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Chapter 1: Ten Principles of Economics

Questions for Review: Answers

1. Examples of tradeoffs include time tradeoffs (such as studying one subject over another, or studying at all compared to engaging in social activities) and spending tradeoffs (such as whether to use your last ten dollars on pizza or on a study guide for that tough economics course).

2. The opportunity cost of seeing a movie includes the monetary cost of admission plus the time cost of going to the theater and attending the show. The time cost depends on what else you might do with that time; if it's staying home and watching TV, the time cost is pretty small, but if it's working an extra three hours at your job, the time cost is the money you could have earned.

3. The marginal benefit of a glass of water depends on your circumstances. If you've just run a marathon, or you've been walking in the desert sun for three hours, the marginal benefit is very high. But if you've been drinking a lot of liquids recently, the marginal benefit is quite low. The point is that even the necessities of life, like water, don't always have large marginal benefits.

4. Policymakers need to think about incentives so they can understand how people will respond to the policies they put in place. The text's example of seatbelts shows that policy actions can have quite unintended consequences. If incentives matter a lot, they may lead to a very different type of policy; for example, some economists have suggested putting knives in steering columns so that people will drive much more carefully! While this suggestion is silly, it highlights the importance of incentives.

5. Trade among countries isn't a game with some losers and some winners because trade can make everyone better off. By allowing specialization, trade between people and trade between countries improves everyone's welfare.

6. The "invisible hand" of the marketplace represents the idea that even though individuals and firms are all acting in their own self-interest, prices and the marketplace guide them to do what's good for society as a whole.

7. Efficiency is the notion that resources are allocated to their best use. Market economies may not be efficient (that is, there is market failure) if an externality is present or if a firm has market power. Equity is the idea that economic prosperity is distributed fairly. Government policy may play a role in achieving both efficiency and equity.

For example, the government may regulate firms that pollute, so that they don't harm others. The government may regulate monopolies like utility companies, so they don't charge too much. And the government may use taxes and the welfare system to promote income equality.

8. Productivity is important because a country's standard of living depends on its ability to produce goods and services. The greater a country's productivity (the amount of goods and services produced from each hour of a worker's time), the greater will be its standard of living.

9. Inflation is an increase in the overall level of prices in the economy. Inflation is caused by large increases in the quantity of a nation's money.

10. Inflation and unemployment are negatively related in the short run. Reducing inflation entails costs to society in the form of higher unemployment in the short run because it takes time for all prices to adjust fully.

Problems and Applications: Answers

1. a. A family deciding whether to buy a new car faces a tradeoff between the cost of the car and other things they might want to buy. For example, buying the car might mean they must give up going on vacation for the next two years. So the real cost of the car is the family's opportunity cost in terms of what they must give up.

   b. For a member of Congress deciding whether to increase spending on national parks, the tradeoff is between parks and other spending items or tax cuts. If more money goes into the park system, that may mean less spending on national defense or on the police force. Or, the extra money that goes into the park system could be returned to the public in the form of tax cuts.

   c. When a company president decides whether to open a new factory, the decision is based on whether the new factory will increase the firm's profits compared to other alternatives. For example, the company could upgrade existing equipment or expand existing factories. The bottom line is: Which method of expanding production will increase profit the most?

   d. In deciding whether (or how much) to prepare for class, a professor faces a tradeoff between the value of improving the quality of the lecture compared to other things she could do with her time, such as working on additional research.

2. When the benefits of something are psychological, such as going on a vacation, it isn't easy to compare benefits to costs to determine if it's worth doing. But there are two ways to think about the benefits. One is to compare the vacation with what you would do in its place. If you didn't go on vacation, would you buy something like a new set of golf clubs? Then you can decide if you'd rather have the new clubs or the vacation. A second way is to think about how much work you had to do to earn the money to pay for the vacation; then you can decide if the psychological benefits of the vacation were worth the psychological cost of working.

3. If you are thinking of going skiing instead of working at your part-time job, the cost of skiing includes its monetary and time costs, plus the opportunity cost of the wages you're giving up by not working. If the choice is between skiing and going to the library to study, then the cost of skiing is its monetary and time costs plus the cost to you of getting a lower grade in your course.

4. If you spend $100 now instead of investing it for a year and earning 5 percent interest, you are giving up the opportunity to spend $105 a year from now. This idea, that money has a time value, is the basis for the entire field of finance, the subfield of economics that has to do with prices of financial instruments like stocks and bonds.

5. The fact that you've already sunk $5 million isn't relevant to your decision anymore, since that money is gone. What matters now is the chance to earn profits at the margin. If you spend another $1 million and can generate sales of $3 million, you'll earn $2 million in marginal profit, so you should do so. You are right to think that the project has lost a total of $3 million ($6 million in costs and only $3 million in revenue) and you shouldn't have started it. That's true, but if you don't spend the additional $1 million, you won't have any sales and your losses will be $5 million. So what matters is not the total profit, but the profit you can earn at the margin. In fact, you'd pay up to $3 million to complete development; any more than that, and you won't be increasing profit at the margin.

6. a. Since a person gets fewer after-tax Social Security benefits the greater is his or her income, there's an incentive not to save for retirement. If you save a lot, your income will be higher, and you won't get as much after-tax Social Security income as someone who didn't save as much. The unintended consequence of the taxation of Social Security benefits is to reduce saving; yet the Social Security system was designed for the purpose of increasing saving!

   b. For the same reason, you'll tend not to work (or not work as much) after age 65. The more you work, the lower your after-tax Social Security benefits will be. Thus the taxation of Social Security benefits discourages work effort after age 65.

7. a. When welfare recipients who are able to work have their benefits cut off after two years, they have greater incentive to find jobs than if their benefits were to last forever.

   b. The loss of benefits means that someone who can't find a job will get no income at all, so the distribution of income will become less equal. But the economy will be more efficient, since welfare recipients have a greater incentive to find jobs. Thus the change in the law is one that increases efficiency but reduces equity.

8. By specializing in each task, you and your roommate can finish the chores more quickly. If you divided each task equally, it would take you more time to cook than it would take your roommate, and it would take him more time to clean than it would take you. By specializing, you reduce the total time spent on chores.

   Similarly, countries can specialize and trade, making both better off. For example, suppose it takes Spanish workers less time to make clothes than French workers, and French workers can make wine more efficiently than Spanish workers. Then Spain and France can both benefit if Spanish workers produce all the clothes and French workers produce all the wine, and they exchange some wine for some clothes.

9. a. Being a central planner is tough! To produce the right number of CDs by the right artists and deliver them to the right people requires an enormous amount of information. You need to know about production techniques and costs in the CD industry. You need to know each person's musical tastes and which artists they want to hear. If you make the wrong decisions, you'll be producing too many CDs by artists that people don't want to hear, and not enough by others.

   b. Your decisions about how many CDs to produce carry over to other decisions. You have to make the right number of CD players for people to use. If you make too many CDs and not enough cassette tapes, people with cassette players will be stuck with CDs they can't play. The probability of making mistakes is very high. You will also be faced with tough choices about the music industry compared to other parts of the economy. If you produce more sports equipment, you'll have fewer resources for making CDs. So all decisions about the economy influence your decisions about CD production.

10. a. Efficiency: The market failure comes from the monopoly by the cable TV firm.
    b. Equity
    c. Efficiency: An externality arises because secondhand smoke harms nonsmokers.
    d. Efficiency: The market failure occurs because of AT&T's monopoly power.
    e. Equity
    f. Efficiency: There's an externality because of accidents caused by drunk drivers.

11. If everyone were guaranteed the best health care possible, what would the economy look like? Presumably, much more of our nation's output would be devoted to medical care than is now the case. Would that be efficient? If you think that doctors form a monopoly and restrict health care to keep their incomes high, you might think so. But more likely, if the government mandated increased spending on health care, the economy would be less efficient because it would give people more health care than they would choose to pay for. From the point of view of equity, if poor people are less likely to have adequate health care, providing more health care would represent an improvement. Each person would have a more even slice of the economic pie, though the pie would consist of more health care and less of other goods.

12. Since average income in the United States has roughly doubled every 35 years, we are likely to have a better standard of living than our parents, and a much better standard of living than our grandparents. This is mainly the result of increased productivity, so that an hour of work produces more goods and services than it used to. Thus incomes have continuously risen over time, as has the standard of living.

13. If Americans save more and it leads to more spending on factories, there will be an increase in production and productivity, since the same number of workers will have more equipment to work with. The benefits from higher productivity will go to both the workers, who will get paid more since they're producing more, and the factory owners, who will get a return on their investments. There's no such thing as a free lunch, though, because when people save more, they're giving up spending. They get higher incomes at the cost of buying fewer goods.

14. a. If people have more money, they're probably going to spend more on goods and services.

    b. If prices are sticky, and people spend more on goods and services, then output may increase, as producers increase output to meet the higher demand.

    c. If prices can adjust, then people's higher spending will be matched with increased prices, and output won't rise.

15. To make an intelligent decision about whether to reduce inflation, a policymaker would need to know a lot about the tradeoff between inflation and unemployment. Because prices are sticky, an attempt to reduce inflation will lead to higher unemployment. A policymaker thus faces a tradeoff between the benefits of permanently lower inflation compared to the cost of temporarily higher unemployment.

Chapter 2: Thinking Like an Economist

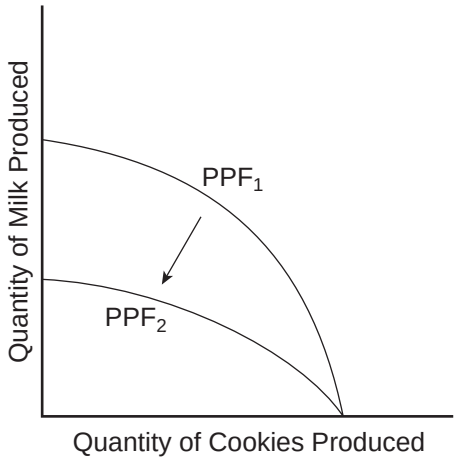
Questions for Review: Answers

1. Economics is like a science because economists use the scientific method. They devise theories, collect data, and then analyze these data in an attempt to verify or refute their theories about how the world works. Economists use theory and observation like other scientists, but they're limited in their ability to run experiments. Instead, they must rely on natural experiments.

2. Economists make assumptions to simplify problems without substantially affecting the answer. Assumptions can make the world easier to understand.

3. An economic model can't describe reality exactly because it would be too complicated to understand. A model is a simplification that allows the economist to see what is truly important.

4. Figure 2-1 shows a production possibilities frontier between milk and cookies (PPF_1). If a disease kills half of the economy's cow population, less milk production is possible, so the PPF shifts inward (PPF_2). Note that if the economy produces all cookies, so it doesn't need any cows, then production is unaffected. But if the economy produces any milk at all, then there will be less production possible after the disease hits.



5. The two subfields in economics are microeconomics and macroeconomics. Microeconomics is the study of how households and firms make decisions and how they interact in specific markets. Macroeconomics is the study of economywide phenomena.

6. Positive statements are descriptive and make a claim about how the world is, while normative statements are prescriptive and make a claim about how the world ought to be. Here's an example. Positive: Very rapid money growth is the cause of inflation. Normative: The government should keep money growth low.

7. The Council of Economic Advisers of a group of economists who consult with the president of the United States about economic matters. The council consists of three members and a staff of several dozen economists. It writes the annual *Economic Report of the President*.

8. Economists sometimes offer conflicting advice to policymakers for three reasons: (1) Economists may disagree about the validity of alternative positive theories about how the world works; (2) Economists may have different values and, therefore, different normative views about what policy should try to accomplish; (3) Economists may in fact agree, and yet the advice of charlatans or cranks obscures the consensus.

Problems and Applications: Answers

1. Many answers are possible.

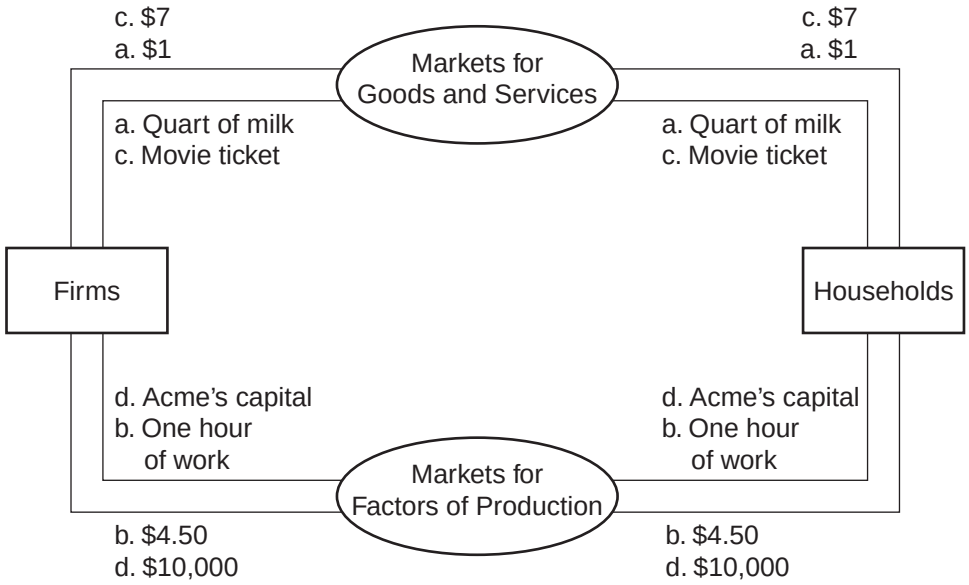
2. a. Steel is a fairly uniform commodity, though some firms produce steel of inferior quality.

   b. Novels are each unique, so they are quite distinguishable.

   c. Wheat produced by one farmer is completely indistinguishable from wheat produced by another.

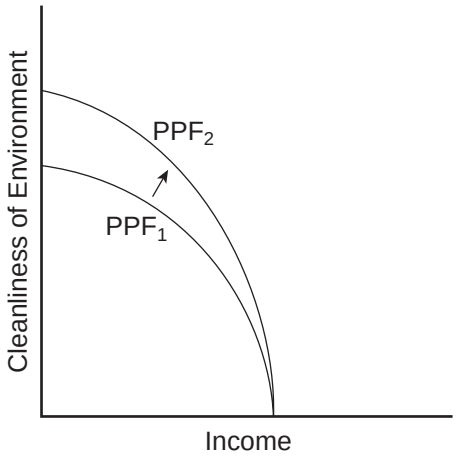
   d. Fast food is much more distinguishable, which is why you see so much advertising for it, as firms try to make their products seem different from other firms' products.

3. See Figure 2-2; the four transactions are shown.



4. The circular flow model excludes the roles of government and international trade. It's reasonable to exclude these features in trying to explain questions such as "What will firms do if costs of production increase?" or "What will people do if their wages increase?" But it isn't reasonable in trying to answer questions such as "How does a higher tax rate affect people's spending?" or "How does a slowdown in foreign economies affect profits in U.S. firms?"

5. See Figure 2-3. The shape and position of the frontier depend on how costly it is to maintain a clean environment—the productivity of the environmental industry. Gains in environmental productivity, such as the development of a no-emission auto engine, lead to shifts of the production-possibilities frontier, like the shift from PPF_1 to PPF_2 shown in the figure.



6. a. A family's decision about how much income to save is microeconomics.

   b. The effect of government regulations on auto emissions is microeconomics.

   c. The impact of higher saving on economic growth is macroeconomics.

   d. A firm's decision about how many workers to hire is microeconomics.

   e. The relationship between the inflation rate and changes in the quantity of money is macroeconomics.

7. a. The statement that society faces a short-run tradeoff between inflation and unemployment is a positive statement. It deals with how the economy *is*, not how it should be. Since economists have examined data and found that there's a short-run negative relationship between inflation and unemployment, the statement is a fact, thus it's a positive statement.

   b. The statement that a reduction in the rate of growth of money will reduce the rate of inflation is a positive statement. Economists have found that money growth and inflation are very closely related. The statement thus tells how the world is, and so it is a positive statement.

   c. The statement that the Federal Reserve should reduce the rate of growth of money is a normative statement. It states an opinion about something that should be done, not how the world is.

   d. The statement that society ought to require welfare recipients to look for jobs is a normative statement. It doesn't state a fact about how the world is. Instead, it is a statement of how the world should be and is thus a normative statement.

   e. The statement that lower tax rates encourage more work and more saving is a positive statement. Economists have studied the relationship between tax rates and work, as well as the relationship between tax rates and saving. They've found a negative relationship in both cases. So the statement reflects how the world is, and is thus a positive statement.

8. Two of the statements in Table 2-1 are clearly normative. They are: "If the federal budget is to be balanced, it should be done over the business cycle rather than yearly" and "The government should restructure the welfare system along the lines of a 'negative income tax.'" Both are suggestions of changes that should be made, rather than statements of fact, so they are clearly normative statements.

Most of the other statements in the table are clearly positive. They include: "A ceiling on rents reduces the quantity and quality of housing available," "Tariffs and import quotas usually reduce general economic welfare," "Flexible and floating exchange rates offer an effective international monetary arrangement," "Fiscal policy (e.g., tax cut and/or expenditure increase) has a significant stimulative impact on a less than fully employed economy," "Cash payments increase the welfare of recipients to a greater degree than do transfers-in-kind of equal cash value," "A large federal budget deficit has an adverse effect on the economy," and "A minimum wage increases unemployment among young and unskilled workers." All the statements are statements about how the world is. Note that in all cases, even though they're statements of fact, fewer than 100 percent of economists agree with them. You could say that positive statements are statements of fact about how the world is, but not everyone agrees about what the facts are.

The last proposition in Table 2-1, "Effluent taxes and marketable pollution permits represent a better approach to pollution control than imposition of pollution ceilings," may be positive or normative, depending on your interpretation. If the statement is based on research showing that effluent taxes and pollution permits are more effective at curtailing pollution at a lower cost than pollution ceilings, the statement is positive. But if the statement simply reflects someone's opinion that effluent taxes and pollution permits should be used, it is a normative statement.

9. As the president, you'd be interested in both the positive and normative views of economists, but you'd probably be *most* interested in their positive views. Economists are on your staff to provide their expertise about how the economy works. They know many facts about the economy and the interaction of different sectors. So you'd be most likely to call on them about questions of fact—positive analysis. Since you're the president, you're the one who has the make the normative statements as to what should be done, with an eye to the political consequences. The normative statements made by economists represent their views, not necessarily either yours or the electorate's.

10. There are many possible answers.

11. As of this writing, the chairman of the Federal Reserve is Alan Greenspan, the chair of the Council of Economic Advisers is Joseph Stiglitz, and the secretary of the treasury is Robert Rubin.

12. As time goes on, you might expect economists to disagree less about public policy because they'll have opportunities to observe different policies that are put into place. As new policies are tried, their results will become known, and they can be evaluated better. It's likely that the disagreement about them will be reduced after they've been tried in practice. For example, many economists thought that wage and price controls

would be a good idea for keeping inflation under control, while others thought it was a bad idea. But when the controls were tried in the early 1970s, the results were disastrous. The controls interfered with the invisible hand of the marketplace and shortages developed in many products. As a result, most economists are now convinced that wage and price controls are a bad idea for controlling inflation.

But it's unlikely that the differences between economists will ever be completely eliminated. Economists differ on too many aspects of how the world works. Plus, even as some policies get tried out and are either accepted or rejected, creative economists keep coming up with new ideas.

13. a. Whether the tax policy is fair or not is a matter of opinion. Some might think the only fair tax system is one in which everyone pays the same tax rate. Others might think that a person with higher income should have a higher tax rate.

b. You'd like to know why Peter and Paul have different incomes—because of their work effort or because of luck. You might like to know what the incentive effects are on their work effort of having to pay higher taxes if their income is higher.

c. If it's possible to find out the answers to questions like those in part (b), you might think a complicated tax system is good, since it can sort things out and make the system as fair as possible. But if there's no way to adjust tax rates to reflect the reasons that people have different incomes or to create good incentives, then a simple tax system with one tax rate for everyone might be preferable. Also, the government needs to consider how much time and effort are required to comply with a complicated tax system. For example, if it takes everyone two days to calculate their taxes when the tax system is complicated, people would desire a simpler tax system even if they had to pay more.

Chapter 3: Interdependence and the Gains from Trade

Questions for Review: Answers

1.' Absolute advantage reflects a comparison of the productivity of one person, firm, or nation to that of another, while comparative advantage compares the relative opportunity costs of the persons, firms, or nations. While a person, firm, or nation may have an absolute advantage in producing every good, they can't have a comparative advantage in every good.

2.' Many examples are possible. Suppose, for example, that Roger can prepare a fine meal of hot dogs and macaroni in just ten minutes, while it takes Anita twenty minutes. And Roger can do all the wash in three hours, while it takes Anita four hours. Roger has an absolute advantage in both cooking and doing the wash, but Anita has a comparative advantage in doing the wash (the wash takes the same amount of time as 12 meals, while it takes Roger 18 meals' worth of time).

3.' Comparative advantage is more important for trade than absolute advantage. In the example in problem 2, Anita and Roger will complete their chores more quickly if Anita does at least some of the wash and Roger cooks the fine meals for both.

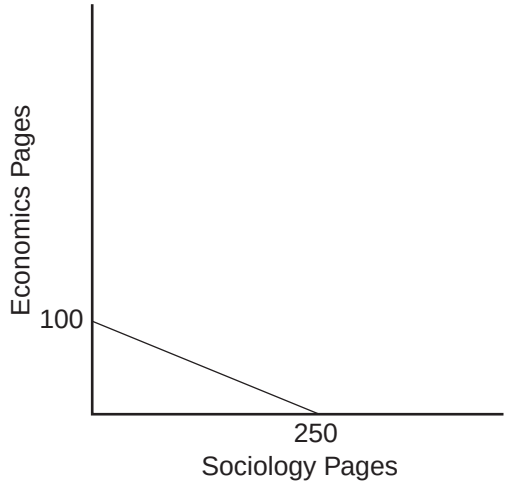
4.' Economists oppose policies that restrict trade among nations because trade allows all countries to achieve greater prosperity by allowing them to receive the gains from comparative advantage. Restrictions on trade hurt all countries.

Problems and Applications: Answers

1.' In the text example of the farmer and the rancher, the farmer's opportunity cost of producing one pound of meat is two pounds of potatoes because for every 20 hours of work, he can produce one pound of meat or two pounds of potatoes. With limited time at his disposal, producing a pound of meat means he gives up the opportunity to produce two pounds of potatoes. Similarly, the rancher's opportunity cost of producing one pound of meat is 1/8 pound of potatoes because for every hour of work, she can produce one pound of meat or 1/8 pound of potatoes. With limited time at her disposal, producing a pound of meat means she gives up the opportunity to produce 1/8 pound of potatoes.

2.' a.' See Figure 3-1. If Maria spends all day (five hours) studying economics, she can read 100 pages, so that is the vertical intercept of the production

possibilities frontier. If she spends all day studying sociology, she can read 250 pages, so that is the horizontal intercept. The time costs are constant, so the production possibilities frontier is a straight line.

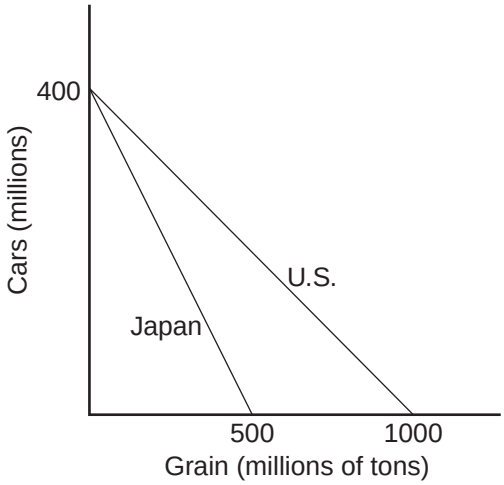


b. It takes Maria two hours to read 100 pages of sociology. In that time, she could read 40 pages of economics. So the opportunity cost of 100 pages of sociology is 40 pages of economics.

3. a.

	Workers needed to make: one car	one ton of grain
U.S.	1/4	1/10
Japan	1/4	1/5

b. See Figure 3-2. With 100 million workers and four cars per worker, if either economy were devoted completely to cars, it could make 400 million cars. Since a U.S. worker can produce 10 tons of grain, if the U.S. produced only grain it would produce 1,000 million tons. Since a Japanese worker can produce 5 tons of grain, if Japan produced only grain it would produce 500 million tons. These are the intercepts of the production possibilities frontiers shown in the figure. Note that since the tradeoff between cars and grain is constant, the production possibilities frontier is a straight line.



c. Since a U.S. worker produces either 4 cars or 10 tons of grain, the opportunity cost of 1 car is 2 1/2 tons of grain, which is 10 divided by 4. Since a Japanese worker produces either 4 cars or 5 tons of grain, the opportunity cost of 1 car is 1 1/4 tons of grain, which is 5 divided by 4. Similarly, the U.S. opportunity cost of 1 ton of grain is 2/5 cars (4 divided by 10) and the Japanese opportunity cost of 1 ton of grain is 4/5 cars (4 divided by 5). This gives the following table:

Opportunity cost of:	1 car (in terms of tons of grain given up)	1 ton of grain (in terms of cars given up)
Country		
U.S.	2 1/2	2/5
Japan	1 1/4	4/5

d. Neither country has an absolute advantage in producing cars, since they're equally productive (the same output per worker); the U.S. has an absolute advantage in producing grain, since it's more productive (greater output per worker).

e. Japan has a comparative advantage in producing cars, since it has a lower opportunity cost in terms of grain given up. The U.S. has a comparative advantage in producing grain, since it has a lower opportunity cost in terms of cars given up.

f. With half the workers in each country producing each of the goods, the U.S. would produce 200 million cars (that's 50 million workers times 4 cars each) and 500 million tons of grain (50 million workers times 10 tons each). Japan would produce 200 million cars (50 million workers times 4 cars each) and 250 million tons of grain (50 million workers times 5 tons each).

g. From any situation with no trade, in which each country is producing some cars and some grain, suppose the U.S. changed 1 worker from producing cars to producing grain. That worker would produce 4 fewer cars and 10 additional tons of grain. Then suppose the U.S. offers to trade 7 tons of grain to Japan for 4 cars. The U.S. will do this because it values 4 cars at 10 tons of grain, so it will be better off if the trade goes through. Suppose Japan changes 1 worker from producing grain to producing cars. That worker would produce 4 more cars and 5 fewer tons of grain. Japan will take the trade because it values 4 cars at 5 tons of grain, so it will be better off. With the trade and the change of 1 worker in both the U.S. and Japan, each country gets the same amount of cars as before and both get additional tons of grain (3 for the U.S. and 2 for Japan). Thus by trading and changing their production, both countries are better off.

4. a. Pat's opportunity cost of making a pizza is 1/2 gallon of root beer, since she could brew 1/2 gallon in the time (2 hours) it takes her to make a pizza. Pat has an absolute advantage in making pizza since she can make one in two hours, while it takes Kris four hours. Kris's opportunity cost of making a pizza is 2/3 gallons of root beer, since she could brew 2/3 of a gallon in the time (4 hours) it takes her to make a pizza. Since Pat's opportunity cost of making pizza is less than Kris's, Pat has a comparative advantage in making pizza.

b. Since Pat has a comparative advantage in making pizza, she will make pizza and exchange it for root beer that Kris makes.

c. The highest price of pizza in terms of root beer that will make both roommates better off is 2/3 gallons of root beer. If the price were higher than that, then Kris would prefer making her own pizza (at an opportunity cost of 2/3 gallons of root beer) rather than trading for pizza that Pat makes. The lowest price of pizza in terms of root beer that will make both roommates better off is 1/2 gallon of root beer. If the price were lower than that, then Pat would prefer making her own root beer (she can make 1/2 gallon of root beer instead of making a pizza) rather than trading for root beer that Kris makes.

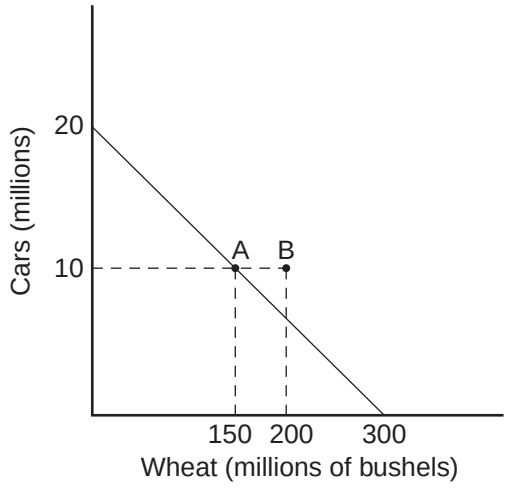
5. a. Since a Canadian worker can make either two cars a year or 30 bushels of wheat, the opportunity cost of a car is 15 bushels of wheat. Similarly, the

opportunity cost of a bushel of wheat is 1/15 of a car. The opportunity costs are the reciprocals of each other.

b. See Figure 3-3. If all 10 million workers produce two cars each, they produce a total of 20 million cars, which is the vertical intercept of the production possibilities frontier. If all 10 million workers produce 30 bushels of wheat each, they produce a total of 300 million bushels, which is the horizontal intercept of the production possibilities frontier. Since the tradeoff between cars and wheat is always the same, the production possibilities frontier is a straight line.

If Canada chooses to consume 10 million cars, it will need 5 million workers devoted to car production. That leaves 5 million workers to produce wheat, who will produce a total of 150 million bushels (5 million workers times 30 bushels per worker). This is shown as point A on Figure 3-3.

c. If the United States buys 10 million cars from Canada and Canada continues to consume 10 million cars, then Canada will need to produce a total of 20 million cars. So Canada will be producing at the vertical intercept of the production possibilities frontier. But if Canada gets 20 bushels of wheat per car, it will be able to consume 200 million bushels of wheat, along with the 10 million cars. This is shown as point B in the figure. Canada should accept the deal because it gets the same number of cars and 50 million more bushes of wheat.



6. Though the professor could do both writing and data collection faster than the student (that is, he has an absolute advantage in both), his time is limited. If the professor's comparative advantage is in writing, it makes sense for him to pay a student to collect the data, since that's the student's comparative advantage.

7. a. English workers have an absolute advantage over Scottish workers in producing scones, since English workers produce more scones per hour (50 vs. 40). Scottish workers have an absolute advantage over English workers in producing sweaters, since Scottish workers produce more sweaters per hour (2 vs. 1). Comparative advantage runs the same way. English workers, who have an opportunity cost of 1/50 sweaters per scone (1 sweater per hour divided by 50 scones per hour), have a comparative advantage in scone production over Scottish workers, who have an opportunity cost of 1/20 sweater per scone (2 sweaters per hour divided by 40 scones per hour). Scottish workers, who have an opportunity cost of 20 scones per sweater (40 scones per hour divided by 2 sweaters per hour), have a comparative advantage in sweater production over English workers, who have an opportunity cost of 50 scones per sweater (50 scones per hour divided by 1 sweater per hour).

   b. If England and Scotland decide to trade, Scotland will produce sweaters and trade them for scones produced in England. A trade with a price between 20 and 50 scones per sweater will benefit both countries, as they'll be getting the traded good at a lower price than their opportunity cost of producing the good in their own country.

   c. Even if a Scottish worker produced just one sweater per hour, the countries would still gain from trade, because Scotland would still have a comparative advantage in producing sweaters. Its opportunity cost for sweaters would be higher than before (40 scones per sweater, instead of 20 scones per sweater before). But there are still gains from trade since England has a higher opportunity cost (50 scones per sweater).

8. a. With no trade, one pair of white socks trades for one pair of red socks in Boston, since productivity is the same for the two types of socks. The price in Chicago is 2 pairs of red socks per pair of white socks.

   b. Boston has an absolute advantage in the production of both types of socks, since a worker in Boston produces more (3 pairs of socks per hour) than a worker in Chicago (2 pairs of red socks per hour or 1 pair of white socks per hour).

   Chicago has a comparative advantage in producing red socks, since the opportunity cost of producing a pair of red socks is 1/2 pair of white socks,

while the opportunity cost of producing a pair of red socks in Boston is 1 pair of white socks. Boston has a comparative advantage in producing white socks, since the opportunity cost of producing a pair of white socks in Boston is 1 pair of red socks, while the opportunity cost of producing a pair of white socks in Chicago is 2 pairs of red socks.

c. If they trade socks, Boston will produce white socks for export, since it has the comparative advantage in white socks, while Chicago produces red socks for export, which is Chicago's comparative advantage.

d. Trade can occur at any price between 1 and 2 pairs of red socks per pair of white socks. At a price lower than 1 pair of red socks per pair of white socks, Boston will choose to produce its own red socks (at a cost of 1 pair of red socks per pair of white socks) instead of buying them from Chicago. At a price higher than 2 pairs of red socks per pair of white socks, Chicago will choose to produce its own white socks (at a cost of 2 pairs of red socks per pair of white socks) instead of buying them from Boston.

9. a. The cost of all goods is lower in Germany than in France in the sense that all goods can be produced with fewer worker hours.

b. The cost of any good for which France has a comparative advantage is lower in France than in Germany. Though Germany produces all goods with less labor, that labor is more valuable. So the cost of production, in terms of opportunity cost, will be lower in France for some goods.

c. Trade between Germany and France will benefit both countries. For each good in which it has a comparative advantage, each country should produce more goods than it consumes, trading the rest to the other country. Total consumption will be higher in both countries as a result.

10. a. True; two countries can achieve gains from trade even if one of the countries has an absolute advantage in the production of all goods. All that's necessary is that each country have a comparative advantage in some good.

b. False; it is not true that some people have a comparative advantage in everything they do. In fact, no one can have a comparative advantage in everything. Comparative advantage reflects the opportunity cost of one good or activity in terms of another. If you have a comparative advantage in one thing, you must have a comparative disadvantage in the other thing.

c. False; it is not true that if a trade is good for one person, it can't be good for the other one. Trades can and do benefit both sides—especially trades based on comparative advantage. If both sides didn't benefit, trades would never occur.

Chapter 4: The Market Forces of Supply and Demand

Questions for Review: Answers

1. A competitive market is a market in which there are many buyers and many sellers so that each has a negligible impact on the market price.

2. The quantity of a good that buyers demand is determined by the price of the good, income, the prices of related goods, tastes, and expectations.

3. The demand schedule is a table that shows the relationship between the price of a good and the quantity demanded. The demand curve is the downward-sloping line relating price and quantity demanded. They are related because the demand curve is simply a graph showing the points in the demand schedule.

4. The demand curve slopes downward because of the law of demand—other things equal, when the price of a good rises, the quantity demanded of the good falls. People buy less of a good when its price rises, both because they can't afford to buy as much and because they switch to purchasing other goods.

5. A change in consumers' tastes leads to a shift of the demand curve. A change in price leads to a movement along the demand curve.

6. The quantity of a good that sellers supply is determined by the price of the good, input prices, technology, and expectations.

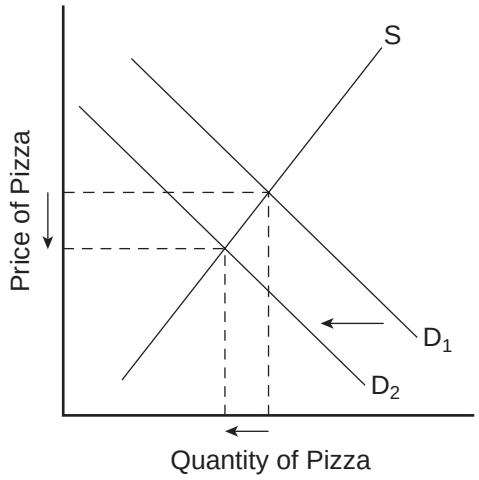
7. A supply schedule is a table showing the relationship between the price of a good and the quantity a producer is willing and able to supply. The supply curve is the upward-sloping line relating price and quantity supplied. They are related because the supply curve is simply a graph showing the points in the supply schedule.

8. The supply curve slopes upward because when the price is high, suppliers' profits increase, so they supply more output to the market. The result is the law of supply—other things equal, when the price of a good rises, the quantity supplied of the good also rises.

9. A change in producers' technology leads to a shift in the supply curve. A change in price leads to a movement along the supply curve.

10. The equilibrium of a market is the point at which the demand and supply curves intersect. At the equilibrium price, the quantity of the good that buyers are willing and able to buy exactly balances the quantity that sellers are willing and able to sell. If the price is above the equilibrium price, sellers want to sell more than buyers want to buy, so there is excess supply. Sellers try to increase their sales by cutting prices; that continues until they reach the equilibrium price. If the price is below the equilibrium price, buyers want to buy more than sellers want to sell, so there is excess demand. Sellers can raise their price without losing customers; that continues until they reach the equilibrium price.

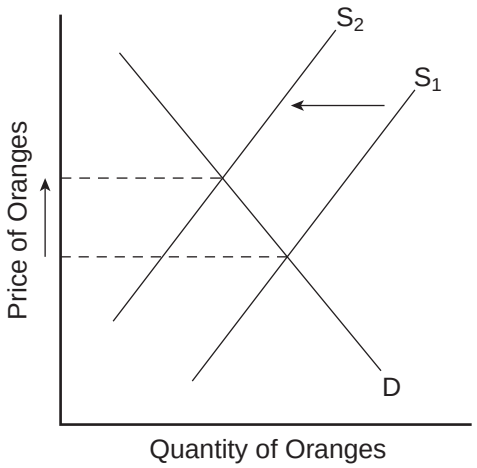
11. When the price of beer rises, the demand for pizza declines, because beer and pizza are complements and people want to buy less beer. When we say the demand for pizza declines, we mean that the demand curve for pizza shifts to the left as in Figure 4-1. The supply curve for pizza isn't affected. With a shift to the left in the demand curve, the equilibrium price and quantity both decline, as the figure shows. Thus the quantity of pizza supplied and demanded both fall. In sum, supply is unchanged, demand is decreased, quantity supplied declines, quantity demanded declines, and the price falls.



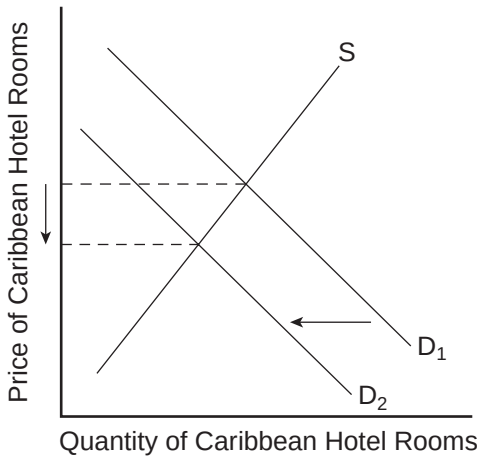
12. Prices play a vital role in market economies because they bring markets into equilibrium. If the price is different from its equilibrium level, quantity supplied and quantity demanded aren't equal. The resulting excess supply or excess demand leads suppliers to adjust the price until equilibrium is restored. Prices thus serve as signals that guide economic decisions and allocate scarce resources.

Problems and Applications: Answers

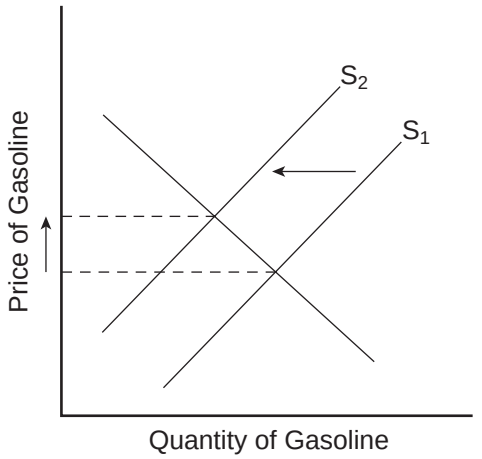
1. a. Cold weather damages the orange crop, reducing the supply of oranges. This can be seen in Figure 4-2 as a shift to the left in the supply curve for oranges. The new equilibrium price is higher than the old equilibrium price.

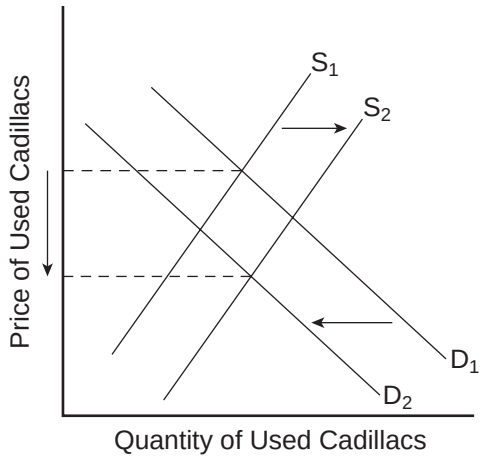


b. People often travel to the Caribbean from New England to escape cold weather, so demand for Caribbean hotel rooms is high in the winter. In the summer, fewer people travel to the Caribbean, since northern climes are more pleasant. The result, as shown in Figure 4-3, is a shift to the left in the demand curve. The equilibrium price of Caribbean hotel rooms is thus lower in the summer than in the winter, as the figure shows.

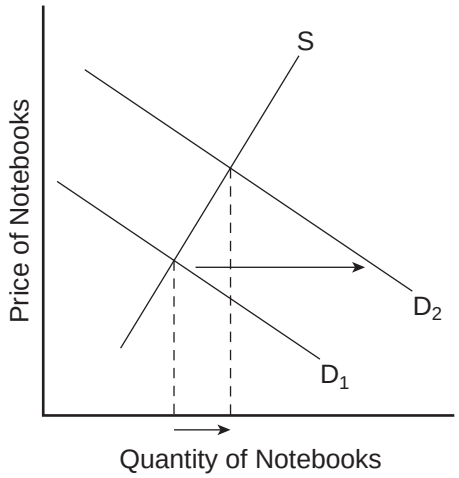


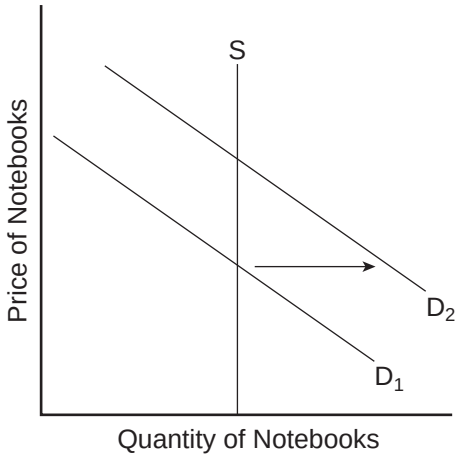
c. When a war breaks out in the Middle East, many markets are affected. Since much oil production takes place there, the war disrupts oil supplies, shifting the supply curve for gasoline to the left, as shown in Figure 4-4. The result is a rise in the equilibrium price of gasoline. With a higher price for gasoline, the cost of operating a gas-guzzling automobile, like a Cadillac, will increase. As a result, the demand for used Cadillacs will decline, as people in the market for cars won't find Cadillacs as attractive. In addition, some people who already own Cadillacs will try to sell them. The result is that the demand curve for used Cadillacs shifts to the left, while the supply curve shifts to the right, as shown in Figure 4-5. The result is a decline in the equilibrium price of used Cadillacs.





2. The statement that "an increase in the demand for notebooks raises the quantity of notebooks demanded, but not the quantity supplied" is false, in general. As Figure 4-6 shows, the increase in demand for notebooks results in an increased quantity supplied. The only way the statement would be true is if the supply curve were perfectly inelastic, as shown in Figure 4-7.





3. a. If people decide to have more children (a change in tastes), they'll want larger vehicles for hauling their kids around, so the demand for minivans will increase. Supply won't be affected.

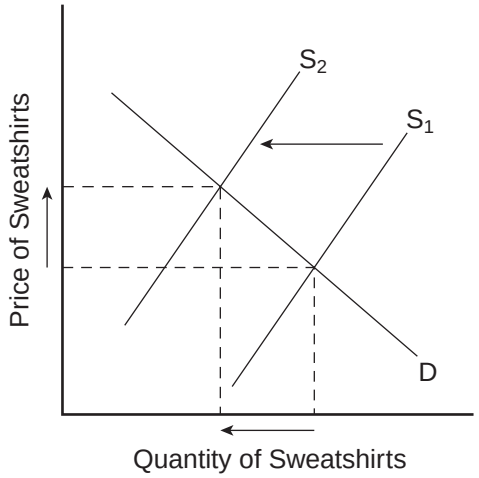
b. If a strike by steelworkers raises steel prices, the costs of producing a minivan rise (a rise in input prices). The result is a decrease in the supply of minivans. Demand won't be affected.

c. The development of new automated machinery for the production of minivans is an improvement in technology. The reduction in firms' costs results in an increase in supply. Demand isn't affected.

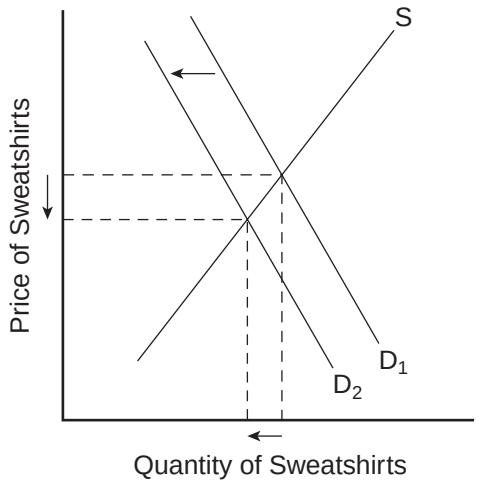
d. The rise in the price of station wagons affects minivan demand because station wagons are substitutes for minivans (that is, there's a rise in the price of a related good). The result is an increase in demand for minivans. Supply isn't affected.

e. The reduction in peoples' wealth caused by a stock-market crash reduces their income, leading to a reduction in the demand for minivans, since minivans are a normal good.

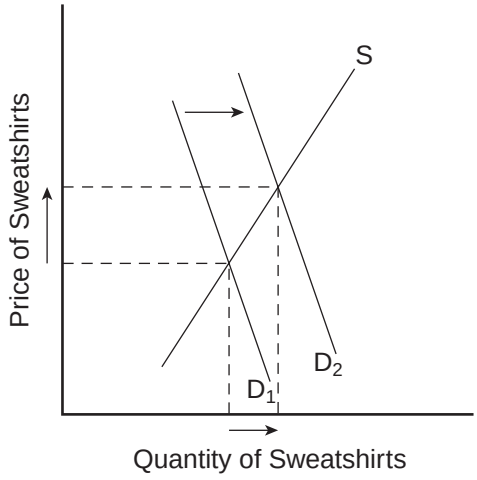
4. a. When a hurricane in South Carolina damages the cotton crop, it raises input prices for producing sweatshirts. As a result, the supply of sweatshirts shifts to the left, as shown in Figure 4-8. The new equilibrium has a higher price and lower quantity of sweatshirts.



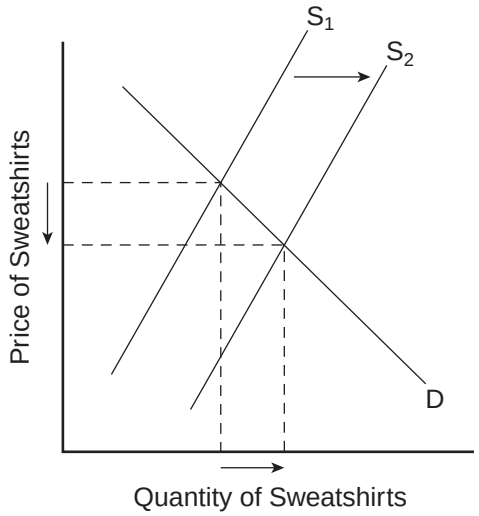
b. A decline in the price of leather jackets leads more people to buy leather jackets, reducing the demand for sweatshirts. The result, shown in Figure 4-9, is a decline in both the equilibrium price and quantity of sweatshirts.



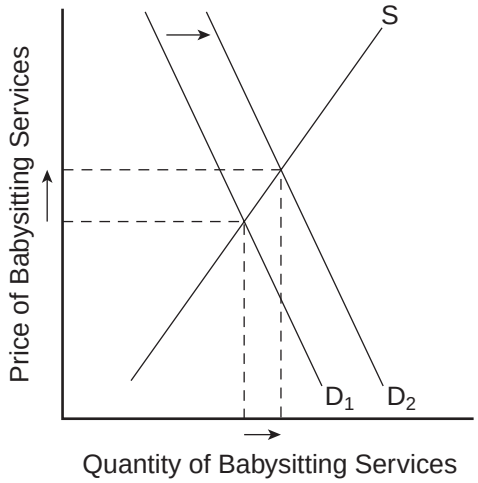
c. The effects of colleges requiring students to engage in morning calisthenics in appropriate attire raises the demand for sweatshirts, as shown in Figure 4-10. The result is an increase in both the equilibrium price and quantity of sweatshirts.

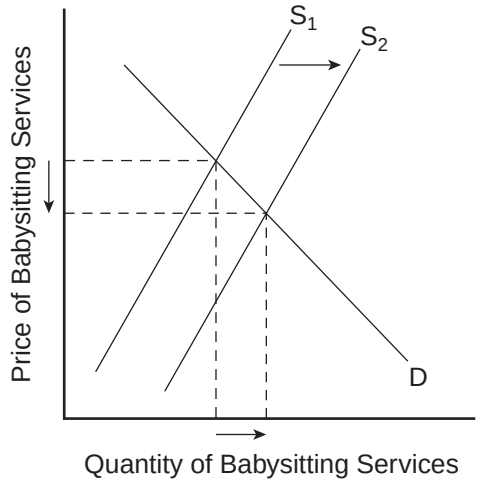


d. The invention of new knitting machines increases the supply of sweatshirts. As Figure 4-11 shows, the result is a reduction in the equilibrium price and an increase in the equilibrium quantity of sweatshirts.



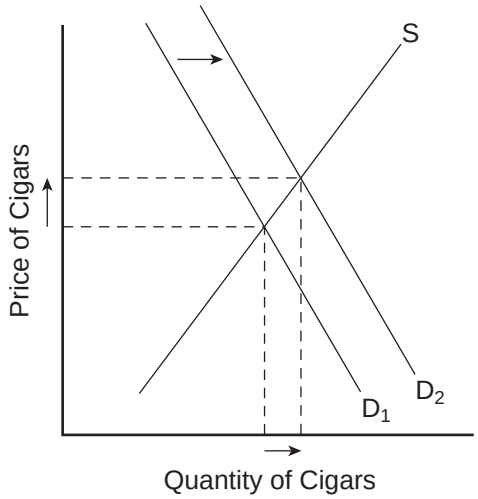
5. A temporarily high birth rate in the year 2000 leads to opposite effects on the price of babysitting services in the years 2005 and 2015. In the year 2005, there are more 5-year olds who need sitters, so the demand for babysitting services rises, as shown in Figure 4-12. The result is a higher price for babysitting services in 2005. However, in the year 2015, the increased number of 15-year olds shifts the supply of babysitting services to the right, as shown in Figure 4-13. The result, as shown in Figure 4-13, is a decline in the price of babysitting services.





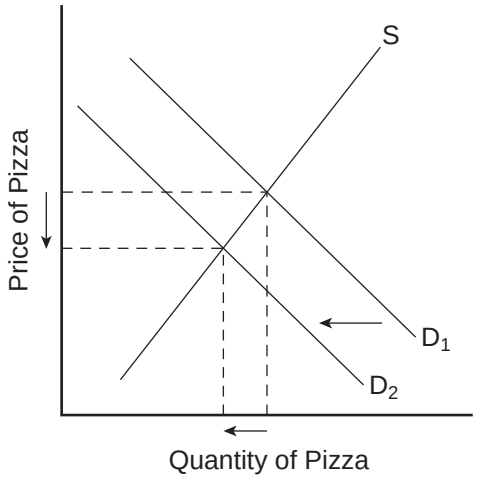
6. a. Cigars and chewing tobacco are substitutes for cigarettes, since a higher price for cigarettes would increase demand for cigars and chewing tobacco.

b. An increase in the tax on cigarettes leads to increased demand for cigars and chewing tobacco. The result, as shown in Figure 4-14 for cigars, is a rise in both the equilibrium price and quantity of cigars and chewing tobacco.

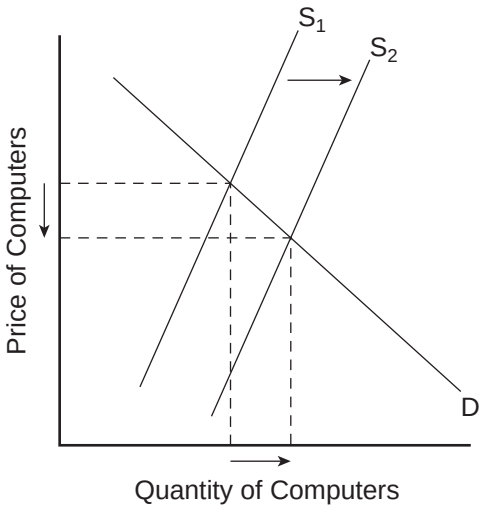


c. The results in part (b) showed that a tax on cigarettes leads people to substitute cigars and chewing tobacco for cigarettes when the tax on cigarettes rises. To reduce total tobacco usage, policymakers might also want to increase the tax on cigars and chewing tobacco, or pursue some type of public education program.

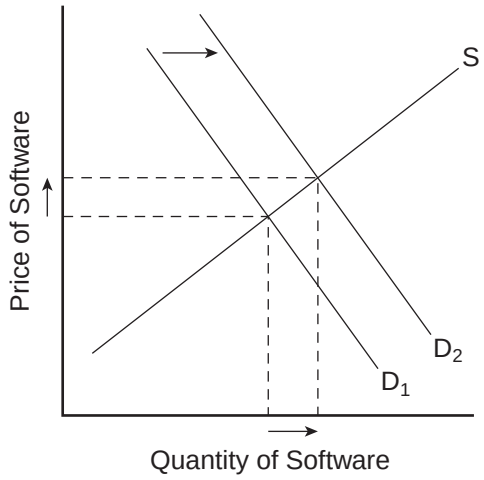
7. Quantity supplied equals quantity demanded at a price of $6 and quantity of 81 pizzas (Figure 4-15). If price were greater than $6, quantity supplied would exceed quantity demanded, so suppliers would reduce their price to gain sales. If price were less than $6, quantity demanded would exceed quantity supplied, so suppliers could raise their price without losing sales. In both cases, the price would continue to adjust until it reached $6, the only price at which there's neither excess supply nor excess demand.



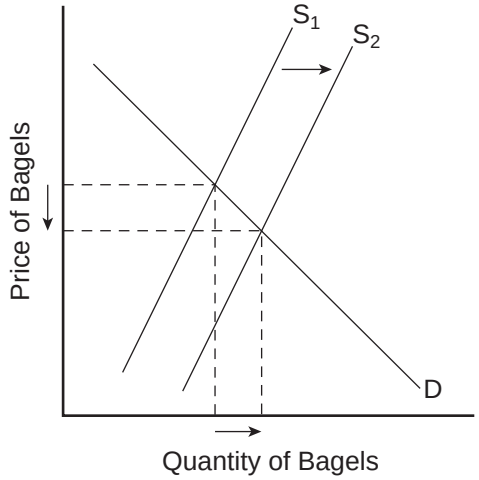
8. a. A technological breakthrough that reduces the cost of producing computer chips represents a decline in an input price for producing a computer. The result is a shift to the right in the supply of computers, as shown in Figure 4-16. The equilibrium price falls and the equilibrium quantity rises, as the figure shows.



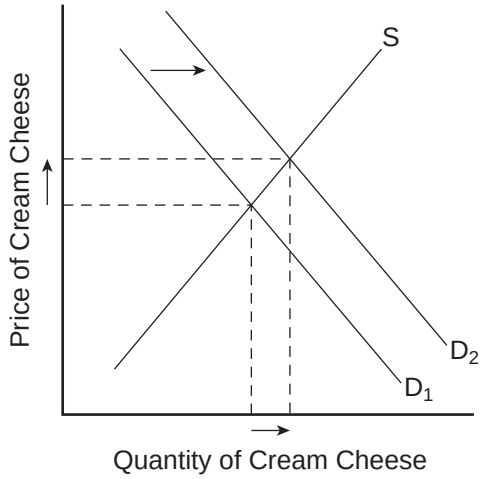
b. Since computer software is a complement to computers, the increased equilibrium quantity of computers increases the demand for software. As Figure 4-17 shows, the result is a rise in both the equilibrium price and quantity of software.



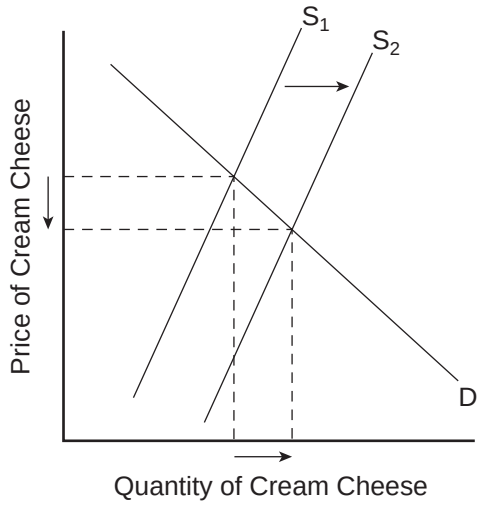
9. a. If the price of flour falls, since flour is an ingredient in bagels, the supply curve for bagels would shift to the right. The result, shown in Figure 4-18, would be a fall in the price of bagels and a rise in the equilibrium quantity of bagels.



