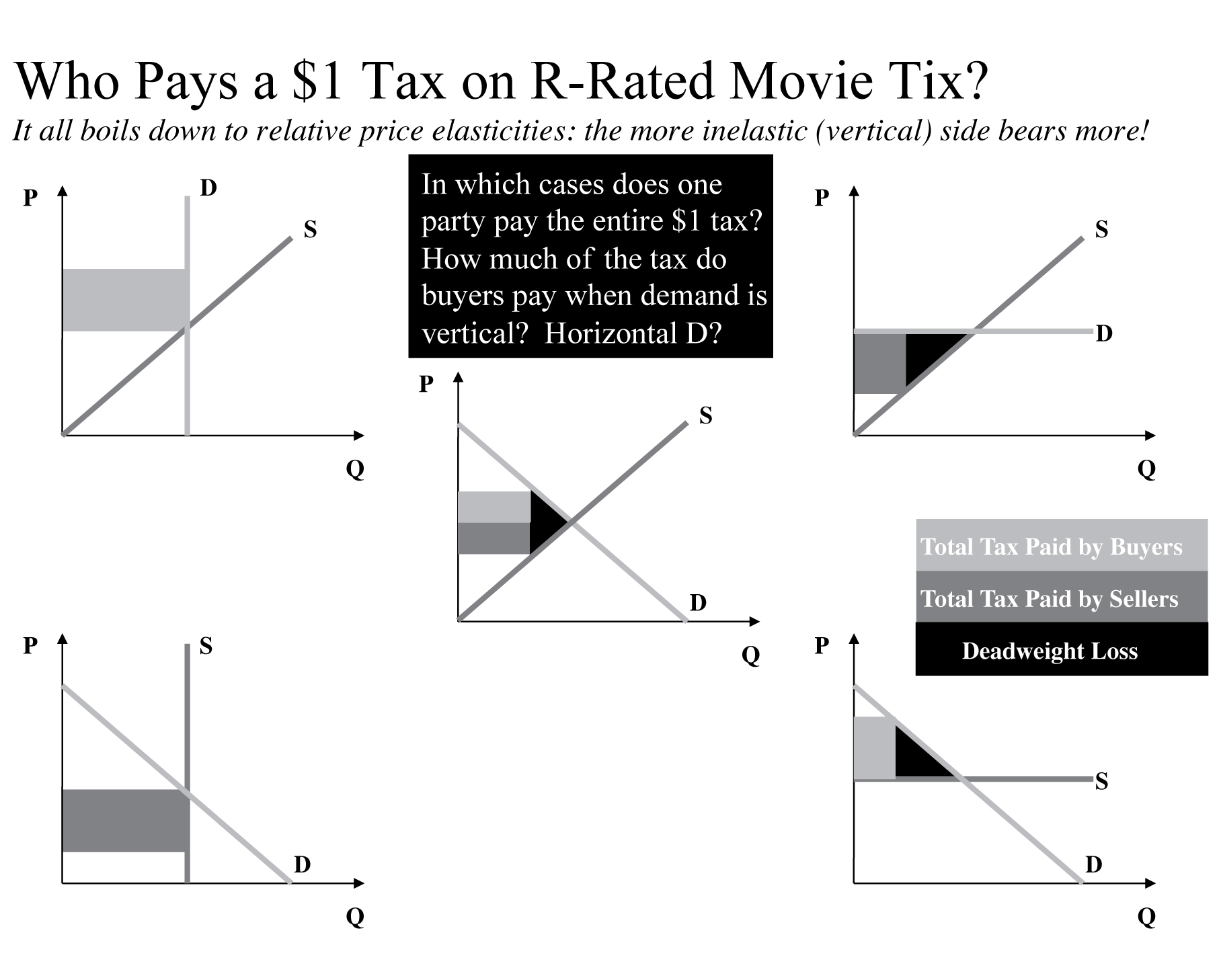
* First, for a given tax *T*, find *Q*TAX. For example, if *T* = 20, then we will have the tax wedge (*P*PAID = *P*RECD + 20), demand (*P*PAID = 180 – *Q*), and supply (*P*RECD = 60 + *Q*). Combining the wedge and demand equations gives us *P*RECD = 160 – *Q*, so 160 – *Q* = 60 + *Q*, so *Q*TAX = 50.
* Second, for a desired target output *Q*TAX, find the necessary tax *T*. For example, if we want *Q*TAX = 40, then we will have *P*PAID = 180 – 40 = 140 and *P*RECD = 60 + 40 = 100, so *P*PAID – *P*RECD = 140 – 100 = 40 = *T*.
* For either type of problem we can use our standard welfare measures to compute consumer surplus (*CS*), producer surplus (*PS*), deadweight loss (*DWL*), and tax revenues (*TR*). If we start with a nice S&D diagram in competitive equilibrium, we expect to find that an excise tax causes lower CS, lower PS, and higher DWL. Intuitively, deadweight loss comes from mutually beneficial, but unrealized (thanks to the tax!) voluntary exchanges between buyers and sellers.
* *Common Mistakes or Misunderstandings:* Be sure to distinguish between the tax revenue that the government collects on each unit sold (*T*) and the total tax revenue the government collects from all of the units sold (*TQ*TAX). In other words, if a $1 tax is charged on each of 20 T-shirts purchased, then the per-unit tax revenue is $1, but the total tax revenue is ($1)(20) = $20.
* Note that because a per-unit subsidy is equivalent to a negative per-unit tax, we can use a very similar approach to analyze the effects of a subsidy.

**Choice & Consequence: The Deadweight Loss Depends on the Tax**—Economist Arthur Okun’s “leaky bucket” captures the idea that tax systems tend to create deadweight loss, so in an effort to redistribute income from one group to another using taxes, we actually destroy some value. For example, if we raise $100 by taxing players in the widget market, but then when we carry those tax revenues over to the gadget market, we lose $10 in the process; in general, we tend to think of taxes causing market distortions, perhaps in the form of people trying to get out of paying the tax. This unfortunate result inspires us to consider other forms of taxes that generate less DWL. British Prime Minister Margaret Thatcher famously enacted a lump-sum poll tax, which involved zero DWL, but it was regressive, so it increased income inequality; this reminds us of the efficiency-equity trade-off introduced in Chapter 7.

* How should we evaluate tax systems? Here are some desirable qualities of a tax system:
  + **Efficient:** Causes minimal distortions in incentives to engage in mutually beneficial trade. Causes minimal efforts to legally avoid or illegally evade the tax. Minimize the deadweight loss per dollar of taxes collected.
  + **Simple and Inexpensive:** Has a minimal cost of both taxpayer compliance and government administration.
  + **Flexible:** Adapts to the state of the macroeconomy, so the tax does not harm taxpayers as much during a downturn.
  + **Politically Responsible:** The tax code is generated from informed public debate; if not, we might expect a tax code to feature many loopholes carved out by logrolling or shady dealings.
  + **Fair and Equitable:** We collect taxes from those with the greatest ability to pay. If there is *vertical equity,* then wealthy people pay more. If there is *horizontal equity,* then like people are taxed alike, so people with similar incomes pay similar amounts of tax. Usually there is an efficiency-equity trade-off.
* As we saw in Exhibit 10.8, tax policies cause winners and losers, and we could apply several different plausible definitions of fairness!

*The Effects of Demand and Supply Elasticities on the Tax Burden*—Buyers and sellers equally split the $2 jambalaya tax because of the nice, symmetric way the S&D curves were drawn in Exhibits 10.11 and 10.12. However, if one of the curves is relatively more price elastic, then that curve’s economic actors will be better able to avoid the tax and shift its burden onto the actors on the other curve. Thus, price elasticity of demand and price elasticity of supply jointly determine tax incidence.

* *Teaching Tip:* If one erases the 8000 label from the quantity axes in Exhibit 10.11, then one could do the math to demonstrate P\*=6.50, Q\*=4000, and the correct incidence answers using inverse demand function *Pd = (55/6) – (1/1500)Qd* and inverse supply function *PS = (23/6) + (1/1500)QS.Alternative Teaching Examples:* Suppose that Congress passes a law that imposes a $1 tax on all tickets sold to R-rated movies. Ask students who would be affected by this and in what ways. Who would be the winners? And the losers? How might movie fans react to this law? One might show a slide like this to demonstrate how the price-elasticities of supply and demand affect tax incidence:



* We can link elasticities not only to tax incidence but also to policy effectiveness. Suppose a politician tried to use this $1 tax to reduce consumption of R-rated movies. [Students are happy to provide examples of R-rated movies, if asked.] Under which scenarios would this policy be a huge success, resulting in the politician’s re-election? The quantity consumed would plunge in the northeast and southeast cases (in the previous diagrams) in which either *S* or *D* is perfectly price-elastic. Under which scenarios would the policy be an embarrassing failure, resulting in the politician leaving office? The quantity consumed doesn’t budge in the northwest and southwest cases, which means a poorly designed policy could be an exercise in futility!
* This section is especially important for journalists, who are likely to have to report on government policies. For example, suppose the state reduces the per-gallon gasoline tax by 10 cents. A journalist without an economics background is likely to expect that the gas price paid at the pump by buyers will fall by exactly 10 cents, but someone who understands incidence knows that the 10 cent savings will be split between buyers and sellers, unless we have an unusual market, in which demand is perfectly price inelastic or supply is perfectly price elastic.
* A fun, made-up word is “taxploitation,” which sounds like it could mean something about the degree to which one is forced to shoulder more of the tax burden because one is less sensitive to price changes. A useful formula to know is . Intuitively, the impact of the price changes on buyers and sellers will be equal when the two elasticities are the same in absolute value. If *S* is elastic (large *PES*), while *D* is inelastic (small *PED*), then *P*PAID will rise more than *P*RECD falls, so buyers will bear most of the tax. Exhibits 10.13 and 10.14 illustrate two useful cases one can use to understand the formula.
* *Teaching Tip:* It is useful to remind students that the PED varies along a downward-sloping, linear demand curve, and that halfway down we always find PED = -1. When we say that supply is more elastic than demand in Exhibit 10.13, we are saying that in the neighborhood of the equilibrium, supply is flatter than demand, so sellers are more responsive than buyers to price changes. This doesn’t preclude the PED from ranging from -0 to -∞ as we move northwesterly on the demand curve.

***10.2 Regulation***

When the government is not satisfied with the free market equilibrium price, quantity and/or quality, it can take actions to influence the market outcome. The government can use a heavy hand (e.g., forbidding production of a negative externality) or a light touch (e.g., using Pigouvian taxes to discourage firms from generating negative externalities).

**Direct Regulation**—Also known as command-and-control regulation, direct regulation controls the amount of a certain activity. For example, the Food and Drug Administration forces pharmaceutical firms to send promising new drug compounds away for costly, time-consuming testing on human subjects before it will approve them for sale by a doctor’s prescription; this is probably better for ethical drugs than a *caveat emptor* (“let the buyer beware”) system in which each customer has to determine whether the drug is safe and reasonably effective.

* The examples of quantity limits, which include fishing quotas, zoning restrictions, antismoking laws, and blue laws (that restrict the sale of liquor on Sundays), might inspire conversation. One might ask students whether it makes sense to close businesses on particular days for religious reasons.

*Price Controls: Price Ceilings and Price Floors*—Sometimes the government (perhaps acting on behalf of its constituents) decides that the market price is incorrect. Then it may implement a price ceiling to keep a price below its equilibrium level, or a price floor to keep a price above its equilibrium level. We will examine these briefly in turn.

*Price Ceilings*—The textbook example of a price ceiling is apartment rent control, which sounds good in theory—affordable housing would help the homeless, right?—but tends to be troublesome in practice, thanks to the invisible hand. In particular, we tend to have a blind spot: an artificially lower (subequilibrium) price is great for consumers but bad news for producers. As a consequence, we expect more quantity demanded, less quantity supplied, and a product shortage. The winners from this policy will be the lucky buyers who get to buy the scarce product, and among the losers are the interested buyers who would have been willing to pay more than the equilibrium price but are now shut out of the market.