Since cream cheese is a complement to bagels, the rise in quantity demanded of bagels increases the demand for cream cheese, as shown in Figure 4-19. The result is a rise in both the equilibrium price and quantity of cream cheese. So, a fall in the price of flour indeed raises both the equilibrium price of cream cheese and the equilibrium quantity of bagels.

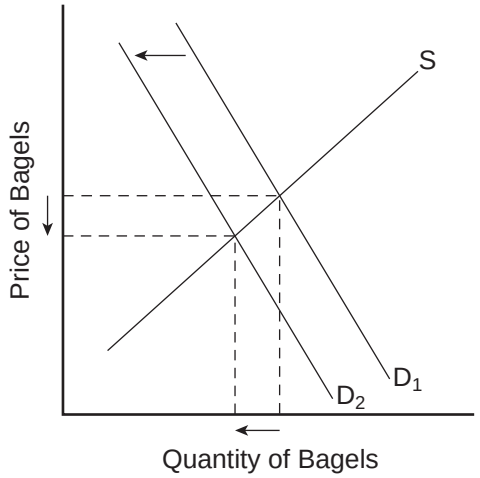


What happens if the price of milk falls? Since milk is an ingredient in cream cheese, the fall in the price of milk leads to an increase in the supply of cream cheese. This leads to a decrease in the price of cream cheese (Figure 4-20), rather than a rise in the price of cream cheese. So a fall in the price of milk couldn't have been responsible for the pattern observed.

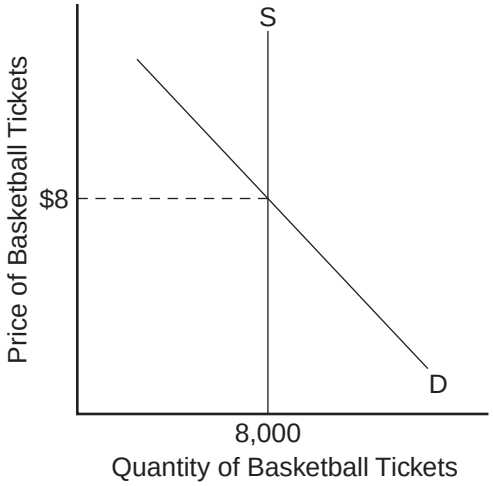


b. In part (a), we found that a fall in the price of flour led to a rise in the price of cream cheese and a rise in the equilibrium quantity of bagels. If the price of flour rose, the opposite would be true—a fall in the price of cream cheese and a fall in the equilibrium quantity of bagels. Since the question says the equilibrium price of cream cheese has risen, it couldn't have been caused by a rise in the price of flour.

What happens if the price of milk rises? From part (a), we found that a fall in the price of milk caused a decline in the price of cream cheese, so a rise in the price of milk would cause a rise in the price of cream cheese. Since bagels and cream cheese are complements, the rise in the price of cream cheese would reduce the demand for bagels, as Figure 4-21 shows. The result is a decline in the equilibrium quantity of bagels. So a rise in the price of milk does cause both a rise in the price of cream cheese and a decline in the equilibrium quantity of bagels.



10. a. As Figure 4-22 shows, the supply curve is vertical. The constant supply makes sense because the basketball arena has a fixed number of seats no matter what the price.



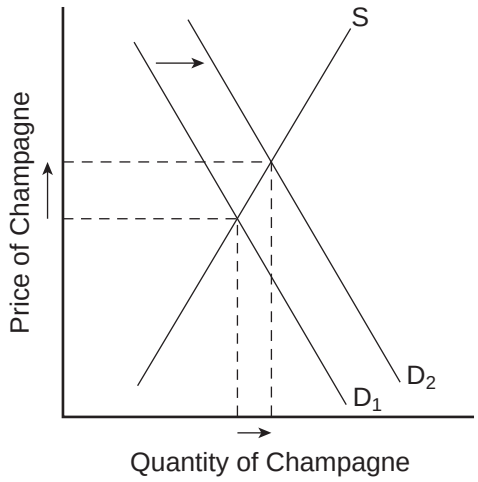
b. Quantity supplied equals quantity demanded at a price of $8. The equilibrium quantity is 8,000 tickets.

c.

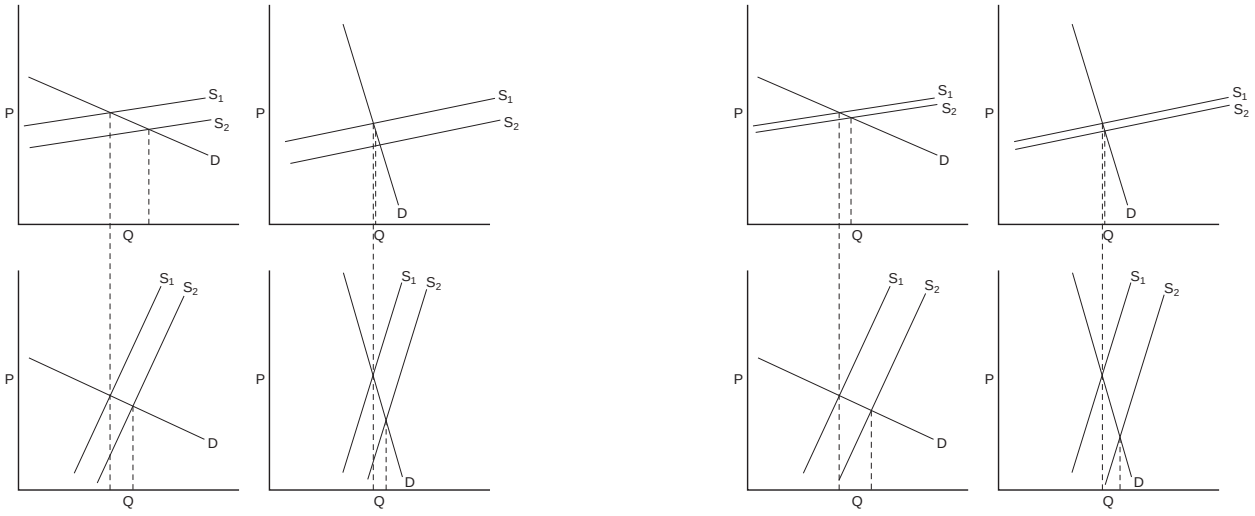
price	quantity demanded	quantity supplied
4	14,000	8,000
8	11,000	8,000
12	8,000	8,000
16	5,000	8,000
20	2,000	8,000

The new equilibrium price will be $12, which equates quantity demanded to quantity supplied. The equilibrium quantity is 8,000 tickets.

11. The executives are confusing changes in demand with changes in quantity demanded. Figure 4-23 shows the demand curve prior to the marketing campaign (D_1), and after the campaign (D_2). The marketing campaign increased the demand for champagne, as shown, leading to a higher equilibrium price and quantity. The influence of the higher price on demand is already reflected in the outcome. It's impossible for the scenario outlined by the executives to occur.



12. The statement "For a given increase in supply, the slopes of both the demand curve and the supply curve affect the change in equilibrium quantity" is true. This can be seen in Figure 4-24, in which four diagrams show how the steepness or flatness of demand and supply curves affects the change in equilibrium quantity. The steeper is the supply curve, the greater the change in quantity. The flatter the demand curve, the greater the change in quantity.



13. Setting quantity demanded equals quantity supplied gives 1,600 - 300 P = 1,400 + 700 P. Subtracting 1,400 from both sides of the equation and adding 300 P to both sides gives 200 = 1,000 P, or P = 1/5. Plugging this into either the demand or supply equation gives Q = 1,540.

14. A perfectly competitive market is one in which there are many buyers and many sellers so that each has a negligible impact on the market price. The example in the chapter, in which there were just two buyers and two sellers, is probably not very competitive. The market is an oligopoly, since there are just two sellers.

Chapter 5: Elasticity and Its Application

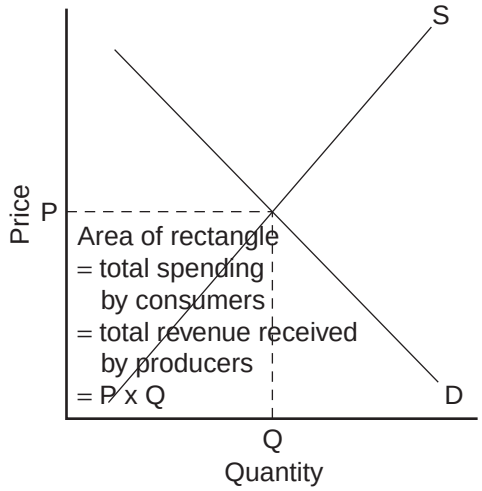
Questions for Review: Answers

1. The price elasticity of demand measures how much the quantity demanded responds to a change in price. The income elasticity of demand measures how much the quantity demanded changes as consumer income changes.

2. The determinants of the price elasticity of demand include whether the good is a necessity or a luxury, how available close substitutes are, how broadly defined the market is, and the time horizon. Luxury goods have greater price elasticity than necessities, goods with close substitutes have greater elasticity, goods in more narrowly defined markets have greater elasticity, and goods have greater elasticity the longer the time horizon.

3. Elasticity greater than one means demand is elastic. When the elasticity is greater than one, the percentage change in quantity demanded exceeds the percentage change in price. When the elasticity equals zero, demand is perfectly inelastic. There's no change in quantity demanded when there's a change in price.

4. Figure 5-1 presents a supply-and-demand diagram, showing total spending by consumers. It's equal to the total revenue received by producers, since consumers pay producers. Both total spending and total revenue are equal to the equilibrium price times the equilibrium quantity, which is the area of the rectangle shown in the figure.



5. If demand is elastic, an increase in price reduces total revenue. With elastic demand, the quantity demanded falls by a greater percentage than the percentage increase in price. As a result, total revenue declines.

6. A good with an income elasticity less than zero is called an inferior good.

7. The formula for the price elasticity of supply is the percentage change in quantity supplied divided by percentage change in price. It measures how much the quantity supplied responds to changes in the price.

8. The price elasticity of supply of Picasso paintings is zero, since no matter how high price rises, no more can ever be produced.

9. The price elasticity of supply is usually larger in the long run than it is in the short run. Over short periods of time, firms cannot easily change the size of their factories to make more or less of a good, so the quantity supplied is not very responsive to price. Over longer periods, firms can build new factories or close old ones, so the quantity supplied is more responsive to price.

10. OPEC was unable to maintain a high price through the 1980s because the elasticity of supply and demand were more elastic in the long run. When the price of oil rose, producers of oil outside of OPEC increased oil exploration and built new extraction capacity. Consumers responded with greater conservation efforts. As a result, supply increased and demand fell, leading to a lower price for oil in the long run.

Problems and Applications: Answers

1. a. Mystery novels have more elastic demand than required textbooks, because mystery novels have close substitutes and are a luxury good, while required textbooks are a necessity with no close substitutes. If the price of mystery novels were to rise, readers could substitute other types of novels, or buy fewer novels altogether. But if the price of required textbooks were to rise, students would have little choice but to pay the higher price. Thus the quantity demanded of required textbooks is less responsive to price than the quantity demanded of mystery novels.

   b. Beethoven recordings have more elastic demand than classical music recordings in general. Beethoven recordings are a narrower market than classical music recordings, so it's easy to find close substitutes for them. If the price of Beethoven recordings were to rise, people could substitute other classical recordings, like Mozart. But if the price of all classical recordings were to rise,

substitution would be more difficult (a transition from classical music to rap is unlikely!). Thus the quantity demanded of classical recordings is less responsive to price than the quantity demanded of Beethoven recordings.

c. Heating oil during the next five years has more elastic demand than heating oil during the next six months. Goods have a more elastic demand over longer time horizons. If the price of heating oil were to rise temporarily, consumers couldn't switch to other sources of fuel without great expense. But if the price of heating oil were to be high for a long time, people would gradually substitute to gas or electric heat. As a result, the quantity demanded of heating oil during the next six months is less responsive to price than the quantity demanded of heating oil during the next five years.

d. Root beer has more elastic demand than water. Root beer is a luxury with close substitutes, while water is a necessity with no close substitutes. If the price of water were to rise, consumers have little choice but to pay the higher price. But if the price of root beer were to rise, consumers could easily switch to other sodas. So the quantity demanded of root beer is more responsive to price than the quantity demanded of water.

2. a. For business travelers, the price elasticity of demand when the price of tickets rises from \$200 to \$250 is [(2,000 - 1,900)/2,000]/[(250 - 200)/200] = 1/5 (or [(2,000 - 1,900)/1,950]/[(250 - 200)/225] = 3/13 ≅ 0.23 by the midpoint method). For vacationers, the price elasticity of demand when the price of tickets rises from \$200 to \$250 is [(800 - 600)/800]/[(250 - 200)/200] = 1 (or [(800 - 600)/700] / [(250 - 200)/225] = 9/7 ≅ 1.29 by the midpoint method).

b. The price elasticity of demand for vacationers is higher than the elasticity for business travelers because vacationers can more easily choose a different mode of transportation (like driving or taking the train). Business travelers are less likely to do so since time is more important to them and their schedules are less adaptable.

3. a. Your price elasticity of demand as the price of compact discs rises from \$8 to \$10 and your income is \$10,000 is [(40 - 32)/40] / [(10 - 8)/8] = 4/5 = 0.8 (or [(40 - 32)/36] / [(10 - 8)/9] = 1 by the midpoint method). If your income is \$12,000, the elasticity is [(50 - 45)/50] / [(10 - 8)/8] = 2/5 = 0.4 (or [(50 - 45)/47.5] / [(10 - 8)/9] = 9/19 ≅ 0.47 by the midpoint method).

b. Your income elasticity of demand as your income increases from \$10,000 to \$12,000 and the price is \$12 is [(30 - 24)/24] / [(12,000 - 10,000)/10,000] =

5/4 = 1.25 (or [(30 - 24)/27] / [(12,000 - 10,000)/11,000] = 11/9 ≅ 1.22 by the midpoint method).

Your income elasticity of demand as your income increases from $10,000 to $12,000 and the price is $16 is [(12 - 8)/8] / [(12,000 - 10,000)/10,000] = 5/2 = 2.5 (or [(12 - 8)/10] / [(12,000 - 10,000)/11,000] = 11/5 = 2.2 by the midpoint method).

4. a. If Emily always spends one-third of her income on clothing, then her income elasticity of demand is one, since maintaining her clothing expenditures as a constant fraction of her income means the percentage change in her quantity of clothing must equal her percentage change in income. For example, suppose the price of clothing is $30, her income is $9,000, and she purchases 100 clothing items. If her income rose 10 percent to $9,900, she'd spend a total of $3,300 on clothing, which is 110 clothing items, a 10 percent increase.

   b. Emily's price elasticity of clothing demand is also one, since every percentage point increase in the price of clothing would lead her to reduce her quantity purchased by the same percentage. Again, suppose the price of clothing is $30, her income is $9,000, and she purchases 100 clothing items. If the price of clothing rose 1 percent to $30.30, she would purchase 99 clothing items, a 1 percent reduction. [Note: This part of the problem can be confusing to students if they have an example with a larger percentage change and they use the point elasticity. Only for a small percentage change will the answer work with an elasticity of one. Alternatively, they can get the second part if they use the midpoint method for any size change.]

   c. Since Emily spends a smaller proportion of her income on clothing, then for any given price, her quantity demanded will be lower. Thus her demand curve has shifted to the left. But because she'll again spend a constant fraction of her income on clothing, her income and price elasticities of demand remain one.

5. a. With a 4.3 percent decline in quantity following a 20 percent increase in price, the price elasticity of demand is only .215, which is fairly inelastic.

   b. With inelastic demand, the Transit Authority's revenue rises when the fare rises.

   c. The elasticity estimate might be unreliable because it's only the first month after the fare increase. As time goes by, people may switch to other means of transportation in response to the price increase. So the elasticity may be larger in the long run than it is in the short run.

6. Tom's price elasticity of demand is zero, since he wants the same quantity regardless of the price. Jerry's price elasticity of demand is one, since he spends the same amount on gas, no matter what the price, which means his percentage change in quantity is equal to the percentage change in price.

7. To explain the fact that spending on restaurant meals declines more during economic downturns than does spending on food to be eaten at home, economists look at the income elasticity of demand. In economic downturns, people have lower income. To explain the fact, all you'd need to explain it is that the income elasticity of restaurant meals be larger than the income elasticity of spending on food to be eaten at home.

8. a. With a price elasticity of demand of 0.4, reducing the quantity demanded of cigarettes by 20 percent requires a 50 percent increase in price, since 20/50 = 0.4. With the price of cigarettes currently $2, this would require an increase in the price to $3 a pack (or $3 1/3 using the midpoint method).

   b. The policy will have a larger effect five years from now than it does one year from now. The elasticity is likely to be larger in the long run, since it may take some time for people to reduce their cigarette usage. The habit of smoking is likely to be hard to break in the short run.

   c. Since teenagers don't have as much income as adults, they are likely to have a higher price elasticity of demand. Also, adults are more likely to be addicted to cigarettes, making it more difficult to reduce their quantity demanded in response to a higher price.

9. You'd expect the price elasticity of supply to be larger for vanilla ice cream than for all ice cream. A producer of vanilla ice cream could easily adjust the quantity of vanilla ice cream and produce other types of ice cream. But a producer of ice cream would have a more difficult time adjusting the overall quantity of ice cream.

10. a. Farmers whose crops weren't destroyed benefitted because the destruction of some of the crops reduced the supply, causing the equilibrium price to rise.

    b. To tell whether farmers as a group were hurt or helped by the floods, you'd need to know the price elasticity of demand. It could be that the additional income earned by farmers whose crops weren't destroyed rose more because of the higher prices than farmers whose crops were destroyed, if demand is inelastic.

11. A worldwide drought could increase the total revenue of farmers if the price elasticity of demand for grain is inelastic. The drought reduces the supply of grain, but if

demand is inelastic, the reduction of supply causes a large increase in price. Total farm revenue would rise as a result. If there's only a drought in Kansas, Kansas's production isn't a large enough proportion of the total farm product to have much impact on the price. As a result, price is about unchanged, while the output of Kansas farmers declines, thus reducing their income.

12. When productivity increases for all farmland at a point in time, the increased productivity leads to a rise in farmland prices, since more output can be produced on a given amount of land. But prior to the technological improvements, the productivity of farmland depended mainly on the prevailing weather conditions. There was little opportunity to substitute land with worse weather conditions for land with better weather conditions. As technology improved over time, it became much easier to substitute different types of land. So the price elasticity of demand for land increased over time. As a result, productivity and farmland prices are negatively related over time.

13. The rise in the tax rate wouldn't necessarily increase tax revenue, since if the demand for cars were elastic, the rise in the price of cars could be enough to reduce total spending on the cars. As a result, total tax revenue might have declined, instead of increasing.

Chapter 6: Supply, Demand, and Government Policies

Questions for Review: Answers

1. An example of a price ceiling is the rent control system in New York City. An example of a price floor is the minimum wage. Many other examples are possible.

2. A shortage of a good arises when there is a binding price ceiling. A surplus of a good arises when there is a binding price floor.

3. Economists usually oppose controls on prices because prices have the crucial job of coordinating economic activity by balancing demand and supply. When policymakers set controls on prices, they obscure the signals that guide the allocation of society's resources. Further, price controls often hurt those they are trying to help.

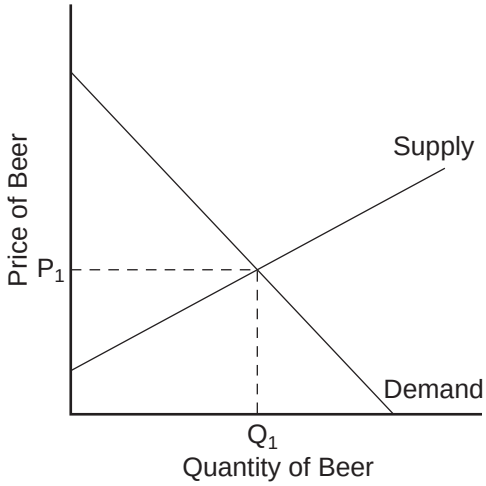
4. A tax paid by buyers shifts the demand curve, while a tax paid by sellers shifts the supply curve. However, the outcome is the same regardless of who pays the tax.

5. A tax on a good raises the price buyers pay, lowers the price sellers receive, and reduces the quantity sold.

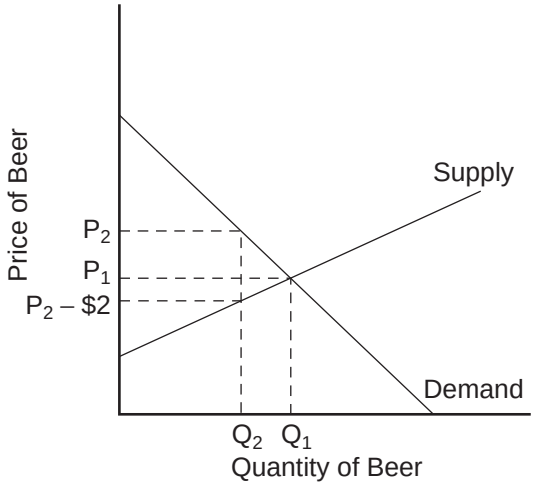
6. The burden of a tax is divided between buyers and sellers depending on the elasticity of demand and supply. Elasticity represents the willingness of buyers or sellers to leave the market, which in turns depends on their alternatives. When a good is taxed, the side of the market with fewer good alternatives cannot easily leave the market and thus bears more of the burden of the tax.

Problems and Applications: Answers

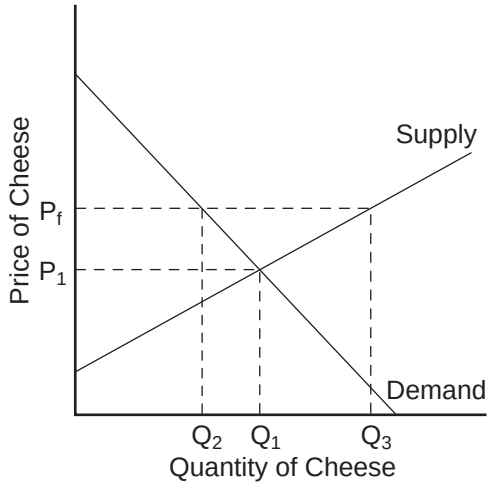
1. a. Figure 6-1 shows the market for beer without the tax. The equilibrium price is P_1 and the equilibrium quantity is Q_1. The price paid by consumers is the same as the price received by producers.



b. When the tax is imposed, it drives a wedge of \$2 between supply and demand, as shown in Figure 6-2. The price paid by consumers is P_2, while the price received by producers is P_2 - \$2. The quantity of beer sold declines to Q_2.



2. a. The imposition of a binding price floor in the cheese market is shown in Figure 6-3. In the absence of the price floor, the price would be P_1 and the quantity would be Q_1. With the floor set at P_f, which is greater than P_1, the quantity demanded is Q_2, while quantity supplied is Q_3, so there is a surplus of cheese in the amount Q_3 - Q_2.



b. The farmers' complaint that their total revenue has declined is correct if demand is elastic. With elastic demand, the percentage decline in quantity would exceed the percentage rise in price, so total revenue would decline.

c. If the government purchases all the surplus cheese at the price floor, producers benefit and taxpayers lose. Producers could then produce a quantity Q_3 of cheese, gaining substantial producer surplus. But consumers would buy only the quantity Q_2 of cheese, so they are in the same position as before. Taxpayers lose because they would be financing the purchase of the surplus cheese. Society as a whole loses in the sense that total surplus in the cheese market isn't being maximized.

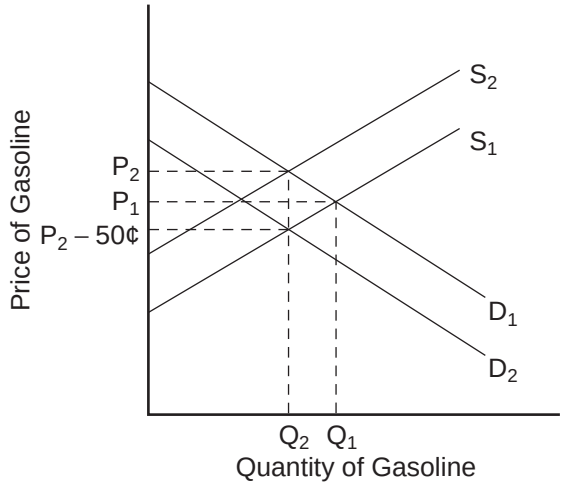
3. If the government imposes a $500 tax on luxury cars, the price paid by consumers will rise less than $500, in general. The burden of any tax is shared by both producers and consumers--the price paid by consumers rises and the price received by producers falls, with the difference between the two equal to the amount of the tax. The only exception would be if the supply curve were perfectly elastic, in which case consumers would bear the full burden of the tax and the price paid by consumers would rise by exactly $500.

4. a. The equilibrium price of frisbees is $8 and the equilibrium quantity is 6 million frisbees.

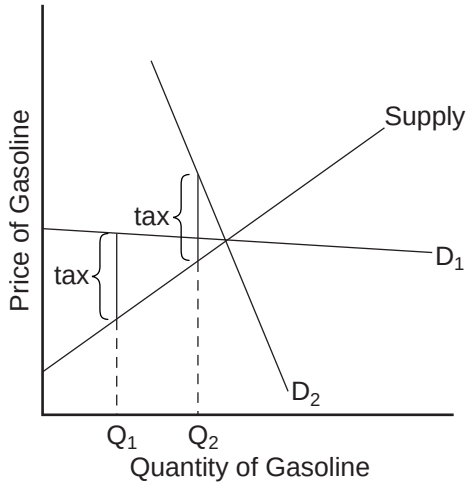
b. With a price floor of $10, the new market price is $10 since the price floor is binding. At that price, only 2 million frisbees are sold, since that's the quantity demanded.

c. If there's a price ceiling of $9, it has no effect, since the market equilibrium price is $8, below the ceiling. So the equilibrium price is $8 and the equilibrium quantity is 6 million frisbees.

5. a. It doesn't matter whether the tax is imposed on producers or consumers--the effect will be the same. With no tax, as shown in Figure 6-4, the demand curve is D_1 and the supply curve is S_1. If the tax is imposed on producers, the supply curve shifts up by the amount of the tax (50 cents) to S_2. Then the equilibrium quantity is Q_2, the price paid by consumers is P_2, and the price received (after taxes are paid) by producers is P_2 - 50 cents. If the tax is instead imposed on consumers, the demand curve shifts down by the amount of the tax (50 cents) to D_2. The downward shift in the demand curve (when the tax is imposed on consumers) is exactly the same magnitude as the upward shift in the supply curve when the tax is imposed on producers. So again, the equilibrium quantity is Q_2, the price paid by consumers is P_2 (including the tax paid to the government), and the price received by producers is P_2 - 50 cents.



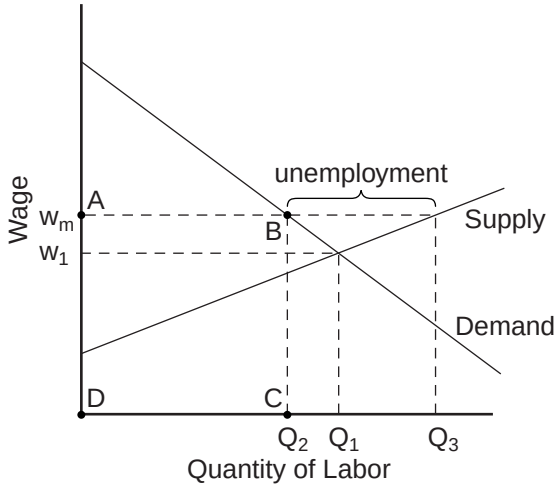
b. The more elastic is the demand curve, the more effective this tax will be in reducing the quantity of gasoline consumed. Greater elasticity of demand means that quantity falls more in response to the rise in the price of gasoline. Figure 6-5 illustrates this result. Demand curve D_1 represents an elastic demand curve, while demand curve D_2 is more inelastic. To get the same tax wedge between demand and supply requires a greater reduction in quantity with demand curve D_1 than for demand curve D_2.



c. The consumers of gasoline are hurt by the tax because they get less gasoline at a higher price.

d. Workers in the oil industry are hurt by the tax as well. With a lower quantity of gasoline being produced, some workers may lose their jobs. With a lower price received by producers, wages of workers might decline.

6. a. Figure 6-6 shows the effects of the minimum wage. In the absence of the minimum wage, the market wage would be w_1 and Q_1 workers would be employed. With the minimum wage (w_m) imposed above w_1, the market wage is w_m, the number of employed workers is Q_2, and the number of workers who are unemployed is $Q_3 - Q_2$. Total wage payments to workers are shown as the area of rectangle ABCD, which equals w_m times Q_2.

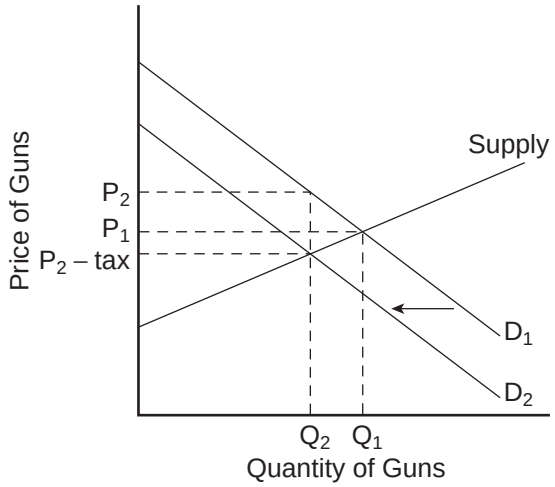


b. An increase in the minimum wage would decrease employment. The size of the effect on employment depends only on the elasticity of demand. The elasticity of supply doesn't matter, because there's a surplus of labor.

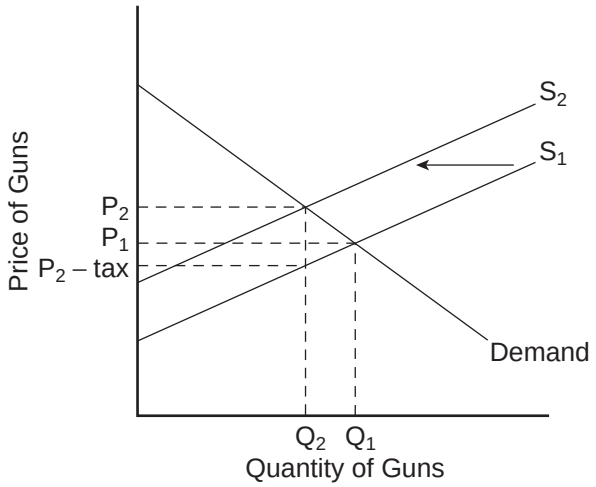
c. The increase in the minimum wage would increase unemployment. The size of the rise in unemployment depends on both the elasticities of supply and demand. The elasticity of demand determines the demand for labor, the elasticity of supply determines the supply of labor, and the difference between the supply and demand for labor is the amount of unemployment.

d. If the demand for unskilled labor were inelastic, the rise in the minimum wage would increase total wage payments to unskilled labor. With inelastic demand, the percentage decline in employment would be less than the percentage increase in the wage, so total wage payments increase. However, if the demand for unskilled labor were elastic, total wage payments would decline, since then the percentage decline in employment would exceed the percentage increase in the wage.

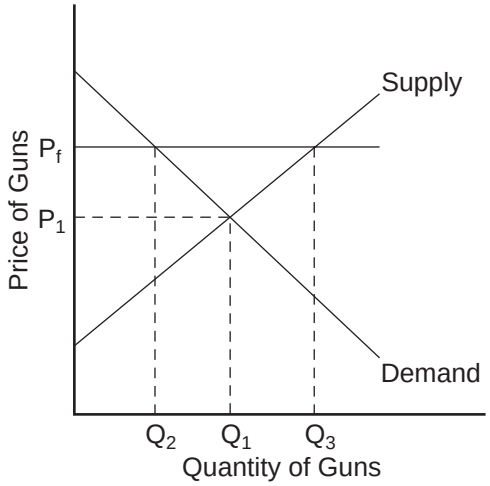
7. a. Figure 6-7 shows the effect of a tax on gun buyers. The tax reduces the demand for guns from D_1 to D_2. The result is a rise in the price buyers pay for guns from P_1 to P_2, and a decline in the quantity of guns from Q_1 to Q_2.



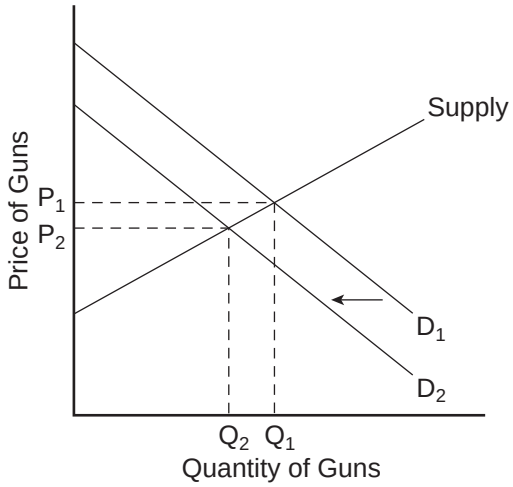
b. Figure 6-8 shows the effect of a tax on gun sellers. The tax reduces the supply of guns from S_1 to S_2. The result is a rise in the price buyers pay for guns from P_1 to P_2, and a decline in the quantity of guns from Q_1 to Q_2.



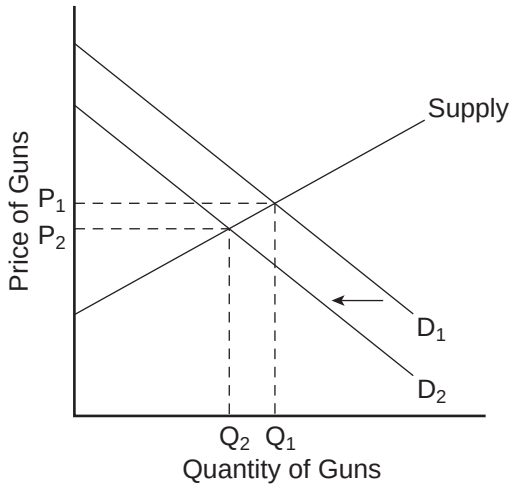
c. Figure 6-9 shows the effect of a binding price floor on guns. The increase in price from P_1 to P_f leads to a decline in the quantity of guns from Q_1 to Q_2. There is excess supply in the market for guns, since the quantity supplied (Q_3) exceeds the quantity demanded (Q_2) at the price P_f.



d. Figure 6-10 shows the effect of a tax on ammunition. The tax on ammunition reduces the demand for guns from D_1 to D_2, because ammunition and guns are complements. The result is a decline in the price of guns from P_1 to P_2, and a decline in the quantity of guns from Q_1 to Q_2.



8. a. Programs aimed at making the public aware of the dangers of smoking reduce the demand for cigarettes, shown in Figure 6-11 as a shift from demand curve D_1 to D_2. The price support program increases the price of tobacco, which is the main ingredient in cigarettes. As a result, the supply of cigarettes shifts to the left, from S_1 to S_2. The effect of both programs is to reduce the quantity of cigarette consumption from Q_1 to Q_2.



b. The combined effect of the two programs on the price of cigarettes is ambiguous. The education campaign reduces demand for cigarettes, which tends to reduce the price. The tobacco price supports raise the cost of production of cigarettes, which tends to increase the price.

c. The taxation of cigarettes further reduces cigarette consumption, since it increases the price to consumers. As shown in the figure, the quantity falls to Q_3.

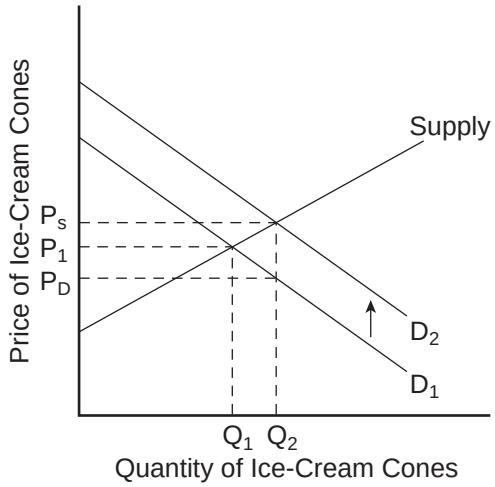
9. a. Equating quantity demanded to quantity supplied gives 20,000 - 90 P = 10,000 + 110 P. Subtracting 10,000 and adding 90 P to both sides of the equation gives 10,000 = 200 P. Dividing both sides of the equation by 200 gives P = 50. Plugging this result into the supply equation gives Q = 10,000 + (110 x 50) = 15,500. So the equilibrium price is $50 and the equilibrium quantity is 15,500.

b. With a price ceiling of $40 per ticket, quantity demanded is 20,000 - (90 x 40) = 16,400. Quantity supplied is 10,000 + (110 x 40) = 14,400. There's a shortage in the market of 2,000 tickets. The policy decreases the number of people who attend classical music concerts, since supply is lower because of the lower price.

10. First, let's see what the equilibrium price and quantity are before the tax is imposed. Equating quantity demanded and quantity supplied gives 20 - 2 P = P - 1. Adding 1 + 2 P to both sides of the equation gives 21 = 3 P. Dividing through both sides by 3 gives P = 7. At a price of $7, equilibrium quantity can be found in either the supply or demand equation: Q = 20 - (2 x 7) = 6.

When the tax is imposed, suppliers get a price that's $3 less than buyers pay. Let P be the price received by suppliers. Then P + 3 is the price paid by buyers. Now equating the quantity demanded to the quantity supplied gives 20 - 2(P + 3) = P - 1, which can be expanded to 20 - 2P - 6 = P - 1. Adding 1 + 2 P to both sides of the equation gives 15 = 3 P. Dividing through both sides by 3 gives P = 5. At a price of $5, equilibrium quantity can be found in either the supply or demand equation: Q = 20 - [2 x (5+3)] = 4. Suppliers receive $5 per pizza, while buyers pay $8, an increase in price of $1.

11. a. The effect of a 50 cent per cone subsidy is to shift the demand curve up by 50 cents at each quantity, since at each quantity a consumer's willingness to pay is 50 cents higher. The effects of such a subsidy are shown in Figure 6-12. Before the subsidy, the price is P_1. After the subsidy, the price received by sellers is P_S and the effective price paid by consumers is P_D, which equals P_S minus 50 cents. Before the subsidy, the quantity of cones sold is Q_1; after the subsidy the quantity is Q_2.



b. Because of the subsidy, consumers are better off, since they consume more at a lower price. Producers are also better off, since they sell more at a higher price. The government loses, since it has to pay for the subsidy.

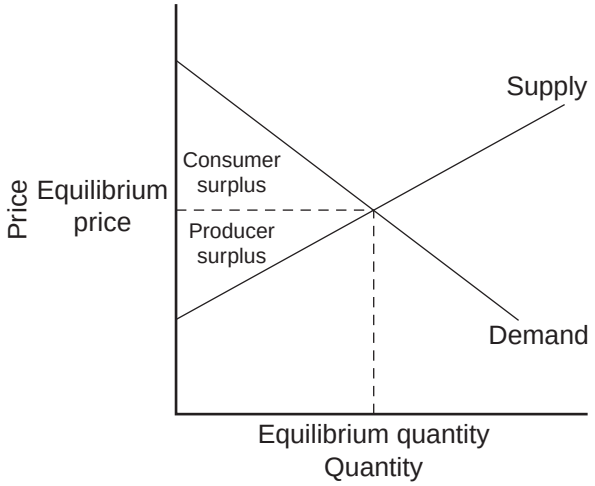
Chapter 7: Consumers, Producers, and the Efficiency of Markets

Questions for Review: Answers

1. Buyers' willingness to pay, consumer surplus, and the demand curve are all closely related. The height of the demand curve represents the willingness to pay of the buyers. Consumer surplus is the area below the demand curve and above the price, which equals each buyer's willingness to pay less the price of the good.

2. Sellers' costs, producer surplus, and the supply curve are all closely related. The height of the supply curve represents the costs of the sellers. Producer surplus is the area below the price and above the supply curve, which equals the price minus each sellers' costs.

3. Figure 7-1 shows producer and consumer surplus in a supply-and-demand diagram.



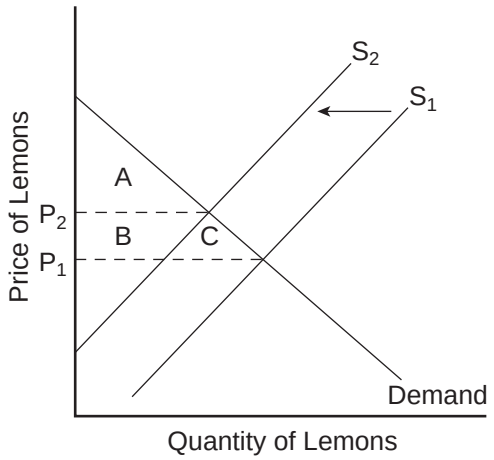
4. An allocation of resources is efficient if it maximizes total surplus, the sum of consumer surplus and producer surplus. But efficiency may not be the only goal of economic policymakers; they may also be concerned about equity--the fairness of the distribution of well-being.

5. The invisible hand of the marketplace guides the self-interest of buyers and sellers into promoting general economic well-being. Despite decentralized decision making and self-interested decision makers, free markets lead to an efficient outcome.

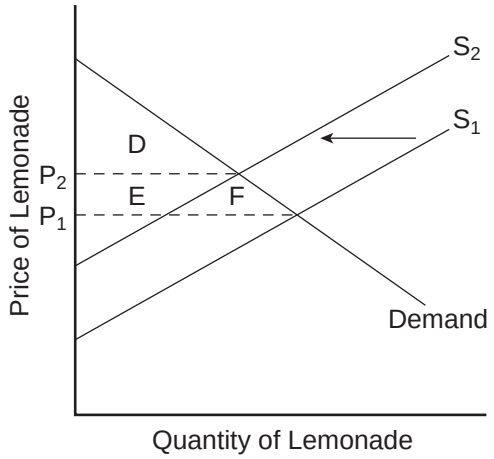
6. Two types of market failure are market power and externalities. Market power may cause market outcomes to be inefficient because when firms influence prices they cause price and quantity to differ from the levels they'd be under perfect competition, which keeps total surplus from being maximized. Externalities are side effects that aren't taken into account by buyers and sellers. As a result, the free market doesn't maximize total surplus.

Problems and Applications: Answers

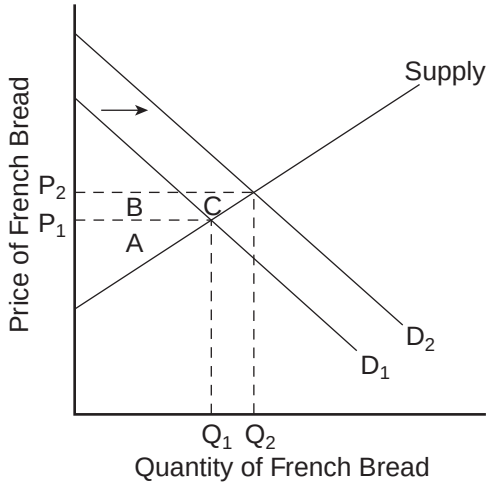
1. If an early freeze in California sours the lemon crop, the supply curve for lemons shifts to the left, as shown in Figure 7-2. The result is a rise in the price of lemons and a decline in consumer surplus from A + B + C to just A. So consumer surplus declines by the amount B + C.



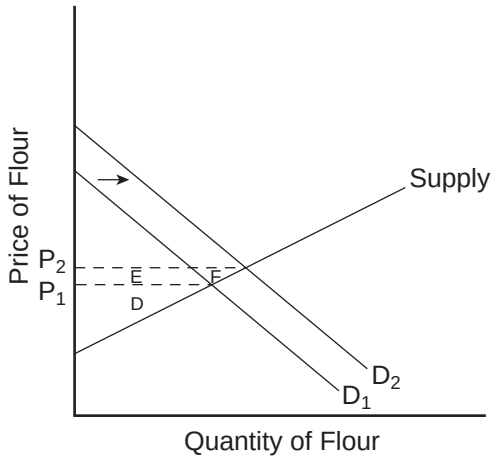
In the market for lemonade, the higher cost of lemons reduces the supply of lemonade, as shown in Figure 7-3. The result is a rise in the price of lemonade and a decline in consumer surplus from D + E + F to just D, a loss of E + F. Note that an event that affects consumer surplus in one market often has effects on consumer surplus in other markets.



2. A rise in the demand for French bread leads to an increase in producer surplus in the market for French bread, as shown in Figure 7-4. The shift of the demand curve leads to an increased price, which increases producer surplus from area A to area A + B + C.



The increased quantity of French bread being sold increases the demand for flour, as shown in Figure 7-5. As a result, the price of flour rises, increasing producer surplus from area D to D + E + F. Note that an event that affects producer surplus in one market leads to effects on producer surplus in related markets.

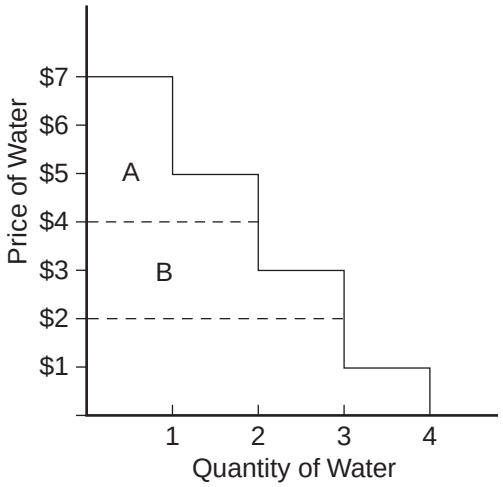


3. a. Bert's demand schedule is:

Price	Quantity demanded
More than $7	0
$5 to $7	1
$3 to $5	2
$1 to $3	3
$1 or less	4

Bert's demand curve is shown in Figure 7-6.

b. When the price of a bottle of water is $4, Bert buys two bottles of water. His consumer surplus is shown as area A in the figure. He values his first bottle of water at $7, but pays only $4 for it, so has consumer surplus of $3. He values his second bottle of water at $5, but pays only $4 for it, so has consumer surplus of $1. Thus Bert's total consumer surplus is $3 + $1 = $4, which is the area of A in the figure.

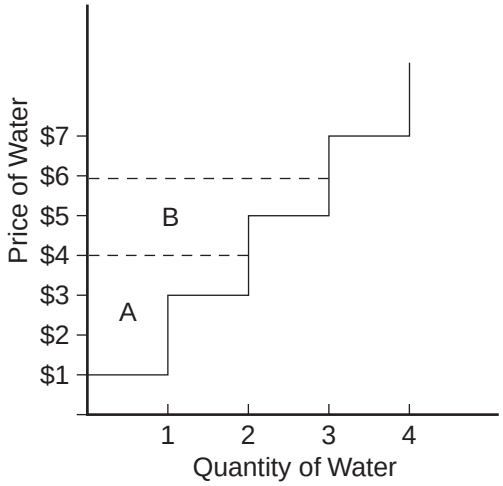


c. When the price of a bottle of water falls from $4 to $2, Bert buys three bottles of water, an increase of one. His consumer surplus consists of both areas A and B in the figure, an increase in the amount of area B. He gets consumer surplus of $5 from the first bottle ($7 value minus $2 price), $3 from the second bottle ($5 value minus $2 price), and $1 from the third bottle ($3 value minus $2 price), for a total consumer surplus of $9. Thus consumer surplus rises by $5 (which is the size of area B) when the price of a bottle of water falls from $4 to $2.

4. a. Ernie's supply schedule for water is:

Price	Quantity supplied
More than $7	4
$5 to $7	3
$3 to $5	2
$1 to $3	1
$1 or less	0

Ernie's supply curve is shown in Figure 7-7.



b. When the price of a bottle of water is $4, Ernie sells two bottles of water. His producer surplus is shown as area A in the figure. He receives $4 for his first bottle of water, but it costs only $1 to produce, so Ernie has producer surplus of $3. He also receives $4 for his second bottle of water, which costs $3 to produce, so he has producer surplus of $1. Thus Ernie's total producer surplus is $3 + $1 = $4, which is the area of A in the figure.

c. When the price of a bottle of water rises from $4 to $6, Ernie sells three bottles of water, an increase of one. His producer surplus consists of both areas A and B in the figure, an increase by the amount of area B. He gets producer surplus of $5 from the first bottle ($6 price minus $1 cost), $3 from the second bottle ($6 price minus $3 cost), and $1 from the third bottle ($6 price minus $5 price), for a total producer surplus of $9. Thus producer surplus rises by $5 (which is the size of area B) when the price of a bottle of water rises from $4 to $6.

5. a. From Ernie's supply schedule and Bert's demand schedule, the quantity demanded and supplied are:

Price	Quantity supplied	Quantity demanded
$2	1	3
$4	2	2
$6	3	1

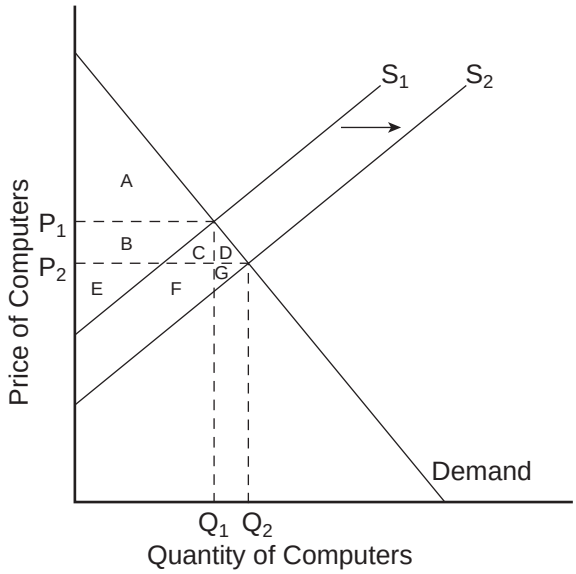
Only a price of $4 brings supply and demand into equilibrium, with an equilibrium quantity of 2.

b. At a price of $4, consumer surplus is $4 and producer surplus is $4, as shown in problems 3 and 4. Total surplus is $4 + $4 = $8.

c. If Ernie produced one fewer bottle, his producer surplus would decline to $3, as shown in problem 4. If Bert consumed one fewer bottle, his consumer surplus would decline to $3, as shown in problem 3. So total surplus would decline to $3 + $3 = $6.

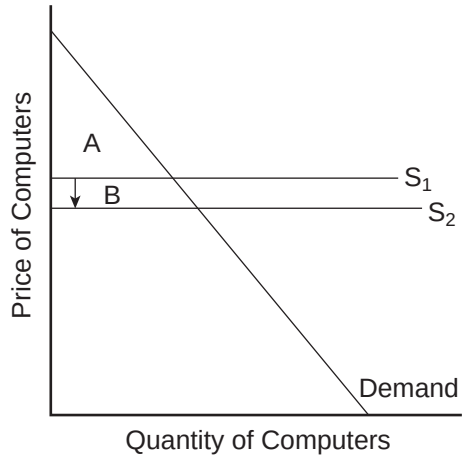
d. If Ernie produced one additional bottle of water, his cost would be $5, but the price is only $4, so his producer surplus would decline by $1. If Bert consumed one additional bottle of water, his value would be $3, but the price is $4, so his consumer surplus would decline by $1. So total surplus declines by $1 + $1 = $2.

6. a. The effect of falling production costs in the market for computers results in a shift to the right in the supply curve, as shown in Figure 7-8. As a result, the equilibrium price of computers declines and the equilibrium quantity increases.

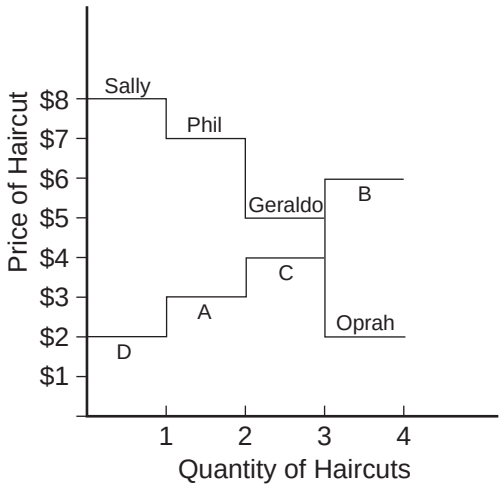


b. The decline in the price of computers increases consumer surplus from area A to A + B + C + D, an increase in the amount B + C + D. Prior to the shift in supply, producer surplus was areas B + E (the area above the supply curve and below the price). After the shift in supply, producer surplus is areas E + F + G. So producer surplus changes by the amount F + G - B, which may be positive or negative. The increase in quantity increases producer surplus, while the decline in the price reduces producer surplus. Since consumer surplus rises by B + C + D and producer surplus rises by F + G - B, total surplus rises by C + D + F + G.

c. If the supply of computers is very elastic, then the shift of the supply curve benefits consumers most. To take the most dramatic case, suppose the supply curve were horizontal, as shown in Figure 7-9. Then there is no producer surplus at all. Consumers capture all the benefits of falling production costs, with consumer surplus rising from area A to area A + B.

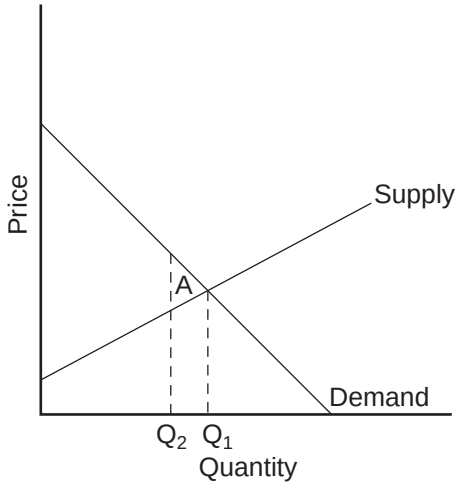


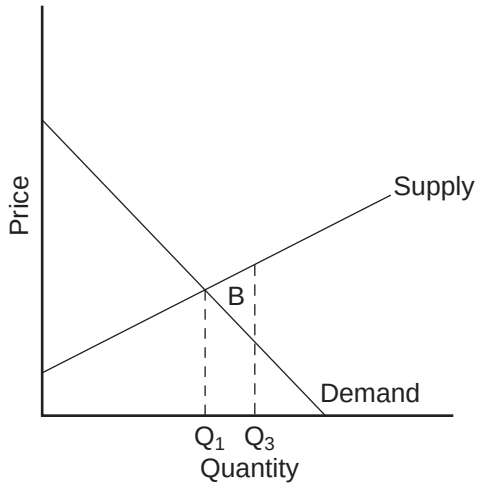
7. a. Figure 7-10 shows supply and demand curves for haircuts. Supply equals demand at a quantity of three haircuts and a price between $4 and $5. Firms A, C, and D should cut the hair of Sally, Phil, and Geraldo. Oprah's willingness to pay is too low and firm B's costs are too high, so they do not participate. The maximum total surplus is the area between the demand and supply curves, which totals $11 ($8 value minus $2 cost for the first haircut, plus $7 value minus $3 cost for the second, plus $5 value minus $4 cost for the third).



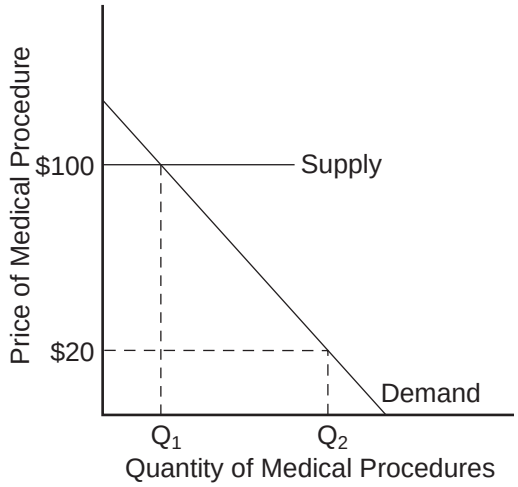
b. It's good that firms A, C, and D are cutting hair, since they are the lowest cost producers. But Sally Jessie values a haircut at $8, while Oprah values it at only $2. So total surplus could be increased by $6 if Sally Jessie had her hair cut instead of Oprah.