* In the context of rent controls, here are some of the unintended consequences:
  + A lower price attracts more potential tenants.
  + A lower price scares off some potential landlords.
  + Some apartments are converted to condos, office space, or storage space (in order to earn a higher return).
  + Fewer new apartment buildings are constructed, prolonging the shortage.
  + With less incentive to respond to customers, landlords cut maintenance costs; we would expect them to be less attentive when things break down.
  + Landlords try to collect shortfall in clever ways, such as key money (“Sure, the apartment rent is controlled, but if you want to enter the apartment, you’ll need a key, and this key will cost you $200 a month!”) or furniture rental fees (“The apartment is rent controlled, but you are required to rent this folding chair for a mere $200 a month!”).
  + Turnover and vacancies are lower because the opportunity costs of moving are so high! Once a family moves into a rent-controlled apartment, it rarely leaves.
* *Alternative Teaching Examples:* Sellers more or less disappear and buyers resort to looting after the government of a less-developed nation imposes price controls. Some states have usury laws to control interest rates. Anti-gouging laws (as we saw in Chapter 7) prevent exorbitant prices following natural disasters such as Hurricane Katrina.
* *Alternative Teaching Examples:* Capping the interest rates that lenders can charge is another form of a price ceiling. Lenders earn a return by effectively renting out money, and lenders expect some percentage of borrowers to default (i.e., fail to repay the loan with interest), so they try to identify which borrowers seem riskiest, and either avoid lending to them or charge them higher interest rates. *Usury laws* that prohibit charging high interest rates might effectively eliminate loans to the riskiest borrowers.
* In addition to the standard analysis shown in Exhibits 10.15 and 10.16, one can give students a little more practice using S&D curves by asking them to decompose the quantity shortage into the part due to buyers and the part due to sellers. In Exhibit 10.15, we see that the quantity demanded rose from 4,000 to 5,500, so we might think of this as “1,500 new buyers” (assuming each buyer purchases at most one unit). Likewise, we see that the quantity supplied fell from 4,000 to 2,500, so we might think of this as “1,500 fewer sellers” (assuming each producer sells at most one unit). The artificially lower (subequilibrium) price has attracted many new buyers and scared off many former sellers, so both sides are to blame for the resulting shortage. The shortage of 3,000 can be blamed on 1,500 new buyers and 1,500 lost sellers.
* Price ceilings have no bite when the price cap is set above the market equilibrium price. One might compare this law to a road sign that says “Speed Limit 200 mph” because in either case, the law will not affect behavior because it doesn’t constrain behavior.
* It is helpful to keep in mind that students are probably much more familiar with the tenant’s perspective on apartment rent, as opposed to the landlord’s perspective. Economists can add a lot of value by broadening students’ horizons and getting them to think about both sides of the market, buyers and sellers.

*Price Floors*—Once we have analyzed a price ceiling, it is easy to understand a price floor because these price control policies are very similar. The key difference is that the price is now set artificially higher than the equilibrium price and prevented from falling, so informally, the supra-equilibrium price will attract profit-seeking sellers and scare off some buyers, and formally, the supra-equilibrium price increases the quantity supplied and decreases the quantity demanded.

* The textbook example of minimum price regulation is the minimum wage, sometimes described as the hourly wage of hiring a low-skilled worker. Economic theory suggests that this policy will create a labor surplus (also known as unemployment) along with winners and losers. The winners will be the lucky folks to land the scarce, higher paying jobs, and the losers will include those who would have been willing to work at the equilibrium wage but now are unable to find work. This topic has become headline news in 2014, with Seattle raising its minimum wage from around $9 to $15. Economists still debate the impact of minimum wages; some argue that rather than automating, fast-food firms (stereotypically, a major employer of minimum wage workers) will raise their prices, enjoy lower turnover, and will not face a relative cost disadvantage if rival firms are also forced to raise wages.
* Again, students will tend to be much more familiar with one perspective on price controls. For example, students are much more likely to have earned the minimum wage while working as a restaurant employee than to have paid the minimum wage while working as a restaurant employer.
* We tend to assume that when the quantities demanded and supplied are unequal, the most efficient players are served first. In other words, if the quantity supplied is 100 and the quantity demanded is 300, then the first 100 at the top left of the demand curve are served, as opposed to the middle 100, or the last 100 at the bottom right of the demand curve. Technically, price ceilings and price floors are disequilibrium models because the quantities supplied and demanded typically differ; in contrast, per-unit taxes and subsidies are equilibrium models for which the market clears: QS = Qd = Q\*.

***10.3 Government Failures***

In addition to the deadweight loss caused by most forms of government intervention, we are concerned about a broader set of inefficiencies known as *government failures*, which include costly bureaucracies, corruption, and the underground economy.

* One could extend this list to include the following:
  + The government rarely faces competition when it provides services, which creates monopoly-style problems at public schools, the Department of Motor Vehicles, and the U.S. Postal Service. The DMV is not typically known for its ambiance, short lines, or cheerful service. A government worker may be more likely to follow a safe, bureaucratic script than to go out of his/her way to be helpful.
  + Absent the profit motive, it is not clear how to measure performance. Agencies cherry-pick from a variety of indicators and make it sound like they have been successful.
  + With less need to outperform rivals, a government may have little incentive to cut costs or improve its technology.
  + Policies arbitrarily create winners and losers, which affects income inequality and creates incentives for rent seeking by well-connected individuals competing to get their interests heard.

**The Direct Costs of Bureaucracies**—There is an opportunity cost of running a bureaucracy: many of those government workers could have been productive in private sector jobs. Moreover, bureaucracies are insulated to various degrees from the pressures faced by profit-seeking firms.

* To get some sense of this, we might study the *revolving door* phenomenon, in which former government workers move to high-paying private sector jobs once they have learned how to navigate the public sector. The movement also goes in the other direction: who better to regulate an industry than a former industry executive who is very familiar with the industry and its major players?

**Corruption**—Large governments create opportunities for individuals to misuse public funds or distort the allocation of resources for personal gain. For instance, an official might accept a $10,000 bribe in exchange for helping a firm land a lucrative government construction project contract. This happens all over the world, not just in less-developed nations, but also in the United States, where New York, Louisiana, Illinois, and Florida are known for relatively high levels of corruption.

**Underground Economy**—We sometimes observe market activities that go unreported to the government, such as restaurant servers who do not report tips (or pay income taxes). There are also markets in illegal goods and services, such as drugs, prostitution, and dog fighting. These black markets create problems, such as undermining bans on prohibited products, putting legitimate firms at a cost disadvantage, forcing governments to levy higher taxes to compensate for the missing tax revenue, and encouraging wasteful spending on cat-and-mouse games between criminals and authorities.

* One might get some mileage out of some of these examples: Colorado legalized marijuana, Amsterdam has a famous Red Light District, and one can gamble in Las Vegas, Atlantic City, and on many riverboats across America.