8. In Figure 7-11, the initial equilibrium is shown where supply equals demand at quantity Q_1. Total surplus is the area between the supply and demand curves to the left of Q_1. If the planner reduced production of the good to Q_2, total surplus would decline by the area A in the figure, because purchasers have a higher willingness to pay for such output than the cost of producing it. Similarly, as shown in Figure 7-12, if the planner increased production of the good to Q_3, total surplus would decline by the area B, because the cost of producing that additional output exceeds the willingness to pay of purchasers.





9. a. Figure 7-13 illustrates the demand for medical care. If each procedure has a price of \$100, quantity demanded will be Q_1 procedures.

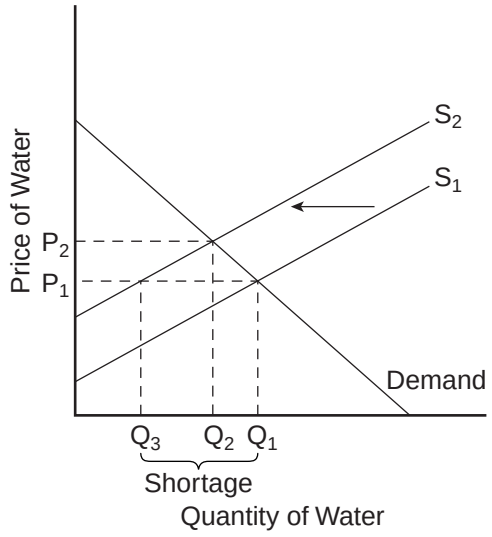


b. If consumers pay only \$20 per procedure, the quantity demanded will be Q_2 procedures. Since the cost to society is \$100, the number of procedures performed is too large to maximize total surplus. The quantity that maximizes total surplus is Q_1 procedures, which is less than Q_2.

c. The use of medical care is excessive in the sense that consumers get procedures whose value is less than the cost of producing them.

d. To prevent this excessive use, the consumer must bear the marginal cost of the procedure. But this would require eliminating insurance. Another possibility would be that the insurance company, which pays most of the marginal cost of the procedure ($80, in this case) could decide whether the procedure should be performed. But the insurance company doesn't get the benefits of the procedure, so its decisions may not reflect the value to the consumer.

10. a. Figure 7-14 illustrates the effect of the drought. The supply curve shifts to the left, leading to a rise in the equilibrium price from P_1 to P_2 and a decline in the equilibrium quantity from Q_1 to Q_2.



b. If the price of water is not allowed to change, there will be an excess demand for water, with the shortage shown on the figure as the difference between Q_1 and Q_3.

c. The system for allocating water is inefficient because it no longer allocates water to those who value it most highly. Some people who value water at more than its cost of production will be unable to obtain it, so society's total surplus isn't maximized.

The allocation system seems unfair as well. Water is allocated simply on past usage, rewarding past wastefulness. If a family's demand for water increases, say because of an increase in family size, the policy doesn't allow them to

obtain more water. Poor families, who probably used water mostly for necessary uses like drinking, would suffer more than wealthier families who would have to cut back only on luxury uses of water like operating backyard fountains and pools. However, the policy also keeps the price of water lower, which benefits poor families, since otherwise more of their family budget would have to go for water.

d. If the city allowed the price of water to rise to its equilibrium price P_2, the allocation would be more efficient. Quantity supplied would equal quantity demanded and there would be no shortage. Total surplus would be maximized.

Whether the market allocation would be more or less fair than the proportionate reduction in water under the old policy is difficult to say, but it is likely to be more fair. Notice that the quantity supplied would be higher (Q_2) in this case than under the water restrictions (Q_3), so there's less reduction in water usage. To make the market solution even more fair, the government could provide increased tax relief or welfare payments for poor families who suffer from paying the higher water prices.

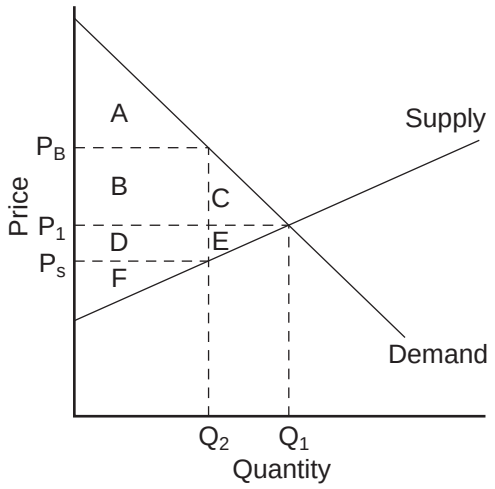
11. The key assumption that justifies economists' use of consumer surplus as a measure of economic well-being is that the demand curve represents the benefits buyers receive from a good. Since advertising can increase the demand for a product by changing people's perceptions of the benefits of a good, then the demand curve evidently doesn't represent the benefits buyers receive from a good. So consumer surplus may not be a good measure of economic well-being, since it is subject to manipulation by advertising.

Chapter 8: Application: The Costs of Taxation

Questions for Review: Answers

1. When the sale of a good is taxed, both consumer surplus and producer surplus decline. The decline in consumer surplus and producer surplus exceeds the amount of government revenue that's raised, so society's total surplus declines. The tax distorts the incentives of both buyers and sellers, so resources are allocated inefficiently.

2. Figure 8-1 illustrates the deadweight loss and tax revenue from a tax on the sale of a good. Without a tax, the equilibrium quantity would be Q_1, the equilibrium price would be P_1, consumer surplus would be A+B+C, and producer surplus would be D+E+F. The imposition of a tax places a wedge between the price buyers pay, P_B, and the price sellers receive, P_S, where $P_B = P_S$ + tax. The equilibrium quantity declines to Q_2. Now consumer surplus is A, producer surplus is F, and government revenue is B+D. The deadweight loss of the tax is C+E, since that area is lost because of the decline in quantity from Q_1 to Q_2.

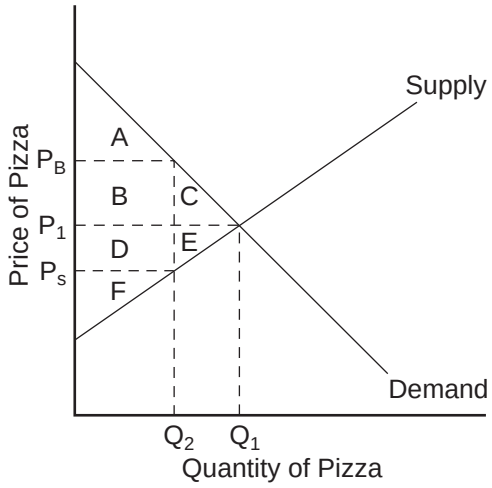


3. The greater the elasticities of demand and supply, the greater the deadweight loss of a tax. Since elasticity measures the response of quantity to a change in price, higher elasticity means the tax induces a greater reduction in quantity, hence a greater distortion to the market.

4. The deadweight loss of a tax rises more than proportionally as the tax rises. Tax revenue, however, may increase initially as the tax rises, but as the tax rises further, revenue rises less than proportionally and eventually declines.

Problems and Applications: Answers

1. a. Figure 8-2 illustrates the market for pizza. The equilibrium price is P_1, the equilibrium quantity is Q_1, consumer surplus is area A+B+C, and producer surplus is area D+E+F. There is no deadweight loss, as all the potential gains from trade are realized; total surplus is the entire area between the demand and supply curves--A+B+C+D+E+F.



b. With a $1 tax on each pizza sold, the price paid by buyers, P_B, is now higher than the price received by sellers, P_S, where $P_B = P_S + \$1$. The quantity declines to Q_2, consumer surplus is area A, producer surplus is area F, government revenue is area B+D, and deadweight loss is area C+E. Consumer surplus declines by B+C, producer surplus declines by D+E, government revenue increases by B+D, and deadweight loss increases by C+E.

c. If the tax were removed and consumers and producers voluntarily transferred B+D to the government to make up for the lost tax revenue, then everyone would be better off than without the tax. The equilibrium quantity would be Q_1, as in the case without the tax, and the equilibrium price would be P_1. Consumer surplus would be A+C, because consumers get surplus of A+B+C, then voluntarily transfer B to the government. Producer surplus would be D+F, since producers get surplus of D+E+F, then voluntarily transfer D to the

government. Both consumers and producers are better off than the case when the tax was imposed. If consumers and producers gave a little bit more than B+D to the government, then all three parties, including the government, would be better off. This illustrates the inefficiency of taxation.

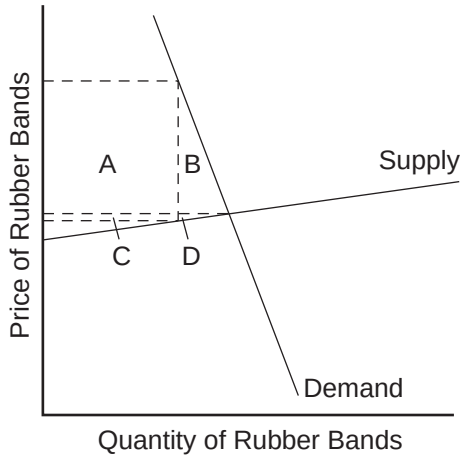
2. a. The statement, "If the government taxes land, wealthy landowners will pass the tax on to their poorer renters," is incorrect. With a tax on land, landowners can not pass the tax on. Since the supply curve of land is perfectly inelastic, landowners bear the entire burden of the tax. Renters won't be affected at all.

   b. The statement, "If the government taxes apartment buildings, wealthy landowners will pass the tax on to their poorer renters," is correct. With a tax on apartment buildings, landowners can more easily pass the tax on, though the extent to which they do this depends on the elasticities of supply and demand. In this case, the tax is a direct addition to the cost of rental units, so the supply curve will shift up by the amount of the tax. The tax will be shared by renters and landowners, depending on the elasticities of demand and supply.

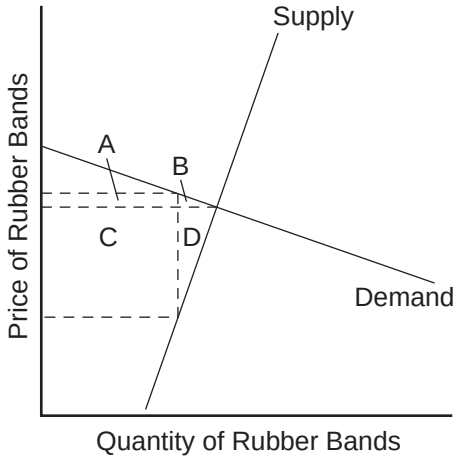
3. a. The statement, "A tax that has no deadweight loss cannot raise any revenue for the government," is incorrect. An example is the case of a tax when either supply or demand is perfectly inelastic. The tax has neither an effect on quantity nor any deadweight loss, but it does raise revenue.

   b. The statement, "A tax that raises no revenue for the government cannot have any deadweight loss," is incorrect. An example is the case of a 100 percent tax imposed on sellers. With a 100 percent tax on their sales of the good, sellers won't supply any of the good, so the tax will raise no revenue. Yet the tax has a large deadweight loss, since it reduces the quantity sold to zero.

4. a. With very elastic supply and very inelastic demand, the burden of the tax on rubber bands will be borne largely by buyers. As Figure 8-3 shows, consumer surplus declines considerably, by area A+B, but producer surplus doesn't fall much at all, just by area C+D.



b. With very inelastic supply and very elastic demand, the burden of the tax on rubber bands will be borne largely by sellers. As Figure 8-4 shows, consumer surplus doesn't decline much, just by area A+B, while producer surplus falls substantially, by area C+D.



5. a. The deadweight loss from a tax on heating oil is likely to be greater in the fifth year after it is imposed rather than the first year. In the first year, the elasticity of demand is fairly low, as people who own oil heaters aren't likely to get rid of them right away. But over time they may switch to other energy sources and people buying new heaters for their homes will more likely choose gas or electric, so the tax will have a greater impact on quantity.

b. The tax revenue is likely to be higher in the first year after it is imposed than in the fifth year. In the first year, demand is more inelastic, so the quantity doesn't decline as much and tax revenue is relatively high. As time passes and more people substitute away from oil, the equilibrium quantity declines, as does tax revenue.

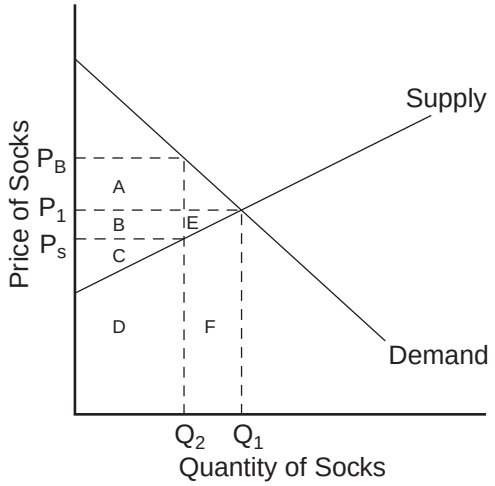
6. Since the demand for food is inelastic, a tax on food is a good way to raise revenue because it doesn't lead to much of a deadweight loss; thus taxing food is less inefficient than taxing other things. But it isn't a good way to raise revenue from an equity point of view, since poorer people spend a higher proportion of their income on food, so the tax would hit them harder than it would hit wealthier people.

7. a. This tax has such a high rate that it isn't likely to raise much revenue. Because of the high tax rate, the equilibrium quantity in the market is likely to be at or near zero.

b. Senator Moynihan's goal was probably to ban the use of hollow-tipped bullets. In this case, a tax is as effective as an outright ban.

8. a. Figure 8-5 illustrates the market for socks and the effects of the tax. Without a tax, the equilibrium quantity would be Q_1, the equilibrium price would be P_1, total spending by consumers equals total revenue for producers, which is P_1 x Q_1, which equals area B+C+D+E+F, and government revenue is zero. The imposition of a tax places a wedge between the price buyers pay, P_B, and the price sellers receive, P_S, where $P_B = P_S$ + tax. The equilibrium quantity declines to Q_2. Now total spending by consumers is P_B x Q_2, which equals area A+B+C+D, total revenue for producers is P_S x Q_2, which is area C+D, and government tax revenue is Q_2 x tax, which is area A+B.

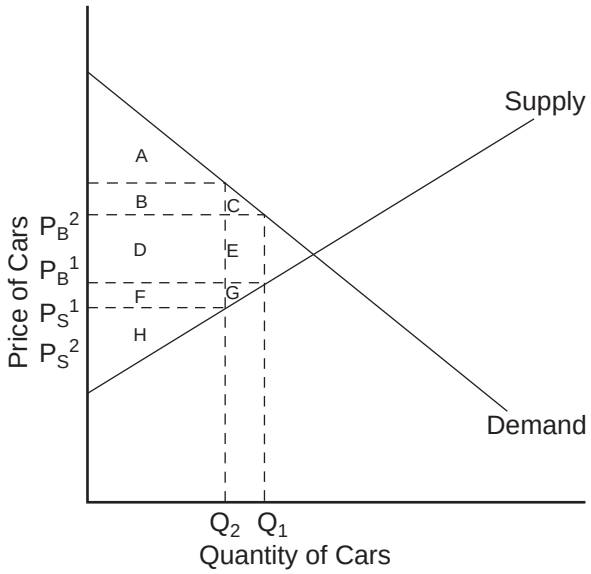
b. The price received by producers falls because of the tax, unless supply is perfectly elastic. Total receipts for producers fall, since producers lose revenue equal to area B+E+F.



c. The price paid by consumers rises, unless demand is perfectly elastic. Whether total spending by consumers rises or falls depends on the price elasticity of demand. If demand is elastic, the percentage decline in quantity exceeds the percentage increase in price, so total spending declines. If demand is inelastic, the percentage decline in quantity is less than the percentage increase in price, so total spending rises. Whether total consumer spending falls or rises, consumer surplus declines because of the increase in price and reduction in quantity.

9. Since the tax on gadgets was eliminated, all tax revenue must come from the tax on widgets. The tax revenue from the tax on widgets equals the tax per unit times the quantity produced. Since the increased tax causes a smaller quantity of widgets to be produced, then it's impossible for tax revenue to double--multiplying the tax per unit (which doubles) times the quantity (which declines) gives a number that is less than double the original tax revenue from widgets. So the government's tax change will yield less money than before.

10. a. Figure 8-6 illustrates the effects of the tax increase on the new car market in New Jersey. The quantity of cars sold declines from Q_1 to Q_2, the price paid by consumers rises from P_B^1 to P_B^2, and the price received by producers declines from P_S^1 to P_S^2, where $P_B^1 = P_S^1 + \$100$ and $P_B^2 = P_S^2 + \$150$.



b. The following table shows the welfare impact of the change in the tax.

	OLD	NEW	CHANGE
Consumer Surplus	A+B+C	A	-(B+C)
Producer Surplus	F+G+H	H	-(F+G)
Government Revenue	D+E	B+D+F	+(B+F) - E
Total Surplus	A+B+C+D+E+F+G+H	A+B+D+F+H	-(C+E+G)

c. The change in government revenue is B + F - E, which could be positive or negative.

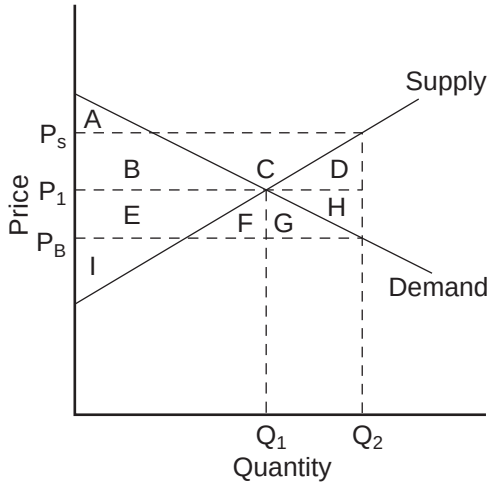
d. The change in deadweight loss is positive, as it increases by C+E+G, meaning that the economy as a whole is worse off.

e. The demand for cars in New Jersey is probably fairly elastic, since people could travel to nearby states to buy cars. With elastic demand, area B in the figure will be very small, so the additional tax is less likely to increase government revenue. New Jersey could try to reduce the elasticity of demand by requiring people to pay sales tax to New Jersey when they buy a car outside the state.

11. From the standpoint of economic efficiency, the British poll tax is wonderful, because it doesn't distort any economic incentives, so has no deadweight loss. But such a tax is inequitable, because it is more burdensome on the poor than on the rich. As a result, the tax was quite unpopular.

12. Figure 8-7 illustrates the effects of the \$2 subsidy on a good. Without the subsidy, the equilibrium price is P_1 and the equilibrium quantity is Q_1. With the subsidy, buyers pay price P_B, producers receive price P_S (where $P_S = P_B + \$2$), and the equilibrium quantity is Q_2. The following table illustrates the effect of the subsidy on consumer surplus, producer surplus, government revenue, and total surplus. Since total surplus declines by area D+H, the subsidy leads to a deadweight loss in that amount.

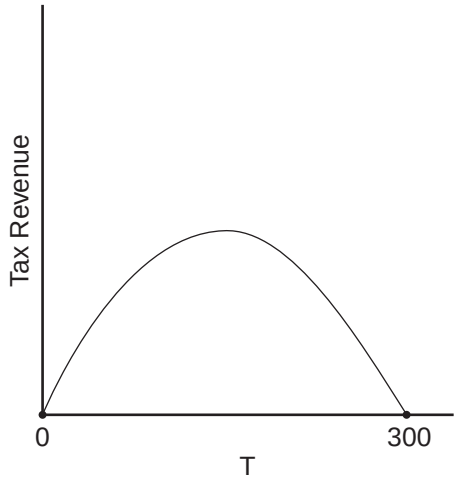
	OLD	**NEW**	**CHANGE**
Consumer Surplus	A+B	A+B+E+F+G	+(E+F+G)
Producer Surplus	E+I	B+C+E+I	+(B+C)
Government Revenue	0	-(B+C+D+E+F+G+H)	-(B+C+D+E+F+G+H)
Total Surplus	A+B+E+I	A+B-D+E-H+I	-(D+H)



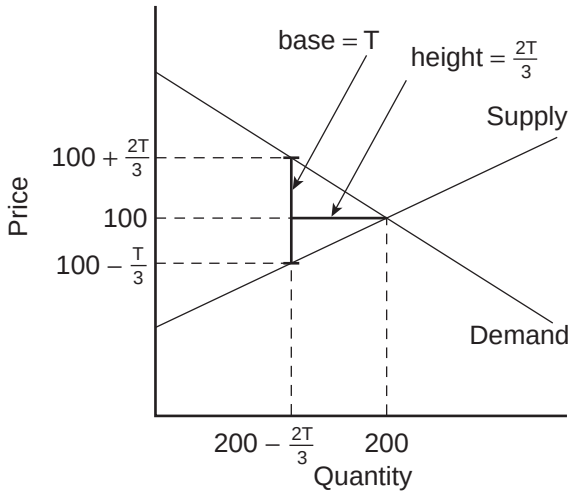
13. a. Setting quantity supplied equal to quantity demanded gives $2P = 300 - P$. Adding P to both sides of the equation gives $3P = 300$. Dividing both sides by 3 gives $P = 100$. Plugging $P = 100$ back into either equation for quantity demanded or supplied gives $Q = 200$.

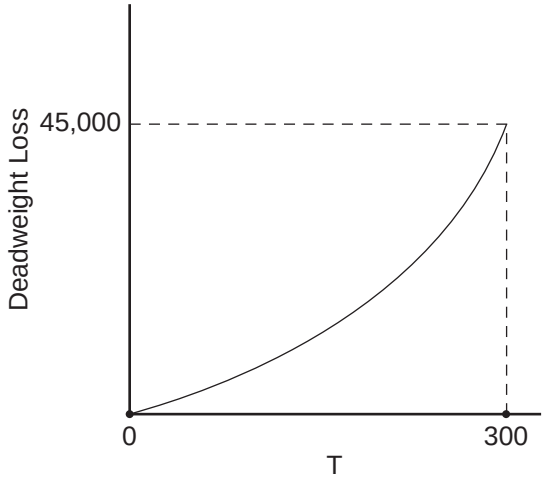
b. Now P is the price received by sellers and $P+T$ is the price paid by buyers. Equating quantity demanded to quantity supplied gives $2P = 300 - (P+T)$. Adding P to both sides of the equation gives $3P = 300 - T$. Dividing both sides by 3 gives $P = 100 - T/3$. Then $P+T = 100 + 2T/3$. The quantity sold is now $Q = 2P = 200 - 2T/3$. The price received by sellers declines from 100 to $100 - T/3$. The price paid by buyers increases from 100 to $100 + 2T/3$. The quantity sold declines from 200 to $200 - 2T/3$.

c. Since tax revenue is TxQ and $Q = 200 - 2T/3$, then tax revenue equals $200\ T - 2T^2/3$. Figure 8-8 shows a graph of this relationship. Tax revenue is zero at $T = 0$ and at $T = 300$.



d. As Figure 8-9 shows, the area of the triangle (laid on its side) that represents the deadweight loss is 1/2 x base x height, where the base is the change in the price, which is the size of the tax, T, and the height is the amount of the decline in quantity, which is $2T/3$. So the deadweight loss equals $1/2 \times T \times 2T/3 = T^2/3$. This rises exponentially from 0 (when $T = 0$) to 45,000 when $T = 300$, as shown in Figure 8-10.





e. A tax of $200 per unit is a bad idea, because it's in a region in which tax revenue is declining. The government could reduce the tax to $150 per unit, get more tax revenue ($15,000 when the tax is $150 versus $13,333 when the tax is $200), and reduce the deadweight loss (7500 when the tax is $150 compared to 13,333 when the tax is $200).

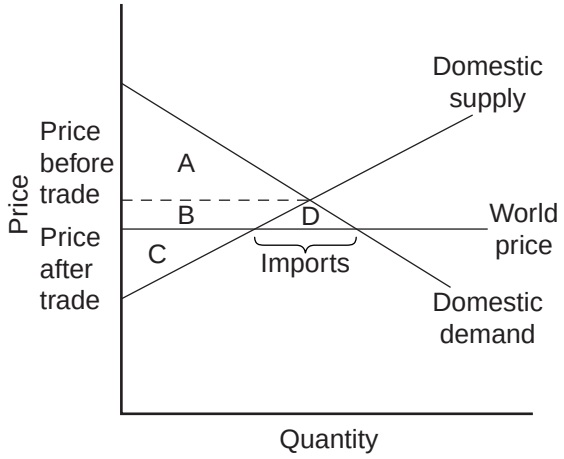
Chapter 9: Application: International Trade

Questions for Review: Answers

1. If the domestic price that prevails without international trade is above the world price, the country does not have a comparative advantage in producing the good. If the domestic price is below the world price, the country has a comparative advantage in producing the good.

2. If a country has a comparative advantage in producing a good, it will become an exporter when trade is allowed. If a country does not have a comparative advantage in producing a good, it will become an importer when trade is allowed.

3. Figure 9-1 illustrates supply and demand for an importing country. Before trade is allowed, consumer surplus is area A and producer surplus is area B + C. After trade is allowed, consumer surplus is area A + B + D and producer surplus is area C. The change in total surplus is an increase by area D.

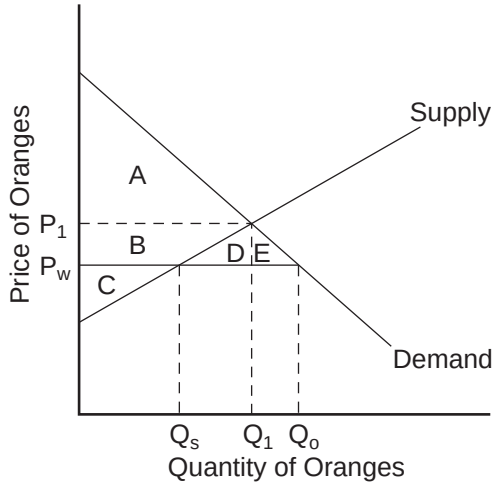


4. The arguments given to support trade restrictions are: (1) trade destroys jobs; (2) industries threatened with competition may be vital for national security; (3) new industries need trade restrictions to help them get started; (4) some countries unfairly subsidize their firms, so competition isn't fair; and (5) trade restrictions can be useful bargaining chips. Economists disagree with these arguments: (1) trade may destroy some jobs, but it creates other jobs; (2) arguments about national security tend to be exaggerated; (3) the government can't easily identify new industries that are worth

protecting; (4) if countries subsidize their exports, doing so simply benefits consumers; and (5) bargaining over trade is a risky business, since it may backfire, making the country worse off without trade.

Problems and Applications: Answers

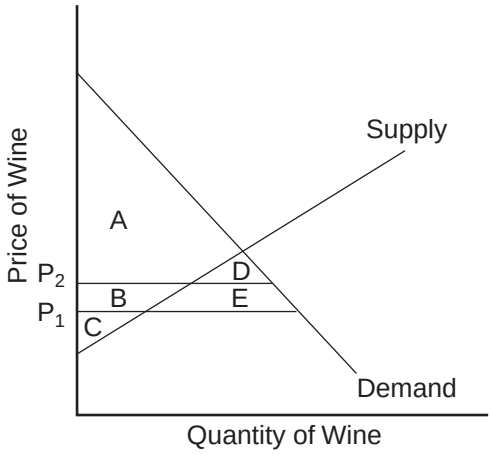
1. a. In Figure 9-2, with no international trade the equilibrium price is P_1 and the equilibrium quantity is Q_1. Consumer surplus is area A and producer surplus is area B + C, so total surplus is A + B + C.



   b. When the U.S. orange market is opened to trade, the new equilibrium price is P_W, the quantity consumed is Q_D, the quantity produced domestically is Q_S, and the quantity imported is $Q_D - Q_S$. Consumer surplus increases from A to A + B + D + E. Producer surplus decreases from B + C to C. Total surplus increases from A + B + C to A + B + C + D + E.

2. a. Figure 9-3 illustrates the U.S. market for wine, where the world price of wine is P_1. The following table illustrates the results under the heading "P_1."

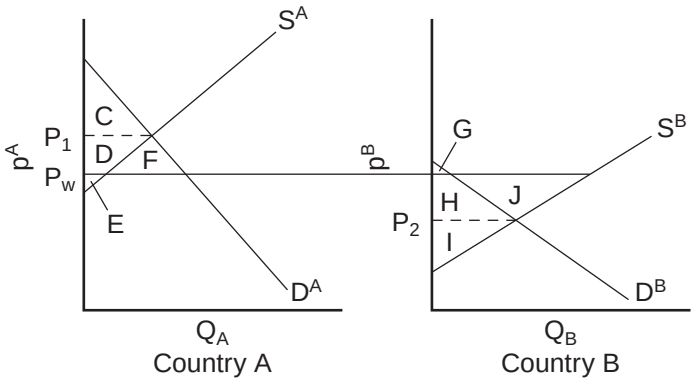
	P_1	**P_2**	**CHANGE**
Consumer Surplus	A+B+D+E	A+D	-(B+E)
Producer Surplus	C	B+C	+B
Total Surplus	A+B+C+D+E	A+B+C+D	-E



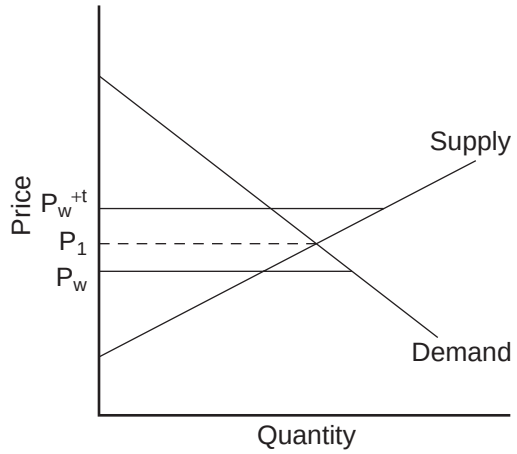
b. The shift in the Gulf Stream destroys some of the grape harvest, raising the world price of wine to P_2. The table shows the effects on consumer, producer, and total surplus, under the heading "P_2" and the change in the surplus measures under the heading "CHANGE." Consumers lose, producers win, and the United States as a whole is worse off.

3. Figure 9-4 shows the market for cotton in countries A and B. Note that the world price of cotton is the same in both countries. Country A imports cotton from country B. The table below shows that total surplus is higher in both countries. However, in country A, consumers are better off and producers are worse off, while in country B, consumers are worse off and producers are better off.

	OLD	**NEW**	**CHANGE**
Country A			
Consumer Surplus	C	C+D+F	+(D+F)
Producer Surplus	D+E	E	-D
Total Surplus	C+D+E	C+D+E+F	+F
Country B			
Consumer Surplus	G+H	G	-H
Producer Surplus	I	H+I+J	+(H+J)
Total Surplus	G+H+I	G+H+I+J	+J

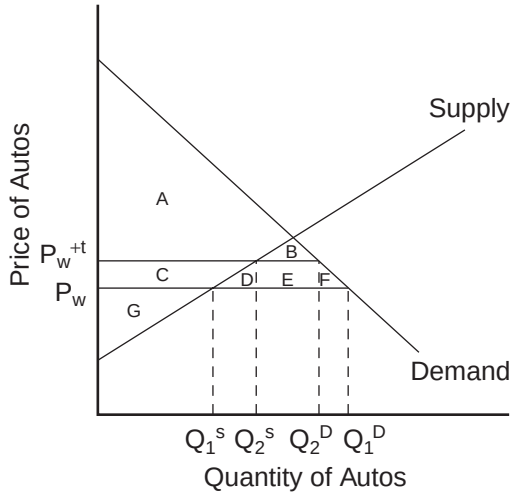


4. When the world price of a good is above the no-trade price, the country will export the good, so a tariff will have no effect since there will be no imports. If the world price is below the no-trade price, a tariff that exceeds the difference between those prices leads the country to import nothing. Equilibrium occurs where quantity supplied equals quantity demanded with no trade. As Figure 9-5 shows, the no-trade equilibrium price is P_1 and the world price is P_W. With the tariff on imports, the price to consumers is $P_W + t$, but at that price, supply exceeds demand, so there will be no imports. As a result, the equilibrium price will be P_1. Since the tariff prevents trade from occurring, it reduces the country's total surplus.



5. The impact of a tariff on imported autos in shown in Figure 9-6. Without the tariff, the price of an auto is P_W, the quantity produced in the United States is Q_1^S, and the quantity purchased in the United States is Q_1^D. The United States imports autos in the quantity $Q_1^D - Q_1^S$. The imposition of the tariff raises the price of autos to $P_W + t$, causing an increase in quantity supplied by U.S. producers to Q_2^S and a decline in the quantity demanded to Q_2^D, thus reducing the number of imports to $Q_2^D - Q_2^S$. The table shows the impact on consumer surplus, producer surplus, government revenue, and total surplus both before (OLD) and after (NEW) the imposition of the tariff, as well as the change (CHANGE). Since consumer surplus declines by C+D+E+F while producer surplus rises by C and government revenue rises by E, deadweight loss is D+F. The loss of consumer surplus in the amount C+D+E+F is split up as follows: C goes to producers, E goes to the government, and D+F is deadweight loss.

	OLD	**NEW**	**CHANGE**
Consumer Surplus	A+B+C+D+E+F	A+B	-(C+D+E+F)
Producer Surplus	G	C+G	+C
Government	0	E	+E
Total Surplus	A+B+C+D+E+F+G	A+B+C+E+G	-(D+F)



6. a. The world wheat price must be below the U.S. no-trade price, because wheat farmers oppose NAFTA. They oppose it because they know that when trade is allowed, the U.S. price of wheat will decline to the world price, and their producer surplus will fall. The world corn price must be above the U.S. no-trade price, since corn farmers support NAFTA. They know that when trade is allowed, the U.S. price of corn will rise to the world price, and their producer surplus will rise.

   b. Considering both markets together, NAFTA makes wheat farmers worse off and corn farmers better off, so it isn't clear whether farmers as a whole gain or lose. Similarly, consumers of wheat gain (since the price of wheat will decline) and consumers of corn lose (since the price of corn will rise), so consumers as a whole may either gain or lose. However, we know that the total gains from trade are positive, so the United States as a whole is better off.

7. a. With no trade, the equilibrium price in the United States is $40 and the equilibrium quantity is 60 thousand watches. The equilibrium price in Switzerland is $20 and the equilibrium quantity is 50 thousand watches.

   b. If trade is opened, quantity demanded in both countries equals quantity supplied in both countries at a price of $30. The U.S. price declines and the Swiss price rises.

   c. The total quantity of watches produced in both countries is 105 thousand. The United States produces 40 thousand and Switzerland produces 65 thousand. The United States consumes 70 thousand watches and Switzerland consumes 35 thousand, so Switzerland exports 30 thousand to the United States.

   d. The U.S. watch industry contracts, so employment declines. The Swiss watch industry expands, so employment rises. U.S. producers and Swiss consumers lose while U.S. consumers and Swiss producers gain. Overall, there is a gain from trade.

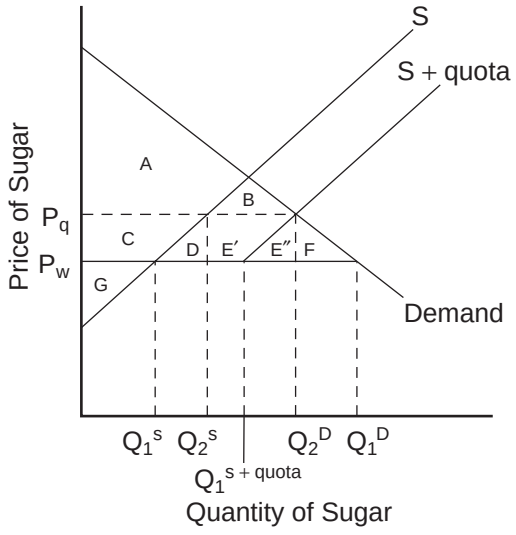
8. The tax on wine from California is just like a tariff imposed by one country on imports from another. As a result, Washington producers would be better off and Washington consumers would be worse off. The higher price of wine in Washington means producers would produce more wine, so they would hire more workers. Tax revenue would go to the government of Washington. So both claims are true, but it's bad policy because the losses to Washington consumers exceed the gains to producers.

9. Senator Hollings is correct that the price of clothing is the world price. But that price is lower than it would be in the absence of trade, so consumer surplus is higher than it would be without trade. Thus consumers *do* benefit from lower-priced imports.

10. Selling the licenses at auction is the policy with the lowest deadweight loss, since the licenses go to those who value them the most. In addition, the government gets revenue from selling the licenses, so it can reduce taxes elsewhere, lowering deadweight loss from other taxes. The largest deadweight loss probably goes to the policy of waiting in line for the licenses, since people incur the loss of time in waiting, which is a deadweight loss. If people can then sell the licenses, they'll go to those who value them most highly; however, the government will get no revenue, so can't reduce taxes elsewhere. The policy with the middle amount of deadweight loss is the policy of distributing licenses randomly. It doesn't have the deadweight loss associated with people standing in line, but doesn't raise revenue like the policy of selling the licenses.

11. a. Figure 9-7 illustrates the effects of a quota in the U.S. sugar market. The domestic supply curve is denoted S. Before the quota, the total supply curve is along curve S for quantities from 0 to Q_1^S and is horizontal at P_W, the world price of sugar, for higher quantities, representing imports of sugar. The result is that the equilibrium quantity supplied is Q_1^S, the equilibrium quantity demanded is Q_1^D, imports are $Q_1^D - Q_1^S$, and the price is P_W.

When the quota is introduced, the total supply curve is the same as without the quota up to the quantity Q_1^S + quota, then follows the curve S + quota for higher quantities. The quota limits the quantity of imports of sugar, leading to equilibrium at price P_q. The result is that the equilibrium quantity supplied is Q_2^S, the equilibrium quantity demanded is Q_2^D, and imports are $Q_2^D - Q_2^S$.



b. The following table illustrates the effects on welfare of the quota on sugar. The gains to license holders may accrue to private parties if the government gives the quota licenses away, or to the government if the licenses are sold.

	Without quota	With quota	Change
Consumer Surplus	A+B+C+D+E'+E"+F	A+B	-(C+D+E'+E"+F)
Producer Surplus	G	C+G	+C
License Holders	0	E'+E"	+E'+E"
Total Surplus	A+B+C+D+E'+E"+F+G	A+B+C+E'+E"+G	-(D+F)

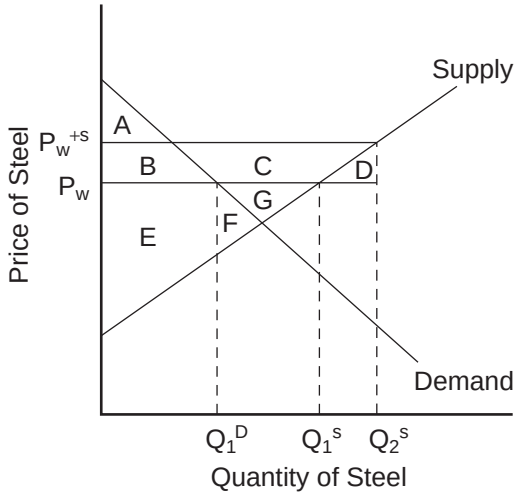
c. Gains and losses in other countries could be important, since we can trade gains across countries to improve the welfare of everyone. In addition, it isn't clear that we should be in cutthroat competition with other countries; we may care about people throughout the world.

d. The higher sugar prices caused by the quota system have had an impact on the fructose syrup industry since fructose is a substitute for sugar. With a higher sugar price, people substitute fructose for sugar, so the fructose industry expands.

12. An export subsidy increases the price of steel exports received by producers by the amount of the subsidy, s, as shown in Figure 9-8. The figure shows the world price, P_W, before the subsidy is put in place. At that price, domestic consumers buy quantity Q_1^D of steel, producers supply Q_1^S units, and the country exports the quantity $Q_1^S - Q_1^D$. With the subsidy put in place, suppliers get a total price per unit of $P_W + s$, since they receive the world price for their exports P_W, and the government pays them the subsidy of s. However, note that domestic consumers can still buy steel at the world price P_W, by importing it. Domestic firms don't want to sell steel to domestic customers, since they don't get the subsidy for doing so. So domestic companies will sell all the steel they produce abroad, in total quantity Q_2^S. Domestic consumers continue to buy quantity Q_1^D. The country imports steel in quantity Q_1^D and exports the quantity Q_2^S, so net exports of steel are the quantity $Q_2^S - Q_1^D$. The end result is that the domestic price of steel is unchanged, the quantity of steel produced increases, the quantity of

steel consumed is unchanged, and the quantity of steel exported increases. As the following table shows, consumer surplus is unaffected, producer surplus rises, government revenue declines, and total surplus declines.

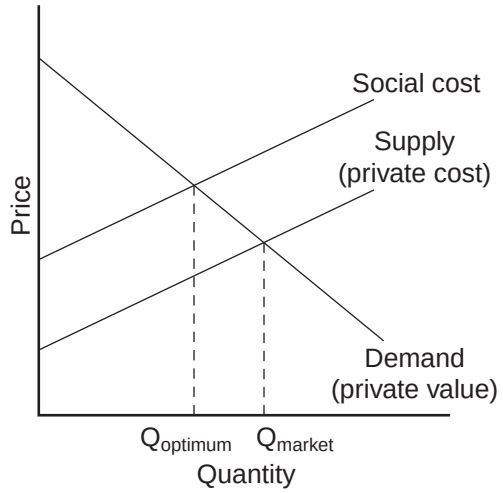
	Without subsidy	**With subsidy**	**Change**
Consumer Surplus	A+B	A+B	0
Producer Surplus	E+F+G	B+C+E+F+G	+(B+C)
Government Revenue	0	-(B+C+D)	-(B+C+D)
Total Surplus	A+B+E+F+G	A+B-D+E+F+G	-D



Chapter 10: Externalities

Questions for Review: Answers

1. Figure 10-1 illustrates the effect of a negative externality in production. The equilibrium quantity provided by the market is Q_{MARKET}. Because of the externality, the social cost of production is greater than the private cost of production, so the social-cost curve is above the supply curve. The optimal quantity for society is $Q_{OPTIMUM}$. The private market produces too much of the good, as Q_{MARKET} is greater than $Q_{OPTIMUM}$.



2. Externalities can be solved without government intervention through moral codes and social sanctions (which tell us to internalize externalities, such as not to litter), charities (donations to organizations like the Sierra Club to protect the environment or to universities to support education), merging firms whose externalities affect each other (for example, the apple grower and the beekeeper), or by contract.

3. According to the Coase theorem, your roommate and you will bargain over whether your roommate will smoke in the room. If you value clean air more than your roommate values smoking, the bargaining process will lead to your roommate not smoking. But if your roommate values smoking more than you value clean air, the bargaining process will lead to your roommate smoking. The outcome is efficient as long as transaction costs do not prevent an agreement from taking place. The solution may be reached by one of you paying off the other either not to smoke or for the right to smoke.

4. Economists prefer Pigovian taxes over regulations as a way to protect the environment from pollution because they can reduce pollution at a lower cost to society. A tax can be set to reduce pollution to the same level as a regulation. The tax has the advantage of letting the market determine the least expensive way to reduce pollution. The tax gives firms incentive to develop cleaner technologies, since doing so reduces the taxes they have to pay.

Problems and Applications: Answers

1. a. The statement, "The benefits of Pigovian taxes as a way to reduce pollution have to be weighed against the deadweight losses that these taxes cause," is false. In fact, Pigovian taxes reduce the inefficiency of pollution by reducing the quantity of the good being produced that has pollution as a by-product. So, Pigovian taxes reduce deadweight loss, they don't increase it.

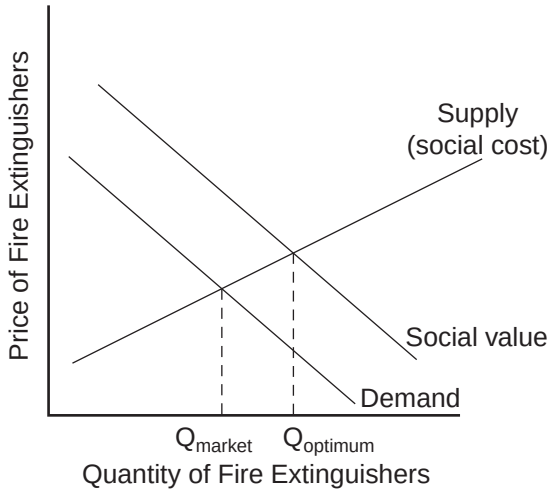
   b. The statement, "A negative production externality calls for a Pigovian tax on producers, whereas a negative consumption externality calls for a Pigovian tax on consumers," is inaccurate. It doesn't matter on whom the tax is imposed--the incidence of the tax will be identical. So whether the externality is from production or consumption of the good, a tax on either producers or consumers will lead to the same reduction of quantity and change in the prices producers receive or consumers pay.

2. a. Fire extinguishers exhibit positive externalities in consumption because even though people buy them for their own use, they prevent fire from damaging the property of others.

   b. Figure 10-2 illustrates the positive externality from fire extinguishers. Notice that the social value curve is above the demand curve.

   c. The market equilibrium level is denoted Q_{MARKET} and the efficient level of output is denoted $Q_{OPTIMUM}$. The quantities differ because in deciding to buy fire extinguishers, people don't account for the benefits they provide to other people.

   d. A government policy that would result in the efficient outcome would be to subsidize people $10 for every fire extinguisher they buy.



3. Charitable organizations are most often organized to deal with externalities. By letting charitable contributions be deductible under the federal income tax, the government provides a tax subsidy to charity, thus encouraging private solutions to the externality. People can give to the organization that they feel provides the most benefit to society, so the tax subsidy may be more effective than if the government itself tried to solve the externality. For example, churches may be better at helping the needy than government welfare programs.

4. If the Swiss government subsidizes cattle farming, it must be because there are externalities associated with it. Since tourists come to Switzerland to see the beautiful countryside, encouraging farms, as opposed to industrial development, is important to maintaining the tourist industry. Thus farms produce a positive externality by keeping the land beautiful and unspoiled by development. The government's subsidy thus helps the market provide the optimal amount of farms.

5. Figure 10-3 shows a situation in which studded snow tires should be banned completely. The demand curve intersects the supply curve at a positive quantity, Q_{MARKET}. But the damage to highways caused by the studded tires means the social value of the tires is much less than the private value shown by the demand curve. As the figure shows, if the social value curve doesn't intersect the supply curve, the efficient quantity, $Q_{OPTIMUM}$, is zero.

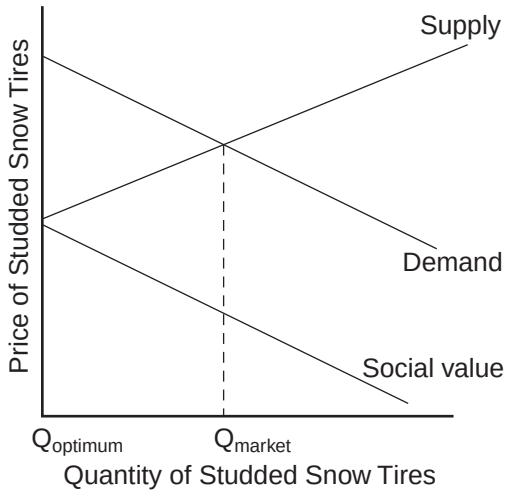
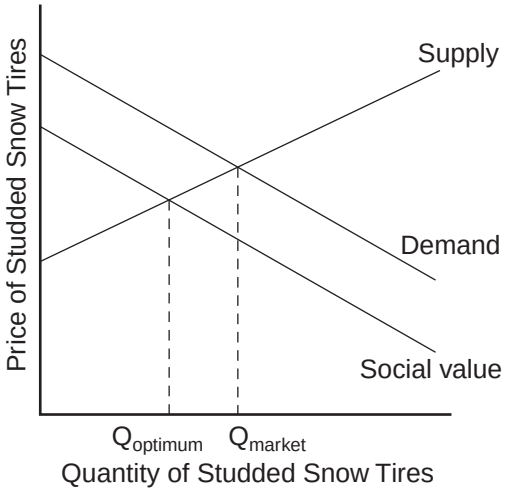
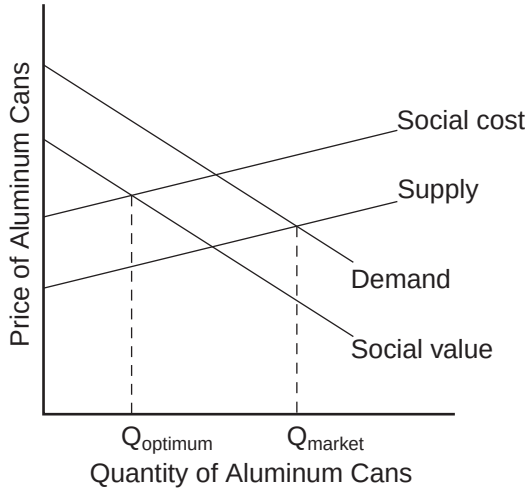


Figure 10-4 illustrates the situation in which the use of studded snow tires should be reduced from the free-market level, but not banned. Now the social value curve intersects the supply curve at a quantity, $Q_{OPTIMUM}$, which is less than the free-market quantity, Q_{MARKET}, but not zero.



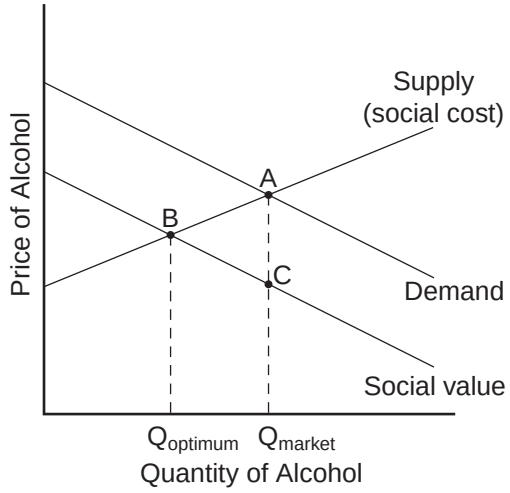
6. a. The external cost of producing aluminum cans arises from the pollution generated in the production process. The external cost of using aluminum cans comes from the fact that they don't decompose, so they last a long time in landfills.

b. Figure 10-5 illustrates the market for aluminum cans. The quantity of cans that will be sold in the free market is Q_{MARKET}, and the efficient quantity is $Q_{OPTIMUM}$.



7. a. The market for alcohol is shown in Figure 10-6. The social value curve is below the demand curve because of the externality from increased motor vehicle accidents caused by those who drink and drive. The free-market equilibrium level of output is Q_{MARKET} and the efficient level of output is $Q_{OPTIMUM}$.

b. The triangular area between points A, B, and C represents the deadweight loss of the market equilibrium. This area shows the amount by which social costs exceed social value for the quantity of alcohol consumption beyond the efficient level.



8. a. It's efficient to have different amounts of pollution reduction at different firms because the costs of reducing pollution differ across firms. If they were all made to reduce pollution by the same amount, the costs would be low at some firms and prohibitive at others, imposing a greater burden overall.

b. Command-and-control approaches that rely on uniform pollution reduction among firms give the firms no incentive to reduce pollution beyond the mandated amount. Instead, every firm will reduce pollution by just the amount required and no more.

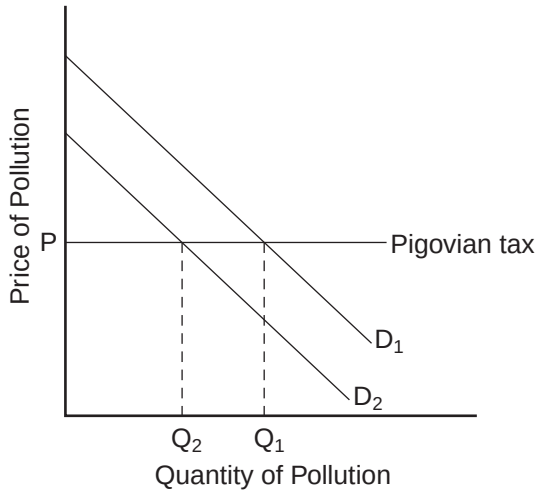
c. Pigovian taxes or tradable pollution rights give firms greater incentives to reduce pollution. Firms are rewarded by paying lower taxes or spending less on permits if they find methods to reduce pollution, so they have the incentive to engage in research on pollution control. The government doesn't have to figure out which firms can reduce pollution the most--it lets the market give firms the incentive to reduce pollution on their own.

9. a. If the government knew the cost of reduction at each firm, it would have Acme eliminate all its pollution (at a cost of $10 per ton times 100 tons = $1,000) and have Creative eliminate half of its pollution (at a cost of $100 per ton times 50 tons = $5,000). This minimizes the total cost ($6,000) of reducing the remaining pollution to 50 tons.

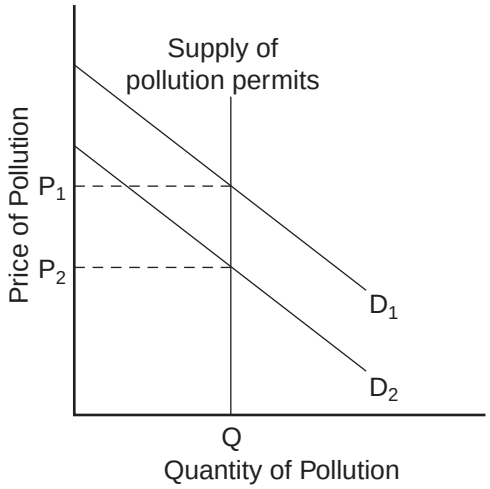
b. If each firm had to reduce pollution to 25 tons (so each had to reduce pollution by 75 tons), the cost to Acme would be 75 x $10 = $750 and the cost to Creative would be 75 x $100 = $7,500. The total cost would be $8,250.

c. In part *a*, it costs $6,000 to reduce total pollution to 50 tons, but in part *b* it costs $8,250. So it's definitely less costly to have Acme reduce all its pollution and have Creative cut its pollution in half. Even without knowing the costs of pollution reduction, the government could achieve the same result by auctioning off pollution permits that would allow only 50 tons of pollution. This would ensure that Acme reduced its pollution to zero (since Creative would outbid it for the permits) and Creative would then reduce its pollution to 50 tons.

10. a. An improvement in the technology for controlling pollution would reduce the demand for pollution rights, shifting the demand curve to the left. Figure 10-7 illustrates what would happen if there were a Pigovian tax, while Figure 10-8 shows the impact if there were a fixed supply of pollution permits. In both figures, the curve labeled D_1 is the original demand for pollution rights and the curve labeled D_2 is the new demand for pollution rights after the improvement in technology.



b. With a Pigovian tax, the price of pollution remains unchanged and the quantity of pollution declines, as Figure 10-7 shows. With pollution permits, the price of pollution declines and the quantity of pollution is unchanged, as Figure 10-8 illustrates.



11. a. In terms of economic efficiency in the market for pollution, it doesn't matter if the government distributes the permits or auctions them off, as long as firms can sell the permits to each other. The only difference would be that the government could make money if it auctioned the permits off, thus allowing it to reduce taxes, which would help reduce the deadweight loss from taxation.

b. If the government allocated the permits to firms who didn't value them as highly as other firms, the firms could sell the permits to each other so they'd end up in

the hands of the firms who value them most highly. Thus the allocation of permits among firms wouldn't matter for efficiency. But it would affect the distribution of wealth, since those who got the permits and sold them would be better off.

12. The advantage of allowing the permits to be traded throughout the entire West Coast would be to broaden the market, allowing greater gains from trade. The disadvantage would be that pollution is only a critical problem in certain areas, like the Los Angeles area. So the costs of pollution are higher there and the permits should thus be priced higher or be in more limited supply.

13. a. International cooperation is needed because the externality from global warming is worldwide, so the benefits from solving the problem are worldwide. Further, the efficient solution to the problem involves minimizing the costs to society; in this case, society means the entire world.

    b. Since it would be efficient to reduce carbon dioxide most in countries where the costs of reducing carbon dioxide emissions are low, some compensation scheme needs to be put in place to encourage the reduction of emissions. One possibility would be to monitor emissions, taxing those countries whose emissions are high and using the proceeds to subsidize those who reduce their emissions. This gives the incentive to reduce emissions in those areas where the cost of doing so is the least. In countries where the cost of reducing emissions is high, they'll just pay the tax. A system of uniform emission reductions would impose high costs on some countries and low costs on others, and wouldn't give anyone the incentive to reduce emissions beyond the mandated amount.

14. All activities, including reducing pollution, involve opportunity costs. Under command-and-control policies, there's an opportunity cost in terms of the resources that firms must use to reduce pollution. Using market-based methods merely recognizes that fact and gives firms economic incentives to reduce pollution, thus reducing the costs of reducing pollution. Since market-based methods can be priced to reduce pollution by the same amount as command-and-control policies, they can achieve the same results at lower costs.

15. a. A permit is worth $25 to firm B, $20 to firm A, and $10 to firm C, since that's the cost of reducing pollution by one unit. Since firm B faces the highest costs of reducing pollution, it will keep its own 40 permits and buy 40 permits from the other firms, so that it can still pollute by 80 units. That leaves 40 permits for firms A and C. Since firm A values them most highly, it will keep its own 40 permits. So it must be that firm C sells its 40 permits to firm B. Thus firm B doesn't reduce its pollution at all, firm A reduces its pollution by 30 units at a

cost of $20 x 30 = $600, and firm C reduces its pollution by 50 units at a cost of $10 x 50 = $500. The total cost of pollution reduction is $1,100.

b. If the permits couldn't be traded, then firm A would have to reduce its pollution by 30 units at a cost of $20 x 30 = $600, firm B would reduce its pollution by 40 units at a cost of $25 x 40 = $1,000, and firm C would reduce its pollution by 10 units at a cost of $10 x 10 = $100. The total cost of pollution reduction would be $1,700. That's $600 higher than in the case in which the permits could be traded.

Chapter 11: Public Goods and Common Resources

Questions for Review: Answers

1. An excludable good is one that people can be prevented from using. A rival good is one for which one person's use of it diminishes another person's enjoyment of it. Pizza is both excludable, since a pizza producer can prevent someone from eating it who doesn't pay for it, and rival, since when one person eats it, no one else can eat it.

2. A public good is a good that is neither excludable nor rival. An example is national defense, which protects the entire nation. No one can be prevented from enjoying the benefits of it, so it isn't excludable, and an additional person who benefits from it doesn't diminish the value of it to others, so it isn't rival. The private market won't supply the good, since no one would pay for it, since they can't be excluded from enjoying it if they don't pay for it.

3. A common resource is a good that is rival but not excludable. An example is fish in the ocean. If someone catches a fish, that leaves fewer fish for everyone else, so it's a rival good. But the ocean is so vast, you can't charge people for the right to fish, or prevent them from fishing, so it isn't excludable. Thus, without government intervention, people will use the good too much, since they don't account for the costs they impose on others when they use the good.

Problems and Applications: Answers

1. a. The externalities associated with public goods are positive. Since the benefits from the public good received by one person don't reduce the benefits received by anyone else, the social value of public goods is substantially greater than the private value. Examples include national defense, knowledge, uncongested non-toll roads, and uncongested parks. Since public goods aren't excludable, the free-market quantity is zero, so it is less than the efficient quantity.

   b. The externalities associated with common resources are generally negative. Since common resources are rival but not excludable (so not priced) the use of the common resources by one person reduces the amount available for others. Since common resources aren't priced, people tend to overuse them--their private value for using the resources exceeds the social value. Examples include fish in the ocean, the environment, congested non-toll roads, the Town Common, and congested parks.

2. a. (1) Police protection is a natural monopoly, since it is excludable (the police may ignore some neighborhoods) and not rival (unless the police force is overworked, they're available whenever a crime arises). You could make an argument that police protection is rival, if the police are too busy to respond to all crimes, so that one person's use of the police reduces the amount available for others; in that case, police protection is a private good.

(2) Snow plowing is most likely a common resource. Once a street is plowed, it isn't excludable. But it is rival, especially right after a big snowfall, since plowing one street means not plowing another street.

(3) Education is a private good (with a positive externality). It is excludable, since someone who doesn't pay can be prevented from taking classes. It is rival, since the presence of an additional student in a class reduces the benefits to others.

(4) Rural roads are public goods. They aren't excludable and they aren't rival since they're uncongested.

(5) City streets are common resources when congested. They aren't excludable, since anyone can drive on them. But they are rival, since congestion means every additional driver slows down the progress of other drivers. When they aren't congested, city streets are public goods, since they're no longer rival.

b. The government may provide goods that aren't public goods, such as education, because of the externalities associated with them.

3. a. Since knowledge is a public good, the benefits of basic scientific research are available to many people. The private firm doesn't take this into account when choosing how much research to undertake; it only takes into account what it will earn.

b. The United States has tried to give private firms incentives to provide basic research by subsidizing it through organizations like the National Institute of Health and the National Science Foundation.

c. If it's basic research that adds to knowledge, it isn't excludable at all, unless people in other countries can be prevented somehow from sharing that knowledge. So perhaps U.S. firms get a slight advantage because they hear about technological advances first, but knowledge tends to diffuse rapidly.

4. When a person litters along a highway, others bear the negative externality, so the private costs are low. Littering in your own yard imposes costs on you, so has a higher private cost, and is thus rare.

5. When the system is congested, each additional rider imposes costs on other riders. For example, when all seats are taken, some people must stand. Or if there isn't any room to stand, some people must wait for a train that isn't as crowded. Increasing the fare during rush hour internalizes this externality.

6. On privately owned land, the amount of logging is likely to be efficient. Loggers have incentives to do the right amount of logging, since they care that the trees replenish themselves and the forest can be logged in the future. Publicly owned land, however, is a common resource, and is likely to be overlogged, since loggers won't worry about the future value of the land.

   Since public lands tend to be overlogged, the government can improve things by restricting the quantity of logging to its efficient level. Selling permits to log, or taxing logging, could be used to reach the appropriate quantity by internalizing the externality. Such restrictions are unnecessary on privately owned lands, since there is no externality.

7. a. Overfishing is rational for fishermen since they're using a common resource. They don't bear the costs of reducing the number of fish available to others, so it's rational for them to overfish. The free-market quantity of fishing exceeds the efficient amount.

   b. A solution to the problem could come from regulating the amount of fishing, taxing fishing to internalize the externality, or auctioning off fishing permits. But these solutions wouldn't be easy to implement, since many nations have access to oceans, so international cooperation would be necessary, and enforcement would be difficult, because the sea is so large it's hard to police.

   c. By giving property rights to countries, the scope of the problem is reduced, since each country has a greater incentive to find a solution. Each country can impose a tax or issue permits, and monitor a smaller area for compliance.

   d. Since government agencies, like the Coast Guard in the United States, protect fishermen and rescue them when they need help, the fishermen aren't bearing the full costs of their fishing. Thus they fish more than they should.

   e. The statement, "Only when fishermen believe they are assured a long-term and exclusive right to a fishery are they likely to manage it in the same far-sighted

way as good farmers manage they land," is sensible. If fishermen owned the fishery, they'd be sure not to overfish, because they'd bear the costs of overfishing. This is a case in which property rights help prevent the overuse of a common resource.

f. Alternatives include regulating the amount of fishing, taxing fishermen, auctioning off fishing permits, or taxing fish sold in stores. All would tend to reduce the amount of fishing from the free-market amount to the efficient amount.

8. The private market provides information about the quality or function of goods and services in several different ways. First, producers advertise, providing people information about the product and its quality. Second, private firms provide information to consumers with independent reports on quality; an example is the magazine *Consumer Reports*. The government plays a role as well, by regulating advertising, thus preventing firms from exaggerating claims about their products, regulating certain goods like gasoline and food to be sure they're measured properly and provided without disease, and not allowing dangerous products on the market.

9. Recognizing that there are opportunity costs that are relevant for cost-benefit analysis is the key to answering this question. A richer community can afford to place a higher value on life and safety. So the richer community is willing to pay more for a traffic light, and that should be considered in cost-benefit analysis.

Chapter 12: The Design of the Tax System

Questions for Review: Answers

1. Over the past several decades, government has grown more rapidly than the rest of the economy. The ratio of government revenue to GDP has increased over time.

2. The two most important sources of revenue for the U.S. federal government are individual income taxes (about 44 percent of total revenue) and social insurance taxes (about 36 percent).

3. Corporate profits are taxed first when the corporate income tax is taken out of a corporation's income and again when the profits are used to pay dividends to the corporation's shareholders, which are taxed by the individual income tax.

4. The burden of a tax to taxpayers is greater than the revenue received by the government because: (1) taxes impose deadweight losses by reducing the quantity of goods produced and purchased below their efficient level; and (2) taxes entail a costly administrative burden on taxpayers.

5. Some economists advocate taxing consumption rather than income because taxing income discourages saving. A consumption tax would not distort people's saving decisions.

6. Wealthy taxpayers should pay more taxes than poor taxpayers because: (1) they benefit more from public services; and (2) they have a greater ability to pay.

7. Horizontal equity refers to the idea that families in the same economic situation should be taxed equally. The concept of horizontal equity is hard to apply because families differ in many ways, so it isn't obvious how to tax them equitably. For examples, two families with the same income may have different numbers of children and different levels of medical expenses.

Problems and Applications: Answers

1. Excluding food and clothing from the sales tax is justified on equity grounds because poor people spend a greater proportion of their income on those items. By exempting them from taxation, the system makes the rich bear a greater burden than the poor. From the point of view of efficiency, however, excluding food and clothing from the

sales tax is inefficient, since the demand for food and clothing is probably relatively inelastic. There's less deadweight loss from taxing a good with inelastic demand than a good with elastic demand.

2. Government spending has grown over time as our society has come to rely on the government to provide a social safety net, including medical care, for everyone. The trend is likely to continue as the average age of the population increases.

3. a. Over the past 35 years, the increase in revenue of the total government is attributable more to increases in state and local government revenue than to federal government revenue. In 1960, state and local government revenue was 35 percent of total government revenue; by 1995 it had risen to 44 percent.

   b. Personal taxes account for about the same proportion of the total revenue of federal and state and local governments now as they did 35 years ago (35 percent in 1960, 34 percent in 1995), corporate taxes account for a lower proportion (16 percent in 1960, 9 percent in 1995), social insurance taxes account for a substantially greater proportion (16 percent in 1960, 30 percent in 1995), and excise taxes account for a lower proportion (33 percent in 1960, 27 percent in 1995).

   c. Transfer payments account for a much greater proportion of the total expenditures of federal and state and local governments now than they did 35 years ago (24 percent in 1960, 43 percent in 1995), while purchases account for a much smaller proportion (70 percent in 1960, 50 percent in 1995).

4. a. If the number of retirees is rising and total expenditures are frozen, then benefits per retiree will decline over time. Since the number of workers is rising, albeit slowly, tax payments per worker would decline slowly over time.

   b. If benefits per retiree were frozen, total expenditures would rise quickly, along with the number of retirees. To pay for the increased expenditures, tax payments per worker would rise, since the number of workers isn't growing as rapidly as the number of retirees.

   c. If tax payments per worker were frozen, total expenditures would rise slowly, at the same rate as the growth rate of the number of workers. Since the number of retirees is rising more rapidly, benefits per retiree would decline over time.

   d. The answers to parts *a*, *b*, and *c* suggest there's no easy solution. Either workers will pay more per person or retirees will get fewer benefits per person.

Policymakers may eventually be forced to compromise, both reducing benefits per retiree and increasing tax payments per worker.

5. a. Because contributions to charity are tax deductible, people donate more to charity than they otherwise would.

   b. Because sales of beer are taxed, people buy less beer than they otherwise would.

   c. Because interest that a homeowner pays on a mortgage is tax deductible, homeownership is encouraged.

   d. Because realized capital gains are taxed, but accrued gains are not, people sell assets that have fallen in value, but they don't sell assets that have appreciated, so they can avoid paying taxes on their gains.

6. If the state raises its sales tax from 5 percent to 6 percent, it isn't plausible that sales tax revenue will increase 20 percent. The increase in the tax rate is 20 percent, so the only way tax revenue could increase 20 percent would be if total spending didn't fall in response to the tax increase, which is unlikely. Instead, the higher tax would raise the price of goods, so people would spend less. Thus tax revenues might go up, because the tax rate is higher, but by less than 20 percent.

7. a. Because a woman who earns income loses AFDC benefits, the tax discourages labor supply; it's like a higher tax on her wages.

   b. The subsidy from the EITC encourages labor supply, since it provides a subsidy.

   c. The advantage of eliminating AFDC and putting the money into EITC is that it would make people more self-sufficient by giving them the incentive to work. The disadvantage is that their children would receive less care, since their parents would be working.

8. The effect of the Tax Reform Act of 1986 on interest payments was to reduce consumer debt and increase home equity debt. People started financing general expenditures through home equity loans and paid down their mortgages less quickly.

9. a. The fact that visitors to many national parks pay an entrance fee is an example of the benefits principle, since people are paying for the benefits they receive.

b. The fact that local property taxes support elementary and secondary schools is an example of the ability-to-pay principle, since if you own more expensive property you must pay more tax.

c. The setup of airport trust funds is an example of the benefits principle, since use of the airport generates a tax that pays for upkeep of the airport.

10. a. If there were no limit on the federal payroll tax, it would be proportional since it's the same proportion regardless of income; with the limit, the tax is regressive since the average tax rate declines the higher income is beyond the limit.

b. The fact that people get fewer benefits relative to their contributions the higher is their income makes the Social Security system more progressive than the payroll tax alone.

11. a. For the proportional tax system, the average tax rate is 25 percent whether a person earns income of $50,000, $100,000, and $200,000.

For the regressive tax system, the average tax rate is 30 percent for someone earning $50,000, 25 percent for someone earning $100,000, and 20 percent for someone earning $200,000.

For the progressive tax system, the average tax rate is 20 percent for someone earning $50,000, 25 percent for someone earning $100,000, and 30 percent for someone earning $200,000.

b. For the proportional tax system, the marginal tax rate as income rises from $50,000 to $100,000 is the increase in taxes ($12,500) divided by the increase in income ($50,000) = 25 percent. The marginal tax rate as income rises from $100,000 to $200,000 is the increase in taxes ($25,000) divided by the increase in income ($100,000) = 25 percent.

For the regressive tax system, the marginal tax rate as income rises from $50,000 to $100,000 is the increase in taxes ($10,000) divided by the increase in income ($50,000) = 20 percent. The marginal tax rate as income rises from $100,000 to $200,000 is the increase in taxes ($15,000) divided by the increase in income ($100,000) = 15 percent.

For the progressive tax system, the marginal tax rate as income rises from $50,000 to $100,000 is the increase in taxes ($15,000) divided by the increase in income ($50,000) = 30 percent. The marginal tax rate as income rises from

$100,000 to $200,000 is the increase in taxes ($35,000) divided by the increase in income ($100,000) = 35 percent.

c. In the proportional tax system, the average tax rate equals the marginal tax rate. In the regressive tax system, the marginal tax rate is less than the average tax rate and both tax rates decline as income rises. In the progressive tax system, the marginal tax rate is greater than the average tax rate and both tax rates rise as income rises. The marginal tax rate is relevant to someone deciding whether to accept a job that pays slightly more than her current job, since it tells her how much of the extra income she'll keep after taxes. For judging the vertical equity of the tax system, the average tax rate is relevant, since vertical equity suggests that people with a greater ability to pay should pay a larger amount.

12. The efficiency justification for taxing consumption rather than income is that taxing income discourages saving. If the United States were to adopt a consumption tax, the U.S. tax system would become less progressive because the poor spend a greater proportion of their income than the rich. However, tax rates could be modified or deductions increased to make the tax more progressive.

13. The legal division of social insurance taxes, such that half the tax is paid by employers and half by employees, doesn't indicate the true incidence of these taxes. As with all taxes, the incidence of social insurance taxes depends not on who pays the taxes but on the elasticities of demand and supply—in this case, the elasticities of demand and supply for labor. Since the supply of labor is probably fairly inelastic, the incidence of social insurance taxes falls largely on employees.

14. Eliminating the tax deduction for meals would reduce the amount of lunches to which corporate executives take clients. But the incidence wouldn't be borne entirely by corporations, but instead by eating and drinking establishments that would lose a substantial chunk of their business.

Chapter 13: The Costs of Production

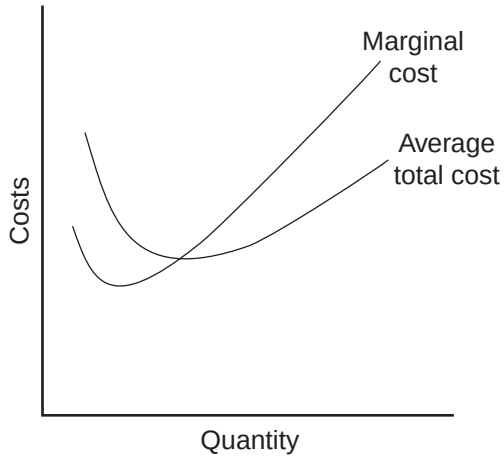
Questions for Review: Answers

1. The relationship between a firm's total revenue, profit, and total cost is that profit equals total revenue minus total costs.

2. An accountant would not count the opportunity cost of alternative employment as an accounting cost. An example is given in the text, in which Helen runs a cookie business, but she could instead work as a computer programmer. Because she's working in her cookie factory, she gives up the opportunity to earn $100 per hour as a computer programmer. The accountant ignores this opportunity cost because no money flow occurs. But the cost is relevant to Helen's decision to run the cookie factory.

3. Total cost consists of all the costs needed to produce a given quantity of output. It includes fixed costs and variable costs. Average total cost is the cost of a typical unit of output and is equal to total cost divided by the quantity produced. Marginal cost is the cost of producing an additional unit of output and is equal to the change in total cost divided by the change in quantity. An additional relation between average total cost and marginal cost is that whenever marginal cost is less than average total cost, average total cost is declining; whenever marginal cost is greater than average total cost, average total cost is rising.

4. Figure 13-1 shows the marginal-cost curve and the average-total-cost curve for a typical firm. It has three main features: (1) marginal cost is rising; (2) average total cost is U-shaped; and (3) whenever marginal cost is less than average total cost, average total cost is declining; whenever marginal cost is greater than average total cost, average total cost is rising. Marginal cost is rising because in the short run the firm must hire additional labor to produce more output without being able to buy additional equipment. The average total cost curve is U-shaped because the firm initially has economies of scale in production, spreading out fixed costs over additional units, but as quantity increases, it costs more to increase quantity further because some important input is limited. Marginal cost and average total cost have the relationship they do because marginal cost pulls average total cost in the same direction. The marginal cost and average total cost curves intersect at the minimum of average total cost; that quantity is the efficient scale.



5. In the long run, a firm can adjust the factors of production that are fixed in the short run; for example, it can increase the size of its factory. As a result, the long-run average-total-cost curve has a much flatter U-shape than the short-run average-total-cost curve. In addition, the long-run curve lies below all of the short-run curves.

Problems and Applications: Answers

1. a. opportunity cost; b. average total cost; c. fixed cost; d. variable cost; e. total cost; f. marginal cost.

2. a. The opportunity cost of something is what must be forgone to acquire it.

   b. The opportunity cost of running the hardware store is $550,000, consisting of $500,000 to rent the store and buy the stock and a $50,000 opportunity cost, since your aunt would quit her job as an accountant to run the store. Since the total opportunity cost of $550,000 exceeds revenue of $510,000, your aunt shouldn't open the store, as her profit would be negative--she would lose money.

3. a. Since you'd have to pay for room and board whether you went to college or not, that portion of your college payment is not an opportunity cost.

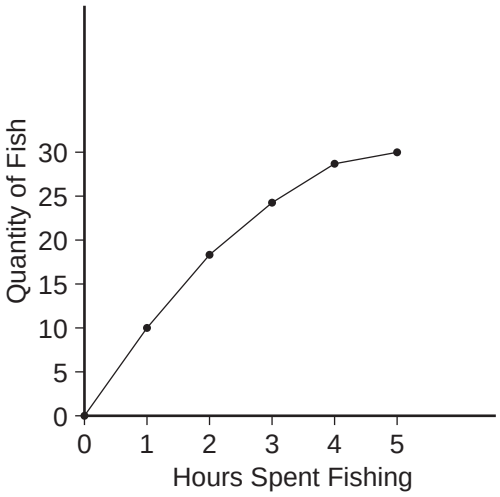
   b. The explicit opportunity cost is the cost of tuition.

   c. An implicit opportunity cost is the cost of your time. You could work at a job for pay rather than attend college. The wages you give up represent an opportunity cost of attending college.

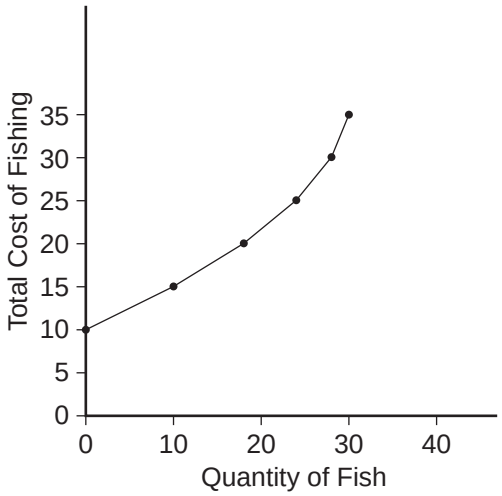
4. a. The following table shows the marginal product of each hour spent fishing:

Hours	Fish	Marginal Product	Fixed Cost	Variable Cost	Total Cost
0	0		10	0	10
		10			
1	10		10	5	15
		8			
2	18		10	10	20
		6			
3	24		10	15	25
		4			
4	28		10	20	30
		2			
5	30		10	25	35

b. Figure 13-2 graphs the fisherman's production function. The production function becomes flatter as the number of hours spent fishing increases, illustrating diminishing marginal product.



c. The table shows the fixed cost, variable cost, and total cost of fishing. Figure 13-3 shows the fisherman's total-cost curve. It slopes up because catching additional fish takes additional time. The curve is convex because there are diminishing returns to fishing time--each additional hour spent fishing yields fewer additional fish.



5. Fixed costs include the cost of owning or renting a car to deliver the bagels and the cost of advertising; they're fixed costs because they don't vary with output. Variable costs include the cost of the bagels and gas for the car, since those costs will increase as output increases.

6. a. The fixed cost is 300, since fixed cost equals total cost minus variable cost.

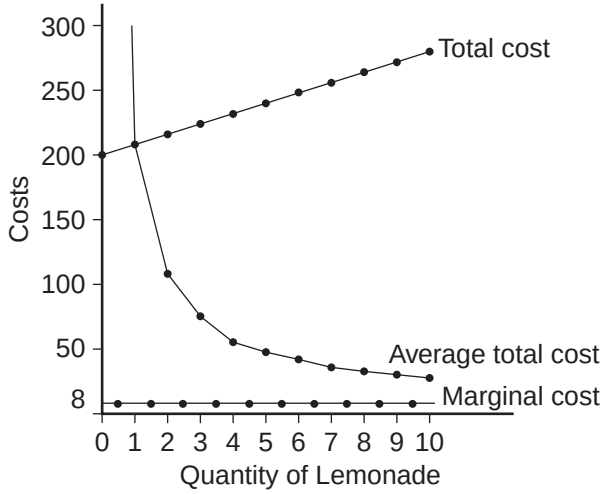
b.

Q	TC	VC	MC
0	300	0	
			50
1	350	50	
			40
2	390	90	
			30
3	420	120	
			30
4	450	150	
			40
5	490	190	
			50
6	540	240	

Marginal cost equals the change in total cost or the change in variable cost. That's because total cost equals variable cost plus fixed cost and fixed cost doesn't change as the quantity changes. So as quantity increases, the increase in total cost equals the increase in variable cost and both are equal to marginal cost.

7. a. The fixed cost of setting up the lemonade stand is $200. The variable cost per cup is 50 cents.

b. The following table shows total cost, average total cost, and marginal cost. These are plotted in Figure 13-4.



Quantity	Total Cost	Average Total Cost	Marginal Cost
0	200	--	
			8
1	208	208	
			8
2	216	108	
			8
3	224	74.7	
			8
4	232	58	
			8
5	240	48	
			8
6	248	41.3	
			8
7	256	36.6	
			8
8	264	33	
			8
9	272	30.2	
			8
10	280	28	

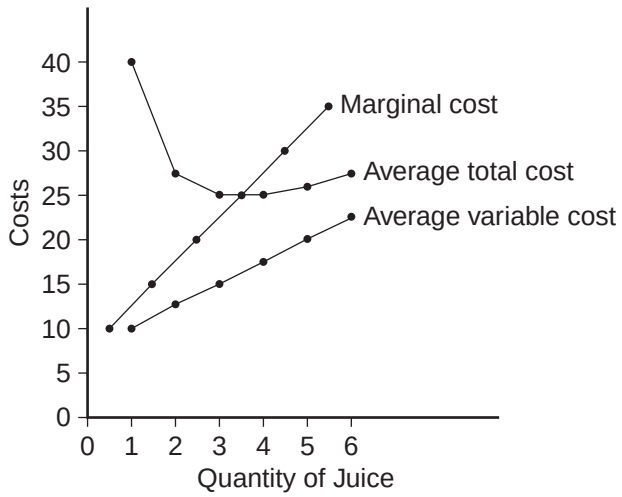
8. The following table illustrates average fixed cost (AFC), average variable cost (AVC), and average total cost (ATC) for each quantity. The efficient scale is 4 houses per month, since that minimizes average total cost.

Q	VC	FC	TC	AFC	AVC	ATC
0	0	200	200	--	--	--
1	10	200	210	200	10	210
2	20	200	220	100	10	110
3	40	200	240	66.7	13.3	80
4	80	200	280	50	20	70
5	160	200	360	40	32	72
6	320	200	520	33.3	53.3	86.7
7	640	200	840	28.6	91.4	120

9. a. The following table shows average variable cost (AVC), average total cost (ATC), and marginal cost (MC) for each quantity.

Q	VC	TC	AVC	ATC	MC
0	0	30	--	--	
					10
1	10	40	10	40	
					15
2	25	55	12.5	27.5	
					20
3	45	75	15	25	
					25
4	70	100	17.5	25	
					30
5	100	130	20	26	
					35
6	135	165	22.5	27.5	

b. Figure 13-5 graphs the three curves. The marginal cost curve is below the average total cost curve when output is less than 4, as average total cost is declining. The marginal cost curve is above the average total cost curve when output is above 4, as average total cost is rising. The marginal cost curve is always above the average variable cost curve, and average variable cost is always increasing.



10. The following table shows quantity (Q), total cost (TC), and average total cost (ATC) for the three firms:

	Firm A		Firm B		Firm C	
Q	TC	ATC	TC	ATC	TC	ATC
1	60	60	11	11	21	21
2	70	35	24	12	34	17
3	80	26.7	39	13	49	16.3
4	90	22.5	56	14	66	16.5
5	100	20	75	15	85	17
6	110	18.7	96	16	106	17.7
7	120	17.1	119	17	129	18.4

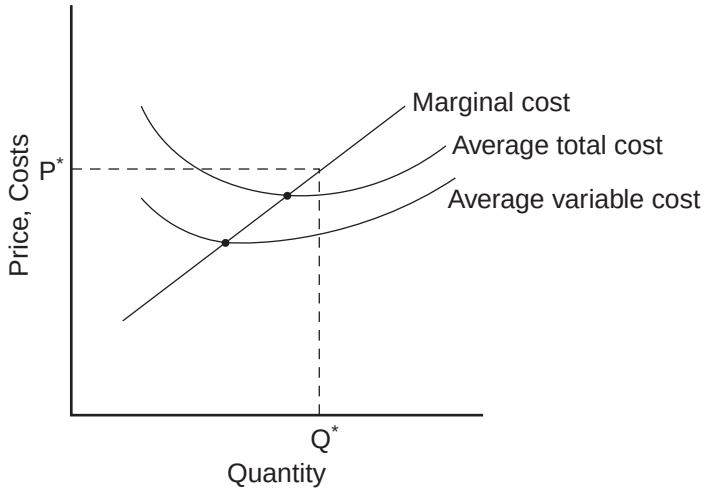
Firm A has economies of scale since average total cost declines as output increases.
Firm B has diseconomies of scale since average total cost rises as output rises.
Firm C has economies of scale for output from 1 to 3, then diseconomies of scale for greater levels of output.

Chapter 14: Firms in Competitive Markets

Questions for Review: Answers

1. A competitive firm is a firm in a market in which: (1) there are many buyers and many sellers in the market; (2) the goods offered by the various sellers are largely the same; and (3) usually firms can freely enter or exit the market.

2. Figure 14-1 shows the cost curves for a typical firm. For a given price (such as P^*), the level of output that maximizes profit is the output where marginal cost equals price (Q^*), as long as price is greater than average variable cost at that point (in the short run), or greater than average total cost (in the long run).



3. A firm will shut down temporarily if the revenue it would get from producing is less than the variable costs of production. This occurs if price is less than average variable cost.

4. A firm will exit a market if the revenue it would get if it stayed in business is less than its total cost. This occurs if price is less than average total cost.

5. A firm's price equals marginal cost in both the short run and the long run. In both the short run and the long run, price equals marginal revenue. The firm should increase output as long as marginal revenue exceeds marginal cost, and reduce output if

marginal revenue is less than marginal cost. Profits are maximized when marginal revenue equals marginal cost.

6. The firm's price equals the minimum of average total cost only in the long run. In the short run, price may be greater than average total cost, in which case the firm is making profits, or price may be less than average total cost, in which case the firm is making losses. But the situation is different in the long run. If firms are making profits, other firms will enter the industry, which will lower the price of the good. If firms are making losses, they will exit the industry, which will raise the price of the good. Entry or exit continue until firms are making neither profits nor losses. At that point, price equals average total cost.

Problems and Applications: Answers

1. A competitive market is one in which: (1) there are many buyers and many sellers in the market; (2) the goods offered by the various sellers are largely the same; and (3) usually firms can freely enter or exit the market. Of these goods, bottled water is probably the closest to a competitive market. Tap water is a natural monopoly because there's only one seller. Cola and beer aren't perfectly competitive because every brand is slightly different.

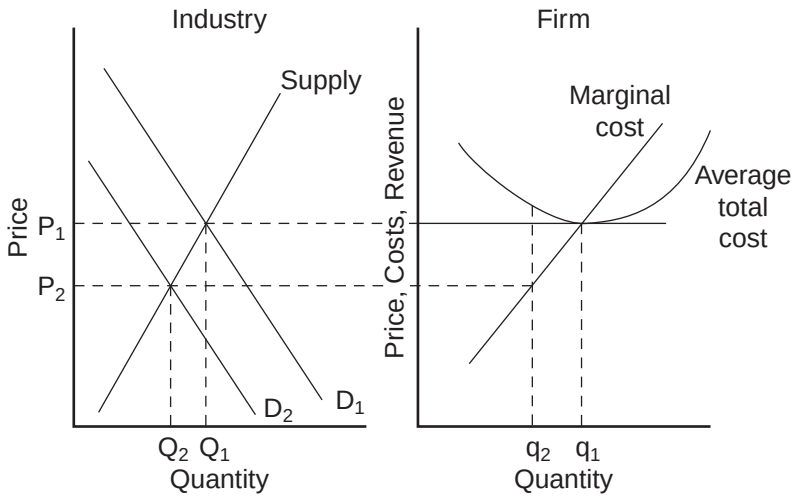
2. Since a new customer is offering to pay $300 for one dose, marginal revenue between 200 and 201 doses is $300. So we must find out if marginal cost is greater than or less than $300. To do this, calculate total cost for 200 doses and 201 doses, and calculate the increase in total cost. Multiplying quantity by average total cost, we find that total cost rises from $40,000 to $40,401, so marginal cost is $401. So your roommate should not make the additional dose.

3. a. Remembering that price equals marginal cost in equilibrium, we know the marginal cost must be 30 cents, since that's the price.

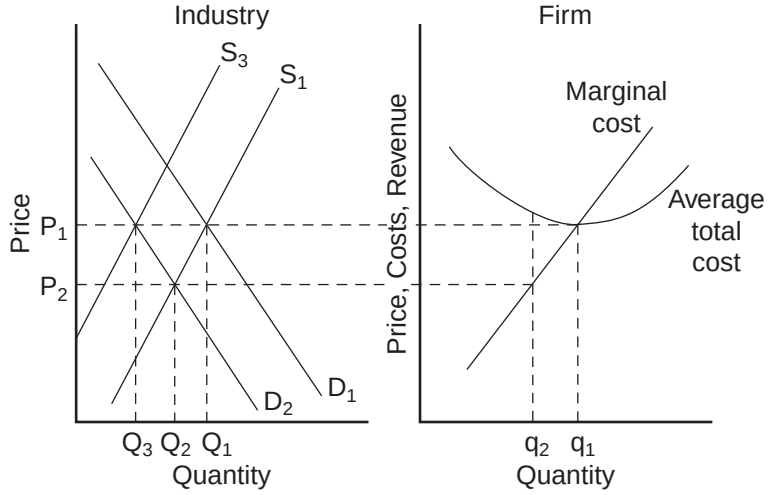
   b. The industry is not in long-run equilibrium since price exceeds average total cost.

4. Once you've ordered the dinner, its cost is sunk, so it doesn't represent an opportunity cost. As a result, the cost of the dinner shouldn't influence your decision about stuffing yourself.

5. a. Figure 14-2 shows the short-run effect of declining demand for beef. The shift of the industry demand curve from D_1 to D_2 reduces the quantity from Q_1 to Q_2 and reduces the price from P_1 to P_2. This affects the firm, reducing its quantity from q_1 to q_2. Before the decline in the price, the firm was making zero profits; afterwards, profits are negative, as average total cost exceeds price.



b. Figure 14-3 shows the long-run effect of declining demand for beef. Since firms were losing money in the short run, some firms leave the industry. This shifts the supply curve from S_1 to S_3. The shift of the supply curve is just enough to increase the price back to its original level, P_1. As a result, industry output falls still further, to Q_3. For firms that remain in the industry, the rise in the price to P_1 returns them to their original situation, producing quantity q_1 and earning zero profits.

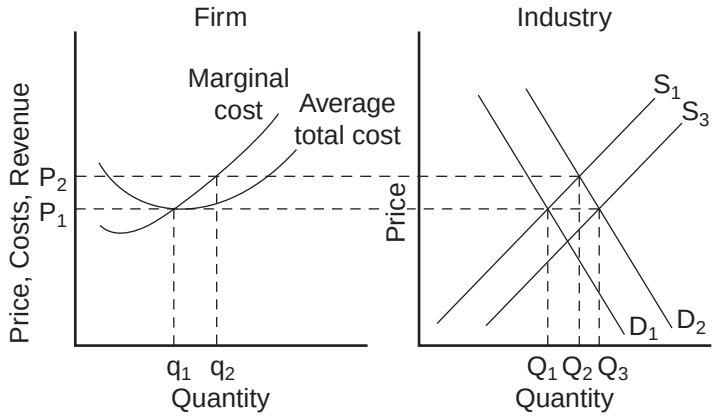


6. Figure 14-4 shows that although high prices cause an industry to expand, entry into the industry eventually returns prices to the point of minimum average total cost. In the figure, the industry is originally in long-run equilibrium. The industry produces output Q_1, where supply curve S_1 intersects demand curve D_1, and the price is P_1. At this

point the typical firm produces output q_1. Since price equals average total cost at that point, the firm makes zero economic profit.

Now suppose an increase in demand occurs, with the demand curve shifting to D_2. This causes "strong prices" in the industry, as the price rises to P_2. It also causes the industry to increase output to Q_2. With the higher price, the typical firm increases its output from q_1 to q_2, and now makes positive profits, since price exceeds average total cost.

However, the positive profits that firms earn encourage other firms to enter the industry. Their entry, "an expansion in an industry," leads the supply curve to shift to S_3. The new equilibrium reduces the price back to P_1, "bringing an end to high prices and manufacturers' prosperity," since now firms produce q_1 and earn zero profit again. The only long-lasting effect is that industry output is Q_3, a higher level than originally.

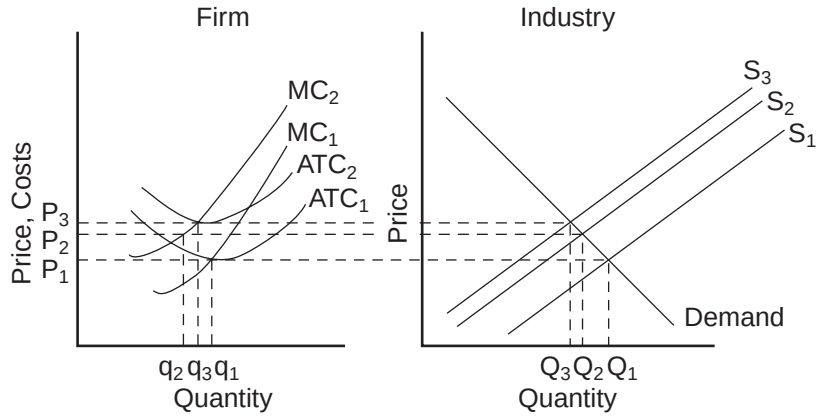


7. The rise in the price of petroleum increases production costs for individual firms and thus shifts the industry supply curve up, as shown in Figure 14-5. The typical firm's initial marginal-cost curve is MC_1 and its average-total-cost curve is ATC_1. In the initial equilibrium, the industry supply curve, S_1, intersects the demand curve at price P_1, which is equal to the minimum average total cost of the typical firm. Thus the typical firm earns no economic profit.

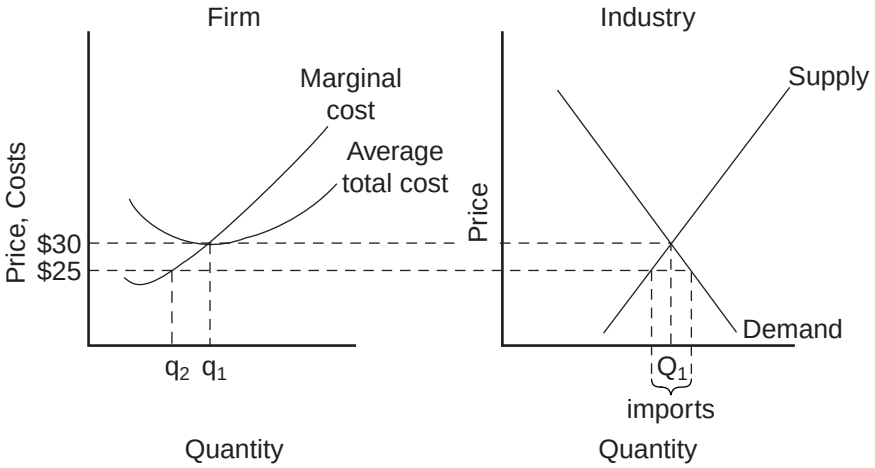
The increase in the price of oil shifts the typical firm's cost curves up to MC_2 and ATC_2, and shifts the industry supply curve up to S_2. The equilibrium price rises from P_1 to P_2, but the price doesn't increase by as much as the increase in marginal cost for the firm. As a result, price is less than average total cost for the firm, so profits are negative.

In the long run, the negative profits lead some firms to exit the industry. As they do so, the industry supply curve shifts to the left. This continues until the price rises to equal the minimum point on the firm's average-total-cost curve. The long-run

equilibrium occurs with supply curve S_3, equilibrium price P_3, industry output Q_3, and firm's output q_3. Thus, in the long run, profits are zero again and there are fewer firms in the industry.



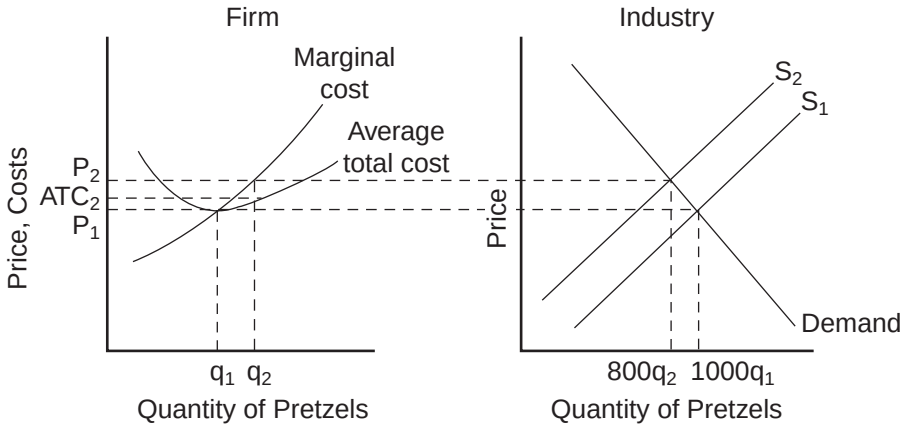
8. a. Figure 14-6 illustrates the situation in the U.S. textile industry. With no international trade, the market is in long-run equilibrium. Supply intersects demand at quantity Q_1 and price \$30, with a typical firm producing output q_1.



b. The effect of imports at \$25 is that the market supply curve follows the old supply curve up to a price of \$25, then becomes horizontal at that price. As a result, demand exceeds domestic supply, so the country imports textiles from other countries. The typical domestic firm now reduces its output from q_1 to q_2, incurring losses, since the large fixed costs imply that average total cost will be much higher than the price.

c. In the long run, domestic firms will be unable to compete with foreign firms because their costs are too high. All the domestic firms will exit the industry and other countries will supply enough to satisfy the entire domestic demand.

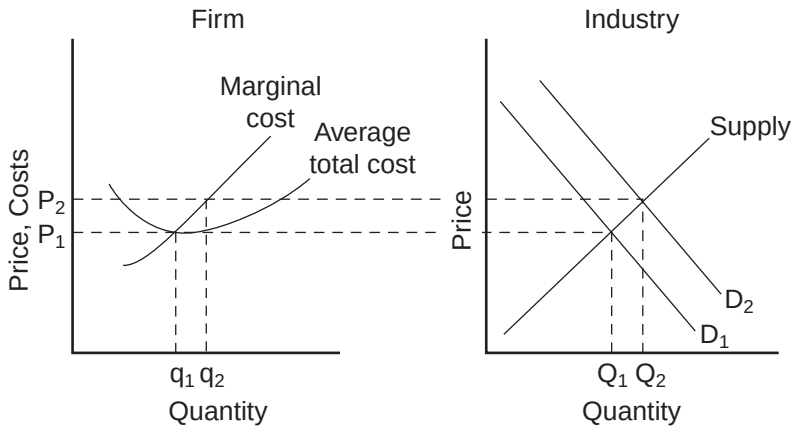
9. a. Figure 14-7 shows the current equilibrium in the market for pretzels. The supply curve, S_1, intersects the demand curve at price P_1. Each stand produces quantity q_1 of pretzels, so the total number of pretzels produced is 1,000 x q_1. Stands earn zero profit, since price equals average total cost.



b. If the city government restricts the number of pretzel stands to 800, the industry supply curve shifts to S_2. The market price rises to P_2, and individual firms produce output q_2. Industry output is now 800 x q_2. Now the price exceeds average total cost, so each firm is making a positive profit. Without restrictions on the market, this would induce other firms to enter the market, but they can't, since the government has limited the number of licenses.

c. The city could charge a license fee for the licenses. Since it's a lump-sum fee for the license, not based on the quantity of sales, such a tax has no effect on marginal cost, so won't affect the firm's output. It will, however, reduce the firm's profits. As long as the firm is left with a zero or positive profit, it will continue to operate. So the license fee that brings the most money to the city is to charge each firm the amount $(P_2 - ATC_2)q_2$, the amount of the firm's profit.

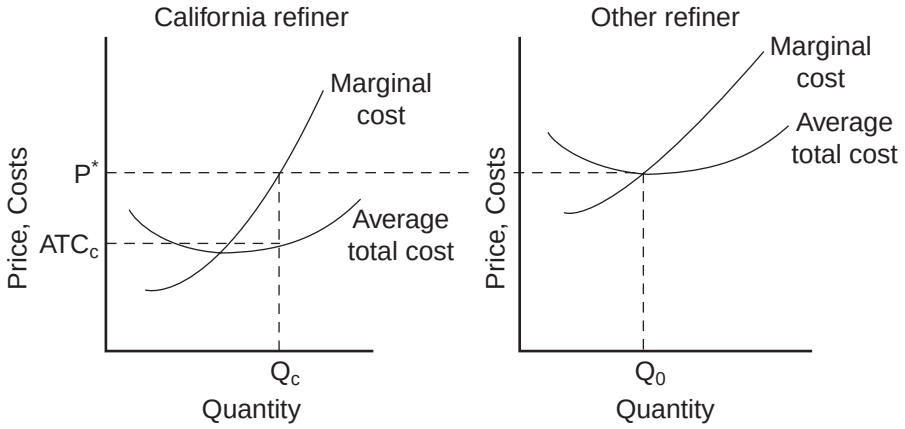
10. a. Figure 14-8 illustrates the gold market (industry) and a representative gold mine (firm). The demand curve, D_1, intersects the supply curve at industry quantity Q_1 and price P_1. Since the industry is in long-run equilibrium, the price equals the minimum point on the representative firm's average total cost curve, so the firm produces output q_1 and makes zero profit.



b. The increase in jewelry demand leads to an increase in the demand for gold, shifting the demand curve to D_2. In the short run, the price rises to P_2, industry output rises to Q_2, and the representative firm's output rises to q_2. Since price now exceeds average total cost, the representative firm now earns positive profits.

c. Since gold mines are earning positive economic profits, over time other firms will enter the industry. This will shift the supply curve to the right, reducing the price below P_2. But it's unlikely that the price will fall all the way back to P_1, since gold is in short supply. Costs for new firms are likely to be higher than for older firms, since they'll have to discover new gold sources. So it's likely that the long-run supply curve in the gold industry is upward sloping. That means the long-run equilibrium price will be higher than it was initially.

11. a. Figure 14-9 shows cost curves for a California refiner and a non-California refiner. Since the California refiner has access to lower-cost oil, its costs are lower.



b. In long-run equilibrium, the price is determined by the costs of non-California refiners, since California refiners can't supply the entire market. The market price will equal the minimum average total cost of the other refiners; they will thus earn zero profits. Since California refiners have lower costs, they will earn positive profits, equal to $(P^* - ATC_C) \times Q_C$.

c. Yes, there is a subsidy to California refiners that is not passed on to consumers. The subsidy accounts for the long-run profits of the California refiners. It arises simply because the oil can't be exported.

Chapter 15: Monopoly

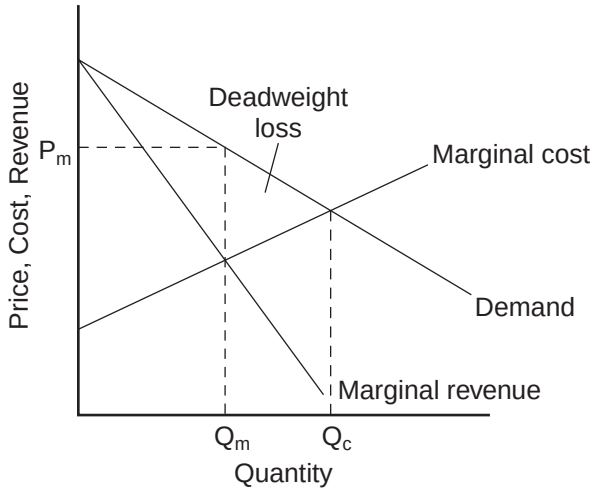
Questions for Review: Answers

1. An example of a government-created monopoly comes from the existence of patent and copyright laws. Both allow firms or individuals to be monopolies for extended periods of time—17 years for patents, forever for copyrights. But this monopoly power is good, because without it, no one would write a book (because anyone could print copies of it, so the author would get no income) and no firm would invest in research and development to invent new products or drugs (since any other company could produce or sell them, and the firm would get no profit from its investment).

2. An industry is a natural monopoly when a single firm can supply a good or service to an entire market at a smaller cost than could two or more firms. As a market grows it may evolve from a natural monopoly to a competitive market.

3. A monopolist's marginal revenue is less than the price of its product because: (1) its demand curve is the market demand curve, so (2) to increase the amount sold, the monopolist must lower the price of its good for every unit it sells, so (3) this cut in prices reduces revenue on the units it was already selling.

4. Figure 15-1 shows the demand, marginal-revenue, and marginal-cost curves for a monopolist. The intersection of the marginal-revenue and marginal-cost curves determines the profit-maximizing level of output, Q_M. The demand curve then shows the profit-maximizing price, P_M.



5. The level of output that maximizes total surplus in Figure 15-1 is where the demand curve intersects the marginal-cost curve, Q_C. The deadweight loss from monopoly is the triangular area between Q_C and Q_M that's above the marginal-cost curve and below the demand curve. It represents deadweight loss because society loses total surplus because of monopoly equal to the value of the good, measured by the demand curve, less the cost of production, given by the marginal-cost curve, for the quantities Q_C - Q_M.

6. The government has the power to regulate mergers between firms because of antitrust laws. Firms might want to merge to increase operating efficiency and reduce costs, something that's good for society, or to gain monopoly power, which is bad for society.

7. When regulators tell a natural monopoly that it must set price equal to marginal cost, two problems arise. The first is that, because a natural monopoly has a constant marginal cost that's less than average cost, setting price equal to marginal cost means that the price is less than average cost, so the firm will lose money. The firm would exit the industry unless the government subsidized it, but getting revenue for such a subsidy would cause the government to raise other taxes, increasing their deadweight loss. The second problem is that it gives the monopoly no incentive to reduce costs.

8. One example of price discrimination is in publishing books. Publishers charge a much higher price for hardback books than for paperback books—far higher than the difference in production costs. Publishers do this because die-hard fans will pay more for a hardback book when the book is first released. Those who don't value the book as highly will wait for the paperback version to come out. The publisher makes greater profit this way than if it charged just one price.

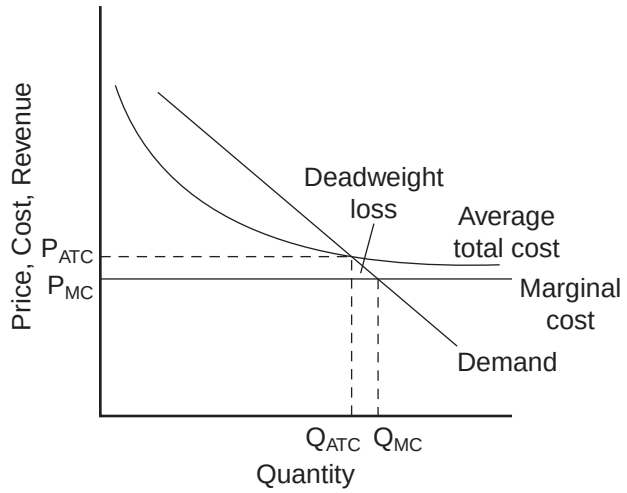
   A second example is the pricing of movie tickets. Theaters give discounts to children and senior citizens because they have a lower willingness to pay for a ticket. Charging different prices helps the theater increase its profit above what it would be if it charged just one price.

Problems and Applications: Answers

1. A firm's marginal revenue is the increase in revenue from producing one more unit of the good. A monopolist's marginal revenue can be negative because to get purchasers to buy an additional unit of the good, the firm must reduce its price on *all* units of the good. The fact that it sells a greater quantity increases revenue, but the decline in price decreases revenue. The overall effect depends on the elasticity of the demand curve. If the demand curve is inelastic, marginal revenue will be negative.

2. A competitive firm faces a more elastic demand curve than a monopolist; in fact, a competitive firm faces a perfectly elastic demand curve since it is a price taker. The larger elasticity arises when a good has many perfect substitutes.

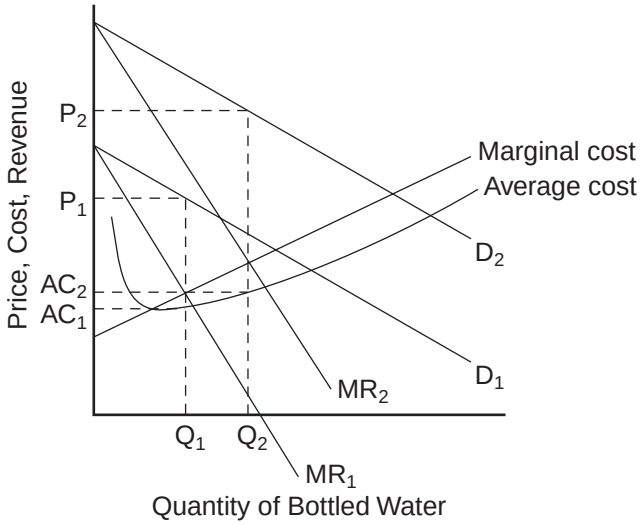
3. Figure 15-2 illustrates a natural monopolist setting price, P_{ATC}, equal to average total cost. The equilibrium quantity is Q_{ATC}. Marginal cost pricing would yield the price P_{MC} and quantity Q_{MC}. Since for quantities between Q_{ATC} and Q_{MC} the benefit to consumers (measured by the demand curve) exceeds the cost of production (measured by the marginal cost curve), the deadweight loss from setting price equal to average total cost is the triangular area shown in the figure.



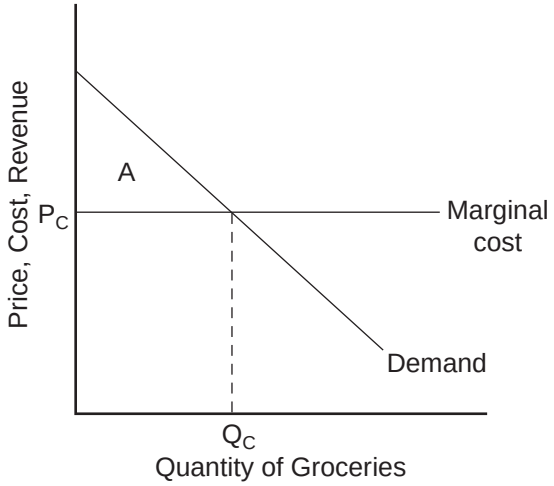
4. Mail delivery has an always-declining average-total-cost curve, since there are large fixed costs for equipment. The marginal cost of delivering a letter is very small. However, the costs are higher in isolated rural areas than they are in densely populated urban areas, since transportation costs differ. Over time, increased automation has reduced marginal cost and increased fixed costs, so the average-total-cost curve has become steeper at small quantities and flatter at high quantities.

5. If the price of tap water rises, the demand for bottled water increases. This is shown in Figure 15-3 as a shift to the right in the demand curve from D_1 to D_2. The corresponding marginal-revenue curves are MR_1 and MR_2. The profit-maximizing level of output is where marginal cost equals marginal revenue. Prior to the increase in the price of tap water, the profit-maximizing level of output is Q_1; after the price increase, it rises to Q_2. The profit-maximizing price is shown on the demand curve: it is P_1 before the price of tap water rises, and it rises to P_2 after. Average cost is AC_1

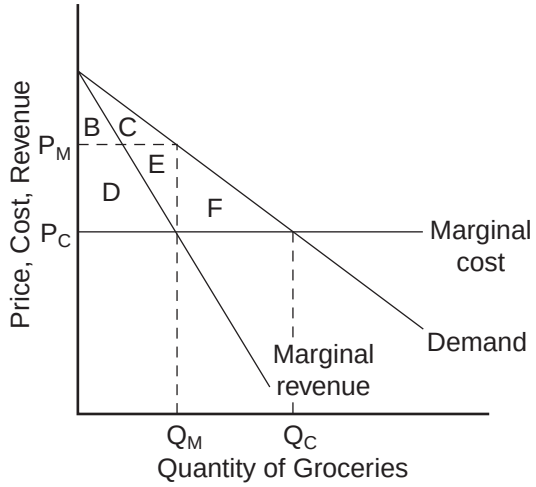
before the price of tap water rises and AC_2 after. Profit increases from $(P_1 - AC_1) \times Q_1$ to $(P_2 - AC_2) \times Q_2$.



6. a. Figure 15-4 illustrates the market for groceries when there are many competing supermarkets with constant marginal cost. Output is Q_C, price is P_C, consumer surplus is area A, producer surplus is zero, and total surplus is area A.



b. If the supermarkets merge, Figure 15-5 illustrates the new situation. Quantity declines from Q_C to Q_M and price rises to P_M. Area A in Figure 15-4 is equal to area B+C+D+E+F in Figure 15-5. Consumer surplus is now area B+C, producer surplus is area D+E, and total surplus is area B+C+D+E. Consumers transfer the amount of area D+E to producers and the deadweight loss is area F.



7. a. The following table shows total revenue and marginal revenue for each price and quantity sold:

Price	Quantity	Revenue	Total Revenue	Marginal Cost	Total Profit
24	10,000	240,000	50,000	190,000	200,000
22	20,000	440,000	100,000	340,000	160,000
20	30,000	600,000	150,000	450,000	120,000
18	40,000	720,000	200,000	520,000	80,000
16	50,000	800,000	250,000	550,000	40,000
14	60,000	840,000	300,000	540,000	

b. Profits are maximized at a price of $16 and quantity of 50,000. At that point, profit is $550,000.

c. As Johnny's agent, you should recommend that he demand $550,000 from them, so he gets all the profit instead of the record company.

8. To the extent that people can substitute other computers for mainframes, that will constrain IBM's monopoly power. So the government might have looked at the demand curve facing IBM, or the divergence between IBM's price and marginal cost, to get some idea of how severe the monopoly problem was.