***10.4 Equity Versus Efficiency***

Exhibit 10.18 shows that society typically faces a trade-off between equity and efficiency, which are two often-competing goals of government policy. When we start near the northwest corner of the diagram, we can increase social surplus (efficiency) by reducing the amount of social inequality; in other words, sometimes we can have our cake and eat it, too! However, at moderate and low levels of inequality, the trade-off kicks in, so to reduce inequality, we must also reduce efficiency. We must make value judgments in determining what is the socially preferable mix of equity and efficiency; indeed, one could view the bottom half of the curve as a spectrum that represents the tension between typical liberals and conservatives. All developed nations strive to achieve some reasonable balance between equity and efficiency, though the welfare state is larger in Europe than in the United States.

***10.5 Consumer Sovereignty and Paternalism***

Should the government try to prevent me from making mistakes? Consumer sovereignty is the idea that a consumer’s choices reflect his true preferences, and outsiders should not meddle in these choices. In contrast, paternalism is the idea that consumers are not necessarily well informed, so the government should encourage them to make the right choices or provide information to that end.

* *Alternative Teaching Examples:* Should I be able to consume raw milk cheese? Should I be able to ride a motorcycle without a helmet? Should I be able to save nothing for retirement? Should I be able to purchase sweetened beverages?

**The Debate**—Fundamentally, the major question in economics is whether, and to what extent, the government should intervene when it identifies a market failure. When a market is plagued with asymmetric information problems, such as moral hazard and adverse selection, should the government step in to provide information? Some economists (University of Chicago’s Richard Thaler and Cass Sunstein, in particular) advocate the use of “nudges” to subtly guide people toward socially preferred decisions. For example, if a firm automatically signs up employees for a 401(k) retirement account—unless they opt out— then more people will start retirement accounts than if the default was no account and workers had to opt in. Likewise, if carrots, raisins, and other healthy snacks are provided in convenient locations near cash registers, while Doritos and other less healthy snacks are stocked in distant, less obvious locations, perhaps the convenience factor will convince consumers to buy and eat what is better for them, healthwise.

**Evidence-Based Economics: What is the optimal size of government?**—The answer is that it is up to the reader, but economists can help a person find his/her answer by identifying and evaluating relevant costs and benefits. In particular, this chapter has stressed the deadweight loss that results from typical policies that try to improve upon the market equilibrium outcome, as well as the government’s sloth-like reflexes. From our coverage of taxes, we see that different people will prefer different types of taxes, so one way to hedge our bets is to use several different taxing systems (e.g., federal income taxes, state sales taxes, and local property taxes) to limit DWL. We can measure whether labor supply is sensitive to changes in the wage rate (not really) and whether tax rates impact taxable income (in the short run, yes, but in the long run, no). It seems that there is a fair amount of work to be done on this topic, so the reader is on her own to decide whether to vote Democrat or Republican—or Libertarian!

**Letting the Data Speak: The Efficiency of Government Versus Privately Run Expeditions**—A researcher found that privately funded expeditions to the North Pole and Northwest Passage were more successful than public expeditions in terms of being smaller, less costly, less likely to lose people or ships, and more likely to attain objectives. Why? In part, because private firms were better able to adapt to new technology and develop useful innovations by learning from the native population. In other words, government faces a problem of inertia.

**Choice & Consequence: Taxation and Innovation**—Researchers found that high taxes might encourage high earners to emigrate to other nations. This can be a double whammy: “Not only would a country unilaterally increasing top tax rates lose revenues because of the flight of high-income innovators, but it would also miss out on the new technologies that these individuals would have otherwise created domestically.”

**VI. Active Learning Exercises**

1. (Taxation and government spending at the state level) The textbook reports state and local receipts and spending by category. Select a state and go to the United States Census Bureau Web site and find the *Annual Survey of State Government Finances Summary Table*. For the state you selected, compare the receipts and spending by category. Which categories represent a larger share of receipts or spending than the national average?

*Solution: At the time of publication this information was available at the following link:* http://www.census.gov/govs/state/.

2. (Classifying tax systems) The Institute on Taxation and Economic Policy (ITEP) published a report (http://www.itepnet.org/whopays3.pdf) that shows that in the state of Florida, the families in the lowest 20 percent income group pay 13.5 percent of their income toward state taxes, whereas families in the 60th to 80th percentile paid 7.6 percent of their income toward state taxes. And finally, the top 1 percent of families by income paid 2.6 percent of their income toward taxes. Would the Florida tax system be classified as progressive, proportional, or regressive? Select a state other than Florida and look at the report. Classify the state’s tax system. The report shows for each state the share of income paid by type of tax. Classify each type of tax for the state you examined.

*Solution: As those with higher incomes pay smaller shares of their income toward state taxes, the system would be classified as regressive.*

3. (Income tax brackets; calculating tax rates) In 2013 Phil Mickelson, a professional golfer, made a comment regarding his negative view of recent tax increases in California. Following is the tax rate schedule for California in 2013. Problem 1 in the textbook gives the 2013 federal income tax rate for a single individual (assume for this problem that these rates apply to Mr. Mickelson). Phil Mickelson reportedly made approximately $49 million in 2013.

| **2013 California Income Tax Rates** | |
| --- | --- |
| **Taxable Income** | **Rate** |
| $0 to $7,582 | 1.0% |
| $7,582 to $17,976 | 2.0% |
| $17,976 to $28,371 | 4.0% |
| $28,371 to $39,384 | 6.0% |
| $39,384 to $49,774 | 8.0% |
| $49,774 to $254,250 | 9.3% |
| $254,250 to $305,100 | 10.3% |
| $305,100 to $508,500 | 11.3% |
| $508,500 and above | 12.3% |