9. a. The following table shows revenue and marginal revenue for the bridge:

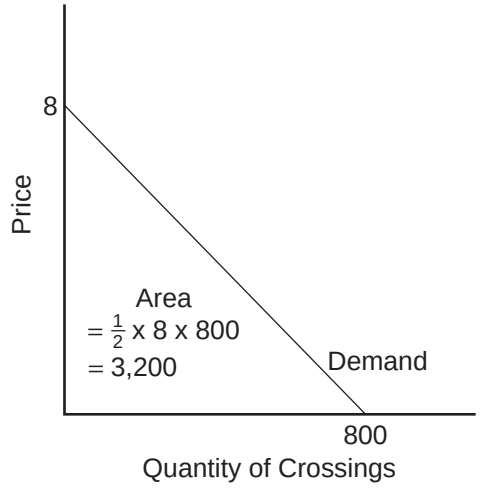
Price	Quantity	Revenue	Marginal Revenue
8	0	0	
			700
7	100	700	
			500
6	200	1,200	
			300
5	300	1,500	
			100
4	400	1,600	
			-100
3	500	1,500	
			-300
2	600	1,200	
			-500
1	700	700	
			-700
0	800	0	

The profit-maximizing price would be where revenue is maximized, which will occur where marginal revenue equals zero, since marginal cost equals zero. This occurs at a price of $4 and quantity of 400. The efficient level of output is 800, since that's where price equals marginal cost equals zero. The profit-maximizing quantity is lower than the efficient quantity because the firm is a monopolist.

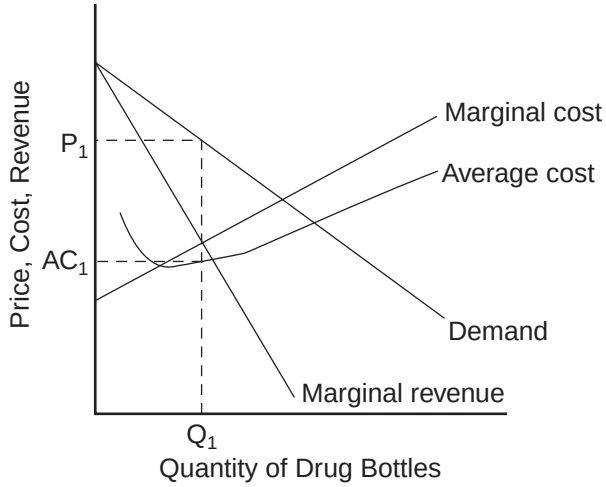
b. The company shouldn't build the bridge because its profits are negative. The most revenue it can earn is $1,600,000 and the cost is $2,000,000, so it would lose $400,000.

c. If the government were to build the bridge, it should set price equal to marginal cost to be efficient. But marginal cost is zero, so the government shouldn't charge people to use the bridge.

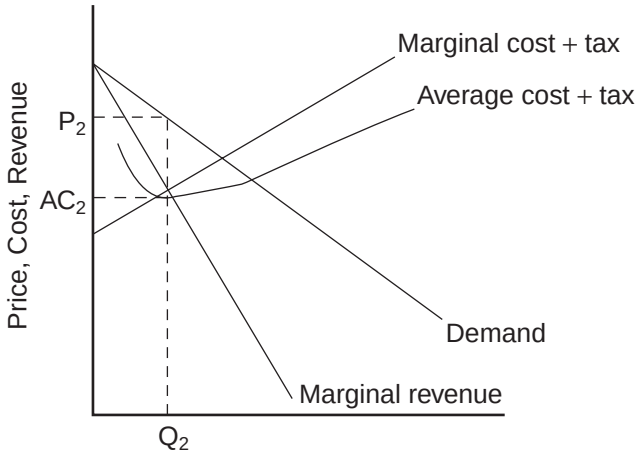
d. Yes, the government should build the bridge, because it would increase society's total surplus. As shown in Figure 15-6, total surplus has area 1/2 x 8 x 800,000 = $3,200,000, which exceeds the cost of building the bridge.



10. a. Figure 15-7 illustrates the drug company's situation. They'll produce quantity Q_1 at price P_1. Profits are equal to $(P_1 - AC_1) \times Q_1$.



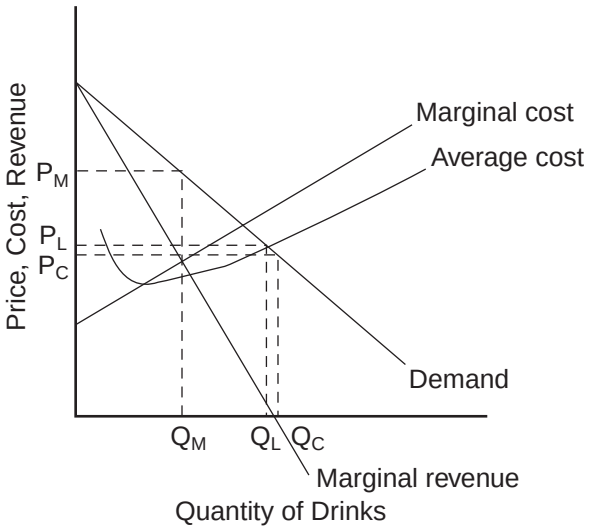
b. The tax on the drug increases both marginal cost and average cost by the amount of the tax. As a result, as shown in Figure 15-8, quantity is reduced to Q_2, price rises to P_2, and average cost plus tax rises to AC_2.



c. The tax definitely reduces profits. After all, the firm could have produced quantity Q_2 at price P_2 before the tax was imposed, but it didn't maximize profits. So the firm's revenue less costs are lower after the tax is imposed; in addition, the firm must pay the tax.

d. A tax of $10,000 regardless of how many bottles of the drug are produced would result in the quantity produced at Q_1 and the price at P_1 in Figure 15-7 because such a tax doesn't affect marginal cost or marginal revenue. It does, however, raise average cost; in fact, profits decline by exactly $10,000.

11. Larry wants to sell as many drinks as possible without losing money, so he wants to set quantity where price (demand) equals average cost, which occurs at quantity Q_L and price P_L in Figure 15-9. Curly wants to bring in as much revenue as possible, which occurs where marginal revenue equals zero, at quantity Q_C and price P_C. Moe wants to maximize profits, which occurs where marginal cost equals marginal revenue, at quantity Q_M and price P_M.

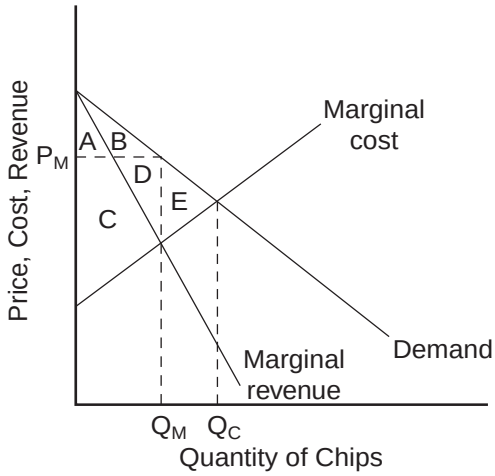


12. a. Long-distance phone service was originally a natural monopoly because installation of phone lines across the country meant that one firm's costs were much lower than if two or more firms did the same thing.

b. With communications satellites, the cost is no different if one firm supplies them or if many firms do so. So the industry evolved from a natural monopoly to a competitive market.

c. It is efficient to have competition in long-distance phone service and regulated monopolies in local phone service because local phone service remains a natural monopoly (being based on land lines) while long-distance service is a competitive market (being based on satellites).

13. a. The patent gives the company a monopoly, as shown in Figure 15-10. At a quantity of Q_M and price of P_M, consumer surplus is area A+B, producer surplus is area C+D, and total surplus is area A+B+C+D.



b. If the firm can perfectly price discriminate, it will produce quantity Q_C and extract all the consumer surplus. Consumer surplus is zero and producer surplus is A+B+C+D+E, as is total surplus. Deadweight loss is reduced from area E to zero. There's a transfer of surplus from consumers to producers of area A+B.

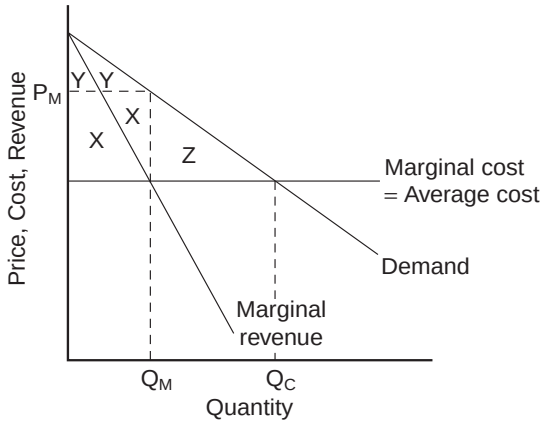
14. A monopolist always produces a quantity at which the demand curve is elastic. If the firm produced a quantity for which the demand curve were inelastic, then if the firm raised its price, quantity would fall by a smaller percentage than the rise in price, so revenue would increase. Since costs would decrease at a lower quantity, the firm would have higher revenue and lower costs, so profit would be higher. Thus the firm should keep raising its price until profits are maximized, which must happen on an elastic portion of the demand curve.

Another way to see this is to note that on an inelastic portion of the demand curve, marginal revenue is negative. Increasing quantity requires a greater percentage reduction in price, so revenue declines. Since a firm maximizes profit where marginal cost equals marginal revenue, and marginal cost is never negative, the profit-maximizing quantity can never occur where marginal revenue is negative, so can never be on an inelastic portion of the demand curve.

15. The government could create monopoly power for the Big Three U.S. automakers by restricting imported cars. Then the Big Three would face much less competition and could drive their prices up substantially.

16. Though Rod Stewart has a monopoly on his own singing, there are many other singers in the market. If Stewart were to raise his price too much, people would substitute to other singers. So there's no need for the government to regulate the price of his concerts.

17. a. Figure 15-11 shows the cost, demand, and marginal-revenue curves for the monopolist. Without price discrimination, the monopolist would charge price P_M and produce quantity Q_M.



b. The monopolist's profit consists of the two areas labeled X, consumer surplus is the two areas labeled Y, and the deadweight loss is the area labeled Z.

c. If the monopolist can perfectly price discriminate, it produces quantity Q_C, and has profit equal to $X+Y+Z$.

d. The monopolist's profit increases from X to $X+Y+Z$, an increase in the amount $Y+Z$. The change in total surplus is area Z. The rise in monopolist's profit is greater than the change in total surplus, since monopolist's profit increases both by the amount of deadweight loss (Z) and by the transfer for consumers to the monopolist (Y).

e. A monopolist would pay the fixed cost that allows it to discriminate as long as $Y+Z$ (the increase in profits) exceeds C (the fixed cost).

f. A benevolent social planner who cared about maximizing total surplus would want the monopolist to price discriminate only if Z (the deadweight loss from monopoly) exceeded C (the fixed cost) since total surplus rises by Z - C.

g. The monopolist has a greater incentive to price discriminate (it will do so if $Y+Z>C$) than the social planner would allow (she would allow it only if $Z>C$). Thus if $Z<C$ but $Y+Z>C$, the monopolist will price discriminate even though it's not in society's interest.

Chapter 16: Oligopoly

Questions for Review: Answers

1. If a group of sellers could form a cartel, they'd try to set quantity and price like a monopolist. They'd set quantity at the point where marginal revenue equals marginal cost, and set price at the corresponding point on the demand curve.

2. Firms in an oligopoly produce a quantity of output greater than the level produced by monopoly at a price less than the monopoly price.

3. Firms in an oligopoly produce a quantity of output less than the level produced by a perfectly competitive market at a price greater than the perfectly competitive price.

4. As the number of sellers in an oligopoly grows larger, an oligopolistic market looks more and more like a competitive market. The price approaches marginal cost, and the quantity produced approaches the socially efficient level.

5. The prisoners' dilemma is a game between two people or firms that illustrates why it is difficult for opponents to cooperate even when cooperation would make them all better off. If they were cooperating, each person or firm would have a great incentive to cheat.

6. The arms race, advertising, and common resources are some examples of how the prisoners' dilemma helps explain behavior. In the arms race in the Cold War, the United States and the Soviet Union couldn't agree on arms' reductions because each was fearful that after cooperating for a while, the other country would cheat. In advertising, two companies would be better off if neither advertised, but each is fearful that if it doesn't advertise, the other company will. When two companies share a common resource, they'd be better off sharing it. But fearful that the other company will overuse it, each company overuses it.

7. Antitrust laws prohibit firms from trying to monopolize a market. The laws are used to prevent mergers that would lead to excessive market power in any single firm and to prevent oligopolists from acting together in ways that would make their markets less competitive.

8. Resale price maintenance occurs when a wholesaler sets a minimum price that retailers can charge. This might seem to be anticompetitive because it prevents retailers from competing on price. But that's doubtful because: (1) if the wholesaler has market

power, it can exercise it through the wholesale price; (2) wholesalers have no incentive to discourage competition among retailers since doing so reduces the quantity sold; and (3) maintaining a minimum price may be valuable so retailers provide customers good service.

Problems and Applications: Answers

1. a. OPEC members were trying to reach an agreement to cut production so they could raise the price.

   b. They were unable to agree on cutting production because each country has an incentive to cheat on any agreement. The turmoil is a decline in the price of oil because of increased production.

   c. OPEC would like Norway and Britain to join their cartel so they could act like a monopoly.

2. a. If there were many suppliers of diamonds, price would equal marginal cost ($1 thousand), so quantity would be 12 thousand.

   b. With only one supplier of diamonds, quantity would be set where marginal cost equals marginal revenue. The following table derives marginal revenue:

Price ($ thousands)	Quantity (thousands)	Total Revenue ($ millions)	Marginal Revenue ($ millions)
8	5	40	
			2
7	6	42	
			0
6	7	42	
			-2
5	8	40	
			-4
4	9	36	
			-6
3	10	30	
			-8
2	11	22	
			-10
1	12	12	

With marginal cost of $1 thousand per diamond, or $1 million per thousand diamonds, the monopoly will maximize profits at a price of $7 thousand and quantity of 6 thousand. Additional production would lead to marginal revenue (0) less than marginal cost.

c. If Russia and South Africa formed a cartel, they would set price and quantity like a monopolist, so price would be $7 thousand and quantity would be 6 thousand. If they split the market evenly, they'd share total revenue of $42 million and costs of $6 million, for a total profit of $36 million. So each would produce 3 thousand diamonds and get a profit of $18 million. If Russia produced 3 thousand diamonds and South Africa produced 4 thousand, the price would decline to $6 thousand. South Africa's revenue would rise to $24 million, costs would be $4 million, so profits would be $20 million, which is an increase of $2 million.

d. Cartel agreements are often not successful because one party has a strong incentive to cheat to make more profit. In this case, each could increase profit by $2 million by producing an extra thousand diamonds. Of course, if both countries did this, both would lose profits.

3. a. Buyers who are oligopolists try to decrease the price of goods they buy.

b. The owners of baseball teams would like to keep players' salaries low. This goal is difficult to achieve because each team has an incentive to cheat on any agreement, since they'll be able to attract better players by offering more money.

c. The salary cap would have formalized the collusion on salaries and prevented any team from cheating.

4. Game theory is helpful for understanding markets with a few firms because with a small number of firms each firm must act strategically. Game theory isn't helpful for understanding markets with many firms, since each firm is so small that strategic interactions with other firms are not important.

5. Many answers are possible, such as picking which movie to see with your friend or negotiating the price of a car. The common link among all the activities is that there are just a few people involved who act strategically.

6. a. If Mexico imposes low tariffs, then the United States is better off with high tariffs, since it gets $30 billion with high tariffs and only $25 billion with low tariffs. If Mexico imposes high tariffs, then the United States is better off with

high tariffs, since it gets $20 billion with high tariffs and only $10 billion with low tariffs. So the United States has a dominant strategy of high tariffs.

If the United States imposes low tariffs, then Mexico is better off with high tariffs, since it gets $30 billion with high tariffs and only $25 billion with low tariffs. If the United States imposes high tariffs, then Mexico is better off with high tariffs, since it gets $20 billion with high tariffs and only $10 billion with low tariffs. So Mexico has a dominant strategy of high tariffs.

b. A Nash equilibrium is a situation in which economic actors interacting with one another each choose their best strategy given the strategies others have chosen. The Nash equilibrium in this case is for each country to have high tariffs.

c. The NAFTA agreement represents cooperation between the two countries. Each reduces tariffs and both are better off as a result.

d. The payoffs in the upper left and lower right parts of the box do reflect a nation's welfare. Trade is beneficial and tariffs are a barrier to trade. However, the payoffs in the upper right and lower left parts of the box aren't valid. A tariff hurts domestic consumers and helps domestic producers, but total surplus declines, as we saw in Chapter 9. So it would be more accurate for these parts of the box to show *both* countries' welfare decline if they imposed high tariffs, whether or not the other country had high or low tariffs.

7. a. Dropping the letter grade by two letters (e.g., A to C) if you have no fun gives the payoffs shown in this table:

		Your Decision	
		Work	Shirk
Classmate's Decision	Work	you: C classmate: C	you: B classmate: D
	Shirk	you: D classmate: B	you: D classmate: D

b. The likely outcome is that both of you will shirk. If your classmate works, you're better off shirking, because you'd rather have an overall B (a B grade and fun) then an overall C (an A grade and no fun). If your classmate shirks, you're indifferent between working for an overall D (a B grade with no fun) and shirking for an overall D (a D grade and fun). So your dominant strategy is to shirk. Your classmate faces the same payoffs, so will also shirk. But, if you're likely to work with the same person again, you have a greater incentive to work,

so that your classmate will work, so you'll both be better off. In repeated games, cooperation is more likely.

8. Even though the ban on cigarette advertising increased the profits of cigarette companies, it was good public policy because it reduced the quantity of cigarette consumption. Since cigarette consumption imposes an externality because of its health costs, the reduction in quantity is beneficial.

9. a. The decision box for this game is:

		American's Decision	
		low price	high price
Braniff's Decision	low price	Braniff: low profits American: low profits	Braniff: high profits American: very low profits
	high price	Braniff: very low profits American: high profits	Braniff: medium profits American: medium profits

b. If Braniff sets a low price, American will set a low price. If Braniff sets a high price, American will set a low price. So American has a dominant strategy to set a low price.

If American sets a low price, Braniff will set a low price. If American sets a high price, Braniff will set a low price. So Braniff has a dominant strategy to set a low price.

Since both have a dominant strategy to set a low price, the Nash equilibrium is for both to set a low price.

c. A better outcome would be for both airlines to set a high price; then they'd both get higher profits. But that outcome could only be achieved by cooperation (collusion). If that happened, consumers would lose because prices would be higher and quantity would be lower.

10. a. If Jones has 10 cows and Smith has 10, for a total of 20 cows, each cow produces $4,000 of milk. Since a cow costs $1,000, profits would be $3,000 per cow, or $30,000 for each farmer.

If one farmer had 10 cows and the other farmer had 20 cows, for a total of 30 cows, each cow produces $3,000 of milk. Profits per cow would be $2,000, so the farmer with 10 cows makes $20,000; the farmer with 20 cows makes $40,000.

If both farmers have 20 cows, for a total of 40 cows, each cow produces $2,000 of milk. Profit per cow is $1,000, so each farmer's profit is $20,000. The results are shown in the table:

		Smith's Decision	
		10 cows	20 cows
Jones's Decision	10 cows	Jones: $30,000 Smith: $30,000	Jones: $20,000 Smith: $40,000
	20 cows	Jones: $40,000 Smith: $20,000	Jones: $20,000 Smith: $20,000

b. If Jones had 10 cows, Smith would want 20 cows. If Jones had 20 cows, Smith would be indifferent (get the same profit) if he had 10 or 20 cows. So Smith has a dominant strategy of having 20 cows.

If Smith had 10 cows, Jones would want 20 cows. If Smith had 20 cows, Jones would be indifferent (get the same profit) if he had 10 or 20 cows. So Jones has a dominant strategy of having 20 cows.

The Nash equilibrium is for each farmer to have 20 cows, since that's the dominant strategy for each. They each make profits of $20,000. But they'd both be better off if they cooperated and each had only 10 cows; then profit would be $30,000 each.

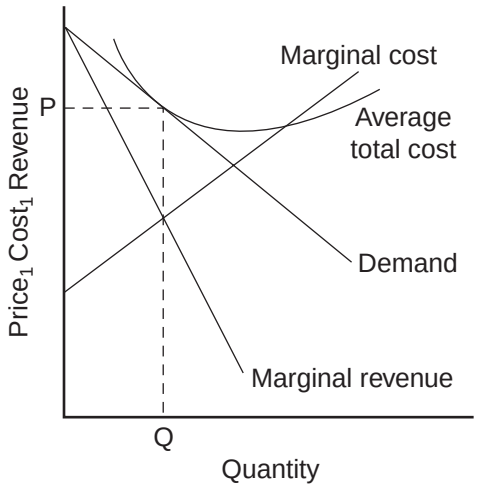
c. Since people tend to overuse common fields, it is more efficient for people to own their own portion of the field. So, over time, common fields have been divided up and owned privately.

Chapter 17: Monopolistic Competition

Questions for Review: Answers

1. The three attributes of monopolistic competition are: (1) there are many sellers; (2) each seller produces a slightly different product; and (3) firms can enter or exit the market without restriction. Monopolistic competition is like monopoly because firms face a downward-sloping demand curve, so price exceeds marginal cost. Monopolistic competition is like perfect competition because, in the long run, price equals average total cost, as free entry and exit drive economic profit to zero.

2. Figure 17-1 shows the long-run equilibrium in a monopolistically competitive market. Price equals average total cost. Price is above marginal cost.



3. Since, in equilibrium, price is above marginal cost, a monopolistic competitor produces too little output. But this is a hard problem to solve because: (1) the administrative burden of regulating the large number of monopolistically competitive firms would be high; and (2) because the firms are earning zero economic profits, forcing them to price at marginal cost means that firms would lose money unless the government subsidized them.

4. Advertising might reduce economic well-being because it's costly, manipulates people's tastes, and impedes competition by making products appear different than they really

are. But advertising might increase economic well-being by providing useful information to consumers and fostering competition.

5. Advertising with no apparent informational content might convey information to consumers if it provides a signal of quality. A firm won't be willing to spend much money advertising a low-quality good, but will be willing to spend significantly more advertising a high-quality good.

6. The two benefits that might arise from the existence of brand names are: (1) brand names provide consumers information about quality when quality can't be easily judged in advance; and (2) brand names give firms an incentive to maintain high quality to maintain the reputation of their brand names.

Problems and Applications: Answers

1. a. The market for #2 pencils is perfectly competitive since pencils by any manufacturer are identical and there are a large number of manufacturers.

   b. The market for bottled water is monopolistically competitive because of consumers' concerns about quality. As a result, each producer has a slightly different product.

   c. The market for copper is perfectly competitive, since all copper is identical and there are a large number of producers.

   d. The market for local telephone service is monopolistic because it is a natural monopoly—it's cheaper for one firm to supply all the output.

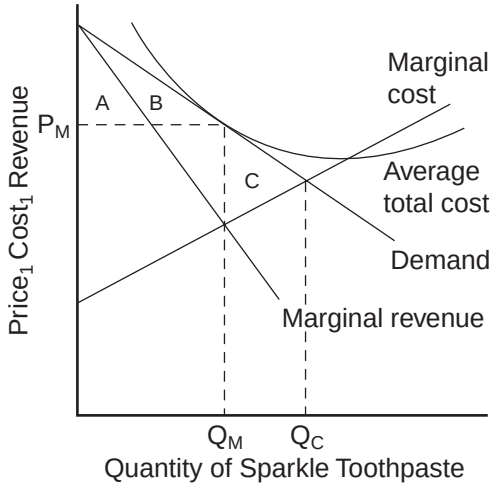
   e. The market for peanut butter is monopolistically competitive because different brand names exist with different quality characteristics.

   f. The market for lipstick is monopolistically competitive because lipstick from different firms differs slightly, but there are a large number of firms who can enter or exit without restriction.

2. A monopolistic firm produces a product for which there are no close substitutes, but a monopolistically competitive firm produces a product that is only somewhat different from substitute goods. So the goods differ in terms of the degree to which substitutes exist.

3. Monopolistically competitive firms don't increase the quantity they produce to lower the average cost of production because doing so would require them to lower their price. The loss in revenue from the lower price outweighs the benefits of the lower cost of production.

4. a. Figure 17-2 illustrates the market for Sparkle toothpaste in long-run equilibrium. The profit-maximizing level of output is Q_M and the price is P_M.



b. Sparkle's profit is zero, since at quantity Q_M, price equals average total cost.

c. The consumer surplus from the purchase of Sparkle toothpaste is area A+B. The efficient level of output occurs where the demand curve intersects the marginal-cost curve, at Q_C. So the deadweight loss is area C, the area above marginal cost and below demand, from Q_M to Q_C.

d. If the government forced Sparkle to produce the efficient level of output, the firm would lose money because average cost would exceed price, so the firm would shut down. If that happened, Sparkle's customers would lose their consumer surplus.

5. Since each firm in a monopolistically competitive market produces a product that's slightly different from other products, a monopolistically competitive market has a large number of products. But whether that number is optimal or not depends on two key externalities: the product-variety externality and the business-stealing externality. The product-variety externality is a positive externality to consumers from the introduction of a new product. The business-stealing externality is a negative

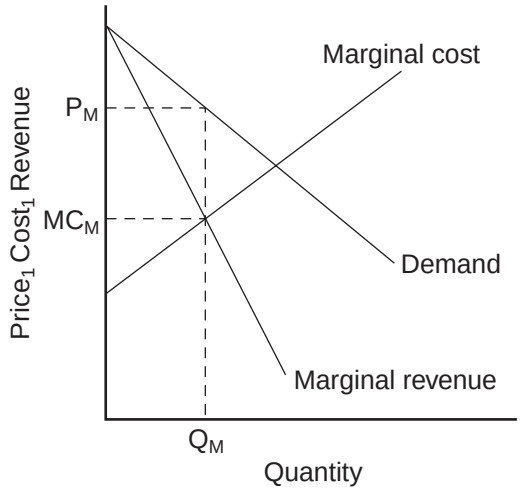
externality because other firms lose customers and profits from the addition of a new product. Since the entrant doesn't take these externalities into account in deciding whether or not to enter the market, it isn't clear whether the actual number of products will be optimal, above optimal, or below optimal.

6. The following table shows, under the market structures listed in the column headings, whether firms do the things listed in each row:

	Market Structure		
Do firms:	Perfect Competition	Monopolistic Competition	Monopoly
make differentiated products?	NO	YES	YES
have excess capacity?	NO	YES	YES
advertise?	NO	YES	YES
pick Q so that MR=MC?	YES	YES	YES
pick Q so that price=MC?	YES	NO	NO
earn economic profits in long-run equilibrium?	NO	NO	YES
face a downward-sloping demand curve?	NO	YES	YES
have MR less than price?	NO	YES	YES
face the entry of other firms?	YES	YES	NO
exit in the long run if profits are less than zero?	YES	YES	YES

7. By sending Christmas cards to their customers, monopolistically competitive firms are advertising themselves. Since they're in a position in which price exceeds marginal cost, they'd like more customers to come in, as shown in Figure 17-3. Since the price,

P_M, exceeds marginal cost, MC_M, any additional customer who pays the existing price increases the firm's profits.



8. If you were thinking of entering the ice-cream business, you'd want to make ice cream that is slightly different from the existing brands. By differentiating your product from others, you gain some market power.

9. Many answers are possible. The answers should explain that commercials are socially useful to the extent that they provide consumers information about the product or demonstrate from the existence of the commercial that the product is worth advertising, so isn't of low quality. They are socially wasteful to the extent that they manipulate people's tastes and try to make products seems more different than they really are.

10. a. A family-owned restaurant would be more likely to advertise than a family-owned farm because the output of the farm is sold in a competitive market, in which there's no reason to advertise, while the output of the restaurant is sold in a monopolistically competitive market.

    b. A manufacturer of cars is more likely to advertise than a manufacturer of fork-lifts because there's little difference between different brands of industrial products like fork-lifts, while there are greater perceived differences between consumer products like cars.

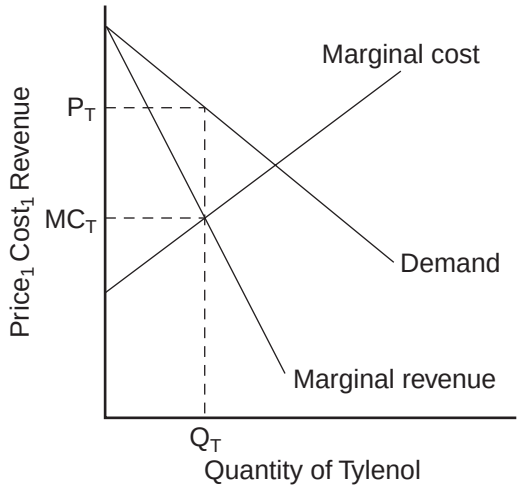
    c. A company that invented a reliable watch is likely to advertise more than a company that invented a less reliable watch that costs the same amount to make because the company with the reliable watch will get many repeat sales over

time to cover the cost of the advertising, while the company with the less reliable watch will not.

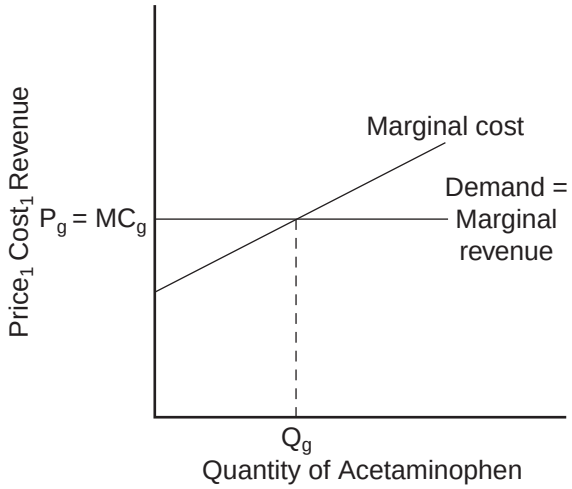
11. a. Perdue created a brand name for chicken by advertising. By doing so, he was able to differentiate his product from other chicken, gaining market power.

b. Society gained to the extent that Perdue has a great incentive to maintain the quality of his chicken. Society lost to the extent that the market for chicken became less competitive, with the associated deadweight loss.

12. a. Figure 17-4 shows Tylenol's demand, marginal revenue, and marginal cost curves. Tylenol's price is P_T, its marginal cost is MC_T, and its markup over marginal cost is $P_T - MC_T$.



b. Figure 17-5 shows the demand, marginal revenue, and marginal cost curves for a maker of acetaminophen. The diagrams differ in that the acetaminophen maker faces a horizontal demand curve, while the maker of Tylenol faces a downward-sloping demand curve. The acetaminophen maker has no markup of price over marginal cost, while the maker of Tylenol has a positive markup, because it has some market power.



c. The maker of Tylenol has a bigger incentive for careful quality control, because if quality were poor, the value of its brand name would deteriorate, sales would decline, and its advertising would be worth less.

Chapter 18: The Markets for the Factors of Production

Questions for Review: Answers

1.2 A firm's production function describes the relationship between the quantity of labor used in production and the quantity of output from production. The marginal product of labor is the increase in the amount of output from an additional unit of labor. Thus the marginal product of labor depends directly on the production function.

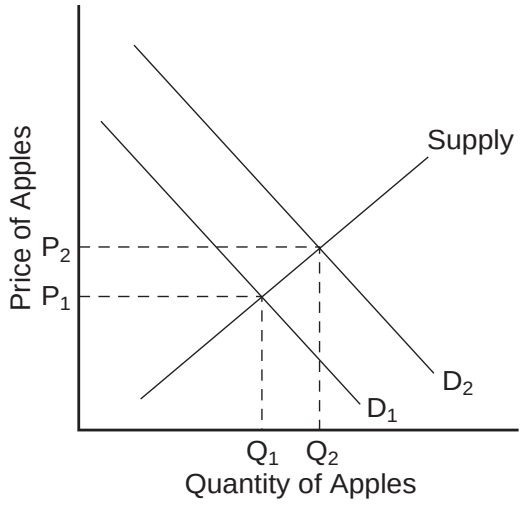
2.2 The value of the marginal product of labor is the marginal product of labor multiplied by the market price of the output.

3.2 A competitive, profit-maximizing firm hires workers up to the point where the value of the marginal product of labor equals the wage. As a result, the value-of-marginal-product curve is the labor-demand curve.

4.2 A large immigration would increase the supply of labor, thus reducing the wage. With more labor working with capital and land, the marginal product of capital and land is higher, so rents earned by owners of land and capital would increase.

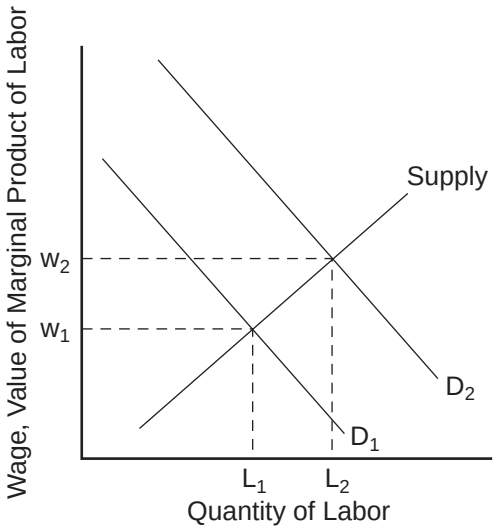
Problems and Applications: Answers

1.2 a.2 The law requiring people to eat one apple a day increases the demand for apples. As shown in Figure 18-1, demand shifts from D_1 to D_2, increasing the price from P_1 to P_2, and increasing quantity from Q_1 to Q_2.



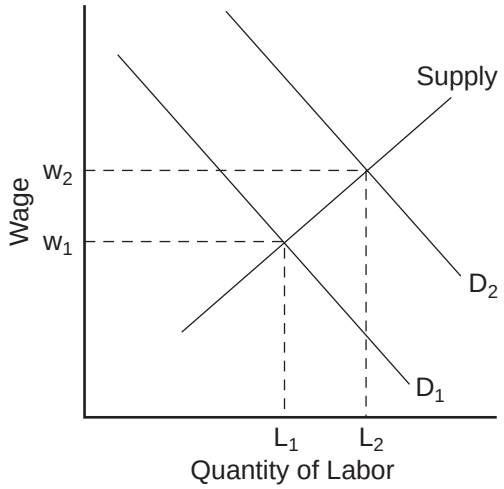
b. Since the price of apples increases, the value of marginal product increases for any given quantity of labor. There's no change in the marginal product of labor for any given quantity of labor. However, since output increases as firms hire more labor, the marginal product of labor decreases.

c. As Figure 18-2 shows, the increase in the value of marginal product of labor shifts the demand curve of labor from D_1 to D_2. The equilibrium quantity of labor rises from L_1 to L_2, and the wage rises from w_1 to w_2.

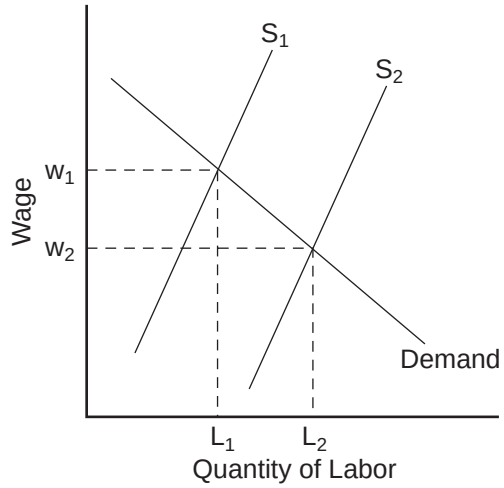


2. Henry Ford made the statement that "It is not the employer who pays wages--he only handles the money. It is the product that pays wages." In the language of economics, he means that the demand for labor is a derived demand. Wages depend on the price of the final product and on the demand for that product.

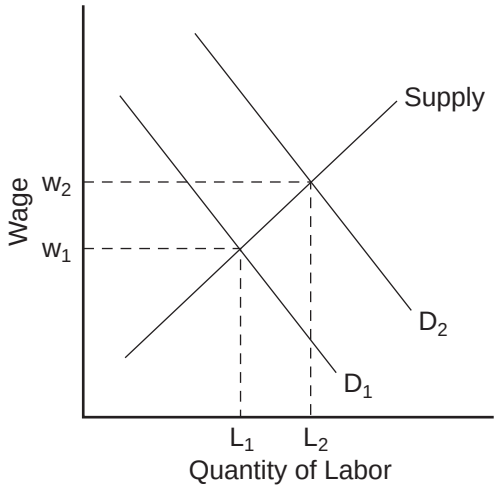
3. a. If Congress were to buy personal computers for all American college students, the demand for computers would increase, raising the price of computers and thus increasing the value of marginal product of workers who produce computers. This is shown in Figure 18-3 as a shift in the demand curve for labor from D_1 to D_2. The result is an increase in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2.



b. If more college students major in engineering and computer science, the supply of labor in the computer industry rises. This is shown in Figure 18-4 as a shift in the supply curve from S_1 to S_2. The result is a decrease in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2.



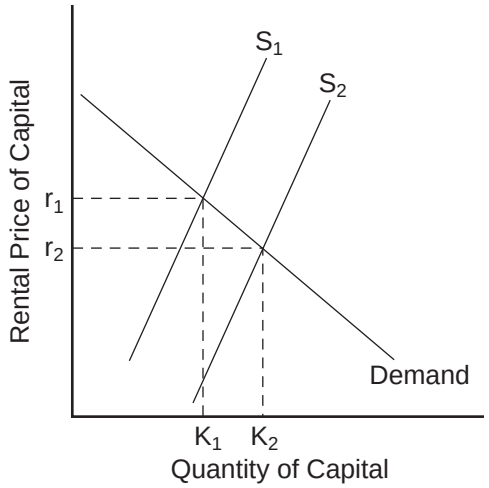
c. If computer firms build new manufacturing plants, this increases the marginal product of labor and the value of the marginal product of labor for any given quantity of labor. This is shown in Figure 18-5 as a shift in the demand curve for labor from D_1 to D_2. The result is an increase in the wage from w_1 to w_2 and an increase in the quantity of labor from L_1 to L_2.



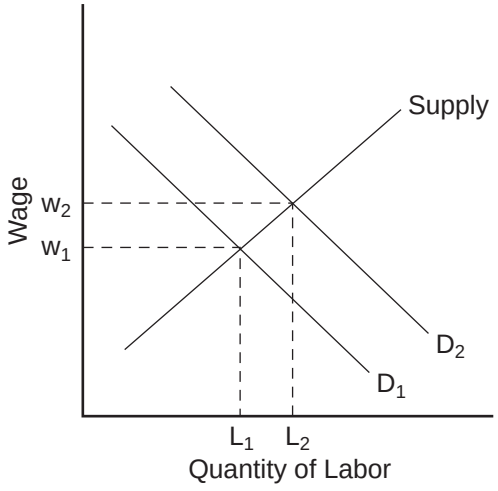
4. A profit-maximizing firm keeps adding more of a factor of production until the factor's value of marginal product equals its price, rather than hiring a smaller amount that would have a much higher value of marginal product. It does so because the increase in profit from hiring one additional unit of the factor of production is equal to the value of marginal product of the factor minus the price of the factor. So, as long as the value of marginal product of the factor exceeds the price of the factor, the firm should keep increasing the quantity of the factor because its profit will rise. As the firm increases the quantity of the factor, however, the value of the marginal product of the factor will decline, until it equals the price. At that point, the firm shouldn't add any more units of the factor, or else its profits will decline.

5. Since your uncle is maximizing his profit, he must be hiring workers such that their wage equals the value of their marginal product. Since the wage is \$6 per hour, their value of marginal product must be \$6 per hour. Since the value of marginal product equals the marginal product times the price of the good, and since the price of a sandwich is \$3, the marginal product of a worker must be 2 sandwiches per hour.

6. a. Figure 18-6 shows the U.S. capital market when there's an inflow of capital from abroad. The inflow of capital shifts the supply curve to the right, from S_1 to S_2. The result is a reduction in the rental rate on capital from r_1 to r_2 and an increase in the quantity of capital from K_1 to K_2.



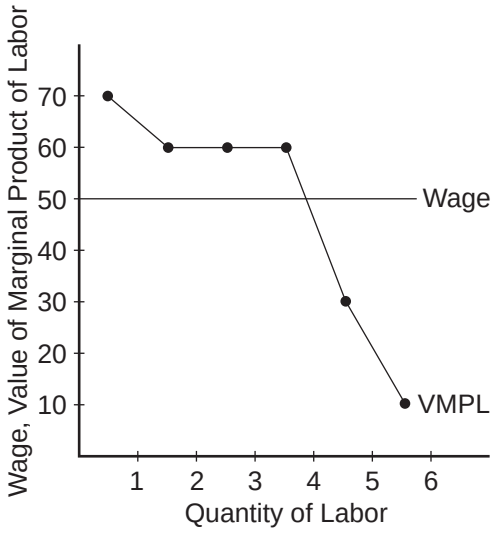
b. The increase in capital increases the marginal product of labor and the value of marginal product of labor for any given quantity of labor. Figure 18-7 shows this as a shift in the demand for labor from D_1 to D_2. As a result, the wage rate rises from w_1 to w_2 and the quantity of labor rises from L_1 to L_2.



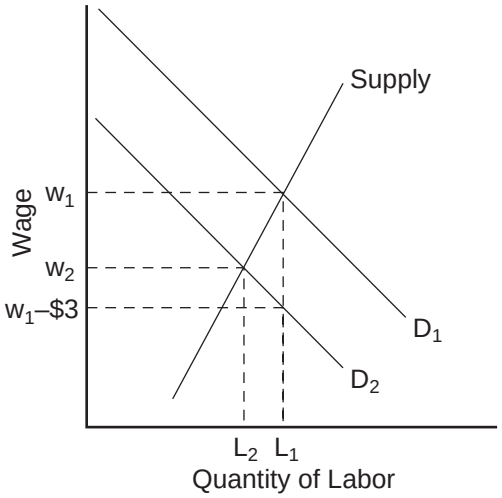
7. The following table shows the marginal product of labor and the value of the marginal product of labor:

L	Q	MPL	VMPL
0	0		
		7	70
1	7		
		6	60
2	13		
		6	60
3	19		
		6	60
4	25		
		3	30
5	28		
		1	10
6	29		

Figure 18-8 plots the firm's demand for labor. Since the wage is $50 per day, the firm should hire four workers. For each of the first four workers, the value of the marginal product of labor exceeds the wage. But for more than four workers, the value of the marginal product is less than the wage. So the firm maximizes profit by hiring four workers.



8. a. If a firm already gives workers fringe benefits valued at more than \$3, the new law would have no effect. But a firm that currently has fringe benefits less than \$3 would be affected by the law. Imagine a firm that currently pays no fringe benefits at all. The requirement that it pay fringe benefits of \$3 reduces the value of marginal product of labor effectively by \$3 in terms of the cash wage the firm is willing to pay. This is shown in Figure 18-9 as a downward shift in the firm's demand for labor from D_1 to D_2, a shift down of exactly \$3.



b. Since the supply curve has a positive but finite slope, the new equilibrium will be one in which the new wage, w_2, is less than the old wage, w_1, but $w_2 > w_1$ - \$3. The quantity of labor also declines.

If the labor supply curve is vertical, then w_2 would equal w_1 - \$3, and there would be no change in the quantity of labor.

c. The preceding analysis is incomplete, of course, because it ignores the fact that the fringe benefits are valuable to workers. As a result, the supply curve of labor will increase, shown as a shift to the right in the supply of labor in Figure 18-10. In general, workers would prefer cash to specific benefits, so the mandated fringe benefits aren't worth as much as cash would be. But in the case of fringe benefits there are two offsetting advantages: (1) fringe benefits aren't taxed; and (2) firms offer cheaper provision of health care than workers could purchase on their own. So whether the fringe benefits are worth more or less than \$3 depends on which of these effects dominates.

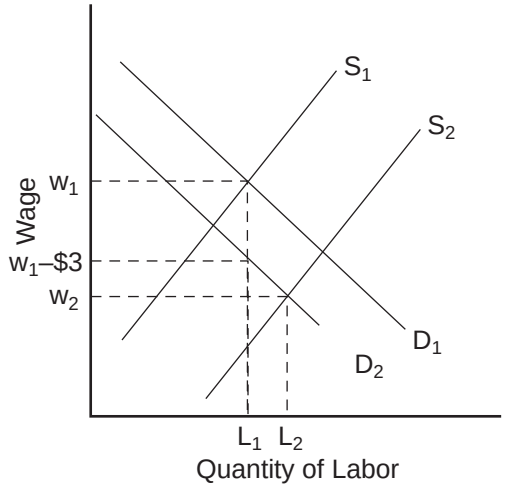
Figure 18-10 is drawn under the assumption that the fringe benefits are worth more than \$3 to the workers. In this case, the new wage, w_2, is less than w_1 - \$3 and the quantity of labor increases from L_1 to L_2.

If the shift in the supply curve were the same as the shift in the demand curve, then $w_2 = w_1$ - \$3 and the quantity of labor remains unchanged.

If the shift in the supply curve were less than the shift in the demand curve, then $w_2 > w_1$ - \$3 and the quantity of labor decreases.

In all three cases there's a lower wage and higher quantity of labor than if the supply curve were unchanged.

d. Since a minimum-wage law wouldn't allow the wage to decline when greater fringe benefits are mandated, it would lead to increased unemployment, because firms would refuse to pay workers more than the value of their marginal product.



9. a. A union is like a monopoly firm in that it is the only supplier of labor, just as a monopoly is the only supplier of the good.

b. Just as a monopoly firm wants to maximize profits, a labor union may wish to maximize the labor income of its members.

c. Just as the monopoly price exceeds the competitive price in the market for a good, the union wage exceeds the free-market wage in the market for labor. And just as the quantity of output of a monopoly is less than the quantity produced by a competitive industry, employment by a unionized firm is less than employment by a non-unionized firm, since the union wage is higher.

d. Unions might wish to maximize total labor income of their members, or they might want the highest wage possible, or they might wish to have the greatest employment possible. In addition, they may wish to have improved working conditions, increased fringe benefits, or input into a firm's decisions.

Chapter 19: Earnings and Discrimination

Questions for Review: Answers

1. Coal miners get paid more than other workers with similar amounts of education. Their higher wage compensates them for the dirty and dangerous nature of coal mining, as well as their long-term health problems. As a result, they earn a sizable compensating differential.

2. Education is a type of capital because it represents an expenditure of resources at one point in time to raise productivity in the future.

3. Education might raise a worker's wage without raising the worker's productivity if education provides a signal that the worker has high ability.

4. Deciding whether a group of workers has a lower wage because of discrimination is difficult because people differ in other attributes, such as the amount of education they have, the amount of experience they have, and the possibility of compensating differentials.

5. The forces of economic competition tend to ameliorate discrimination on the basis of race, since business owners who care only about making money are at an advantage when competing against those who also care about discriminating.

6. Discrimination can persist in a competitive market if customers have a preference for discrimination. For example, if customers prefer blonde waiters to brunettes, restaurants will prefer to hire blonde waiters and they will discriminate against brunettes.

Problems and Applications: Answers

1. a. The opportunity cost of taking a job as a summer intern that pays little or nothing is that a person could make higher wages at a different job.

   b. Despite the low wages, students are willing to take internships because an internship might help them land a permanent job with the firm or the government later. Also, the internship enhances the student's resume. Finally, the student may gain valuable on-the-job training.

c. You would expect that students who were interns make higher incomes later in life.

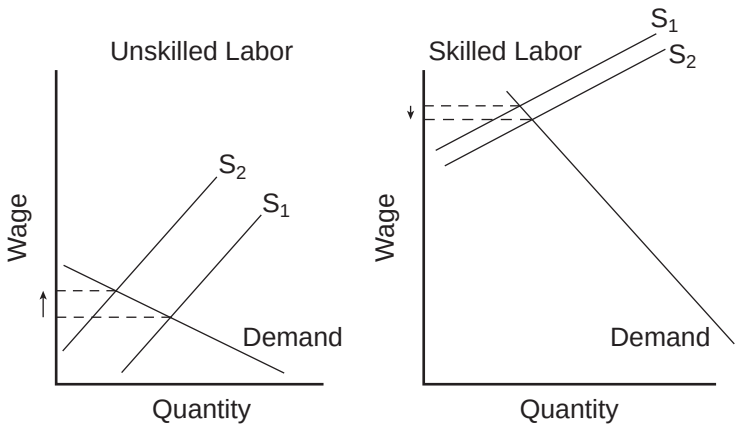
2. The single minimum wage might distort the labor market for teenage workers more than for adult workers because: (1) teenagers have a lower value of marginal product, so it's more likely that the minimum wage will be above their value of marginal product; and (2) the demand for teenage labor is more elastic than for adult labor, so the minimum-wage law distorts the market more.

3. People with more experience usually have had more on-the-job training than others with the same formal education but less experience. Such training increases the value of the marginal product of their labor. Job tenure is also valuable, since people gain job-specific knowledge or a specialization in knowledge that's useful to the firm.

4. Since the demand for college-educated workers increased fairly steadily in both the 1970s and 1980s, yet wages were stagnant in the 1970s and rose in the 1980s, there must have been differences in supply. In this case, there was a greater increase in the supply of college-educated workers in the 1970s and this supply shift kept wages from rising. In the 1980s, supply didn't rise as much, so the increased demand led to rising wages.

5. By the value of skills, we mean the gap between the earnings of skilled and unskilled workers. In developing countries, there are relatively few skilled workers, which means the value of skilled labor is higher relative to the value of unskilled labor and is thus paid a relatively higher wage. The scarcity of skilled workers may have arisen because developing countries aren't wealthy enough to invest as much in human capital. (Note, however, that because skilled workers in developing countries work with less capital than skilled workers in industrialized countries, skilled workers in developing countries are likely to have lower earnings than skilled workers in industrialized countries.)

6. The increased training for unskilled workers would reduce the supply of unskilled workers and increase the supply of skilled workers, as Figure 19-1 shows. In the left panel, the reduced supply of unskilled workers increases the wages of unskilled workers. The increase in supply of skilled workers reduces their wage. As a result, income inequality declines.



7. a. Economics professors may receive higher salaries than professors in some other fields because they have better opportunities outside academia. For example, they could find jobs in the private sector or the government.

   b. Differences in teaching loads can make up for lower pay. If professors in all fields are paid the same, the pay level is probably below what economics professors could earn elsewhere. To attract economics professors, the university would have to offer them some other compensation, such as a lower teaching load.

8. The development of recording devices led to a superstar phenomenon in which the best musicians were paid significantly more than average musicians. So the income of the best musicians rose and the income of the average musician fell.

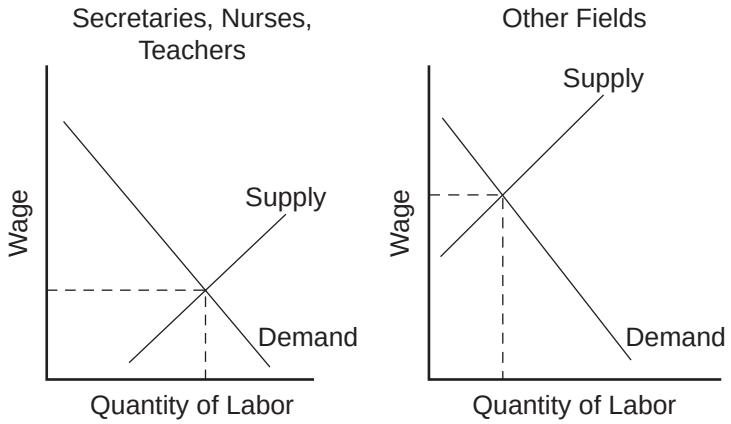
9. You might claim that Alan is despicable because he is discriminating against women. Some might claim that Alan was admirable, though, since he is maximizing profit and giving women a better opportunity to find a job. If more employers were like Alan, the wage differential between men and women would shrink, as employers would be competing for women workers, so women would have as many job options as men. Ultimately, the wage differential could disappear.

10. Even if all the difference in earnings between black workers and white workers could be attributed to differences in years of schooling and school quality, that would not imply that there was no discrimination. There could be discrimination in school quality, for example, with black students being sent to schools of lower quality. Those schools might get fewer tax dollars because of discrimination, so would be of lower quality. In addition, black children could be discouraged from attending school or going on to college.

11. It's pretty difficult to discriminate against people without seeing some characteristic of theirs that you don't like. It's possible to discriminate against the type of person who serves you a meal in a restaurant because you can see him or her. But you can't discriminate against people who make manufactured goods that are sold in retail stores because you can't observe who's producing the goods.

12. a. Figure 19-2 shows a situation in which young women are channelled into careers as secretaries, nurses, and teachers. The left panel shows the labor market for secretaries, nurses, and teachers, and the right panel shows the labor market for other fields. The supply of people in the secretarial, nursing, and teaching fields depresses the wage in those fields relative to other fields.

    b. Over time, if both men and women pursue more varied fields of work, the wages across fields should equalize. The average wages of men should decline relative to the average wages of women.



13. By the "pattern" of market work, O'Neill means that many women drop out of the labor force for several years to start families and to care for their children when they are young. This means they have less experience and job tenure, on average, than men of the same age and education. Consequently, they are paid less.

14. If brunette workers don't like working with blonde workers, a blonde worker's marginal product of labor is likely to be lower, since the firm's output won't be as high compared to the case if the firm had a brunette worker instead. Thus firms might find that blonde workers weren't worth as much and would reduce their wages relative to brunette workers. A profit-maximizing entrepreneur could create a firm using all blonde workers, so there would be no frictions between brunette and blonde workers. If there were many such entrepreneurs, over time the wage differential between brunette and blonde workers would disappear.

Chapter 20: The Distribution of Income

Questions for Review: Answers

1. The richest fifth of the U.S. population earns about ten times as much income as the poorest fifth.

2. The most likely groups to live in poverty are blacks and Hispanics, children, and families headed by a female adult without a husband present.

3. Since people may have temporarily high or low income and since income varies over the life cycle (people's incomes are lower when young and higher when older), annual income doesn't represent true inequality in living standards.

4. A utilitarian would like everyone to have equal incomes, but would recognize that redistributing income distorts incentives, so would proceed only part way to that goal. A liberal would go further than a utilitarian in equalizing incomes, since a liberal would focus on how well off is the worst-off person in society. A libertarian would not care about equalizing incomes at all as long as the process of getting income is fair.

5. In-kind transfers are beneficial because they ensure that the poor get what they need most. In particular, they get food and shelter instead of alcohol and drugs. But in-kind transfers aren't as beneficial to the recipients as cash because they provide no opportunity for substitution into more highly valued goods. The poor are in the best position to know what they need.

Problems and Applications: Answers

1. The factors contributing to the increase in income inequality in the United States during the past 20 years are the breakup of families, making poor families even poorer, and the increase in the number of two-career families, making rich families even richer.

2. The income received by the top fifth of the population was especially high in 1935 because in the middle of the Great Depression many people were unemployed. As a result, national income fell sharply. People with high incomes who kept their jobs thus earned a substantially higher proportion of national income.

3. The percentage of children in families with income below the poverty line is almost twice the percentage of the elderly in such families because the Social Security system

supports the elderly quite well, but the AFDC (Aid for Families with Dependent Children) program has bad incentive effects that tend to keep families from working their way out of poverty.

4. Students' current incomes are substantially less than their permanent incomes, so current incomes don't reflect their standards of living very well. They may borrow now or be supported by their parents, but their college education will pay off with higher future income.

5. a. People may not be able to smooth out their consumption completely because the risk of default may make it hard for them to get loans or there may be a higher interest rate when they borrow than the interest rate when they lend.

   b. Because it isn't always easy to borrow against permanent income, basing measures of inequality solely on permanent income is problematic.

6. a. To increase economic mobility within a generation, the government could support training programs (to provide skills to unskilled workers) and workfare instead of welfare (to help the poor increase their incomes).

   b. To increase economic mobility across generations, the government might increase its support for education.

   c. The advantage of reducing spending on welfare to increase spending on programs that enhance economic mobility is that it gives people greater incentive to work hard to get ahead. The disadvantages are that such programs are expensive and are hard on those who don't make it.

7. Community 1 has ten families with income of $100 each and ten families with income of $20 each. Community 2 has ten families with income of $200 each and ten families with income of $22 each.

   a. Community 2 has more unequal income than community 1. In community 2 the rich have nearly ten times the income of the poor, while in community 1 the rich have only five times the income of the poor. However, the problem of poverty is likely to be slightly worse in community 1, since the poor have lower income.

   b. Rawls would prefer the distribution of income in community 2, since the worst-off family has more income than in community 1.

c. Most people will prefer the income distribution of community 2, since both rich and poor families are better off than their counterparts in community 1, even though inequality is greater.

8. a. Leaks in the bucket are caused by the administrative costs of redistributing income, people who lie about their income to cheat the system, and the fact that labor supply is elastic, so that redistributive taxes reduce labor supply.

b. Generally, Republicans believe the redistributive bucket is more leaky than do Democrats. As a result, they think the government should do less redistribution of income than do Democrats.

9. a. A utilitarian would argue that the marginal utility of the person with an income of $10,000 is higher than the marginal utility of someone with an income of $30,000, so income should be redistributed.

b. Rawls would prefer the second distribution since the worst-off person is better off than in the first distribution.

c. Nozick wouldn't find either more equitable. He would think the most equitable distribution is the one in which people got what they deserved. If the rules of the game are fair, either distribution is quite acceptable.

10. A person who believed that the government should help poor children but not poor adults would be more likely to advocate in-kind transfers rather than cash welfare payments. In-kind payments would include food and clothes to ensure that children's basic needs were taken care of and that the parents weren't squandering money on things for themselves.

11. a. If people received cash instead of Medicaid benefits, it's unlikely that they'd spend as much on health care. Instead, they'd substitute for other things.

b. This suggests that we probably shouldn't value in-kind transfers at the price the government pays for them. They aren't worth as much as their cash equivalent.

c. Since the poor would prefer other things to Medicaid, it might be better to give them cash transfers instead.

12. a. The following table shows pre-tax income, taxes paid to the government (a negative amount means money is received from the government), and after-tax income (all figures in thousands of dollars):

Pre-tax Income	Taxes	After-tax Income
0	-10	10
10	- 5	15
20	0	20
30	5	25
40	10	30

b. The marginal tax rate is 50 percent, since an increase in pre-tax income of $10,000 leads to higher taxes of $5,000. The maximum income at which a family receives money from the government is $20,000.

c. The change in the tax schedule gives a marginal tax rate of 25 percent. The maximum income at which a family receives money from the government is now $40,000.

d. The advantage of the first tax schedule is that the after-tax income distribution would be more equal. The advantage of the second tax schedule is that the marginal tax rate would be lower, so it wouldn't cause as much of a distortion to labor supply.

13. Since John believes that labor supply is highly elastic, he will want less redistribution of income, because elastic labor supply means a greater distortion from redistributive policies.

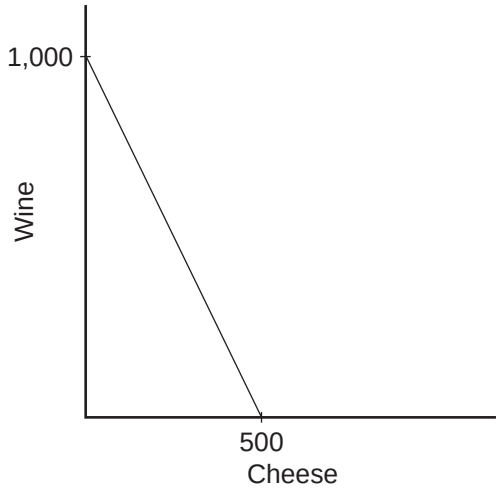
14. a. If you agree with the statement that "Every parent has the right to work hard and save in order to give his or her children a better life," then you'll think inheritance taxes should be low. If you disagree, you'll think inheritance taxes should be high.

b. If you agree with the statement that "No child should be disadvantaged by the sloth or bad luck of his or her parents," then you'll think inheritance taxes should be high. If you disagree, you'll think inheritance taxes should be low.

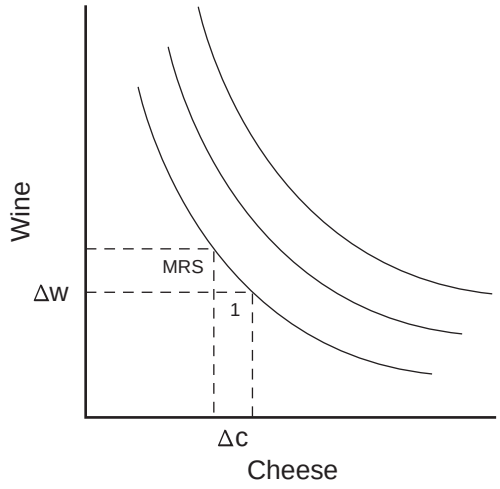
Chapter 21: The Theory of Consumer Choice

Questions for Review: Answers

1.1 Figure 21-1 shows the consumer's budget constraint. The intercept on the horizontal axis shows how much cheese the consumer could buy if she bought only cheese; with income of $3,000 and the price of cheese $6 a pound, she could buy 500 pounds of cheese. The intercept on the vertical axis shows how much wine the consumer could buy if she bought only wine; with income of $3,000 and the price of wine $3 a glass, she could buy 1,000 glasses of wine. With cheese on the horizontal axis and wine on the vertical axis, the budget constraint has a slope of 1,000/500 = 2. Note that if you'd put wine on the horizontal axis and cheese on the vertical axis, the budget constraint would have a slope of 500/1,000 = 1/2.

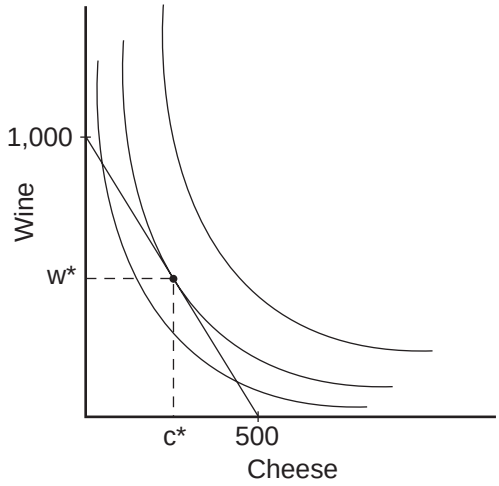


2.1 Figure 21-2 shows a consumer's indifference curves for wine and cheese. Four properties of these indifference curves are: (1) higher indifference curves are preferred to lower ones because more is preferred to less; (2) indifference curves are downward sloping because if the quantity of wine in reduced, the quantity of cheese must increase for the consumer to be equally happy; (3) indifference curves do not cross since a consumer prefers more to less; and (4) indifference curves are bowed inward since a consumer is more willing to trade away wine if she has a lot of it and less willing to trade away cheese if she has little of it.

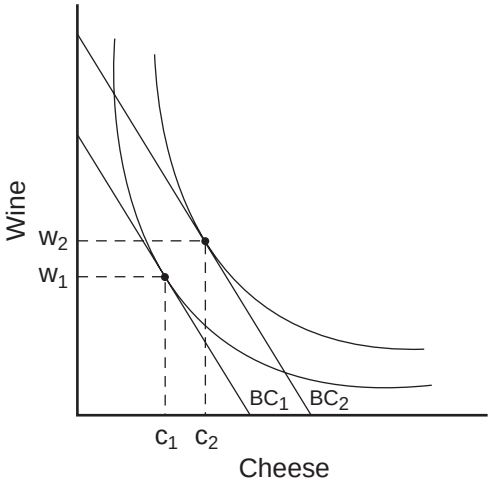


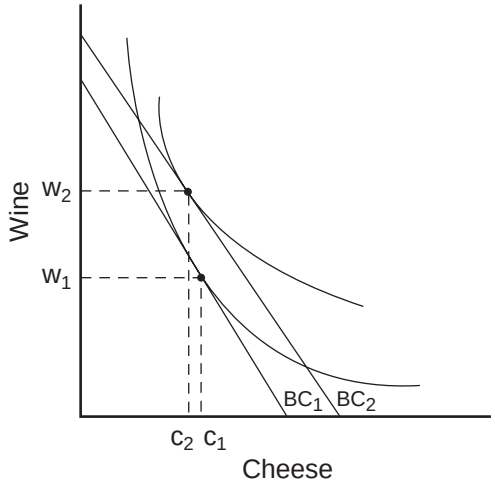
3. In Figure 21-2, the marginal rate of substitution (MRS) of one point on an indifference curve is shown. The marginal rate of substitution shows the amount of wine the consumer would be willing to give up to get one more pound of cheese.

4. Figure 21-3 shows the consumer's budget constraint and indifference curves for wine and cheese. The consumer's optimum consumption choice is shown as w^* and c^*. Since the marginal rate of substitution equals the relative price of the two goods at the optimum, the marginal rate of substitution is \$6/\$3 = 2.

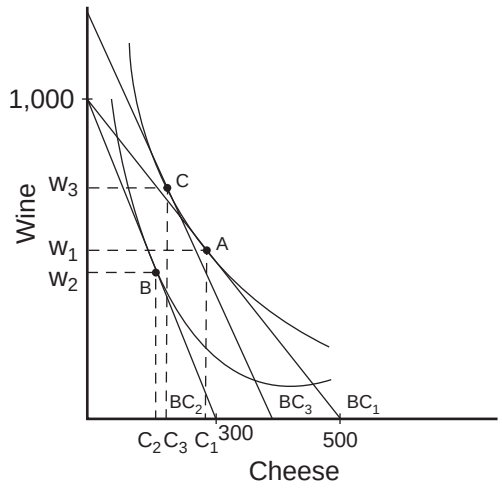


5. Figure 21-4 shows the effect of an increase in income. The rise in income shifts the budget constraint out from BC_1 to BC_2. If both wine and cheese are normal goods, consumption of both increases. If cheese is an inferior good, the increase in income causes the consumption of cheese to decline, as shown in Figure 21-5.





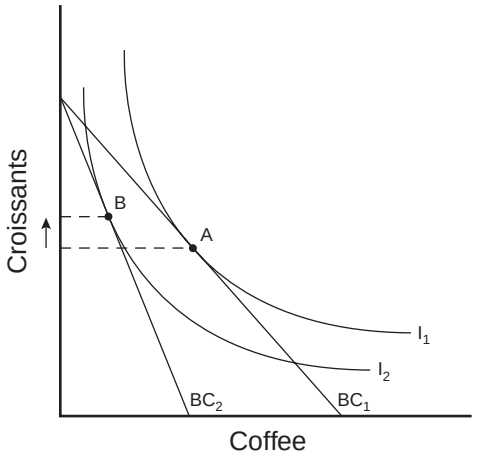
6. A rise in the price of cheese from \$6 to \$10 a pound makes the horizontal intercept of the budget line decline from 500 to 300, as shown in Figure 21-6. The consumer's budget constraint shifts from BC_1 to BC_2 and her optimal choice changes from point A (c_1 cheese, w_1 wine) to point B (c_2 cheese, w_2 wine). To decompose this change into income and substitution effects, we draw in budget constraint BC_3, which is parallel to BC_2 but tangent to the consumer's initial indifference curve at point C. The movement from point A to C represents the substitution effect. Since cheese became more expensive, the consumer substitutes wine for cheese as she moves from point A to C. The movement from point C to B represents an income effect. The rise in the price of cheese results in an effective decline in income.



7. An increase in the price of cheese could induce a consumer to buy more cheese if cheese is a Giffen good. In that case, the income effect of the rise in the price of cheese induces the consumer to buy more cheese if cheese is an inferior good. If the income effect is bigger than the substitution effect (which induces the consumer to buy less cheese), the consumer would buy more cheese.

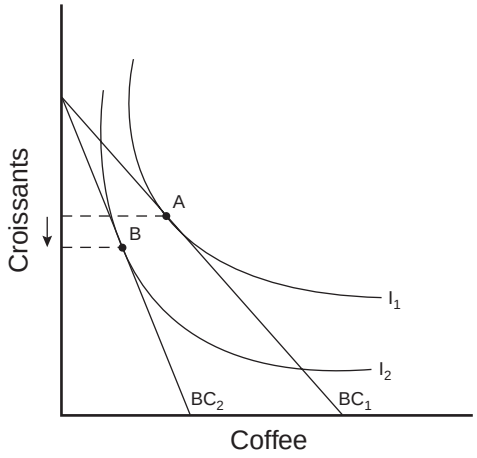
Problems and Applications: Answers

1. a. Figure 21-7 shows the effect of the frost on Jennifer's budget constraint. Since the price of coffee rises, her budget constraint swivels from BC_1 to BC_2.



b. If the substitution effect outweighs the income effect for croissants, Jennifer buys more croissants and less coffee, as shown in Figure 21-7. She moves from point A to point B.

c. If the income effect outweighs the substitution effect for croissants, Jennifer buys fewer croissants and less coffee, moving from point A to point B in Figure 21-8.

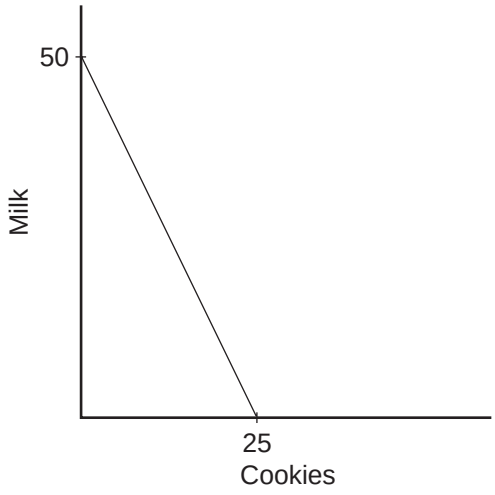


2. Indifference curves between Coke and Pepsi are fairly straight, since there is little to distinguish them, so they are nearly perfect substitutes. Indifference curves between skis and ski bindings are very bowed, since they are complements. A consumer will respond more to a change in the relative price of Coke and Pepsi, possibly switching completely from one to the other if the price changes.

3. a. Cheese and crackers cannot both be inferior goods, since if Mario's income rises he must consume more of something.

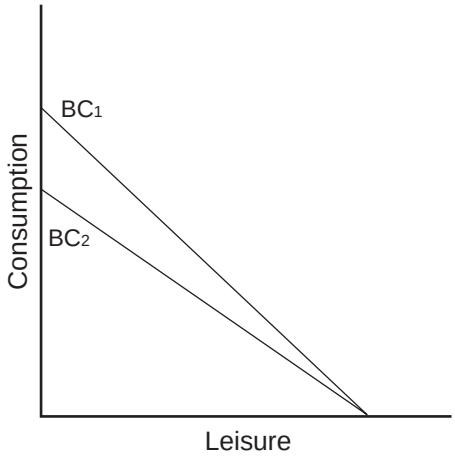
   b. If the price of cheese falls, the substitution effect means Mario will consume more cheese and less crackers. The income effect means Mario will consume more cheese (since cheese is a normal good) and less crackers (since crackers are an inferior good). So, both effects lead Mario to consume more cheese and less crackers.

4. a. Figure 21-9 shows Jim's budget constraint. The vertical intercept is 50 quarts of milk, since if Jim spent all his money on milk he would buy \$100/\$2 = 50 quarts of it. The horizontal intercept is 25 dozen cookies, since if Jim spent all his money on cookies he would buy \$100/\$4 = 25 dozen cookies.

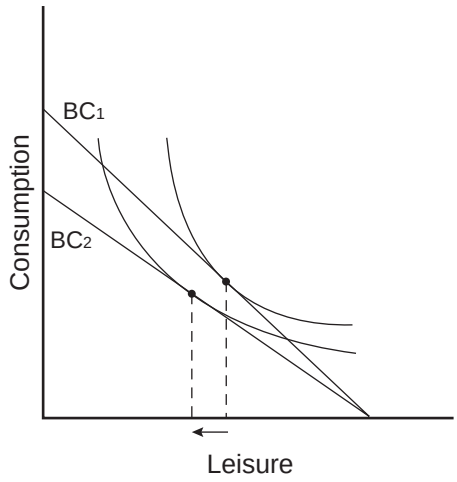


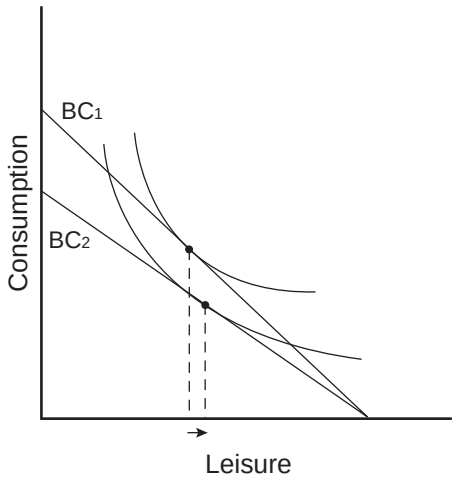
   b. If Jim's salary rises by 10 percent to \$110 and the prices of milk and cookies rise by 10 percent to \$2.20 and \$4.40, Jim's budget constraint would be unchanged. Note that \$110/\$2.20 = 50 and \$110/\$4.40 = 25, so the intercepts of the new budget constraint would be the same as the old budget constraint. Since the budget constraint is unchanged, Jim's optimal consumption is unchanged.

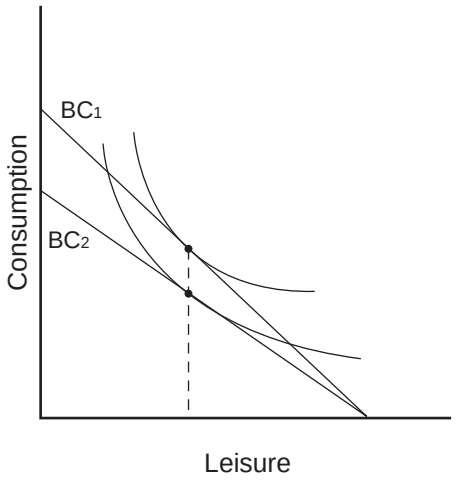
5. a. Budget constraint BC_1 in Figure 21-10 shows the budget constraint if you pay no taxes. Budget constraint BC_2 shows the budget constraint with a 15 percent tax.



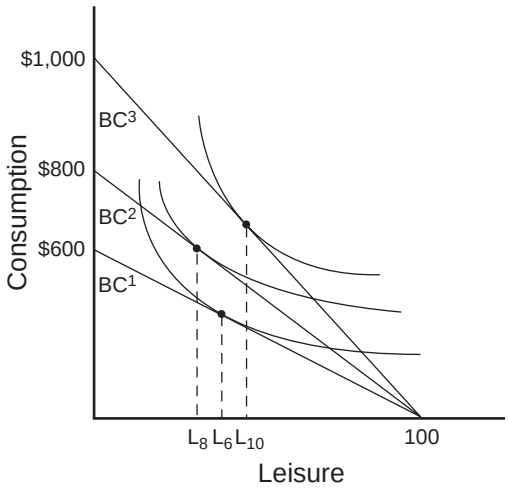
b. Figure 21-11 shows indifference curves for which a person will work more because of the tax, Figure 21-12 shows indifference curves for which a person will work fewer hours because of the tax, and Figure 21-13 shows indifference curves for which a person will work the same number of hours after the tax.



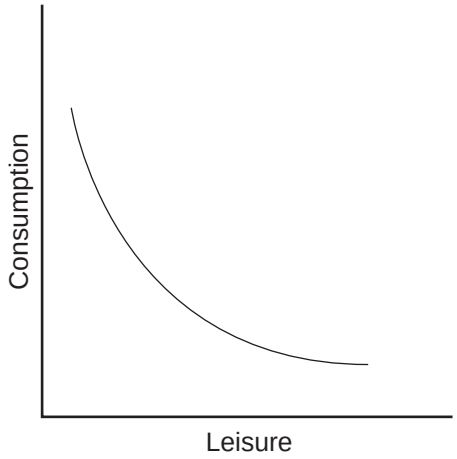




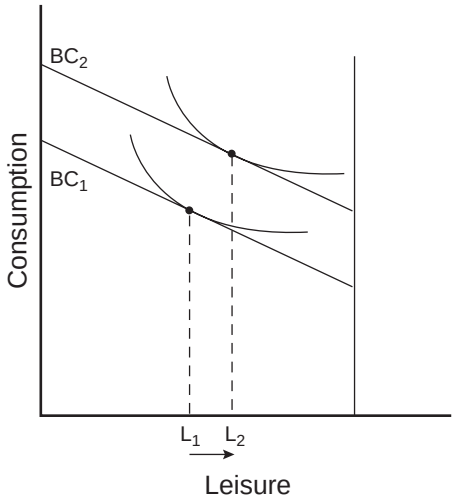
6. Figure 21-14 shows Sarah's budget constraints and indifference curves if she earns \$6 (BC_1), \$8 (BC_2), and \$10 (BC_3) per hour. At a wage of \$6 per hour, she works 100 - L_6 hours; at a wage of \$8 per hour, she works 100 - L_8 hours; and at a wage of \$10 per hour, she works 100 - L_{10} hours. Since the labor supply curve is upward-sloping when the wage is between \$6 and \$8 per hour, $L_6 > L_8$; since the labor supply curve is backward-sloping when the wage is between \$8 and \$10 per hour, $L_{10} > L_8$.



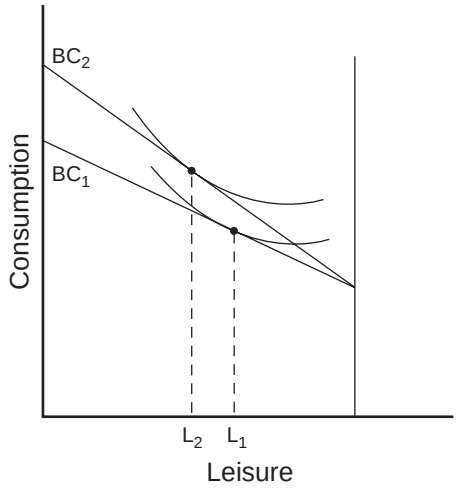
7. Figure 21-15 shows the indifference curve between leisure and consumption that determines how much a person works. An increase in the wage leads to both an income effect and a substitution effect. The higher wage makes the budget constraint steeper, so the substitution effect increases consumption and reduces leisure. But the higher wage has an income effect that increases both consumption and leisure if both are normal goods. The only way that consumption could decrease if the wage increased would be if consumption is an inferior good and if the negative income effect outweighs the positive substitution effect. This could happen for a person who really valued leisure.



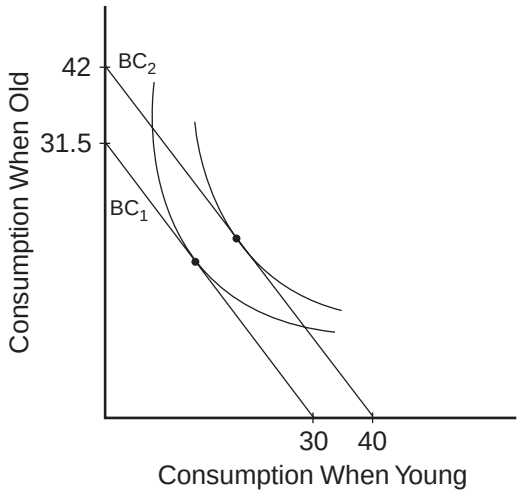
8. a. Figure 21-16 shows how a rise in the income of a husband can lead to a fall in the number of hours worked by his wife. The increase in the income of the husband is shown by a shift of the wife's budget constraint from BC_1 to BC_2. Since her income is higher, if leisure is a normal good, she'll want more leisure and thus work less, as the figure shows.



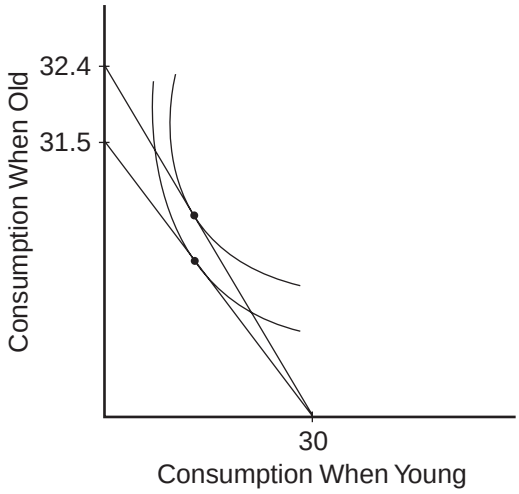
b. Figure 21-17 shows how a rise in female wages affects a woman's decision of how many hours to work. The rise in wages leads to a substitution effect, which decreases leisure and increase work hours, and an income effect, which increases leisure and decreases work hours if leisure is a normal good. If the substitution effect dominates, the woman will work more hours, as the figure shows.



9. a. Figure 21-18 shows the situation in which your salary increases from $30,000 to $40,000. With numbers shown in thousands of dollars in the figure, your initial budget constraint, BC_1, has a horizontal intercept of 30, since you could spend all your income when young. The vertical intercept is 31.5, since if you spent nothing when young and saved all your income, earning 5 percent interest, you'd have $31,500 to spend when old. If your salary increases to $40,000, your budget constraint shifts out in a parallel fashion, with intercepts of 40 and 42, respectively. This is an income effect only, so if consumption when young and old are both normal goods, you'll spend more in both periods.

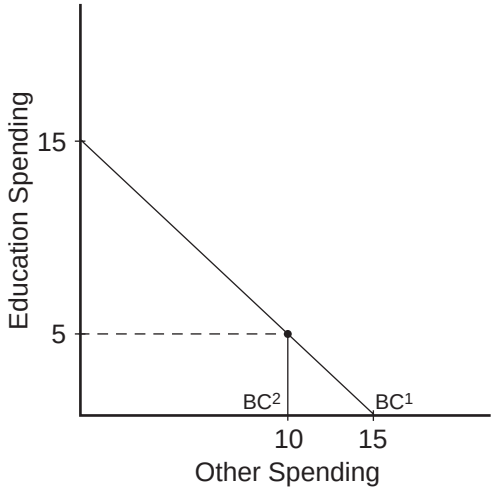


b. If the interest rate on your bank account rises to 8 percent, your budget constraint swivels. If you spend all your income when young, you'll spend just $30,000, as before. But if you save all your income, your old-age consumption increases to $30,000 x 1.08 = $32,400, compared to $31,500 before. As Figure 21-19 indicates, the steeper budget line leads you to substitute future consumption for current consumption. But the income effect of the higher return on your saving leads you to want to increase both future and current consumption if both are normal goods. The result is that your consumption when old certainly rises and your consumption when young could increase or decrease, depending on whether the income or substitution effect dominates.

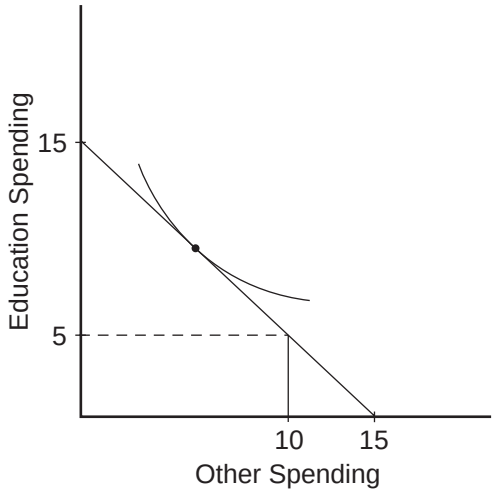


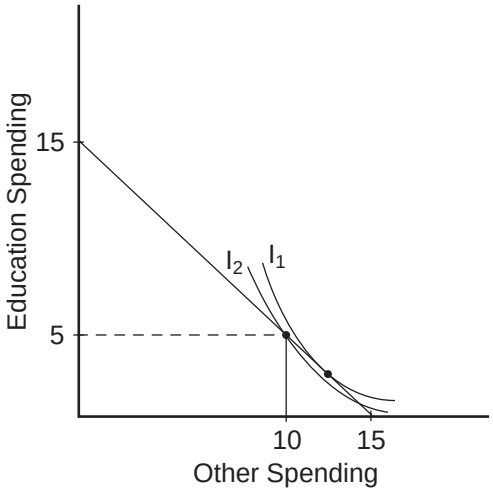
10. The decline in the interest rate on savings has both income and substitution effects, since it causes the budget constraint to swivel. Since consumption when old effectively becomes more expensive relative to consumption when young, there's a subsitution effect that increases consumption when young and decreases consumption when old. The lower interest rate also leads to a negative income effect, causing both consumption when young and consumption when old to decline if both are normal goods. Combining both effects, consumption when old definitely declines and consumption when young might rise or fall, depending on whether the income or substitution effect is stronger.

11. a. Under the existing policy, the town's budget constraint between education spending and other spending is BC_1, a straight line between \$15 million in education spending and \$15 million in other spending, as shown in Figure 21-20. The governor's proposal would require that education spending be at least \$5 million, which cuts off the portion of the budget constraint beyond other spending of \$10 million, making the budget constraint (BC_2) vertical at that point, as shown.



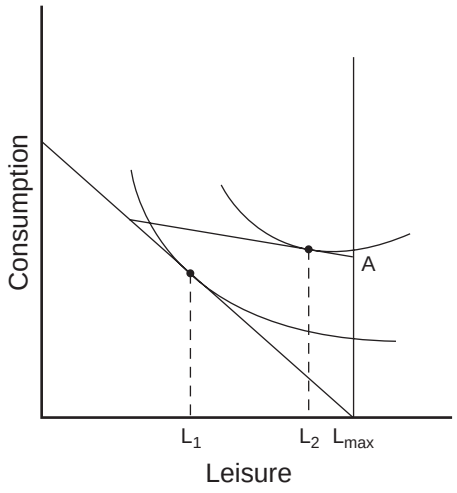
b. If the town would have spent more than $5 million on education anyway, then the new policy has no effect, as shown in Figure 21-21. Since the indifference curve is such that the town chooses to spend more than $5 million on education, the new constraint doesn't change anything. But if the town would have spent less than $5 million on education, the new policy would lead them to increase their spending on education, but would make them worse off, as Figure 21-22 shows. Under the old policy, they could reach indifference curve I_1, but under the new policy, the best they can do is to reach indifference curve I_2, representing a lower level of welfare.





c. Since Youngsville is probably already spending more than the mandated amount on education, the new policy will have no effect. But since Oldsville probably isn't spending that much, the proposal is likely to force Oldsville to increase its educational spending--precisely the place where it isn't needed or wanted.

12. a. Figure 21-23 shows the effects of the welfare program. Without the program, the budget constraint would begin on the horizontal axis at point L_{max} when the family earns no labor income and would have a slope equal to the wage rate. The program provides income of a certain amount if the family earns no labor income, shown as the point A on the figure. Then, if income is earned, the welfare payment is reduced, so the slope of the budget line is less than the slope of the budget line without welfare. At the point where the two budget lines meet, the welfare program provides no further support.



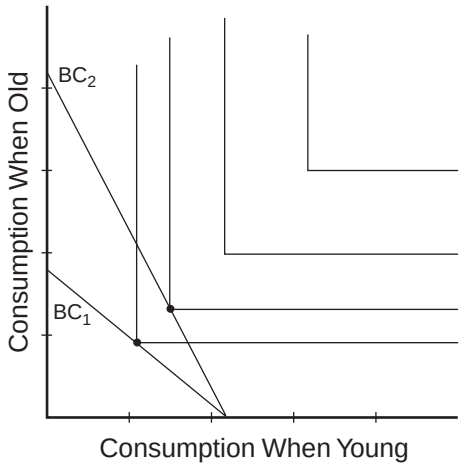
b. The figure shows how indifference curves could be shaped, indicating a reduction in the number of hours worked by the family because of the welfare program. Since the welfare budget constraint is flatter, there's a substitution effect away from consumption and towards leisure. Since the welfare budget constraint is farther from the origin, there's an income effect that increases both consumption and leisure, if both are normal goods. The overall effect is that the change in consumption is ambiguous and the family will want to have more leisure; hence, it will reduce its labor supply.

c. There's no doubt that the family's well-being is increased, since the welfare program gives them consumption and leisure opportunities that weren't available before.

13. a. A lower tax rate would give rise to income and substitution effects on a person's choice of consumption and leisure. The income effect would increase both consumption and leisure, if both are normal goods, since the reduction in the tax rate leaves more after-tax income. The lower tax rate would increase the slope of the budget constraint, so the substitution effect would increase consumption and decrease leisure. The net result is an increase in consumption and an ambiguous effect on leisure, and thus an ambiguous effect on labor supply.

b. An increase in the amount on which no tax is owed would be a pure income effect. If both consumption and leisure are normal goods, both would increase, so labor supply would decrease.

14. a. If a person's utility depends on the lowest level of consumption during her two periods of life, then her indifference curves between consumption when young and consumption when old will be right angles, with the angle occurring where consumption in the two periods are equal, as shown in Figure 21-24.



b. The budget constraint, BC_1, is shown in the figure. Note that the optimum occurs where the budget constraint just hits one of the right-angled indifference curves.

c. An increase in the interest rate shifts the budget constraint to BC_2. Since consumption when young must equal consumption when old, the person increases consumption in both periods. Thus the person saves less even though the interest rate increased. In this case, there's no substitution effect from the higher interest rate, because of the shape of the indifference curves. The only effect is an income effect, leading the person to increase consumption in both periods.

Chapter 22: Measuring a Nation's Income
(Macro Chapter 10)

Questions for Review: Answers

1. An economy's income must equal its expenditure, since every transaction has a buyer and a seller. Expenditure by buyers equals income by sellers.

2. The production of a luxury car contributes more to GDP than the production of an economy car because the luxury car has a higher market value.

3. The contribution to GDP is $3, the market value of the bread, which is the final good that is sold.

4. The sale of used records doesn't affect GDP at all because it involves no current production.

5. The four components of GDP are consumption, such as the purchase of a music CD, investment, such as the purchase of a computer by a business, government purchases, such as the purchase of military aircraft, and net exports, such as the sale of American wheat to Russia.

6.

Year	Nominal GDP	Real GDP	Deflator
2001	100 x $2 = $200	100 x $2 = $200	($200/$200) x 100 = 100
2002	200 x $3 = $600	200 x $2 = $400	($600/$400) x 100 = 150

The percentage change in nominal GDP is (600-200)/200 x 100 = 200%. The percentage change in real GDP is (400-200)/200 x 100 = 100%. The percentage change in the deflator is (150-100)/100 x 100 = 50%.

7. It is desirable for a country to have a large GDP because people could enjoy higher expenditures. But GDP isn't the only important measure of well-being. For example, laws that restrict pollution cause GDP to be lower. If laws against pollution were eliminated, GDP would be higher but the pollution might make us worse off. Or, for example, an earthquake would raise GDP, as expenditures on cleanup, repair, and rebuilding increase. But an earthquake is a pretty undesirable event that lowers our welfare.

Problems and Applications: Answers

1. a. consumption increases; b. investment increases; c. consumption increases, investment decreases; d. consumption increases; e. government purchases increase; f. consumption increases, net exports decrease; g. investment increases

2. With transfer payments, nothing is produced, so there is no contribution to GDP.

3. Purchases of new housing are included in the investment portion of GDP because housing lasts for a long time. For the same reason, purchases of new cars could be thought of as investment, but by convention, they are not. The logic could apply to any durable good, such as household appliances.

4. If GDP included goods that are resold, it would be counting output of that particular year, plus sales of goods produced in a previous year. It would double-count goods that were sold more than once and would count goods in GDP in several years if they were produced in one year and resold in another.

5. The advantage of using prices in counting GDP is that it counts goods according to their economic value, that is, their opportunity cost. Other methods, such as using sizes or weights, wouldn't tell you much about the value of economic resources used in production.

6.

Year	Nominal GDP (billions)	GDP Deflator
1993	$6,343	124
1994	$6,738	126

   a. The growth rate of nominal income is ($6,738 - $6,343)/$6,343 x 100% = 6.2%.

   b. The growth rate of the deflator is (126-124)/124 x 100% = 1.6%.

   c. Real income in 1993 is $6,343/(124/100) = $5,115.

   d. Real income in 1994 is $6,738/(126/100) = $5,348.

   e. The growth rate of real income is ($5,348 - $5,115)/$5,115 x 100% = 4.6%.

   f. The growth rate of nominal income is higher than the growth rate of real income because of inflation.

7. Economists ignore the rise in people's incomes that is caused by higher prices because although incomes are higher, the prices of the goods and services that people buy are also higher. Thus economists prefer to look at real GDP instead of nominal GDP.

8. Many possible answers.

9. To tell if the farmer is better off, you'd need to know if the prices of the goods she buys have increased by more or by less than the prices of the goods she sells.

10. Knowing that the GDP of China is three times that of Sweden doesn't tell you which country is better off economically. Most importantly, the populations of the two countries are quite different. A better measure of economic well-being would be GDP per person.

11. In countries like India, people produce and consume a fair amount of food at home that is not included in GDP. So GDP per person in India and the United States will differ by more than their comparative economic well-being.

12. If the government cares about the total income of Americans, it will emphasize GNP, since that measure includes the income of Americans that is earned abroad. If the government cares about the total amount of economic activity occurring in the United States, it will emphasize GDP, which measures production in the country, whether produced by domestic citizens or foreigners.

13. a. The increased labor-force participation of women has increased GDP in the United States, since it means more people are working.

    b. If our measure of well-being included time spent working in the home and taking leisure, it wouldn't rise as much as GDP, since the rise in women's labor-force participation has reduced time spent working in the home and taking leisure.

    c. Other aspects of well-being that are associated with the rise in women's increased labor-force participation include increased self-esteem and prestige for women in the workforce, especially at managerial levels, but decreased quality time spent with children, whose parents have less time to spend with them. Such aspects would be quite difficult to measure.

Chapter 23: Measuring the Cost of Living

[Chapter 11: Measuring the Cost of Living]

Questions for Review: Answers

1. A 10 percent increase in the price of chicken has a greater effect on the consumer price index than a 10 percent increase in the price of caviar because chicken is a bigger part of the average consumer's market basket.

2. The three problems in the consumer price index as a measure of the cost of living are: (1) substitution bias, which arises because people substitute toward goods that have become relatively less expensive; (2) the introduction of new goods, which are not reflected quickly in the CPI; and (3) unmeasured quality change.

3. If the price of a Navy submarine rises, there is no effect on the consumer price index, since Navy submarines aren't consumer goods. But the GDP price index is affected, since Navy submarines are included in GDP.

4. Since the overall price level doubled, but the price of the candy bar rose sixfold, the real price (the price adjusted for inflation) of the candy bar tripled.

5. The nominal interest rate is the rate of interest paid on a loan in dollar terms. The real interest rate is the rate of interest corrected for inflation. The real interest rate is the nominal interest rate minus the rate of inflation.

Problems and Applications: Answers

1. a. The price of tennis balls increases 0%; the price of tennis racquets increases 50% [=($60-$40)/$40 x 100%]; the price of Gatorade increases 100% [= ($2 - $1)/$1 x 100%].

   To find the percentage change in the overall price level, follow these steps:

   1. Determine the fixed basket of goods: 100 balls, 10 racquets, 200 Gatorades

   2. Find the price of each good in each year:

Year	balls	racquets	Gatorade
1998	$2	$40	$1
1999	$2	$60	$2

3. Compute the cost of the basket of goods in each year:
   1998: (100 x $2) + (10 x $40) + (200 x $1) = $800
   1999: (100 x $2) + (10 x $60) + (200 x $2) = $1,200

4. Choose one year as a base year (1998) and compute the CPI in each year:
   1998: $800/$800 x 100 = 100
   1999: $1,000/$800 x 100 = 150

5. Use the CPI to compute the inflation rate from the previous year:
   1999: (150 - 100)/100 x 100% = 50%

b. Tennis racquets are less expensive relative to Gatorade, since their price rose 50% while the price of Gatorade rose 100%. The well-being of some people changes relative to the well-being of others. Those who purchase a lot of Gatorade become worse off relative to those who purchase a lot of tennis racquets or tennis balls.

2. To find the percentage change in the overall price level, follow these steps:

a. Determine the fixed basket of goods: 100 heads of cauliflower, 50 bunches of broccoli, 500 carrots

b. Find the price of each good in each year:

Year	cauliflower	broccoli	carrots
1998	$2	$1.50	$.10
1999	$3	$1.50	$.20

c. Compute the cost of the basket of goods in each year:
   1998: (100 x $2) + (50 x $1.50) + (500 x $.10) = $325
   1999: (100 x $3) + (50 x $1.50) + (500 x $.20) = $475

d. Choose one year as a base year (1998) and compute the CPI in each year:
   1998: $325/$325 x 100 = 100
   1999: $475/$325 x 100 = 146

e. Use the CPI to compute the inflation rate from the previous year:
   1999: (146-100)/100 x 100% = 46%

3. Since the CPI rose 637%, that means [CPI(1997)-CPI(1947)]/CPI(1947) x 100% = 637%, so CPI(1997)/CPI(1947) -1 = 6.37, so CPI(1997)/CPI(1947) = 7.37. So if an

item costs under 7.37 times as much in 1997 than it did in 1947, then it's relatively less expensive. The easiest way to see this is to take the 1947 price, multiply it by 7.37, and compare it to the 1997 price.

University of Iowa tuition: \$130 x 7.37 = \$958 < \$2,470, so the 1997 cost is higher
gallon of gasoline: \$0.23 x 7.37 = \$1.70 > \$1.22, so the 1997 cost is lower
phone call: \$2.50 x 7.37 = \$18.42 > \$0.45, so the 1997 cost is lower
day in hospital: \$35 x 7.37 = \$258 < \$2,300, so the 1997 cost is higher
hamburger: \$0.15 x 7.37 = \$1.11 > \$0.59, so the 1997 cost is lower

4. a. Since the increase in cost was considered a quality improvement, there was no increase registered in the CPI.

   b. The argument in favor of this is that consumers are getting a better good than before, so the price increase equals the improvement in quality. The problem is that the increased cost might exceed the value of the improvement in air quality, so consumers are worse off. In this case, it would be better for the CPI to at least partially reflect the higher cost.

5. a. introduction of new goods; b. unmeasured quality change; c. substitution bias; d. unmeasured quality change; e. substitution bias

6. a. (40¢ - 15¢)/15¢ x 100% = 167%.

   b. (\$10.82 - \$3.35)/\$3.35 x 100% = 223%.

   c. In 1970: \$.15/(\$3.35/60) = 2.7 minutes. In 1990: \$.40/(\$10.82/60) = 2.2 minutes.

   d. Workers' purchasing power rose in terms of newspapers.

7. a. If the elderly consume the same market basket as other people, Social Security would provide the elderly with an improvement in their standard of living each year because the CPI overstates inflation and Social Security payments are tied to the CPI.

   b. Since the elderly consume more health care than younger people, and since health care costs have risen faster than overall inflation, it's possible that the elderly are worse off. To investigate this, you'd need to put together a market basket for the elderly, which would have a higher weight on health care. You'd then compare the rise in the cost of the "elderly" basket with that of the general basket for CPI.

8. a. When inflation is higher than was expected, the real interest rate is lower than expected. For example, suppose the market equilibrium has an expected real interest rate of 3% and people expect inflation to be 4%, so the nominal interest rate is 7%. If inflation turns out to be 5%, the real interest rate is 7% minus 5% equals 2%.

   b. Since the real interest rate is lower than was expected, the lender loses and the borrower gains.

   c. Homeowners in the 1970s who had fixed-rate mortgages from the 1960s benefited from the unexpected inflation, while the banks who made the mortgage loans lost a lot of money.

9. a. With a nominal interest rate of 3% and inflation of 0%, the real interest rate is 3% - 0% = 3%. The after-tax real interest rate is [3% - (3% x .33)] - 0% = 2%. The effective tax rate on real interest income is (3% - 2%)/3% x 100% = 33%.

   b. With a nominal interest rate of 6% and inflation of 3%, the real interest rate is 6% - 3% = 3%. The after-tax real interest rate is [6% - (6% x .33)] - 3% = 1%. The effective tax rate on real interest income is (3% - 1%)/3% x 100% = 67%.

   c. Inflation discourages saving by interacting with the tax system to increase the tax rate on interest income.

10. When bracket creep occurred, inflation increased people's nominal incomes, pushing them into higher tax brackets, so they had to pay a higher proportion of their incomes in taxes, even though they weren't getting higher *real* incomes. As a result, real tax revenue rose.

Chapter 24: Production and Growth

[Chapter 12: Production and Growth]

Questions for Review: Answers

1. GDP measures both an economy's total income and its total expenditures on goods and services. This dual meaning tells us that a society's standard of living depends on its productivity.

2. The four determinants of productivity are: (1) physical capital, which is the stock of equipment and structures that are used to produce goods and services; (2) human capital, which consists of the knowledge and skills that workers acquire through education, training, and experience; (3) natural resources, which are inputs into production that are provided by nature; and (4) technological knowledge, which is the understanding of the best ways to produce goods and services.

3. A college degree is a form of capital—human capital, to be precise. The skills learned in gaining a college degree increase a worker's productivity.

4. Higher saving means fewer resources are devoted to consumption and more to producing capital goods. The rise in the capital stock leads to rising productivity and more rapid growth in GDP for a while. In the long run, the higher saving rate leads to a higher standard of living. A policymaker might be deterred from trying to raise the rate of saving because doing so requires that people reduce their consumption today and it can take a long time to get to a higher standard of living.

5. A higher rate of saving leads to a higher growth rate temporarily, not permanently. In the short run, increased saving leads to a larger capital stock and faster growth. But as growth continues, diminishing returns to capital mean growth slows down and eventually settles down to its initial rate, though this may take several decades.

6. Removing a trade restriction, such as a tariff, would lead to more rapid economic growth because the removal of the trade restriction acts just as an improvement in technology.

7. The higher the rate of population growth, the lower the level of GDP per person because there's less capital per person, hence lower productivity.

8. The U.S. government tries to encourage advances in technological knowledge by providing research grants through the National Science Foundation and the National

Institute of Health, with tax breaks for firms engaging in research and development, and through the patent system.

Problems and Applications: Answers

1. The facts that countries import many goods and services yet must produce a large quantity of goods and services itself to enjoy a high standard of living are reconciled by noting that there are substantial gains from trade. By producing many goods and services, then trading them for goods and services produced in other countries, a nation maximizes its standard of living.

2. a. Producing cars requires a factory with machines, robots, and an assembly line, as well as human capital that comes from training workers.

   b. Producing high-school educations requires books and buildings as well as human capital from the teachers.

   c. Producing plane travel requires planes and airports as well as human capital in terms of pilots' knowledge.

   d. Producing fruits and vegetables requires irrigation systems, harvesting machinery, and trucks to transport the goods to the market, as well as human capital in the form of agricultural knowledge.

3. Today's standard of living differs from those of our great-grandparents because of improved transportation, communications, entertainment, machinery for household work, and computers, among other things.

4. In the manufacturing sector, employment has fallen sharply while output remains about the same percentage of GDP as before. This is good for our economy because it is the result of increased productivity. Many manufactured goods are much cheaper than they used to be.

5. a. More investment would lead to faster economic growth in the short run.

   b. The change would benefit many people in society who would have higher incomes as the result of faster economic growth. However, there might be a transition period in which workers and owners in consumption-good industries would get lower incomes, and workers and owners in investment-good industries would get higher incomes.

6. a. Private consumption spending includes buying food and buying clothes; private investment spending includes people buying houses and firms buying computers. Many other examples are possible.

   b. Government consumption spending includes paying workers to administer government programs; government investment spending includes buying military equipment and building roads. Many other examples are possible.

7. The opportunity cost of investing in capital is the loss of consumption that results from redirecting resources towards investment. A country can "over-invest" in capital if people would prefer to have higher consumption spending and less future growth. The opportunity cost of investing in human capital is also the loss of consumption that is needed to provide the resources for investment. A country could "over-invest" in human capital if people were too highly educated for the jobs they could get--for example, if the best job a Ph.D. in philosophy could find is managing a restaurant.

8. a. When a German firm opens a factory in South Carolina, it represents foreign direct investment.

   b. The investment increases U.S. GDP since it increases production in the United States. The effect on U.S. GNP would be smaller since the owners would get paid a return on their investment that would be part of German GNP rather than U.S. GNP.

9. a. The United States benefited from the Japanese investment since it made our capital stock larger, increasing our economic growth.

   b. It would have been better for the United States to make the investments itself since then it would have received the returns on the investment itself, instead of the returns going to Japan.

10. Greater educational opportunities for women could lead to faster economic growth in the countries of South Asia because increased human capital would have increased productivity and there would have been external effects from greater knowledge in the country.

11. An increase in the length of time a patent lasts would provide a greater incentive to do research. But this could lead to a decline in the growth rate of GDP because a patent represents an element of monopoly power, so firms that have patents might reduce their production.

12. a. Political stability could lead to strong economic growth by making the country attractive to investors. The increased investment would raise economic growth.

b. Strong economic growth could lead to political stability because when people have high incomes they tend to be satisfied with the political system and are less likely to overthrow or change the government.

Chapter 25: Saving, Investment, and the Financial System

[Chapter 13: Saving, Investment, and the Financial System]

Questions for Review: Answers

1. The financial system's role is to help match one person's saving with another person's investment. Two markets that are part of the financial system are the bond market, through which large corporations, the federal government, or state and local governments borrow, and the stock market, through which corporations sell ownership shares. Two financial intermediaries are banks, which take in deposits and use the deposits to make loans, and mutual funds, which sell shares to the public and use the proceeds to buy a portfolio of financial assets.

2. National saving is the amount of a nation's income that isn't spent on consumption or government purchases. Private saving is the amount of income that households have left after paying their taxes and paying for their consumption. Public saving is the amount of tax revenue that the government has left after paying for its spending. The three variables are related because national saving equals private saving plus public saving.

3. Investment refers to the purchase of new capital, such as equipment or buildings. It is equal to national saving by an accounting identity.

4. A change in the tax code that might increase private saving is the introduction of a consumption tax to replace the income tax. Since a consumption tax wouldn't tax the returns to saving, it would increase the supply of loanable funds, thus lowering interest rates and increasing investment.

5. A government budget deficit arises when the government spends more than it receives in tax revenue. Since a government budget deficit reduces national saving, it raises interest rates, reduces private investment, and thus reduces economic growth.

Problems and Applications: Answers

1. a. The bond of an eastern European government would pay a higher interest rate than the bond of the U.S. government because there would be a greater risk of default.

b. A bond that repays the principal in 2025 would pay a higher interest rate than a bond that repays the principal in 2005 because it has a longer term to maturity, so there is more risk to the principal.

c. A bond from a software company you run in your garage would pay a higher interest rate than a bond from Coca-Cola because your software company has more credit risk.

d. A bond issued by the federal government would pay a higher interest rate than a bond issued by New York State because an investor doesn't have to pay federal income tax on the bond from New York State.

2. a. You'd expect the yield curve to be upward sloping because there's more risk on longer term bonds.

b. Generally, the curve you draw will be upward sloping, except in times of monetary tightening or early in a recession.

3. The stock market does have a social purpose. Firms obtain funds for investment by issuing new stock. People are more likely to buy that stock because there are organized stock markets, so people know they can sell their stock if they want to.

4. Stock prices are viewed as harbingers of future declines in real GDP because people foresee that output will be lower, so corporate profits will be lower, so stocks aren't worth as much.

5. The advantage of owning a diverse portfolio of stocks and bonds rather than holding stocks or bonds from a single company is that it reduces risk. People who own a diverse portfolio of stocks and bonds face less risk because they have only a small stake in each company. Someone who owns stocks or bonds from a single company faces a lot of risk because their return is tied entirely to the success of the one company.

6. Companies encourage their employees to hold stock in the company because it gives the employees the incentive to care about the firm's profits, not just their own salary. Then, if employees see waste or see areas in which the firm can improve, they'll take actions that benefit the company because they know the value of their stock will rise as a result. And it also gives employees an additional incentive to work hard, knowing that if the firm does well, they will profit.

But from an employee's point of view, owning stock in the company for which she or he works can be risky. The employee's wages or salary are already tied to how well the firm performs. If the firm has trouble, the employee could be laid off or have her

or his salary reduced. If the employee owns stock in the firm, then there's a double whammy—the employee is unemployed or gets a lower salary and the value of the stock falls as well. So owning stock in your own company is a very risky proposition. Most employees would be better off diversifying—owning stock or bonds in other companies—so their fortunes wouldn't depend so much on the firm for which they work.

7. If everyone believes the profits of a firm will rise in the future, then the firm's stock price will be high relative to its current earnings, so the price-earnings ratio will be higher than it is for other companies. The disadvantage of buying such stock is that if those future profits don't materialize, the high price-earnings ratio means the stock is overvalued, and you'll get a lower-than-average return on your investment.

8. To a macroeconomist, saving occurs when a person's income exceeds her consumption, while investment occurs when a person or firm purchases new capital, such as a house or business equipment.

   a. When your family takes out a mortgage and buys a new house, that's investment, because it's a purchase of new capital.

   b. When you use your $200 paycheck to buy stock in AT&T, that's saving, because your income of $200 isn't being spent on consumption goods.

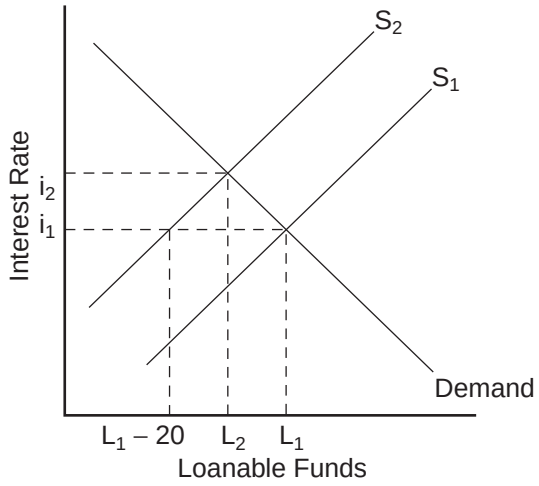
   c. When your roommate earns $100 and deposits it in her account at a bank, that's saving, because the money isn't spent on consumption goods.

   d. When you borrow $1,000 from a bank to buy a car to use in your pizza-delivery business, that's investment, because the car is a capital good.

9. a. If interest rates increase, the costs of borrowing money to build the factory become higher, so the returns from building the new plant may not be sufficient to cover the costs. Thus higher interest rates make it less likely that Intel will build the new factory.

   b. Even if Intel uses its own funds to finance the factory, the rise in interest rates still matters. There's an opportunity cost on the use of the funds. Instead of investing in the factory, Intel could invest the money in the bond market to earn the higher interest rate available there. Intel will compare its potential returns from building the factory to the potential returns from the bond market. So if interest rates rise, so that bond market returns rise, Intel is again less likely to invest in the factory.

10. a. Figure 25-1 illustrates the effect of the \$20 billion increase in government borrowing. Initially, the supply of loanable funds is curve S_1, the equilibrium real interest rate is i_1, and the quantity of loanable funds is L_1. The increase in government borrowing by \$20 billion reduces the supply of loanable funds for each interest rate by \$20 billion, so the new supply curve, S_2, is shown by a shift to the left of S_1 by exactly \$20 billion. As a result of the shift, the new equilibrium real interest rate is i_2. The interest rate has increased as a result of the increase in government borrowing.



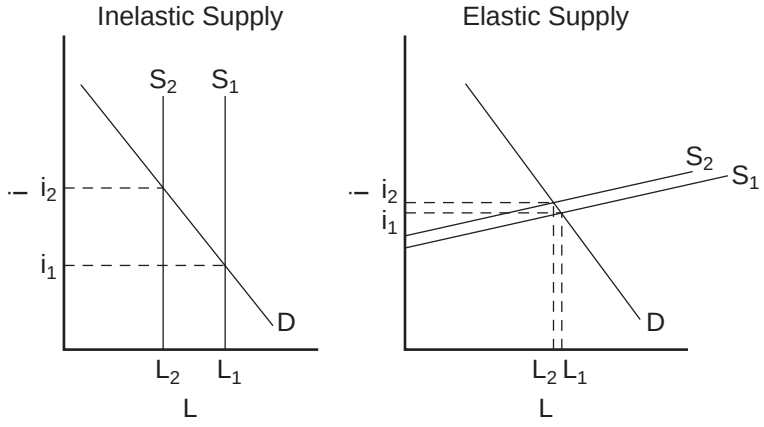
b. Since the interest rate has increased, investment and national saving decline and private saving increases. The increase in government borrowing reduces public saving. From the figure you can see that total loanable funds (and thus both investment and national saving) decline by less than \$20 billion, while public saving declines by \$20 billion and private saving rises by less than \$20 billion.