A. Calculate the 2013 total federal income tax payable for Phil Mickelson.

B. Calculate the 2013 total state income tax payable for Phil Mickelson.

C. Combining the state and federal income tax rates, what was Phil Mickelson’s marginal income tax rate in 2013?

D. Combining the state and federal income taxes, calculate Phil Mickelson’s average tax rate in 2013.

*Solution: A. $19,361,764*

*B. $6,013,884*

*C. 12.3% +39.6% = 51.9%*

*D. (19,361,764 + 6,013,884)/49,000,000 = 51.8%*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Range 1** | **Range 2** | **Marginal Income** | **Tax Rate** | **Tax payment (Marginal Income × Tax Rate)** |
| 0 | 7,582 | 7,582 | 0.01 | 75.82 |
| 7,582 | 17,976 | 10,394 | 0.02 | 207.88 |
| 17,976 | 28,371 | 10,395 | 0.04 | 415.8 |
| 28,371 | 39,384 | 11,013 | 0.06 | 660.78 |
| 39,384 | 49,774 | 10,390 | 0.08 | 831.2 |
| 49,774 | 254,250 | 204,476 | 0.093 | 19,016.268 |
| 254,250 | 305,100 | 50,850 | 0.103 | 5,237.55 |
| 305,100 | 508,500 | 203,400 | 0.113 | 22,984.2 |
| 508,500 | 49,000,000 | 48,491,500 | 0.123 | 5,964,454.5 |
|  |  |  |  |  |
|  |  | Total state tax | | $6,013,884.00 |
|  |  |  |  |  |
| **Range 1** | **Range 2** | **Marginal Income** | **Tax Rate** | **Tax Payment** |
| 0 | 8,925 | 8,925 | 0.1 | 892.5 |
| 8,925 | 36,250 | 27,325 | 0.15 | 4,098.75 |
| 36,250 | 87,850 | 51,600 | 0.25 | 12,900 |
| 87,850 | 183,250 | 95,400 | 0.28 | 26,712 |
| 183,250 | 398,350 | 215,100 | 0.33 | 70,983 |
| 398,350 | 400,000 | 1,650 | 0.35 | 577.5 |
| 400,000 | 49,000,000 | 48,600,000 | 0.396 | 19,245,600 |
|  |  |  |  |  |
|  |  | Total federal tax | | $19,361,764 |

4. (Tax incidence; Deadweight loss) Suppose the market for movies on DVD is perfectly competitive and the market price is $15 per DVD. Now assume the government decides to put a $3 tax on each DVD sold, and as a result of this policy change, consumers must pay a total of $16 to buy a DVD.

A. What share of the tax are consumers paying?

B. What share of the tax are producers paying?

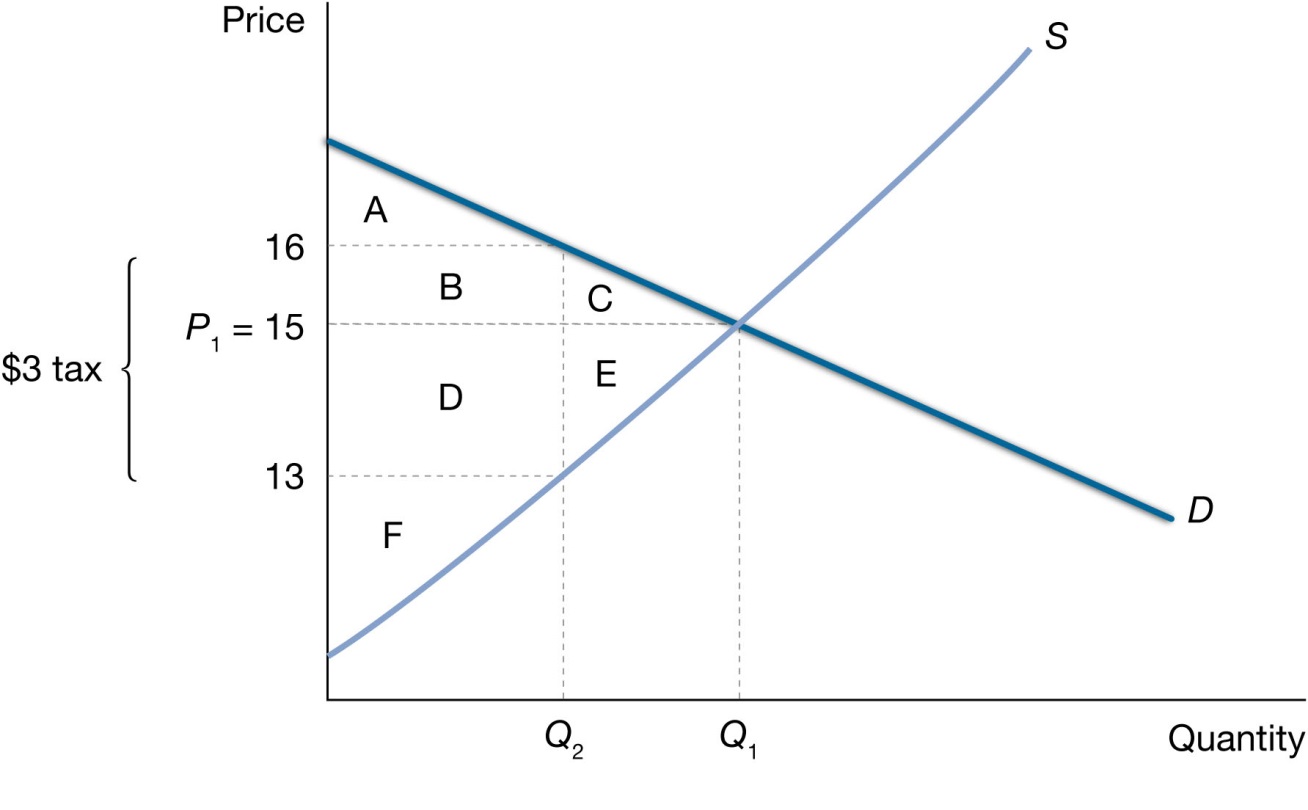
C. On a graph clearly label the areas on the graph that represent consumer surplus, producer surplus, tax incidence on consumers, tax incidence on producers, and deadweight loss before and after the tax.