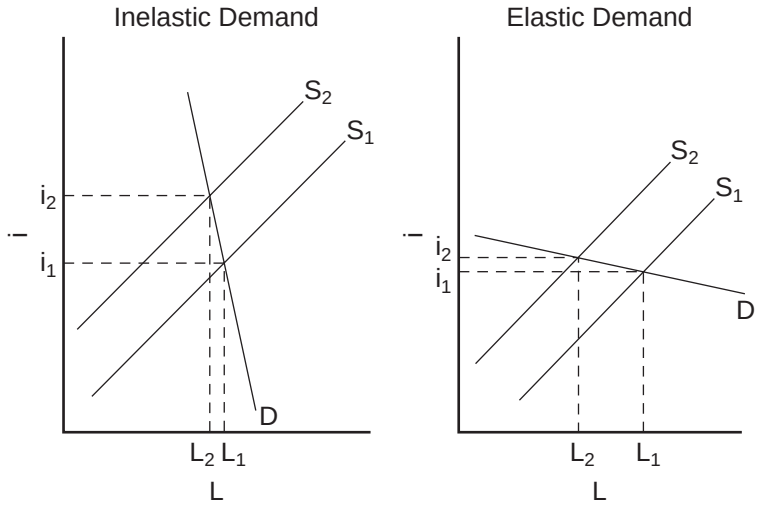
c. The more elastic is the supply of loanable funds, the flatter the supply curve would be, so the interest rate would rise by less and thus national saving would fall by less, as Figure 25-2 shows.

d. The more elastic the demand for loanable funds, the flatter the demand curve would be, so the interest rate would rise by less and thus national saving would fall by more, as Figure 25-3 shows.

e. If households believe that greater government borrowing today implies higher taxes to pay off the government debt in the future, then people will save more so they can pay the higher future taxes, so private saving will increase, as will the

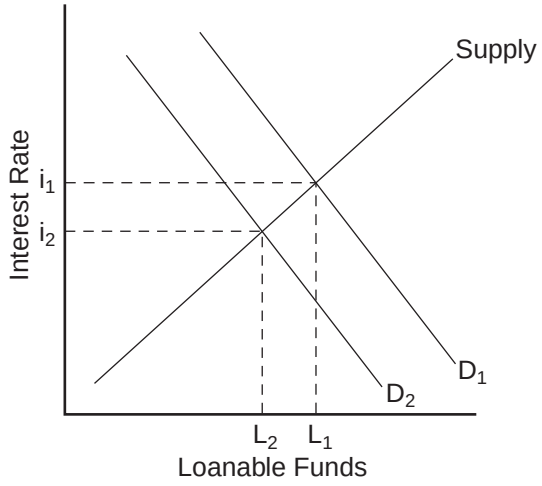
supply of loanable funds. This will offset the reduction in public saving, thus reducing the amount by which the equilibrium quantity of investment and national saving decline, and reducing the amount that the interest rate rises. If the rise in private saving was exactly equal to the increase in government borrowing, there would be no shift in the national saving curve, so investment, national saving, and the interest rate would all be unchanged. This is the case of Ricardian equivalence.



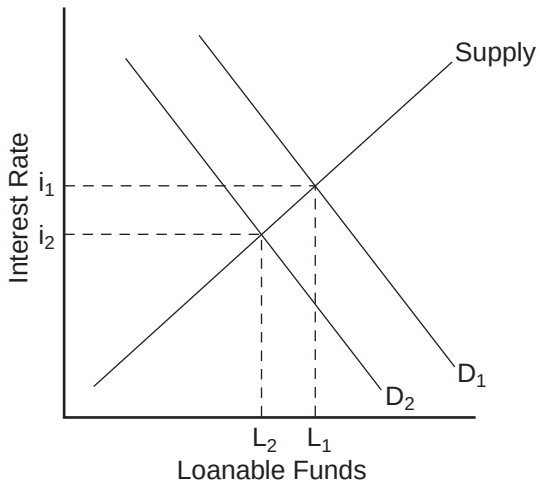


11. Since new computer technology enables firms to reduce inventory investment, the demand curve for loanable funds shifts to the left, as shown in Figure 25-4. As a result, the equilibrium quantity of loanable funds declines, as does the interest rate.

The decline in the interest rate then increases investment in factories and equipment, but overall investment still declines.



12. If world savings declines at the same time world investment rises, the supply curve of loanable funds shifts to the left and the demand curve shifts to the right. Figure 25-5 illustrates the result that the world interest rate will rise, while the overall effect on the equilibrium quantity of loanable funds is ambiguous—it depends on how big the shifts of the two curves are relative to each other and on their elasticities.



13. a. Investment can be increased by reducing taxes on private saving or by reducing the government budget deficit. But reducing taxes on private saving has the effect of increasing the government budget deficit, unless some other taxes are increased or government spending is reduced. So it is difficult to engage in both policies at the same time.

b. To know which of these policies would be a more effective way to raise investment, you'd need to know: (1) what the elasticity of private saving is with respect to the after-tax real interest rate, since that would determine how much private saving would increase if you reduced taxes on saving; (2) how private saving responds to changes in the government budget deficit, since, for example, if Ricardian equivalence holds, the decline in the government budget deficit would be matched by an equal decline in private saving, so national saving wouldn't increase at all; and (3) how elastic investment is with respect to the interest rate, since if investment is quite inelastic, neither policy will have much of an impact on investment.

Chapter 26: The Natural Rate of Unemployment

[Chapter 14: The Natural Rate of Unemployment]

Questions for Review: Answers

1. The BLS categorizes each adult (16 years of age and older) as either employed, unemployed, or not in the labor force. The labor force consists of the sum of the employed plus the unemployed. The unemployment rate is the percentage of the labor force that is unemployed. The labor-force participation rate is the percentage of the total adult population that is in the labor force.

2. Unemployment is typically short term. Most people who become unemployed are able to find new jobs fairly quickly. But, some unemployment is attributable to the relatively few workers who are jobless for long periods of time.

3. Minimum-wage laws are a better explanation for unemployment among teenagers than among college graduates. Teenagers have fewer job-related skills than college graduates, so their wages are low enough to be affected by the minimum wage. College graduates' wages far exceed the minimum wage.

4. Unions may affect the natural rate of unemployment via the effect on insiders and outsiders. Since unions raise the wage above the equilibrium level, the quantity of labor demanded declines while the supply of labor rises, so there is unemployment. Insiders are those who keep their jobs. Outsiders, workers who become unemployed, have two choices: either get a job in a firm that isn't unionized or remain unemployed and wait for a job to open up in the union sector. As a result, the natural rate of unemployment is higher than it would be without unions.

5. Advocates of unions claim that unions are good for the economy because they are an antidote to the market power of the firms that hire workers and they are important for helping firms respond efficiently to workers' concerns.

6. Four reasons why a firm's profits might increase when it raises wages are: (1) better paid workers are healthier and more productive; (2) worker turnover is reduced; (3) worker effort is increased; and (4) the firm can attract higher quality workers.

7. Search unemployment is inevitable because the economy is always changing. Some firms are shrinking while others are expanding. Some regions are experiencing faster growth than other regions. Transitions of workers between firms and between regions are accompanied by temporary unemployment.

The government could help to reduce the amount of search unemployment by public policies that provide information about job vacancies in order to match workers and jobs more quickly, and through public training programs that help ease the transition of workers from declining to expanding industries and help disadvantaged groups escape poverty.

Problems and Applications: Answers

1. The labor force consists of the number of employed (127,587,000) plus the number of unemployed (7,221,000), which equals 134,808,000.

   To find the labor-force participation rate, we need to know the size of the adult population. Adding the labor force (134,808,000) to the number of people not in the labor force (66,645,000) gives the adult population of 201,453,000. The labor-force participation rate is the labor force (134,808,000) divided by the adult population (201,453,000) times 100%, which equals 67%.

   The unemployment rate is the number of unemployed (7,221,000) divided by the labor force (134,808,000) times 100%, which equals 5.4%.

2. Men aged 55 and over experienced the greatest decline in labor force participation. This was because of increased Social Security benefits and retirement income than before, encouraging retirement at an earlier age.

3. Younger women experienced a bigger increase in labor force participation than older women because more of them have entered the labor force (in part because of social changes), so there are more two-career families. In addition, women have delayed having children until later in life and have reduced the number of children they have, so they are in the labor force for a greater proportion of their lives than was the case previously.

4. The fact that employment has increased by 2.6 million while unemployment has declined by 1.4 million is consistent with growth in the labor force of 1.2 million workers. The labor force constantly increases as the population grows and as labor-force participation increases, so the increase in the number of people employed may always exceed the reduction in the number unemployed.

5. a. A construction worker who is laid off because of bad weather is likely to experience short-term unemployment, since the worker will be back to work as soon as the weather clears up.

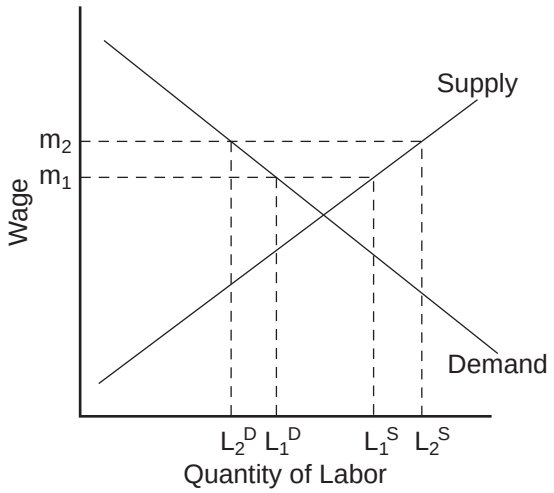
b. A manufacturing worker who loses her job at a plant in an isolated area is likely to experience long-term unemployment, since there are probably few other employment opportunities in the area. She may need to move somewhere else to find a suitable job, which means she'll be out of work for some time.

c. A worker in the stagecoach industry who was laid off because of the growth of railroads is likely to be unemployed for a long time. The worker will have a lot of trouble finding another job when his entire industry is shrinking. He'll probably need to gain additional training or skills to get a job in a different industry.

d. A short-order cook who loses his job when a new restaurant opens is likely to find another job fairly quickly, perhaps even at the new restaurant, so will probably have only a short spell of unemployment.

e. An expert welder with little education who loses her job when the company installs automatic welding machinery is likely to be without a job for a long time, since she lacks the technological skills to keep up with the latest equipment. To remain in the welding industry, she may need to retool by going back to school and learning the newest techniques.

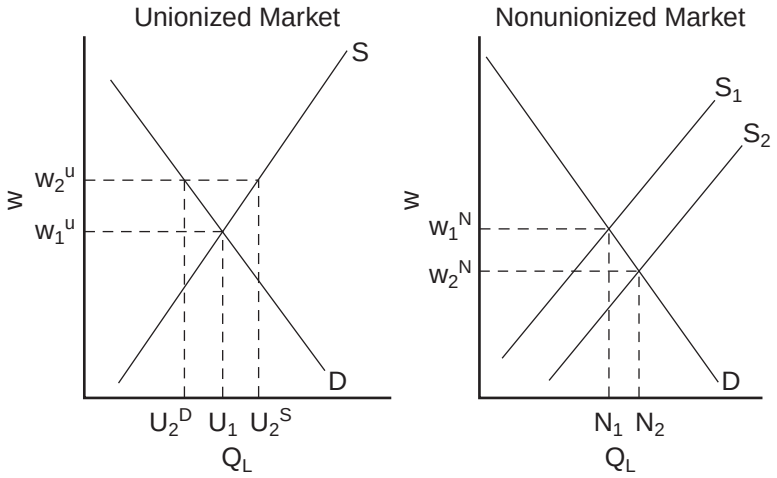
6. Figure 26-1 shows a diagram of the labor market with a binding minimum wage. The initial equilibrium with minimum wage m_1 has quantity of labor supply L_1^S greater than the quantity of labor demanded L_1^D, with unemployment equal to $L_1^S - L_1^D$. An increase in the minimum wage to m_2 leads to an increase in the quantity of labor supplied to L_2^S and a decrease in the quantity of labor demanded to L_2^D. As a result, unemployment increases as the wage rises.



7. Firms in small towns have more market power in hiring because there are fewer opportunities for workers to find jobs elsewhere. Firms generally have less market power now than they used to, since it's now easier for employees to travel farther to go to work. This change in the market power of firms has reduced the need for unions, since competition from other firms keeps workers' wages and benefits high and reduces the need for collective bargaining.

8. a. Figure 26-2 illustrates the effect of a union being established in one labor market. When one labor market is unionized, shown in the figure on the left, the wage rises from w_1^U to w_2^U and the quantity of labor demanded declines from U_1 to U_2^D. Since the wage is higher, the supply of labor increases to U_2^S, so there are U_2^S - U_2^D unemployed workers in the unionized sector. The quantity of labor employed in this market is inefficient, since more workers would like to have jobs at the existing wage.

b. When those workers who become unemployed in the union sector seek employment in the nonunionized market, shown in the figure on the right, the supply of labor shifts to the right from S_1 to S_2. The result is a decline in the wage in the nonunionized sector from w_1^N to w_2^N and an increase in employment in the nonunionized sector from N_1 to N_2.



9. a. When the Japanese developed a strong auto industry, U.S. auto demand became more elastic as a result of increased competition. With more elastic demand for autos, the elasticity of demand for American autoworkers increased.

   b. Since the rise in auto imports made the elasticity of demand for autoworkers more elastic, to maintain a higher-than-competitive wage rate implies a greater reduction in the quantity of labor demanded. So the union had to choose between allowing the union wage to decline or facing the loss of many jobs.

   c. Given the tradeoff faced by the union, they allowed the union wage to get closer to the competitive wage.

10. a. When landlords require tenants to pay security deposits, landlords are the principals and renters are the agents. Asymmetric information arises because renters won't care for the property as carefully as an owner would. To reduce this problem of moral hazard, landlords require tenants to pay security deposits, so tenants must take care of the property to get their money back.

    b. When firms compensate top executives with options to buy company stock at a given price in the future, the firm is the principal and the executives are the agents. Asymmetric information arises because the executives can do things for their own benefit that don't increase the profitability of the firm. For example, executives might buy many expensive perks for themselves (plush offices, a fleet of corporate jets) that the executives enjoy but that reduce profits. The stock options reduce this moral-hazard problem by tying the executives' total compensation directly to the profits of the firm.

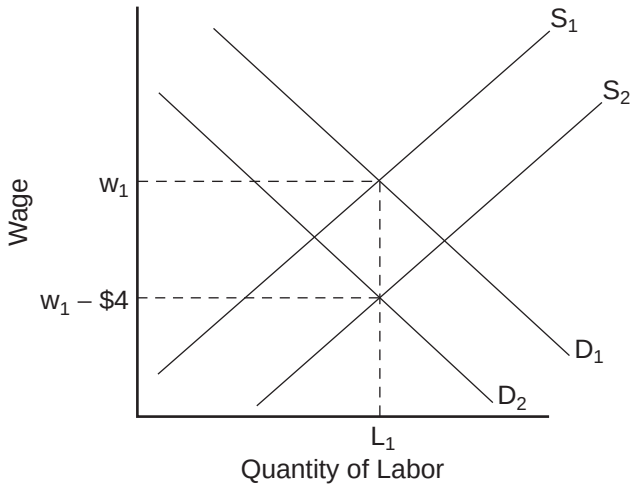
    c. When car insurance companies offer discounts to customers who install anti-theft devices in their cars, the insurance company is the principal and the customers are the agents. Asymmetric information arises on the part of the customers, who won't take as much care to prevent their cars from being stolen since they know they're insured. By giving discounts for antitheft devices, the insurance company offsets this moral hazard, making it more likely that people will install the devices, and thus less likely that cars will be stolen.

11. Raising the price of an insurance policy leads to adverse selection. Healthier people will leave the firm and buy insurance elsewhere. The firm will end up insuring a greater percentage of unhealthy people. Even though the company's income from selling the insurance will rise, the less-healthy people they're now insuring will make more claims, and the firm's profits will probably decline.

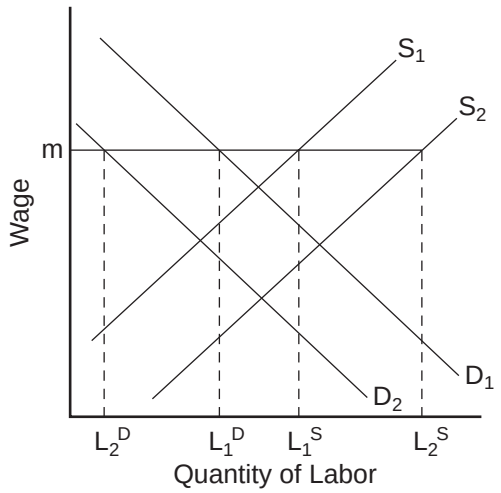
12. a. If a firm were providing no such benefits prior to the legislation, the curve showing the demand for labor would shift down by exactly $4 at each quantity of labor, because the firm wouldn't be willing to pay as high a wage given the increased cost of the benefits.

b. If employees value the benefit by exactly $4 per hour, they'd be willing to work the same amount for a wage that's $4 less per hour, so the supply curve of labor shifts down by exactly $4.

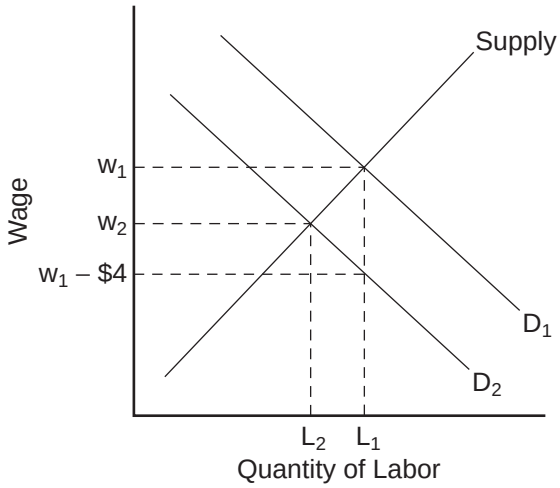
c. Figure 26-3 shows the equilibrium in the labor market. Since the demand and supply curves of labor both shift down by $4, the equilibrium quantity of labor is unchanged and the wage rate declines by $4. Both employees and employers are just as well off as before.



d. If the minimum wage prevents the wage from falling, the result will be increased unemployment, as Figure 26-4 shows. Initially, labor supply is L_1^S and labor demand is L_1^D, so unemployment is given by $L_1^S - L_1^D$. The downward shift of both the demand and supply curves gives a new equilibrium with labor supply L_2^S, labor demand L_2^D, and unemployment $L_2^S - L_2^D$. The wage is unchanged, the level of employment declines, and the level of unemployment rises. Employers are worse off because they hire less labor at a higher wage (including benefits). The workers who become unemployed are worse off because of the policy, while workers who remain employed are better off, since their wages plus benefits have increased.



e. If the workers don't value the mandated benefit at all, the supply curve of labor doesn't shift down. As a result, in part *c*, the wage rate will decline by less than \$4 and the equilibrium quantity of labor will decline, as shown in Figure 26-5. The new wage, w_2, will be less than w_1, but greater than w_1 - \$4. Employers are worse off, since they now pay a greater total wage plus benefits for fewer workers. Employees are worse off, since they get a lower wage and work less.



With a minimum wage in effect, as in part *d*, the impact on unemployment isn't as bad as when the workers valued the benefits. Looking back at Figure 26-4, the only difference is that the labor-supply curve doesn't shift, so the equilibrium quantity of labor supplied stays the same at L_1^S. So, the wage stays the same, labor demand declines, labor supply is unchanged, and unemployment rises. As before, employers are worse off since they get less labor at a higher wage plus benefits. Employees are worse off, too, since there's less employment at the same wage.

Chapter 27: The Monetary System

[Chapter 15: The Monetary System]

Questions for Review: Answers

1. Money is different from other assets in the economy because it is the most liquid asset available. Other assets vary widely in their liquidity.

2. Commodity money is money with intrinsic value, like gold, which can be used for purposes other than as a medium of exchange. Fiat money is money without intrinsic value; it has no value other than its use as a medium of exchange. Our economy today uses fiat money.

3. Demand deposits are balances in bank accounts that depositors can access on demand simply by writing a check. They should be included in the stock of money because they can be used to buy goods and services.

4. If the Fed wants to increase the supply of money with open-market operations, it purchases U.S. government bonds on the open market. The purchase increases the number of dollars in the hands of the public, thus raising the money supply.

5. The discount rate is the interest rate on loans that the Federal Reserve makes to banks. If the Fed raises the discount rate, fewer banks will borrow from the Fed, so banks' reserves will be lower, and thus the money supply will be lower.

6. Reserve requirements are regulations on the minimum amount of reserves that banks must hold against deposits. An increase in reserve requirements raises the reserve ratio, lowers the money multiplier, and decreases the money supply.

7. The Fed can't control the money supply perfectly because: (1) the Fed doesn't control the amount of money that households choose to hold as deposits in banks; and (2) the Fed does not control the amount that bankers choose to lend. The actions of households and banks affect the money supply in ways the Fed can't perfectly control or predict.

Problems and Applications: Answers

1. a. A U.S. penny is money in the U.S. economy because it is used as a medium of exchange to buy goods or services, it serves as a unit of account because prices

in stores are listed in terms of dollars and cents, and it serves as a store of value for anyone who holds it over time.

b. A Mexican peso is not money in the U.S. economy, because it is not used as a medium of exchange, and prices aren't given in terms of pesos, so it isn't a unit of account. It could serve as a store of value, though.

c. A Picasso painting isn't money, because you can't exchange it for goods or services, and prices aren't given in terms of Picasso paintings. It does, however, serve as a store of value.

d. A plastic credit card is similar to money, but represents deferred payment, rather that immediate payment. So credit cards don't fully represent the medium of exchange function of money. Nor are they really stores of value, since they represent short-term loans rather than being an asset like currency.

2. a. It would be difficult to run the economy using the "Swopper's Column" instead of money because it requires finding a double coincidence of wants. Money works efficiently because it requires satisfying people's needs on just one side of each transaction; you buy something for money and sell something else for money. With money, you don't have to buy something from someone who wants something you're selling.

b. The "Swopper's Column" probably exists so that people can avoid paying taxes on things they buy and sell.

3. For an asset to be useful as a medium of exchange, it must be widely accepted (so all transactions can be made in terms of it), recognized easily as money (so people can perform transactions easily and quickly), divisible (so people can provide change), and difficult to counterfeit (so people won't print their own money). That's why nearly all countries use paper money with fancy designs and coins for smaller denominations.

For an asset to be useful as a store of value, it must be something that maintains its value over time and something that can be sold when money is needed. In addition to currency, financial assets (like stocks and bonds) and physical assets (like real estate and art) make good stores of value.

4. a. If there were an easy way to make limestone wheels, the people on Yap would make additional wheels as long as the monetary value of the wheels was greater than the cost of producing the wheels. The result would be that people would make their own money, so there would be too much money produced. Most

likely, people would stop accepting the wheels as money and switch to some other asset as a medium of exchange.

b. If someone in the United States discovered an easy way to counterfeit hundred-dollar bills, they could flood the country with counterfeit currency, thus reducing its value. The result might be a switch to a different type of currency that could prevent the counterfeiting.

5. When your uncle repays a $100 loan from Tenth National Bank (TNB) by writing a check from his TNB checking account, the result is a change in the assets and liabilities of both your uncle and TNB, as shown in these T-accounts:

Your uncle

Assets	Liabilities
Before:	
Checking account $100	Loans $100
After:	
Checking account $ 0	Loans $ 0

Tenth National Bank

Assets	Liabilities
Before:	
Loans $100	Deposits $100
After:	
Loans $ 0	Deposits $ 0

By paying off the loan, your uncle simply eliminated the outstanding loans using the assets in his checking account. Your uncle's wealth hasn't changed; he simply has fewer assets and fewer liabilities.

6. a. Here is BSB's T-account:

Beleaguered State Bank

Assets		Liabilities
Reserves $ 25 million		Deposits $250 million
Loans $225 million		

b. When BSB's largest depositor withdraws $10 million in cash and BSB reduces its loans outstanding to maintain the same reserve ratio, its T-account is now:

Beleaguered State Bank

Assets		Liabilities
Reserves $ 24 million		Deposits $240 million
Loans $216 million		

c. Since BSB is cutting back on its loans, other banks will find themselves short of reserves and they may also cut back on their loans as well.

d. BSB may find it difficult to cut back on its loans immediately, since it can't force people to pay off loans. Instead, it can stop making new loans. But for a time it might find itself with more loans than it wants. It could try to attract additional deposits to get additional reserves, or borrow from another bank or from the Fed.

7. If you take $100 that you held as currency and put it into the banking system, then the total amount of deposits in the banking system increases by $1,000, since a reserve ratio of 10 percent means the money multiplier is 1/.10 = 10. Thus the money supply increases by $900, since deposits increase by $1,000 but currency declines by $100.

8. With a required reserve ratio of 10 percent, the money multiplier could be as high as 1/.10 = 10, if banks hold no excess reserves and people don't keep some additional currency. So the maximum increase in the money supply from a $10 million open-market purchase is $100 million. The smallest possible increase is $0, if all the money was held by banks as excess reserves.

9. a. If the required reserve ratio is 5 percent, then First National Bank's required reserves are $500,000 x .05 = $25,000. Since their total reserves are $100,000, they have excess reserves of $75,000.

   b. With a required reserve ratio of 5 percent, the money multiplier is 1/.05 = 20. If First National lends out its excess reserves of $75,000, the money supply will eventually increase by $75,000 x 20 = $1,500,000.

10. a. With a required reserve ratio of 10 percent and no excess reserves, the money multiplier is 1/.10 = 10. If the Fed sells $1 million of bonds, reserves will decline by $1 million and the money supply will contract by 10 x $1 million = $10 million.

    b. Banks might wish to hold excess reserves if they need to hold the reserves for their day-to-day operations, such as paying other banks for customers' transactions, making change, cashing paychecks, and so on. If banks increase excess reserves such that there's no overall change in the total reserve ratio, then the money multiplier doesn't change and there's no effect on the money stock.

11. a. With banks holding only required reserves of 10 percent, the money multiplier is 1/.10 = 10. Since reserves are $100 billion, the money stock is 10 x $100 billion = $1,000 billion.

    b. If the required reserve ratio is raised to 20 percent, the money multiplier declines to 1/.20 = 5. With reserves of $100 billion, the money stock would decline to $500 billion. Reserves would be unchanged, since all available currency would be held by banks as reserves.

12. a. If people hold all money as currency, the quantity of money is $2,000.

    b. If people hold all money as demand deposits at banks with 100 percent reserves, the quantity of money is $2,000.

    c. If people have $1,000 in currency and $1,000 in demand deposits, the quantity of money is $2,000.

d. If banks have a reserve ratio of 10 percent, the money multiplier is 1/.10 = 10. So if people hold all money as demand deposits, the quantity of money is 10 x $2,000 = $20,000.

e. If people hold equal amounts of currency (C) and demand deposits (D) and the money multiplier for reserves is 10, then two equations must be satisfied: (1) C = D, so that people have equal amounts of currency and demand deposits; and (2) 10 x ($2,000 - C) = D, so that the money multiplier (10) times the number of dollar bills that aren't being held by people ($2,000 - C) equals the amount of demand deposits (D). Using the first equation in the second gives 10 x ($2,000 - D) = D, or $20,000 - 10 D = D, or $20,000 = 11 D, so D = $1,818.18. Then C = $1,818.18. The quantity of money is C + D = $3,636.36.

Chapter 28: Inflation: Its Causes and Costs

[Chapter 16: Inflation: Its Causes and Costs]

Questions for Review: Answers

1. An increase in the price level reduces the value of money because each dollar in your wallet now buys a smaller quantity of goods and services.

2. According to the quantity theory of money, the effect of an increase in the quantity of money is an increase in the price level.

3. Nominal variables are those measured in monetary units, while real variables are those measured in physical units. Examples of nominal variables include the prices of goods, wages, and the dollar value of GDP. Examples of real variables include relative prices (the price of one good in terms of another), real wages, and real GDP. According to the principle of monetary neutrality, only nominal variables are affected by changes in the quantity of money.

4. Inflation is like a tax because everyone who holds money loses purchasing power. In a hyperinflation, the government uses the inflation tax, instead of taxes on income, to finance its spending. Very rapid money growth leads to high rates of inflation.

5. According to the Fisher effect, an increase in the inflation rate raises the nominal interest rate by the same amount that the inflation rate increases, with no effect on the real interest rate.

6. The costs of inflation include shoeleather costs associated with reduced money holdings, menu costs associated with more frequent adjustment of prices, increased variability of relative prices, unintended changes in tax liabilities due to non-indexation of the tax code, confusion and inconvenience resulting from a changing unit of account, and arbitrary redistributions of wealth between debtors and creditors. With a low and stable rate of inflation like that in the United States, none of these costs are very high. Perhaps the most important one is the interaction between inflation and the tax code, which may reduce saving and investment even with a low inflation rate.

7. If inflation is less than expected, creditors benefit and debtors lose. Creditors receive dollar payments from debtors that have a higher real value than was expected.

Problems and Applications: Answers

1. With constant velocity, reducing the inflation rate to zero would require the money growth rate to equal the growth rate of output, not zero, according to the quantity theory of money ($M \times V = P \times Y$).

2. The quantity equation can hold for different measures of the money stock because velocity is different for each different money measure. Similarly, the quantity theory of money also holds because an increase in money growth doesn't affect the money multipliers for each different measure of money, so the rate of money growth is the same for any money measure and is therefore matched by a proportionate rise in inflation.

3. Lenin is right that governments can confiscate the wealth of citizens with inflation. Inflation acts like a tax on people who hold money, by reducing its value. The government can finance its expenditures by printing money and using it to buy things, which results in a higher money supply and inflation. The result is a transfer of wealth from money-holders to the government.

4. If a country's inflation rate increases sharply, the inflation tax on holders of money increases significantly. Wealth in savings accounts isn't subject to a change in the inflation tax because the nominal interest rate will increase with the rise in inflation. But holders of savings accounts are hurt by the increase in the inflation rate because they are taxed on their nominal interest income, so their real returns are lower.

5. Hyperinflations usually arise when governments try to finance much of their expenditures by printing money. This is unlikely to occur if the central bank is independent of the government.

6. The expression, "It ain't worth a continental," refers to the hyperinflation in the 1770s that occurred when the Continental Congress tried to finance its expenditures by the inflation tax. As a result, inflation was very high, and the money became worth less and less.

7. a. When the price of both goods doubles in a year, inflation is 100 percent. The total cost of purchasing equal amounts of beans and rice equals the quantity of each good times its price, added together for all goods. That is, if x is the quantity of beans, which also equals the quantity of rice, then the cost of beans and rice for the year is $x(P_B + P_R)$. In the second year, the cost is $x(P_B' + P_R')$, where the ' mark refers to the price in the second year. Then we can define a price index with a value of one in the first year. In the second year, the price index has the value of the cost of goods in the second year divided by the cost of

goods in the first year. Thus the price index in the second year is $x(P_B' + P_R')/x(P_B + P_R) = (P_B' + P_R')/(P_B + P_R) = (\$2 + \$6)/(\$1 + \$3) = \$8/\$4 = 2$. The inflation rate is then (2-1)/1 x 100% = 100%. Since the prices of all goods rise by 100 percent, the farmers get a 100 percent increase in their incomes to go along with the 100 percent increase in prices, so neither is affected by the change in prices.

b. If the price of beans rises to \$2 and the price of rice rises to \$4, then the price index in the second year is $(P_B' + P_R')/(P_B + P_R) = (\$2 + \$4)/(\$1 + \$3) = \$6/\$4 = 1.5$, so the inflation rate is (1.5-1)/1 x 100% = 50%. Bob is better off because his dollar revenues doubled (increased 100%) while inflation was only 50%. Rita is worse off because inflation was 50%, so the prices of the goods she buys rose faster than the price of the goods (rice) she sells, which rose only 33%.

c. If the price of beans rises to \$2 and the price of rice falls to \$1.50, then the price index in the second year is $(P_B' + P_R')/(P_B + P_R) = (\$2 + \$1.50)/(\$1 + \$3) = \$3.50/\$4 = 0.875$, so the inflation rate is (0.875-1)/1 x 100% = -12.5%. Bob is better off because his dollar revenues doubled (increased 100%) while prices overall fell 12.5%. Rita is worse off because inflation was -12.5%, so the prices of the goods she buys didn't fall as fast as the price of the goods (rice) she sells, which fell 50%.

8. The shoeleather costs of going to the bank include the value of your time, gas for your car that's used as you drive to the bank, and the inconvenience of not having more money on hand. These costs could be measured by valuing your time at your wage rate and valuing the gas for your car at its cost. Valuing the inconvenience of being short of cash is harder to measure, but might depend on the value of the shopping opportunities you give up by not having enough money to buy things you want. Your college president differs from you mainly in having a higher wage, thus having a higher cost of time.

9. The functions of money are to serve as a medium of exchange, unit of account, and a store of value. Inflation mainly affects the ability of money to serve as a store of value, since inflation erodes money's purchasing power, making it less attractive as a store of value. In hyperinflations, money may also fail to serve as a unit of account, because stores have to change prices more often. In some countries with hyperinflation, stores post prices in terms of a more stable currency, such as the U.S. dollar, even when the local currency is still used as the medium of exchange. And sometimes countries even stop using their local currency altogether, using a foreign currency as the medium of exchange as well.

10. a. Unexpectedly high inflation helps the U.S. government by providing higher inflation tax revenue and reducing the real value of outstanding government debt.

b. Unexpectedly high inflation helps a homeowner with a fixed-rate mortgage because she pays a fixed nominal interest rate that was based on expected inflation, and thus pays a lower real interest rate than was expected.

c. Unexpectedly high inflation hurts a union worker in the second year of a labor contract because the contract probably based the worker's nominal wage on the expected inflation rate. As a result, the worker receives a lower-than-expected real wage.

d. Unexpectedly high inflation hurts a college that has invested some of its endowment in Treasury bonds because the higher inflation rate means the college is receiving a lower real interest rate than it had planned.

11. The redistribution from creditors to debtors is something that happens when inflation is unexpected, not when it is expected. The problems that occur with both expected and unexpected inflation include shoeleather costs associated with reduced money holdings, menu costs associated with more frequent adjustment of prices, increased variability of relative prices, unintended changes in tax liabilities due to non-indexation of the tax code, and the confusion and inconvenience resulting from a changing unit of account.

12. a. The statement that "Inflation hurts borrowers and helps lenders, because borrowers must pay a higher rate of interest," is false. Higher *expected* inflation means borrowers pay a higher nominal rate of interest, but it's the same real rate of interest, so borrowers aren't worse off and lenders aren't better off. Higher *unexpected* inflation, on the other hand, makes borrowers better off and lenders worse off.

b. The statement that "If prices change in a way that leaves the overall price level unchanged, then no one is made better or worse off," is false. Changes in relative prices can make some people better off and others worse off, even though the overall price level doesn't change. See problem 7 for an illustration of this.

c. The statement that "Inflation does not reduce the purchasing power of most workers," is true. Most workers' incomes keep up with inflation reasonably well.

Chapter 29: Open-Economy Macroeconomics: Basic Concepts

[Chapter 17: Open-Economy Macroeconomics: Basic Concepts]

Questions for Review: Answers

1. The net exports of a country are the value of its exports minus the value of its imports. Net foreign investment refers to the purchase of foreign assets by domestic residents minus the purchase of domestic assets by foreigners. Net exports are equal to net foreign investment by an accounting identity, since exports from one country to another are matched by payments of some asset from the second country to the first.

2. Saving equals domestic investment plus net foreign investment, since any dollar saved can be used to finance accumulation of domestic capital or it can be used to finance the purchase of capital abroad.

3. If a dollar can buy 100 yen, the nominal exchange rate is 100 yen per dollar. The real exchange rate equals the nominal exchange rate times the domestic price divided by the foreign price, which equals 100 yen per dollar times $10,000 per American car divided by 500,000 yen per Japanese car, which equals 2 Japanese cars per American car.

4. The economic logic behind the theory of purchasing-power parity is that a good must sell for the same price in all locations, otherwise people would profit by engaging in arbitrage.

5. If the Fed started printing large quantities of U.S. dollars, the U.S. price level would increase, and the dollar would buy fewer Japanese yen.

Problems and Applications: Answers

1. a. When an American art professor spends the summer touring museums in Europe, he spends money buying foreign goods and services, so U.S. exports are unchanged, imports increase, and net exports decrease.

   b. When students in Paris flock to see the latest Arnold Schwarzenegger movie, foreigners are buying a U.S. good, so U.S. exports rise, imports are unchanged, and net exports increase.

   c. When your uncle buys a new Volvo, an American is buying a foreign good, so U.S. exports are unchanged, imports rise, and net exports decline.

d. When the student bookstore at Oxford University sells a pair of Levi's 501 jeans, foreigners are buying U.S. goods, so U.S. exports increase, imports are unchanged, and net exports increase.

e. When a Canadian shops in northern Vermont to avoid Canadian sales taxes, a foreigner is buying U.S. goods, so U.S. exports increase, imports are unchanged, and net exports increase.

2. a. Wheat is traded more internationally than in the past because shipping costs have declined, as have trade restrictions.

b. Banking services are traded more internationally than in the past because communications costs have declined, as have trade restrictions.

c. Computer software is traded more internationally than in the past because it is easy to transport.

d. Automobiles are traded more internationally than in the past because transportation costs have declined, as have tariffs and quotas.

3. a. When an American cellular phone company establishes an office in the Czech Republic, U.S. net foreign investment increases, because the U.S. company makes a direct investment in capital in the foreign country.

b. When Harrod's of London sells stock to the General Electric pension fund, U.S. net foreign investment increases, because the U.S. company makes a portfolio investment in the foreign country.

c. When Honda expands its factory in Marysville, Ohio, U.S. net foreign investment declines, because the foreign company makes a direct investment in capital in the United States.

d. When a Fidelity mutual fund sells its Volkswagen stock to a French investor, U.S. net foreign investment declines (if the French investor pays in U.S. dollars), because the U.S. company is reducing its portfolio investment in a foreign country.

4. If national saving is constant and net foreign investment increases, domestic investment must decrease, since national saving equals domestic investment plus net foreign investment. If domestic investment declines, the country's accumulation of domestic capital declines.

5. a. The newspaper shows nominal exchange rates, since it shows the number of units of one currency that can be exchanged for another currency.

   b. On March 24, 1997, the *Wall Street Journal* listed the exchange rate between U.S. dollars and German marks as 1.69 marks per dollar and the exchange rate between U.S. dollars and Japanese yen as 123 yen per dollar. Dividing 123 yen per dollar by 1.69 marks per dollar gives the exchange rate between Germany and Japan as 72.8 yen per mark.

   c. If U.S. inflation exceeds German inflation over the next year, you'd expect the dollar to depreciate relative to the German mark.

6. a. Dutch pension funds holding U.S. government bonds would be happy if the U.S. dollar appreciated. They would then get more Dutch guilders for each dollar they earned on their U.S. investment. In general, if you have an investment in a foreign country, you're better off if that country's currency appreciates.

   b. U.S. manufacturing industries would be unhappy if the U.S. dollar appreciated because their costs of production would be higher in terms of foreign currencies, so they'd need to raise their prices, which will reduce their sales.

   c. Australian tourists planning a trip to the United States would be unhappy if the U.S. dollar appreciated because they would get fewer U.S. dollars for each Australian dollar, so their vacation will be more expensive.

   d. An American firm trying to purchase property overseas would be happy if the U.S. dollar appreciated because it would get more units of the foreign currency and could thus buy more property.

7. All the parts of this question can be answered by keeping in mind the definition of the real exchange rate. The real exchange rate equals the nominal exchange rate times the domestic price level divided by the foreign price level.

   a. If the U.S. nominal exchange rate is unchanged, but prices rise faster in the United States than abroad, the real exchange rate rises.

   b. If the U.S. nominal exchange rate is unchanged, but prices rise faster abroad than in the United States, the real exchange rate declines.

   c. If the U.S. nominal exchange rate declines, and prices are unchanged in the United States and abroad, the real exchange rate declines.

d. If the U.S. nominal exchange rate declines, and prices rise faster abroad than in the United States, the real exchange rate declines.

8. Three goods for which the law of one price is likely to hold are farm goods like wheat, which are nearly identical no matter where they're produced, technological goods like computer software, which have low shipping costs because they're light, and clothing, which also has low shipping costs. Three goods for which the law of one price is not likely to hold are real estate, because you can't move land or buildings from one country to another, goods that are mainly consumed in one country and so aren't traded, like frog legs in France, and services like haircuts, which can't be arbitraged even if the price is very different in different countries.

9. If purchasing-power parity holds, then 3 francs per soda divided by $0.75 per soda equals the exchange rate of 4 francs per dollar.

10. a. To make a profit, you'd want to buy rice where it's cheap and sell it where it's expensive. Since American rice costs 100 dollars per bushel, and the exchange rate is 80 yen per dollar, American rice costs 100 x 80 equals 8,000 yen per bushel. So American rice at 8,000 yen per bushel is cheaper than Japanese rice at 16,000 yen per bushel. So you could take 8,000 yen, exchange them for 100 dollars, buy a bushel of American rice, then sell it in Japan for 16,000 yen, making a profit of 8,000 yen. As people did this, the demand for American rice would rise, increasing the price in America, and the supply of Japanese rice would rise, reducing the price in Japan. The process would continue until the prices in the two countries were the same.

b. If rice were the only commodity in the world, the real exchange rate between the United States and Japan would start out too low, then rise as people bought rice in America and sold it in Japan, until the real exchange became one in long-run equilibrium.

11. a. The Big Mac is appropriate for comparing across countries because it's of fairly uniform quality worldwide. So the *Economist* is clearly comparing the same good sold in different countries.

b. If prices are different in different countries, arbitrage may not be possible, since you can't easily move a Big Mac from one country to another. Beef may be significantly more expensive in some countries than others, and restrictions on trade may prevent the price of beef, and thus the price of the Big Mac, from being the same everywhere.

Chapter 30: A Macroeconomic Theory of the Open Economy

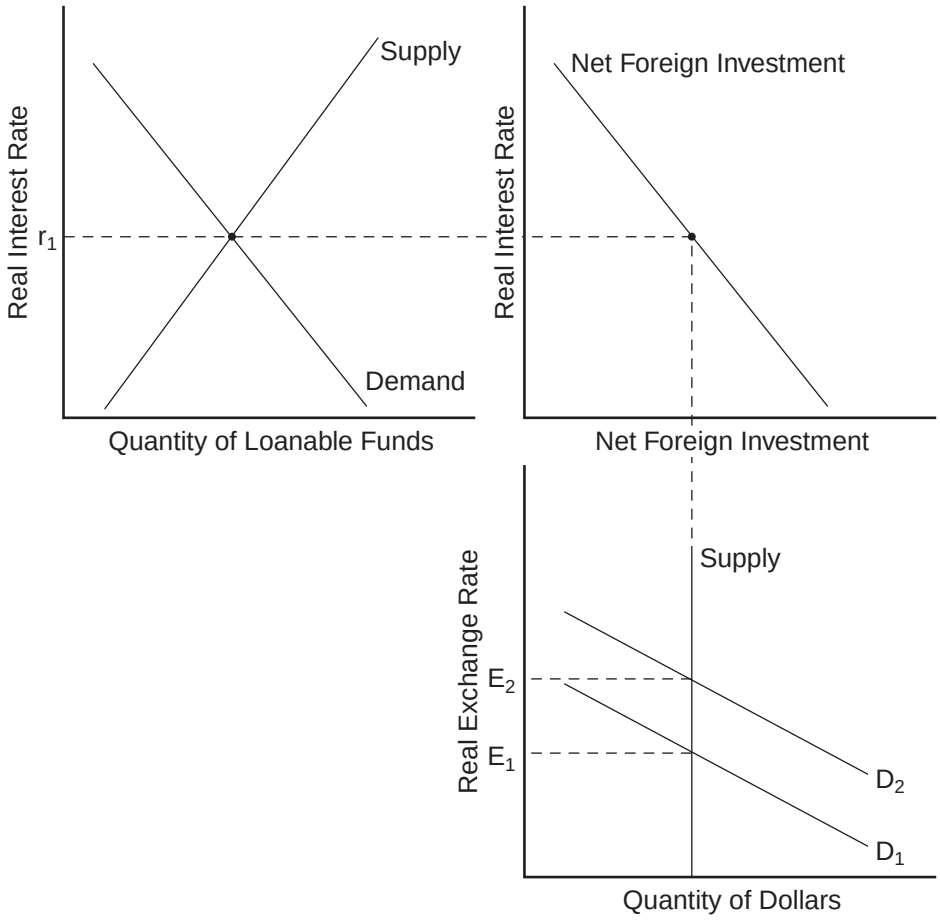
[Chapter 18: A Macroeconomic Theory of the Open Economy]

Questions for Review: Answers

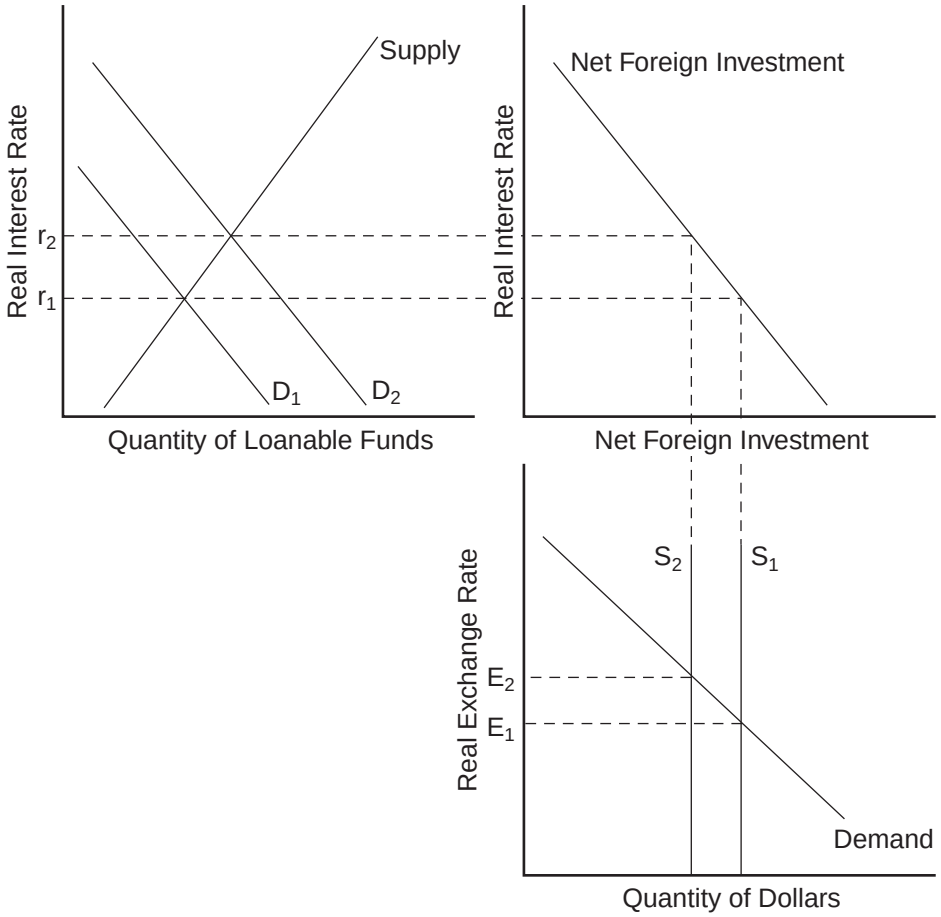
1. The supply of loanable funds comes from national saving. The demand for loanable funds comes from domestic investment and net foreign investment. The supply of dollars in the market for foreign exchange comes from net foreign investment. The demand for dollars in the market for foreign exchange comes from net exports. The link between the two markets is net foreign investment.

2. Government budget deficits and trade deficits are sometimes called the twin deficits because a government budget deficit often leads to a trade deficit. The government budget deficit leads to reduced national saving, causing the interest rate to increase, thus reducing net foreign investment, which in turn reduces net exports.

3. If a union of textile workers encourages people to buy only American-made clothes, imports would be reduced, so net exports would increase for any given real exchange rate. This would cause the demand curve in the market for foreign exchange to shift to the right, as shown in Figure 30-1. The result is a rise in the real exchange rate, but no effect on the trade balance. The textile industry would import less, but other industries, such as the auto industry, would import more because of the higher real exchange rate.



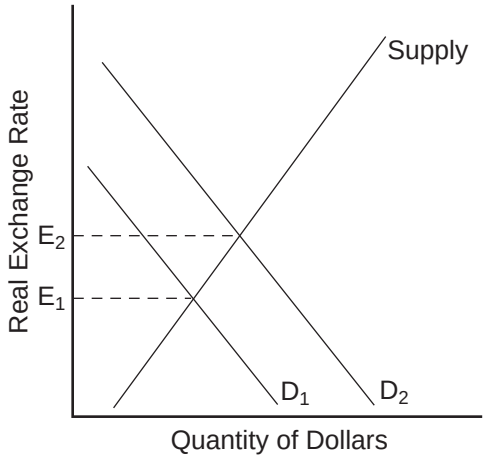
4. If Congress passes an investment tax credit, it subsidizes domestic investment. The desire to increase domestic investment leads firms to borrow more, increasing the demand for loanable funds, as shown in Figure 30-2. This raises the real interest rate, thus reducing net foreign investment. The decline in net foreign investment reduces the supply of dollars in the market for foreign exchange, raising the real exchange rate. The trade balance also declines, since net foreign investment, hence net exports, are lower. The higher real interest rate also increases the quantity of national saving. In summary, saving increases, domestic investment increases, net foreign investment declines, the real interest rate increases, the real exchange rate increases, and the trade balance decreases.



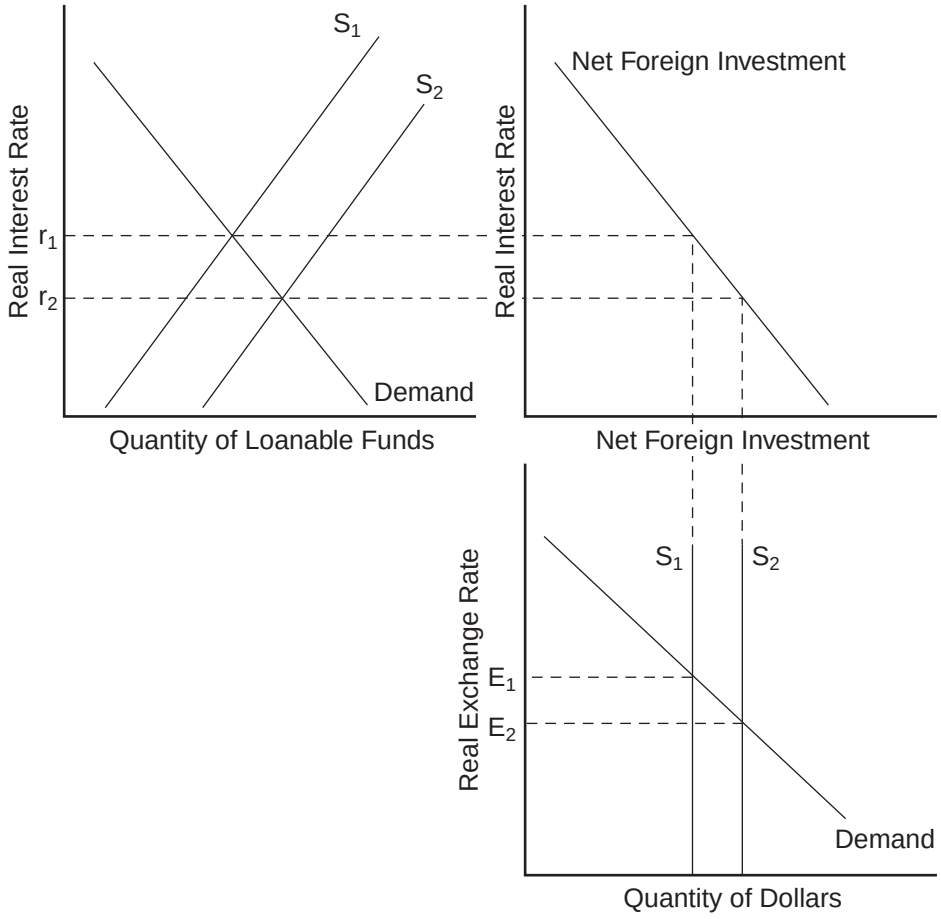
Problems and Applications: Answers

1. Japan generally runs a trade surplus because the Japanese saving rate is high relative to Japanese domestic investment. The result is high net foreign investment, which is matched by high net exports, resulting in a trade surplus. The other possibilities (high foreign demand for Japanese goods, low Japanese demand for foreign goods, and structural barriers against imports into Japan) would affect the real exchange rate, but not the trade surplus.

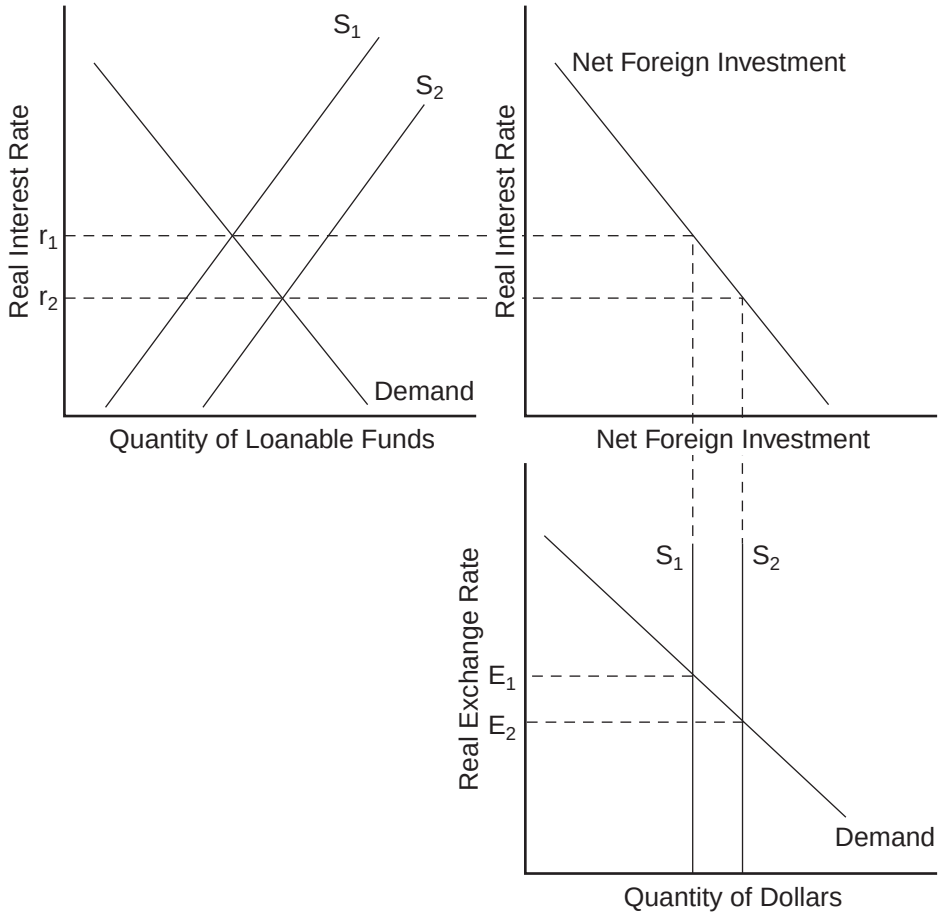
2. An increase in foreigners' income would increase U.S. net exports, as foreigners would buy more U.S. goods. This would increase the demand for U.S. dollars, increasing the real exchange rate, as Figure 30-3 shows.



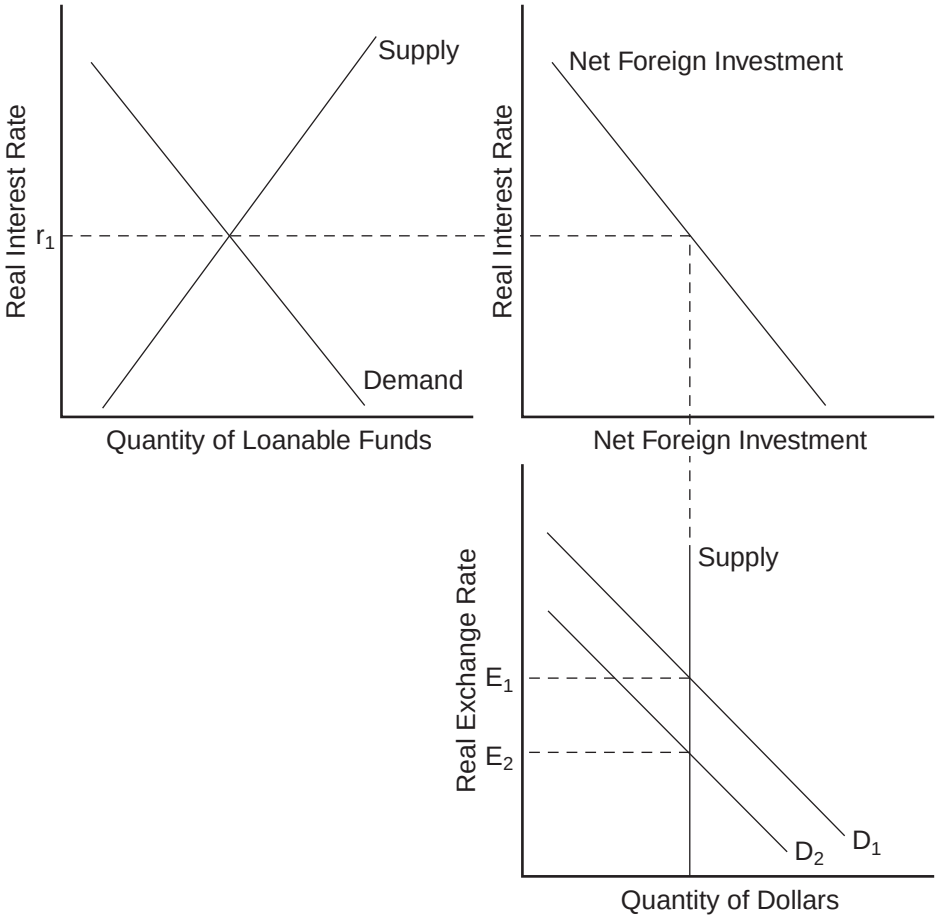
3. A reduction in the U.S. government budget deficit would increase national saving, shifting the supply curve of loanable funds to the right in Figure 30-4. This would reduce the real interest rate in the United States, thus increasing net foreign investment, and reducing the real exchange rate. Thus the real value of the dollar would decline, not increase as the President suggested.