*Solution: A. The price to consumers has increased by $1. The consumers are paying $1 of the $3 tax or one-third of the tax.*

*B. The producers were receiving $15; however, if consumers are now paying $16 and then $3 goes to the government, then the producers are left with only $13. As a result, the producers are paying $2 of the tax or two-thirds.*

*C. See the following graph.*

|  |  |  |
| --- | --- | --- |
|  | ***Before Tax*** | ***With Tax*** |
| *Consumer Surplus* | *ABC* | *A* |
| *Producer Surplus* | *DEF* | *F* |
| *Tax Incidence on Consumer* | *—* | *B* |
| *Tax Incidence on Producer* | *—* | *D* |
| *Deadweight Loss* | *—* | *CE* |



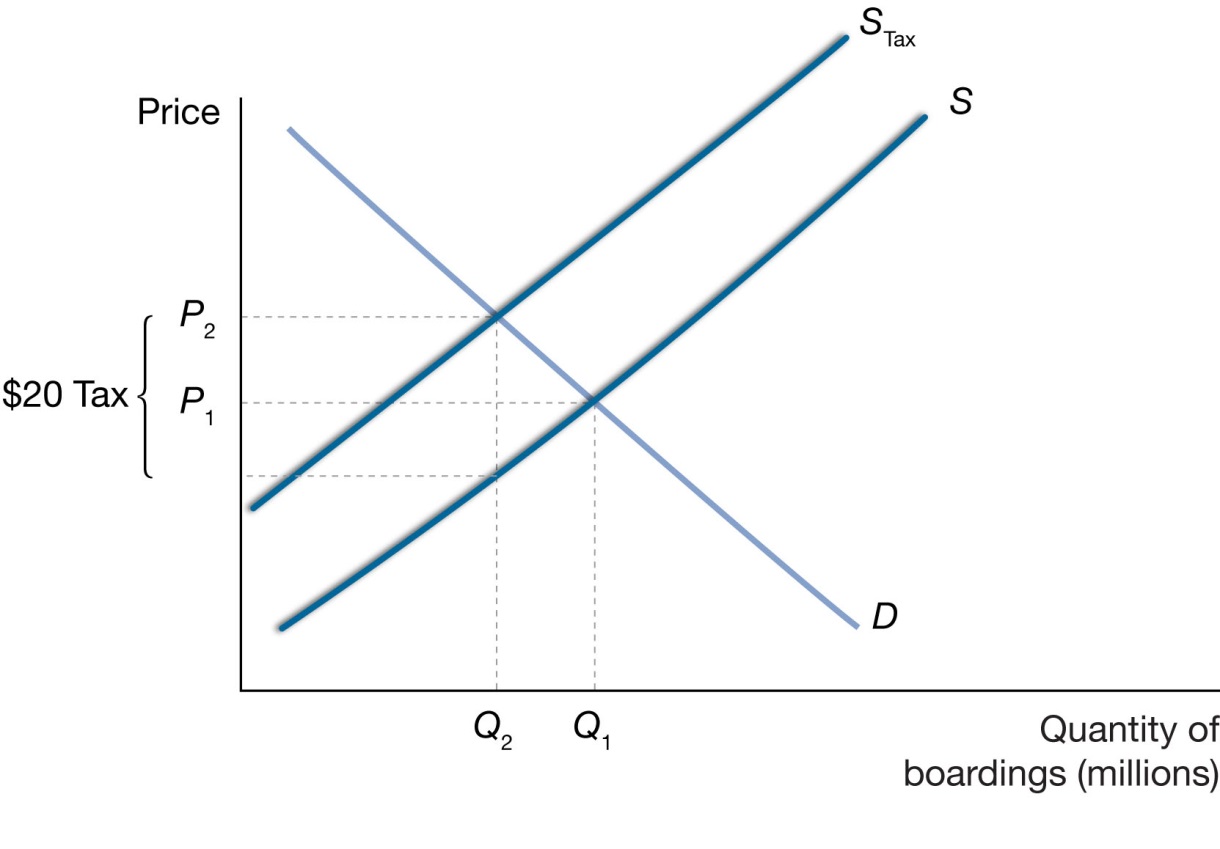
5. (Tax incidence; Deadweight loss from taxes) Suppose the state of Virginia is struggling with its budget. Assume that in order to raise revenue, the state decides to put a tax on all airline boardings (each time a person gets on a commercial flight). The state makes two claims:

Claim 1: “We will not harm consumers. The tax of $20 for each boarding of a plane in Virginia will be paid by the airlines.”

Claim 2: “Last year, there were 1,000,000 airplane boardings in Virginia, so we expect to raise $20 million dollars with this tax.”

Assess each of these two claims using a graph, and evaluate the two statements made by the state. Explain in two to three sentences why you think the statements are likely correct or incorrect.

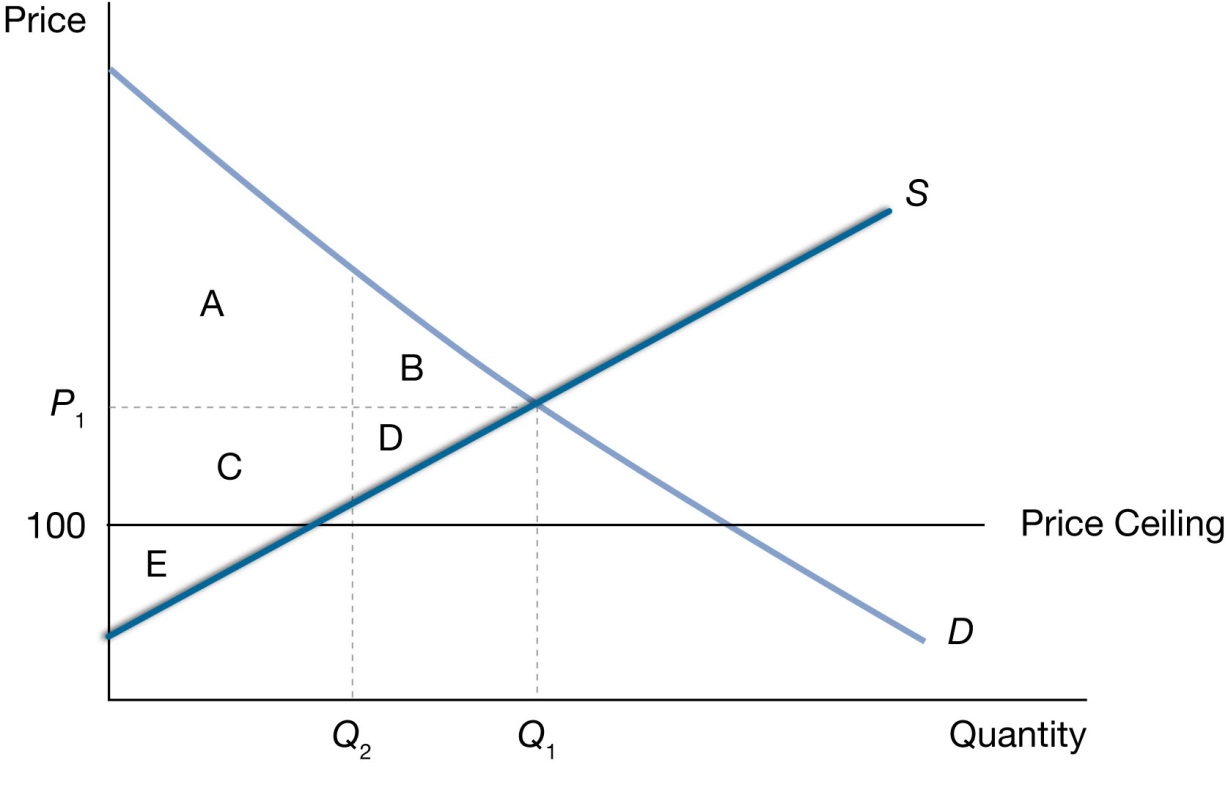
*Solution: Claim 1 is false. As we learned in the chapter, the incidence of the tax is not influenced by whether the tax is officially imposed on consumers or producers. The consumers would pay a portion of this tax. Claim 2 is also false. In order to raise the full $20 million from the tax, the equilibrium quantity of boarding would need to stay exactly the same. Although we have too little information in this question to estimate the change in boardings, we can be confident that there would be something less than the original quantity.*



6. (Price ceilings; Consumer Surplus; Producer Surplus; Deadweight loss) Recently many politicians have raised concerns over increasing average price of textbooks. Suppose the U.S. government passed a law mandating that textbooks have a maximum legal price of $100. Show the impact of this proposal in a graph. Clearly label the equilibrium price and quantity after the price ceiling takes effect. Also, label consumer surplus, producer surplus, and deadweight loss before and after the policy is in effect.

*Solution: See the following graph.*

|  |  |  |
| --- | --- | --- |
|  | ***Before Price Ceiling*** | ***After Price Ceiling*** |
| *Consumer Surplus* | *AB* | *AC* |
| *Producer Surplus* | *CDE* | *E* |
| *Deadweight Loss* | *—* | *BD* |



7. (Per-Unit Taxes; Incidence; Elasticity) Suppose we agree that one of the main causes of obesity is sugary soda, for which demand is given by Pd = 400 – Qd and supply is given by PS = 100 + (½)QS.

1. Draw the free market diagram and mathematically find P\*, Q\*, and consumer surplus.
2. An excise (or per-unit) tax drives a wedge between the price buyers pay and the price sellers receive. Suppose the government will use a per-unit tax to reduce consumption to 100. Find per-unit tax T and deadweight loss.
3. Describe the tax incidence: Of the total per-unit tax, T = PPAID – PRECD, buyers pay PPAID – P\* and sellers pay P\* – PRECD.
4. Use the midpoint elasticity formula to compute PED and PES using quantities Q\* and QTAX=100.

*Solutions:*

1. *See the diagram below. In the free market, set the S&D equations equal and solve for Q\*: 400 – Q = 100 + ½ Q* ⇒ *300 = 3/2 Q* ⇒ *600/3 = 200 = Q\*. Plug into either S or D function. 100 + ½ (200) = 200 = P\*. CHECK: 400 – (200) = 200. Good! CS = Triangular area under demand curve and above the price paid = ½ \* base \* height. CS = ½ (200 – 0) (400 – 200) = (200)(200)/2 = 20,000.*
2. *See the diagram. At QTAX=100, we’ll have PPAID=300 and PRECD=1500, so we must have T = PPAID – PRECD = 300 – 150 = 150 = per-unit tax T. DWL = triangular area between S&D over the range of forgone trades = ½ (200 – 100)(300 – 150) =15,000/2 = 7,500 = DWL.*

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1. *Of the tax of 150, Buyers pay 100 = PPAID – P\* = 300 – 200, while Sellers pay 50 = P\* – PRECD = 200 – 150.*
2. *At Q\*=200, P\*=200. At QTAX=100, we have PPAID=300 and PRECD=150.*

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8. (Price Floor) Suppose about 100 years ago, the Chicago meatpacking labor market was reasonably competitive. In that market for labor services (denoted by L), suppose that demand was characterized by Wd = 400 – Ld , where W denotes wage, and supply was given by LS = 200 (i.e., there were 200 workers willing to work at any wage). Finally, suppose that Upton Sinclair’s famous muckraking novel, *The Jungle*, convinced the city government to impose a minimum wage of $300 per week.

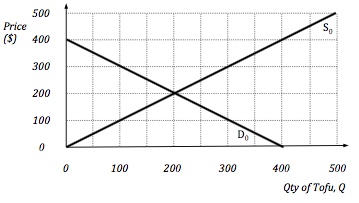
1. Before the minimum wage is implemented, find the free market equilibrium, W\* and L\*.
2. How large would the labor surplus be at the minimum wage of $300?
3. Decompose this labor surplus LS[300] – Ld[300] into the part “due to labor sellers”, LS[300] – L\*, and the part “due to labor buyers,” L\* – Ld[300].
4. Compute the deadweight loss that would result from the minimum wage
5. Were workers better off after this minimum wage policy?

*Solutions:*

1. *In eqm, there will be a unique wage and a unique quantity of labor, so set the prices equal (Wd = WS) and solve for quantity L\*: 400 – L = 200* ⇒ *L\* = 200. Plug this into demand to get W = 400 – 200 = 200 = W\*. See the graph!*
2. *At W=300, QS = 200 and Qd = 100, so there is a surplus of 200 – 100 = 100 workers.*
3. *200 – 100 = (200 – 200) + (200 – 100) = 0 + 100. The higher wage didn’t attract any new workers, but it did inspire employers to hire 100 fewer workers. Thus, “zero new sellers” and “100 fewer buyers.”*
4. *DWL is typically the area between the supply and demand curves for the forgone trades that would have occurred in a free market. Here, the labor supply curve effectively runs along the L-axis at W=0 and then goes vertical, so the DWL area is the trapezoid under labor demand from Ld[300]=100 to L\*=200. DWL = (200-100)(200-0) + ½ (200-100)(300-200) = 20000 + 5000 = 25000.*
5. *It depends. 200 workers would’ve been able to work at W\*=200, but now 100 of them lose their jobs and are ☹. However, the 100 workers who get the scarce jobs earn WMIN=$300 instead of W\*=$200 and are ☺.*

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9. (Price Ceiling) The island community of Herbivoria, which consists mostly of tofu-loving vegetarians, is connected to the mainland by a single bridge. The normal supply and demand curves for tofu are shown in the graph below. Unfortunately, the island is hit by Hurricane Soya, which damages the bridge, cutting off supplies from the mainland. Indeed, after the hurricane passes, the new supply and demand curves for tofu are given by *PS = 200 + QS* and *Pd = 500 – Qd.*



a) At a price of $200, Find the price elasticity of demand on the original demand curve for a price of $200. Hint: You can answer this without doing any math. 

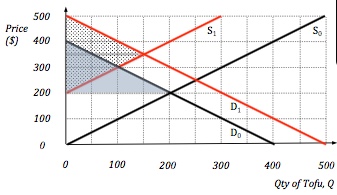
b) Find consumer surplus before the hurricane.

c) What new equilibrium price and deadweight loss would we expect after the hurricane, if the tofu market is left alone? Hint: Use the new supply and demand curves.

d) Unhappy customers convince the government to pass a bill that outlaws price gouging. As a result, the going price in this market cannot exceed PMAX = $200. Find the quantity discrepancy and then decompose this units “due to tofu buyers” and units “due to tofu sellers.”

e) Find the deadweight loss that would be the result of the anti- gouging law.

*Solutions:*



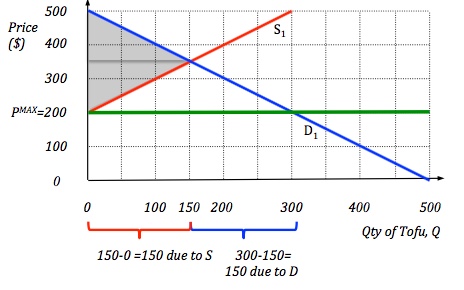
a) *Exactly halfway down a downward sloping linear demand curve the PED = -1.*

b) *CS = 1⁄2 (200 – 0)(400 – 200) = 20000. See the light blue triangle in the diagram above/right.*

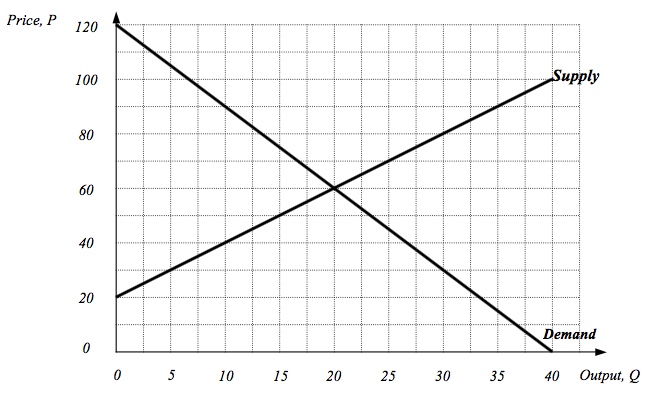
c) *Setting S=D, we have 200 + Q = 500 – Q* ⇒ *300 = 2Q* ⇒ *QAFTER =150* ⇒ *PAFTER =350.  Since no mutually beneficial trades are forgone, DWLAFTER = 0. See the dotted triangle in the diagram above.*

d) *At PMAX, Qd = 300, and QS = 0, so there is a qty shortage of 300 – 0 = 300 units. Starting with the new equilibrium (at Q\*=150), the anti-gouging law would cause quantity demanded to rise from 150 to 300, so 150 units are due to buyers, while the quantity supplied would fall from 150 to 0, so 150 units are due to sellers. See below.*

e) *The area between the new S&D curves is DWL = 1⁄2 (150 – 0)(500 – 300) = (150)2 = 22500. See below.*



10. (Per-Unit Subsidy) Through extensive lobbying, The National Cattlemen’s Beef Association convinces the federal government that beef products should be subsidized. Suppose that in the market for beef products, supply is given by PS = 20 + 2QS and demand is given by Pd = 120 – 3Qd, as shown in the graph below.



1. In a free market equilibrium, find the consumer surplus, producer surplus, and deadweight loss.
2. If government wishes to increase the equilibrium quantity to Q\*\*=30, it should use a per-unit subsidy of σ = \_\_\_\_\_\_\_\_. Then, we can predict these new levels: consumer surplus CS = \_\_\_\_\_\_\_\_, producer surplus PS = \_\_\_\_\_\_\_\_, deadweight loss DWL = \_\_\_\_\_\_\_\_, and the government’s total subsidy bill (to be paid by taxpayers) will be TSB = \_\_\_\_\_\_\_\_.
3. If the government uses a per-unit subsidy of $25, then the price received by sellers is PRECD = \_\_\_\_\_\_\_\_, the price paid by buyers is PPAID = \_\_\_\_\_\_\_\_, and the new quantity traded will be QSUBS = \_\_\_\_\_\_\_\_.

*Solutions:*

1. *In equilibrium, PS =Pd =P and QS =Qd =Q, so 120 - 3Q = 20 + 2Q ⇒ 100 = 5Q ⇒ Q\* = 20 ⇒ P\* = 60. CS=1⁄2(20–0)(120 – 60) = 600. PS = 1⁄2 (20 – 0)(60 – 20) = 400. DWL = 0 since there are NO mutually beneficial voluntary trades forgone,*
2. *Plug Q = 30 into S&D to get PS =20+2(30)=80, and Pd =120–3(30) = 30, and then the difference of 80 – 30 = 50, the per-unit subsidy. The government’s total subsidy bill will be (30 – 0)(80 – 30) = 1500. CS = 1⁄2 (30 – 0)(120 – 30) = 2700/2=1350. PS=1⁄2(30–0)(80–20)=900. DWL=1⁄2(30–20)(80–30)=250.*
3. *Inspecting the diagram, we see that the wedge has to be 25 tall, and this vertical distance corresponds to QSUBS = 25, where PPAID = 45 and PRECD = 70.*

11. (Non-Market Failures) To better understand distant governments, such as the U.S. federal government, one might think about governments closer to home. Based on what you have heard, do you have reason to believe that officials for the governments listed below are altruistic or that they seem self-interested? Do they seem to intervene for the common good or interfere, to the detriment of most of society?

1. Residence hall, fraternity, sorority, social club, etc.
2. Student government
3. Local city government

*Solutions: Answers may vary considerably, but the insight is that some government workers and politicians seem selfless, which others seem selfish.*