4. An increase in saving would shift the supply of loanable funds to the right, as shown in Figure 30-5. The result would be a lower real interest rate, increased net foreign investment, and a lower real exchange rate. This is the opposite of what the columnist had in mind.



5. a. A decline in the quality of U.S. goods at a given real exchange rate would reduce net exports, reducing the demand for dollars, thus shifting the demand curve for dollars to the left in the market for foreign exchange, as shown in Figure 30-6.

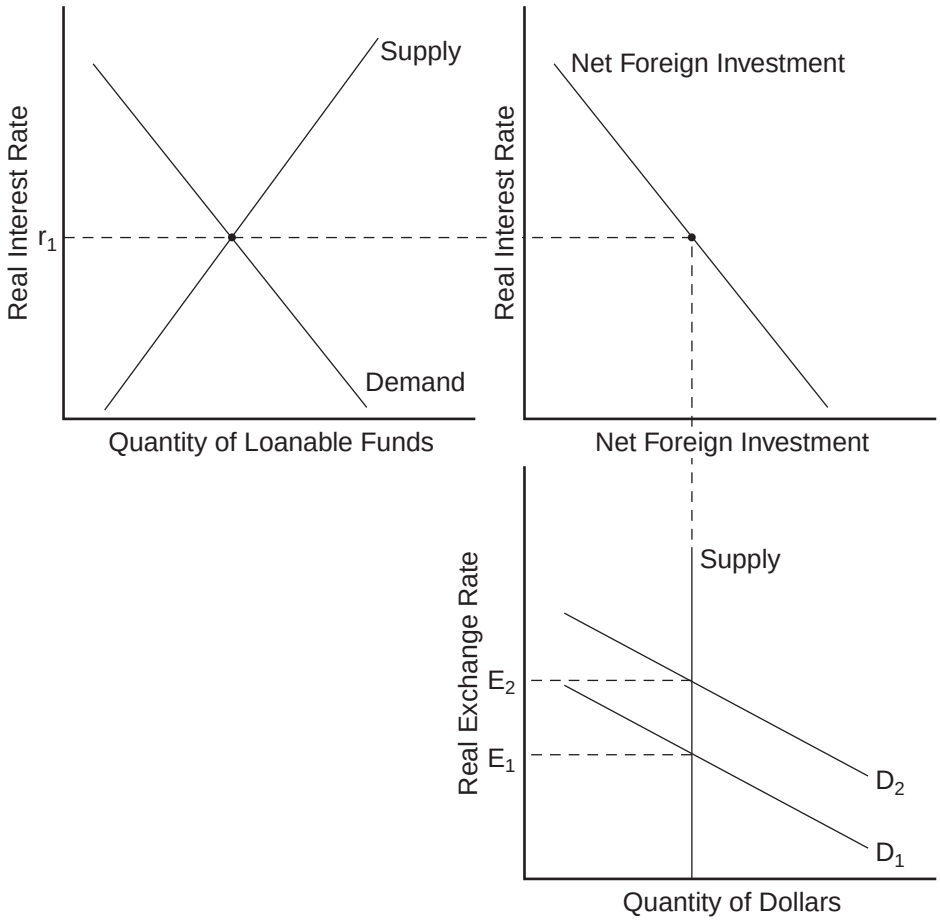


b. The shift to the left of the demand curve for dollars leads to a decline in the real exchange rate. Since net foreign investment is unchanged, and net exports equals net foreign investment, there is no change in equilibrium in net exports or the trade balance.

c. The claim in the popular press is incorrect. A change in the quality of U.S. goods cannot lead to a rise in the trade deficit. The decline in the real exchange rate means that we get fewer foreign goods in exchange for our goods, so our standard of living may decline.

6. A reduction in restrictions of imports would reduce net exports at any given real exchange rate, thus shifting the demand curve for dollars to the left. The shift of the demand curve for dollars leads to a decline in the real exchange rate, which increases net exports. Since net foreign investment is unchanged, and net exports equals net foreign investment, there is no change in equilibrium in net exports or the trade balance. But both imports and exports rise, so export industries benefit.

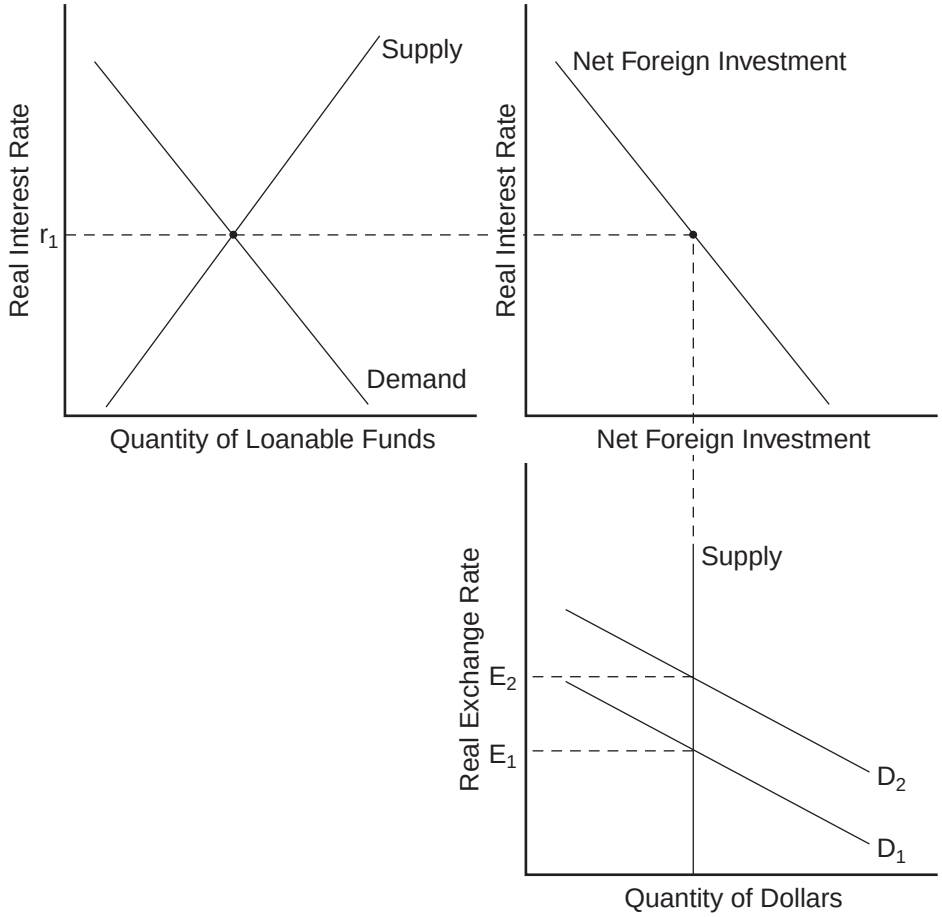
7. a. When the French develop a strong taste for California wines, the demand for dollars in the foreign-currency market increases at any given real exchange rate, as shown in Figure 30-7.



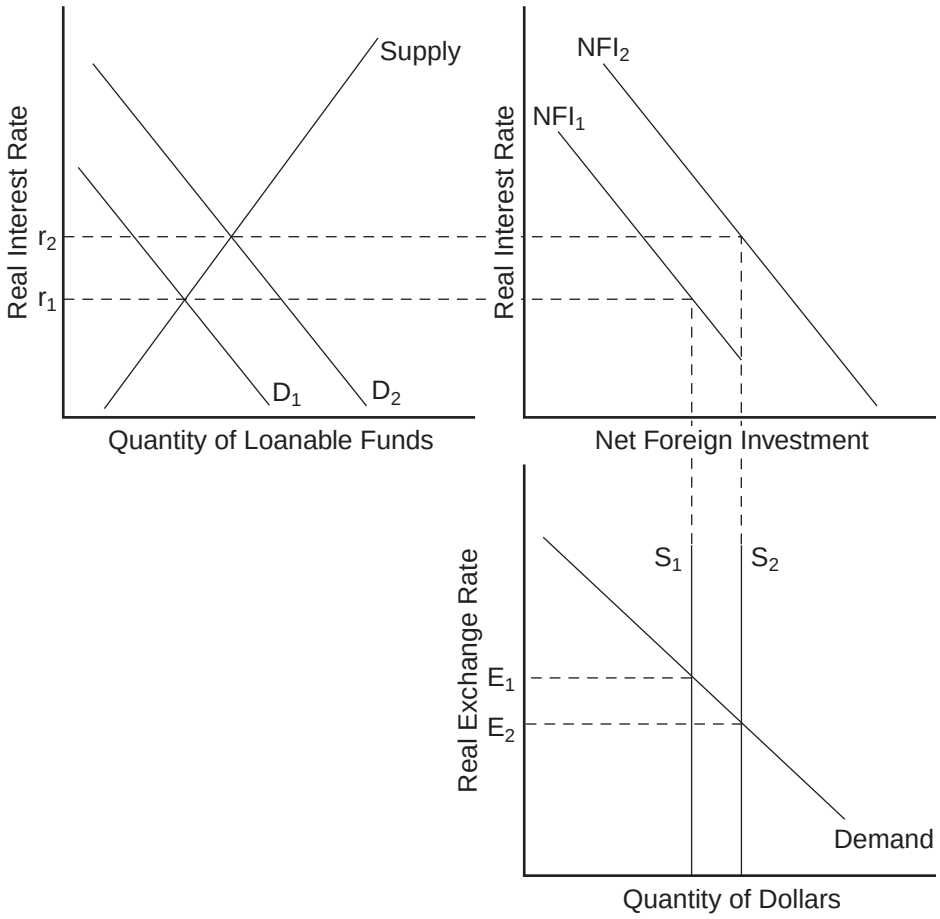
b. The result of the increased demand for dollars is a rise in the real exchange rate.

c. The quantity of net exports is unchanged.

8. An export subsidy increases net exports at any given real exchange rate. This causes the demand for dollars to shift to the right in the market for foreign exchange, as shown in Figure 30-8. The effect is a higher real exchange rate, but no change in net exports. So the senator is wrong; an export subsidy will not reduce the trade deficit.



9. Higher real interest rates in Europe lead to increased U.S. net foreign investment. Higher net foreign investment leads to higher net exports, since in equilibrium net exports equal net foreign investment (NX = NFI). Figure 30-9 shows that the increase in net foreign investment leads to a lower real exchange rate, higher real interest rate, and increased net exports.



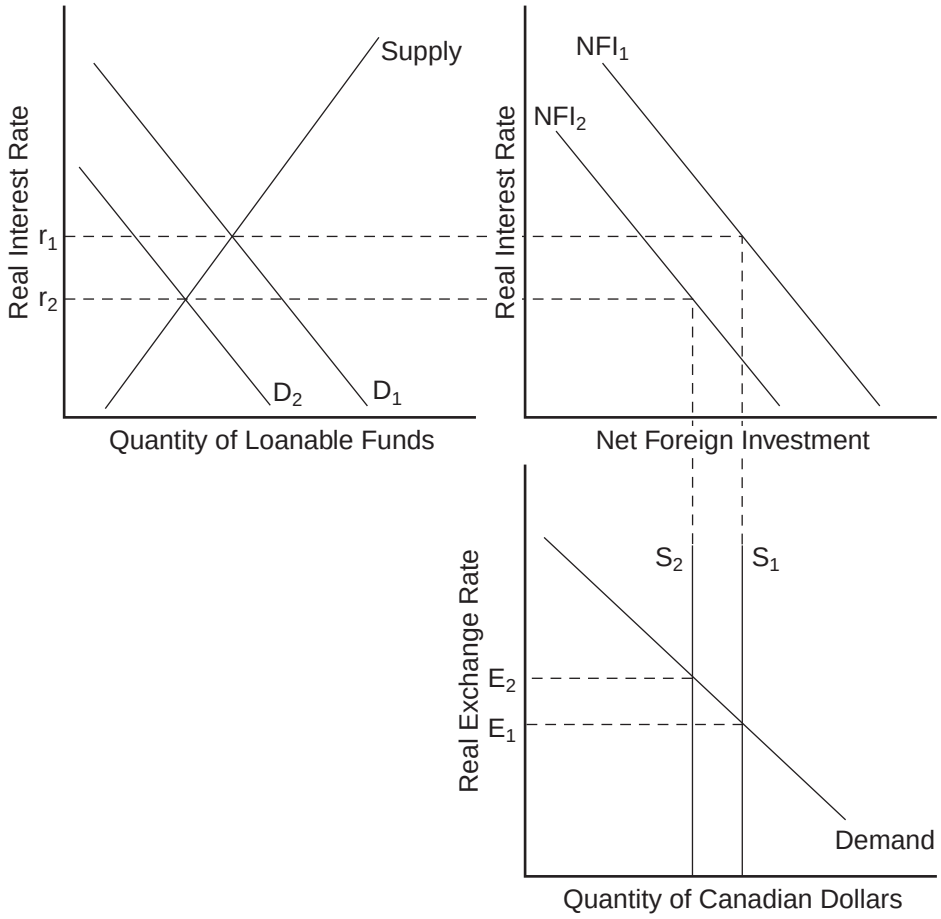
10. a. If the elasticity of U.S. net foreign investment with respect to the real interest rate is very high, the lower real interest rate that occurs because of the increase in private saving will increase net foreign investment a lot, so U.S. domestic investment won't increase much.

b. Since an increase in private saving reduces the real interest rate, inducing an increase in net foreign investment, the real exchange rate will decline. If the elasticity of U.S. exports with respect to the real exchange rate is very low, it will take a large decline in the real exchange rate to increase U.S. net exports by enough to match the increase in net foreign investment.

11. a. When Europeans become more interested in investing in Canada, Canada's net foreign investment declines. This shifts the demand for loanable funds to the left and the net foreign investment curve to the left, as shown in Figure 30-10. In equilibrium, Canadian net foreign investment declines.

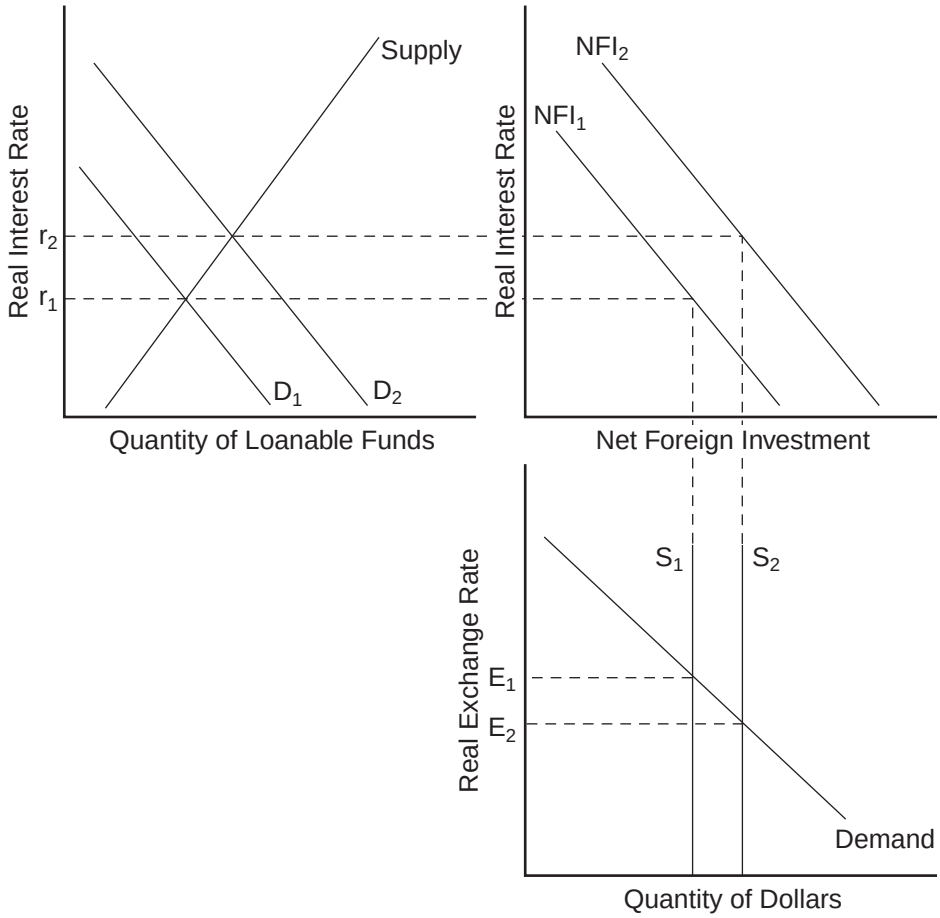
b. As the figure shows, the real interest rate declines, thus reducing Canada's private saving. But the decline in the real interest rate increases Canada's domestic investment.

c. Since Canada's domestic investment increases, in the long run, Canada's capital stock will increase.



12. a. If the Japanese decided they no longer wanted to buy U.S. assets, U.S. net foreign investment would increase, increasing the demand for loanable funds, as shown in Figure 30-11. The result is a rise in U.S. interest rates, an increase in the quantity of U.S. saving (because of the higher interest rate), and lower U.S. domestic investment.

b. In the market for foreign exchange, the real exchange rate declines and the balance of trade increases.



13. a. The models suggest that national saving can be quite different than domestic investment. When governments run large budget deficits, the models suggest that net foreign investment will be low, so national saving will be less than domestic investment. Thus the finding that national saving equals domestic investment seems to contradict the models.

b. If investors are unwilling to accumulate too many assets from a single foreign country, then net foreign investment won't be very responsive to changes in a country's real interest rate. Thus a government budget deficit would lead to a large enough increase in the real interest rate so that it would reduce domestic investment, with little change in net foreign investment. Thus national saving and domestic investment would move closely together, reconciling the fact and the models.

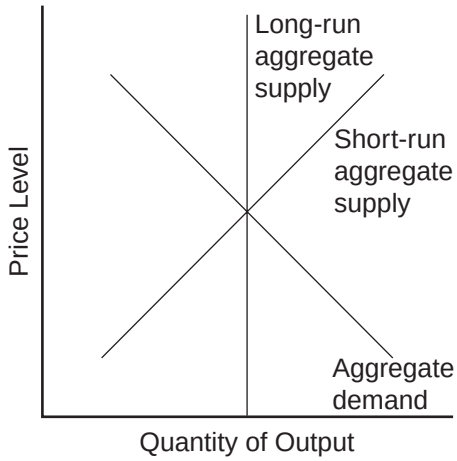
c. If investors are unwilling to accumulate too many assets from the United States, the U.S. trade deficit wouldn't be very high even if the U.S. budget deficit remains large. Instead, U.S. domestic investment would remain low.

Chapter 31: Aggregate Demand and Aggregate Supply

[Chapter 19: Aggregate Demand and Aggregate Supply]

Questions for Review: Answers

1. Figure 31-1 shows aggregate demand, short-run aggregate supply, and long-run aggregate supply.



2. The aggregate-demand curve is downward sloping because: (1) a decrease in the price level makes consumers feel more wealthy, which in turn encourages them to spend more, so there's a larger quantity of goods and services demanded (Pigou's wealth effect); (2) a lower price level reduces the interest rate, encouraging greater spending on investment, so there's a larger quantity of goods and services demanded (Keynes's interest-rate effect); (3) a fall in the U.S. price level causes U.S. interest rates to fall, so the real exchange rate depreciates, stimulating U.S. net exports, so there's a larger quantity of goods and services demanded (Mundell-Fleming's exchange-rate effect).

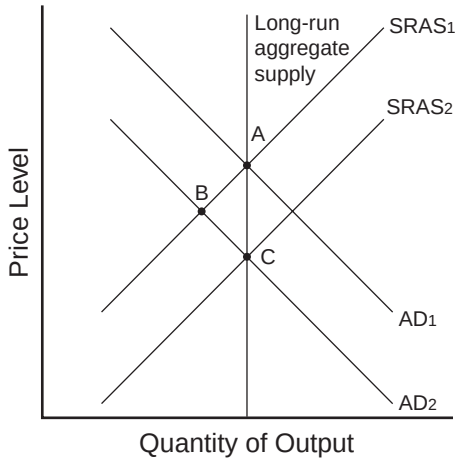
3. The long-run aggregate supply curve is vertical because in the long run, an economy's supply of goods and services depends on its supplies of capital and labor and on the available production technology used to turn capital and labor into goods and services. The price level does not affect these long-run determinants of real GDP.

4. Three theories that explain why the short-run aggregate-supply curve is upward sloping are: (1) the new classical misperceptions theory, in which a lower price level causes misperceptions about relative prices, and these misperceptions induce suppliers to

respond to the lower price level by decreasing the quantity of goods and services supplied; (2) the Keynesian sticky-wage theory, in which a lower price level makes employment and production less profitable because wages do not adjust immediately to the price level, so firms reduce the quantity of goods and services supplied; (3) the new Keynesian sticky-price theory, in which an unexpected fall in the price level leaves some firms with higher-than-desired prices because not all prices adjust instantly to changing conditions, which depresses sales and induces firms to reduce the quantity of goods and services they produce.

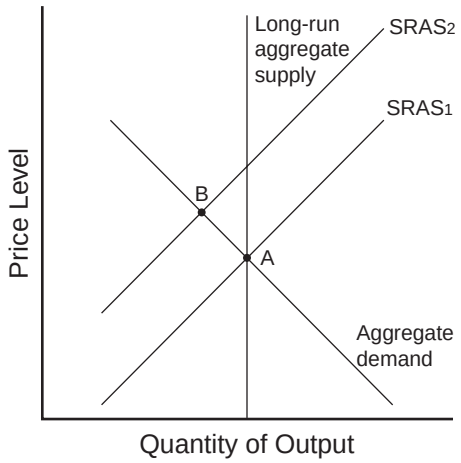
5. The aggregate-demand curve might shift to the left when something (other than a rise in the price level) causes a reduction in consumption spending (such as a desire for increased saving), a reduction in investment spending (such as increased taxes on the returns to investment), decreased government spending (such as a cutback in defense spending), reduced net exports (such as when foreign economies go into recession, so our exports fall), or a decrease in the money supply (such as when the Federal Reserve uses open-market sales).

Figure 31-2 traces through the steps of such a shift in aggregate demand. The economy begins in equilibrium, with short-run aggregate supply, $SRAS_1$, intersecting aggregate demand, AD_1, at point A. When the aggregate-demand curve shifts to the left to AD_2, the economy moves from point A to point B, reducing the price level and the quantity of output. Over time, costs of production decline, shifting the short-run aggregate-supply curve down to $SRAS_2$, and moving the economy from point B to point C, which is back on the long-run aggregate supply curve and has a lower price level.



6. The aggregate-supply curve might shift to the left because of a decline in the economy's capital stock, population, or productivity, all of which shift both the long-run and short-run aggregate supply curves to the left, or because of an increase in the expected price level, which shifts just the short-run aggregate-supply curve (not the long-run aggregate-supply curve) to the left.

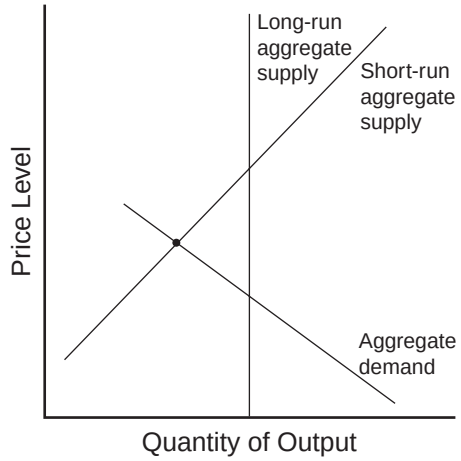
Figure 31-3 traces through the effects of such a shift. The economy starts in equilibrium at point A. The aggregate-supply curve then shifts to the left from $SRAS_1$ to $SRAS_2$. The new equilibrium is at point B, the intersection of the aggregate-demand curve and $SRAS_2$. As time goes on, the economy returns to long-run equilibrium at point A, as the short-run aggregate supply curve shifts back to its original position.



Problems and Applications: Answers

1. Investment is more variable than consumer spending over the business cycle because firms put off buying capital (they don't expand factories or buy new equipment) in recessions. People are also less likely to build new houses in recessions. Much of consumer spending is on necessities, like food, which don't decline as much in recessions. Durable goods, such as furniture and car purchases, are more volatile over the business cycle than nondurable goods, such as food and clothing, or services, such as haircuts and medical care, for the same reason. People put off buying durable goods and just make do with older cars and furniture when economic times are bad.

2. a. The current state of the economy is shown in Figure 31-4. The aggregate-demand curve and short-run aggregate-supply curve intersect at a point to the left of long-run aggregate supply.



b. Okun's Law suggests that for every percentage point that real GDP growth is below its potential growth rate of 3 percent, the unemployment rate will rise by 1/2 percentage point. So if real GDP has declined by 1 percent, GDP growth is 4 percentage points below potential growth of 3 percent, so the unemployment rate will be 4 x 1/2 = 2 percentage points more than it was last year.

c. With employment being underutilized, capital will also be underutilized. In a recession, capacity utilization is below its long-run average.

3. a. When the United States experiences a wave of immigration, the labor force increases, so long-run aggregate supply increases as there are more people who can produce output.

b. When the United Auto Workers union wins an unexpectedly high wage increase in its new contract, production costs rise in the short run, but in the long run there's no effect on labor or capital, so long-run aggregate supply doesn't change. (You could, however, argue that if the rise in the union wage were sufficient to raise automakers labor costs above the equilibrium level, leading them to cut back on labor and production, there would be a long-run effect, decreasing aggregate supply.)

c. When Intel invents a new and more powerful computer chip, productivity increases, so long-run aggregate supply increases as more output can be produced with the same inputs.

d. When a severe hurricane damages factories along the East Coast, the capital stock is smaller, so long-run aggregate supply declines.

4. In Figure 31-7 in the textbook, the unemployment rate at point B is higher than the unemployment rate at point A because output is lower at B than at A. The unemployment rate at point C is the same as that at point A because output is the same at both points. According to the sticky-wage explanation of the short-run aggregate supply curve, output is lower at point B than at point A because wages haven't adjusted. The nominal wage at points A and B are the same, but since the price level is lower at point B the real wage is higher, so firms hire fewer workers and thus output is lower. Point C is on the long-run aggregate supply curve, as is point A, so the real wage must be the same at the two points. Since the price level is lower at point C, the nominal wage at point C must be lower.

5. a. The statement that "the aggregate-demand curve slopes downward because it is the horizontal sum of the demand curves for individual goods" is false. The aggregate-demand curve slopes downward because a fall in the price level raises the overall quantity of goods and services demanded through Pigou's wealth effect, Keynes's interest-rate effect, and Mundell-Fleming's exchange-rate effect.

   b. The statement that "the long-run aggregate-supply curve is vertical because economic forces do not affect long-run aggregate supply" is false. Economic forces of various kinds (such as population and productivity) do affect long-run aggregate supply. The long-run aggregate-supply curve is vertical because the price level doesn't affect long-run aggregate supply.

   c. The statement that "if firms adjusted their prices every day, then the short-run aggregate-supply curve would be horizontal" is false. The short-run aggregate-supply curve would be vertical in that case, not horizontal.

   d. The statement that "whenever the economy enters a recession, its long-run aggregate-supply curve shifts to the left" is false. An economy could enter a recession if the aggregate supply curve or aggregate demand curve shift to the left.

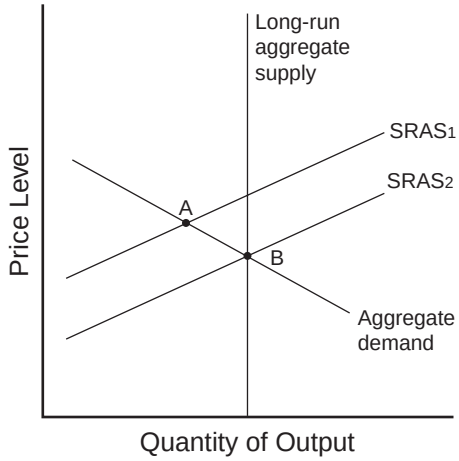
6. a. According to the new classical misperceptions theory, the economy is in a recession when the price level is below what was expected. Over time, as people observe the lower price level, their expectations will adjust, and the economy will return to the long-run aggregate-supply curve.

   According to the Keynesian sticky-wage theory, the economy is in a recession because the price level has declined so that real wages are too high, thus labor demand is too low. Over time, as nominal wages are adjusted so that real wages decline, the economy returns to full employment.

According to the new Keynesian sticky-price theory, the economy is in a recession because not all prices fall enough. Over time, firms are able to adjust their prices more fully, and the economy returns to the long-run aggregate-supply curve.

b. The speed of the recovery in each theory depends on how quickly price expectations (in the new classical misperceptions theory), wages (in the Keynesian sticky-wage theory), and prices (in the new Keynesian sticky-price theory) adjust.

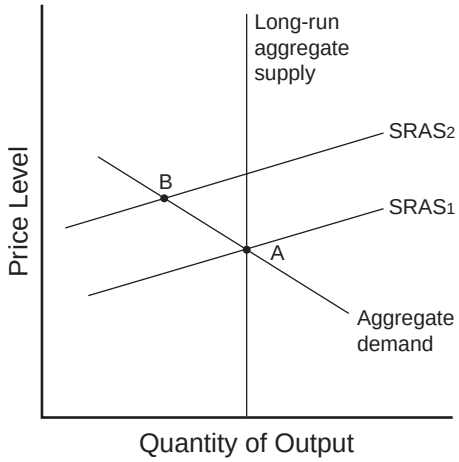
7. Figure 31-5 depicts an economy in a recession. The short-run aggregate supply curve is $SRAS_1$ and the economy is at equilibrium at point A, which is to the left of the long-run aggregate-supply curve. If policymakers take no action, the economy will return to the long-run aggregate-supply curve over time as the short-run aggregate-supply curve shifts to the right to $SRAS_2$. The economy's new equilibrium is at point B.



8. a. If people believe that inflation will be high over the next year, workers will want higher nominal wages. If the price level doesn't rise as much as wages do, real wages will increase, so firms won't hire as many workers.

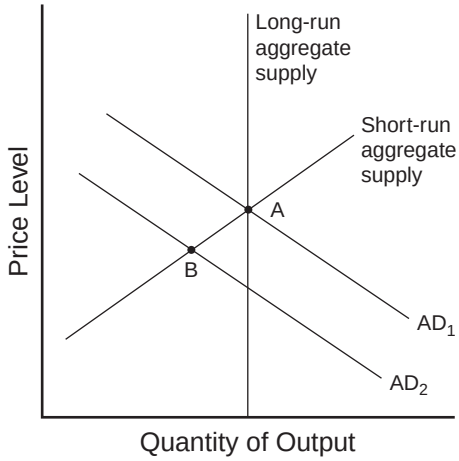
b. Figure 31-6 shows the economy starting out at point A on short-run aggregate-supply curve $SRAS_1$. With higher nominal wages, the short-run aggregate-supply curve will shift to the left to $SRAS_2$. The new equilibrium is at point B, with output less than long-run aggregate supply. In the short run, the price level rises and output falls. In the long-run, the economy will return to point A, as the decline in output eventually leads to a decline in the price level and the short-run aggregate-supply curve returns to $SRAS_1$.

c. In the short-run, expectations of higher inflation were somewhat accurate, as the price level is higher at point B than at point A. But they were wrong in the long run.

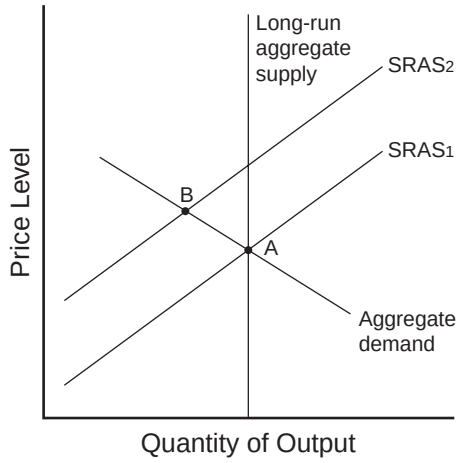


9. Policymakers might want to take action in a recession because it may take the economy a long time to recover on its own. By using monetary or fiscal policy, the government can reduce the length of a recession.

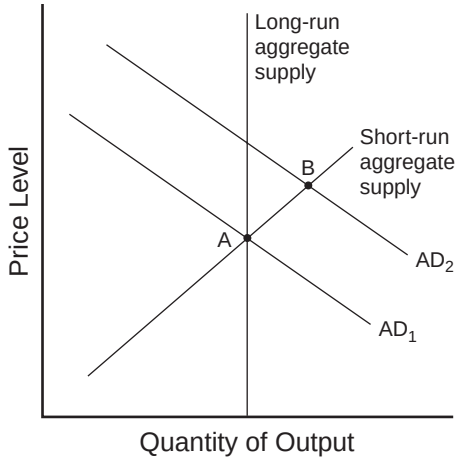
10. a. If households decide to save a larger share of their income, they must spend less on consumer goods, so the aggregate-demand curve shifts to the left, as shown in Figure 31-7. The equilibrium changes from point A to point B, so the price level declines and output declines.



b. If Florida orange groves suffer a prolonged period of below-freezing temperatures, the orange harvest will be reduced. This is represented in Figure 31-8 by a shift to the left in the short-run aggregate-supply curve. The equilibrium changes from point A to point B, so the price level rises and output declines.



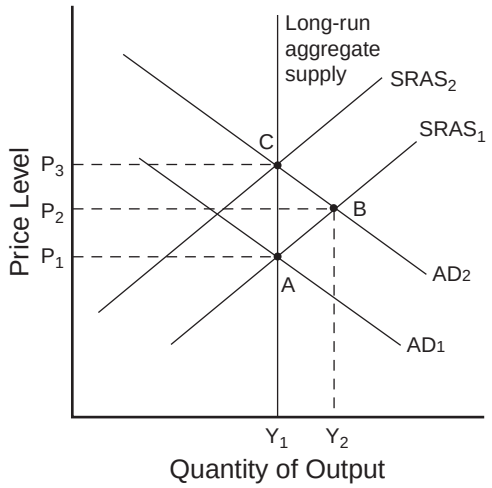
c. If the birthrate shoots up nine months after a severe winter blizzard, many effects are possible. The higher population will increase aggregate demand, the number of people leaving the workforce to give birth will rise, reducing aggregate supply, but the increased population will eventually lead to an increased labor force, increasing aggregate supply in the very long run. If the first effect has the strongest impact on the economy, the result is shown in Figure 31-9. The equilibrium changes from point A to point B, so the price level rises and output rises.



11. a. If firms become optimistic about future business conditions and invest a lot, the result is shown in Figure 31-10. The economy begins at point A with aggregate-demand curve AD_1 and short-run aggregate-supply curve $SRAS_1$. The equilibrium has price level P_1 and output level Y_1. Increased optimism leads to greater investment, so the aggregate-demand curve shifts to AD_2. Now the economy is at point B, with price level P_2 and output level Y_2. The aggregate quantity of output supplied rises because the price level has risen and people have misperceptions about the price level, and/or wages are sticky, and/or prices are sticky, all of which cause output supplied to increase.

b. Over time, as the misperceptions of the price level disappear, and/or wages adjust, and/or prices adjust, the short-run aggregate-supply curve shifts up to $SRAS_2$ and the economy gets to equilibrium at point C, with price level P_3 and output level Y_1. The quantity of output demanded declines as the price level rises because of Pigou's wealth effect, Keynes's interest-rate effect, and Mundell-Fleming's exchange-rate effect.

c. The investment boom might affect the long-run aggregate-supply curve because higher investment today means a larger capital stock in the future, thus higher productivity and output.



12. a. If households decide to hold higher money balances than before, they'll drive up interest rates because people will be selling interest-bearing assets.

b. Higher interest rates will reduce investment spending because the cost of investing will be higher.

c. Higher interest rates will reduce net foreign investment, which in turn will raise the real exchange rate, so the value of the dollar rises.

d. A higher value of the dollar reduces net exports, since U.S. goods become more expensive abroad and foreign goods become cheaper in the United States.

e. Aggregate demand declines because investment and net exports are lower.

Chapter 32: The Influence of Monetary and Fiscal Policy on Aggregate Demand

[Chapter 20: The Influence of Monetary and Fiscal Policy on Aggregate Demand]

Questions for Review: Answers

1. The theory of liquidity preference is Keynes's theory of how the interest rate is determined. It explains the downward slope of the aggregate-demand curve because: (1) a higher price level raises money demand; (2) higher money demand leads to a higher interest rate; and (3) a higher interest rate reduces the quantity of goods and services demanded.

2. A decrease in the money supply shifts the money-supply curve to the left. The money-supply curve now intersects the money-demand curve at a higher interest rate. The higher interest rate reduces the demand for consumption and investment, so aggregate demand falls. Thus, for a given price level, the quantity of goods and services demanded declines, so the aggregate-demand curve shifts to the left.

3. If the government buys $3 billion of police cars, aggregate demand might increase by more than $3 billion because of the multiplier effect on aggregate demand. Aggregate demand might increase by less than $3 billion because of the crowding-out effect on aggregate demand.

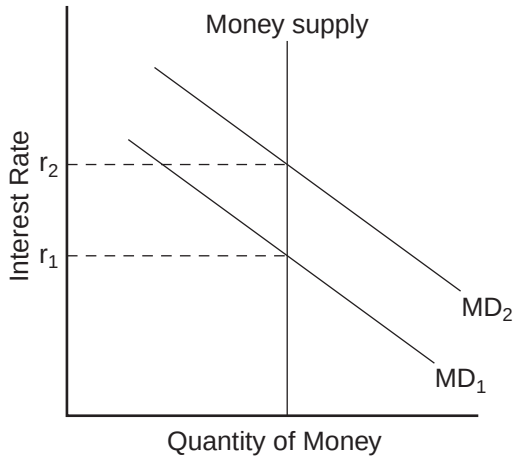
4. If pessimism sweeps the country, households reduce consumption spending and firms reduce investment, so aggregate demand falls. If the Fed wants to stabilize aggregate demand, it must increase the money supply, reducing the interest rate, which will induce households to save less and spend more and will encourage firms to invest more, both of which will increase aggregate demand. If the Fed doesn't increase the money supply, Congress could increase government purchases or reduce taxes to increase aggregate demand.

5. Government policies that act as automatic stabilizers include the tax system and government spending through the unemployment-benefit system. The tax system acts as an automatic stabilizer because when incomes are high people pay more in taxes, so they can't spend as much. When incomes are low, so are taxes; thus people can spend more. The result is that spending is stabilized somewhat. Government spending through the unemployment-benefit system acts as an automatic stabilizer because in recessions the government transfers money to the unemployed so their incomes don't fall as much and thus their spending won't fall as much.

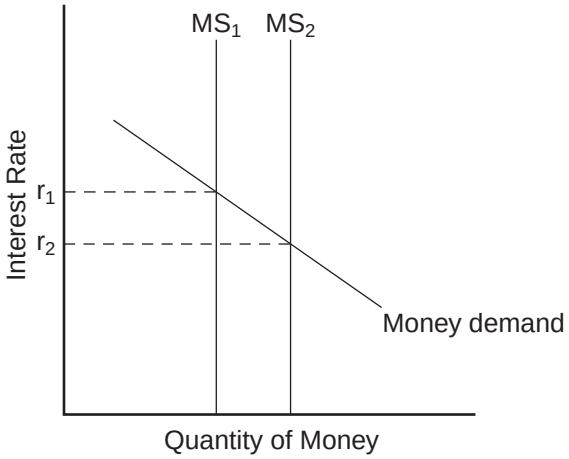
6. Changes in monetary policy have different effects over different time horizons because in the short run the price level is fixed, but in the long run the price level varies proportionally with the money supply. Thus, in the short run, monetary policy has effects on real variables since prices don't change, but in the long run, monetary policy can't affect real variables, only the price level.

Problems and Applications: Answers

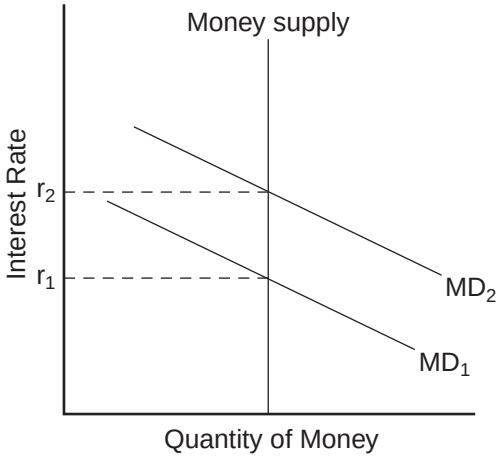
1. a. When a wave of optimism boosts business investment, money demand increases from MD_1 to MD_2 in Figure 32-1. The increase in money demand increases the interest rate.



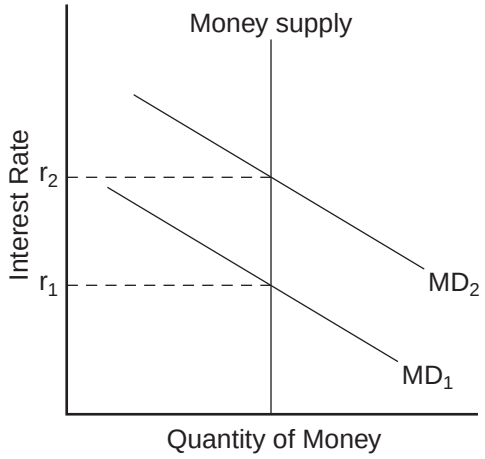
b. When the Federal Reserve reduces reserve requirements, the money supply increases, so the money-supply curve shifts to the right from MS_1 to MS_2, as shown in Figure 32-2. The result is a decline in the interest rate.



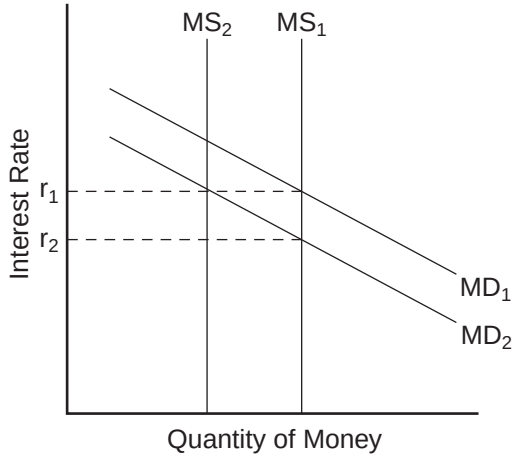
c. When an increase in oil prices shifts the short-run aggregate-supply curve upward, the increased price level increases money demand. The money-demand curve shifts to the right from MD_1 to MD_2, as shown in Figure 32-3. The result is a rise in the interest rate.



d. When households decide to hold more money to use for holiday shopping, the money-demand curve shifts to the right from MD_1 to MD_2, as shown in Figure 32-4. The result is a rise in the interest rate.



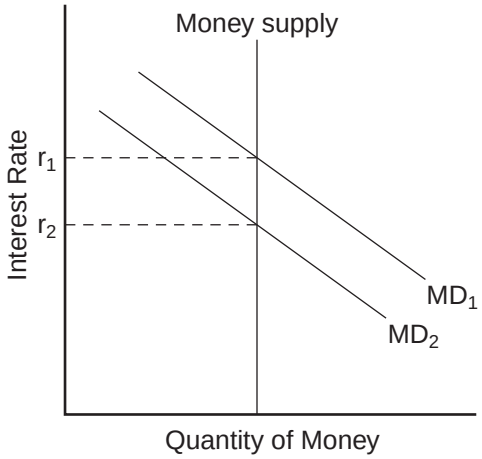
2. a. When more ATMs are available, so that people's money demand is reduced, the money-demand curve shifts to the left from MD_1 to MD_2, as shown in Figure 32-5. If the Fed does not change the money supply, which is at MS_1, the interest rate will decline from r_1 to r_2. The decline in the interest rate shifts the aggregate demand curve to the right, as consumption and investment increase.



b. If the Fed wants to stabilize aggregate demand, it should reduce the money supply to MS_2, so the interest rate will remain at r_1 and aggregate demand won't change.

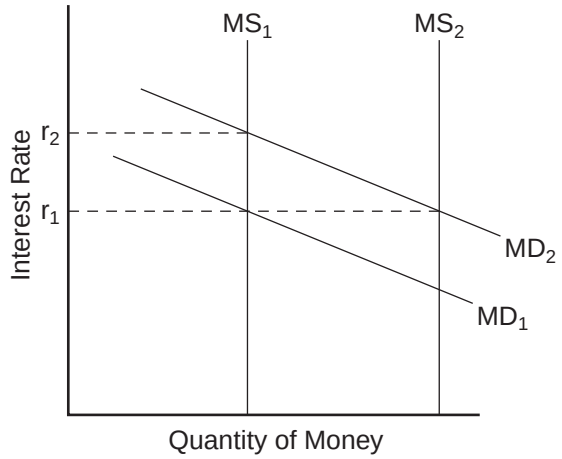
3. A tax cut that is permanent will have a bigger impact on consumer spending and aggregate demand. If the tax cut is permanent, consumers will view it as adding substantially to their financial resources, and they will increase their spending substantially. If the tax cut is temporary, consumers will view it as adding just a little to their financial resources, so they won't increase spending as much.

4. The decline in the U.S. interest rate in 1991 doesn't necessarily imply that monetary policy was expansionary. Since the United States was in a recession, money demand declined. The decline in money demand could have accounted for the decline in the interest rate, as shown in Figure 32-6.



5. a. Legislation allowing banks to pay interest on checking deposits increases the return to money relative to other financial assets, thus increasing money demand.

b. If the money supply remained constant (at MS_1), the increase in the demand for money would have raised the interest rate, as shown in Figure 32-7. The rise in the interest rate would have reduced consumption and investment, thus reducing aggregate demand and output.



c. To maintain a constant interest rate, the Fed would need to increase the money supply from MS_1 to MS_2. Then aggregate demand and output would be unaffected.

6. The demand for net exports is stimulated by expansionary monetary policy through the Mundell-Fleming exchange-rate effect, discussed in chapter 31. The decline in the interest rate increases net foreign investment, thus increasing net exports.

7. a. If there's no crowding out, then the multiplier equals 1/(1-MPC). Since the multiplier is 3, then MPC = 2/3.

b. If there's crowding out, then the MPC would be larger than 2/3. An MPC that's larger than 2/3 would lead to a larger multiplier than 3, which is then reduced down to 3 by the crowding-out effect.

8. a. The initial effect of the tax reduction of $20 billion is to increase aggregate demand by $20 billion x 3/4 (the MPC) = $15 billion. The cut in taxes increases consumption spending depending on the MPC.

b. Additional effects follow this initial effect as the added incomes get spent. The second round leads to increased consumption spending of $15 billion x 3/4 = $11.25 billion. The third round gives an increase in consumption of $11.25 billion x 3/4 = $8.44 billion. The effects continue indefinitely. Adding them all up gives a total effect that depends on the multiplier. With an MPC of 3/4, the multiplier is 1/(1-3/4) = 4. So the total effect is $15 billion x 4 = $60 billion.

c. Government purchases have an initial effect of the full $20 billion, since they increase aggregate demand directly by that amount. The total effect of an increase in government purchases is thus $20 billion x 4 = $80 billion. So government purchases lead to a bigger effect on output than a tax cut does.

9. If consumers become optimistic about their future incomes and purchase an additional $30 billion of additional goods and services, there will be a "multiplied" effect on total output. However, if future income doesn't rise as much as people expected, they won't increase spending any further, so there may not be as large a multiplier.

10. If government spending increases, aggregate demand rises, so money demand rises. The increase in money demand leads to a rise in the interest rate and thus a decline in aggregate demand if the Fed doesn't respond. But if the Fed maintains a fixed interest rate, it will increase money supply, so aggregate demand won't decline. Thus the effect on aggregate demand from an increase in government spending will be larger if the Fed maintains a fixed interest rate.

11. a. Expansionary fiscal policy is more likely to lead to a short-run increase in investment if the investment accelerator is large. A large investment accelerator means that the increase in output caused by expansionary fiscal policy will induce a large increase in investment. Without a large accelerator, investment might decline because the increase in aggregate demand will raise the interest rate.

b. Expansionary fiscal policy is more likely to lead to a short-run increase in investment if the interest sensitivity of investment is small. Since fiscal policy increases aggregate demand, thus increasing money demand and the interest rate, the greater the sensitivity of investment to the interest rate the greater the decline in investment will be, which will offset the positive accelerator effect.

12. a. An increase in government spending would shift the aggregate demand curve to the right, increasing output. The rise in output would raise consumption spending, since people would have higher incomes, and raise investment spending through the accelerator. But money demand would also increase,

raising the interest rate. This would tend to reduce consumption, as people would save more, and reduce investment, since the cost of investing would be higher. Overall, the changes in both consumption and investment are ambiguous.

b. A reduction in taxes would directly increase consumption spending, since people would have higher after-tax incomes. Also, since the reduction in taxes increases consumption spending, aggregate demand increases, so total output increases. The rise in output would raise consumption spending further, since people would have higher incomes, and raise investment spending through the accelerator. But money demand would also increase, raising the interest rate. This would tend to reduce consumption, as people would save more, and reduce investment, since the cost of investing would be higher. Overall, consumption must increase (otherwise aggregate demand wouldn't have increased at all) while the change in investment is ambiguous.

c. An expansion in the money supply reduces the interest rate, thus increasing aggregate demand and output. The rise in output would raise consumption spending, since people would have higher incomes, and raise investment spending through the accelerator. The lower interest rate would increase consumption, as people would save less, and increase investment, since the cost of investing would be lower. Overall, both consumption and investment would increase.

13. a. Tax revenue declines when the economy goes into a recession because taxes are closely related to economic activity. In a recession, people's incomes and wages fall, as do firms' profits, so taxes on all these things decline.

b. Government spending rises when the economy goes into a recession because more people get unemployment-insurance benefits, welfare benefits, and other forms of income support.

c. If the government were to operate under a strict balanced-budget rule, it would have to raise tax rates or cut government spending in a recession. Both would reduce aggregate demand, making the recession more severe.

14. An increase in the money supply raises aggregate demand, thus affecting real variables in the short run. But the increase in the money supply affects only nominal variables in the long run.

a. Consumer expenditures would be smaller in the long run than in the short run. In the short run, the increase in money supply would reduce the interest rate, increasing consumption spending. But in the long run, there would be no effect on consumer expenditures.

b. The price level would be larger in the long run than in the short run. In the short run, the increase in the money supply would have no effect on the price level, since it's fixed. But in the long run, the price level would rise.

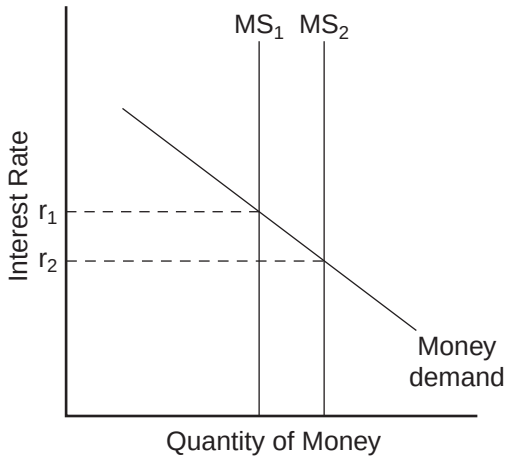
c. The interest rate would be higher in the long run than in the short run. In the short run, the increase in the money supply would reduce the interest rate. But in the long run, the interest rate would be unaffected.

d. Aggregate output would be smaller in the long run than in the short run. In the short run, the increase in money supply would reduce the interest rate, increasing aggregate demand and output. But in the long run, the increase in the money supply would have no effect on output.

15. a. If the Federal Reserve expands the money supply, as shown in Figure 32-8, the interest rate declines in the short run.

b. In the long run, there will be no effect on the interest rate. The price level will rise, increasing money demand. Since the interest rate is a real variable, it can't be affected in the long run because of the classical dichotomy.

c. The short-run effect differs from the long-run effect because of sticky prices. In the short run, prices can't adjust to reflect the change in the money supply. But in the long run they do.

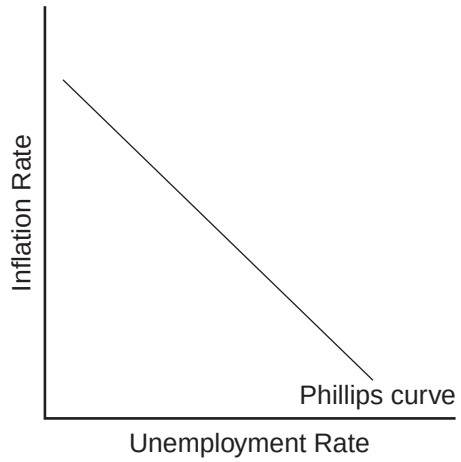


Chapter 33: The Short-run Tradeoff Between Inflation and Unemployment

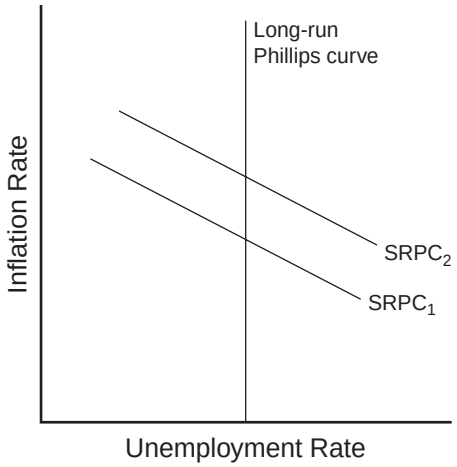
[Chapter 21: The Short-run Tradeoff Between Inflation and Unemployment]

Questions for Review: Answers

1. Figure 33-1 shows the short-run tradeoff between inflation and unemployment. The Fed can move from one point on this curve to another by changing the money supply. An increase in the money supply reduces the unemployment rate and increases the inflation rate, while a decrease in the money supply increases the unemployment rate and decreases the inflation rate.



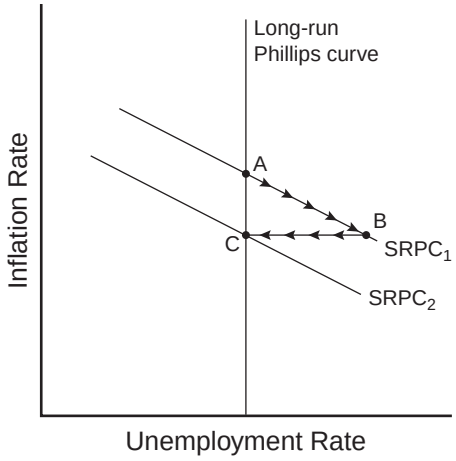
2. Figure 33-2 shows the long-run tradeoff between inflation and unemployment. In the long run, there is no tradeoff, as the economy must return to the natural rate of unemployment on the long-run Phillips curve. In the short run, the economy can move along a short-run Phillips curve, like $SRPC_1$ shown in the figure. But over time the short-run Phillips curve will shift to return the economy to the long-run Phillips curve, for example shifting from $SRPC_1$ to $SRPC_2$.



3. The natural rate of unemployment might differ across countries because different countries have differing degrees of union power, minimum-wage laws, collective-bargaining laws, unemployment insurance, job-training programs, and other factors that influence labor-market conditions.

4. If a drought destroys farm crops and drives up the price of food, the short-run aggregate-supply curve shifts up, as does the short-run Phillips curve, because the costs of production have increased. The higher short-run Phillips curve means the inflation rate will be higher for any given unemployment rate.

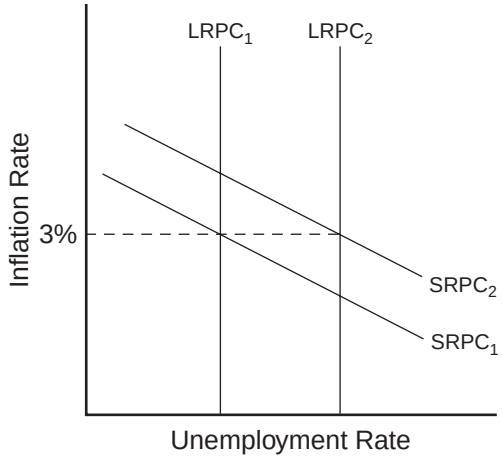
5. When the Fed decides to reduce inflation, the economy moves down along the short-run Phillips curve, as shown in Figure 33-3. Beginning at point A on short-run Phillips curve $SRPC_1$, the economy moves down to point B as inflation declines. Once people's expectations adjust to the lower rate of inflation, the short-run Phillips curve shifts to $SRPC_2$, and the economy moves to point C. The short-run costs of disinflation, which arise because the unemployment rate is temporarily above its natural rate, could be reduced if the Fed's action was credible, so that expectations would adjust more rapidly.



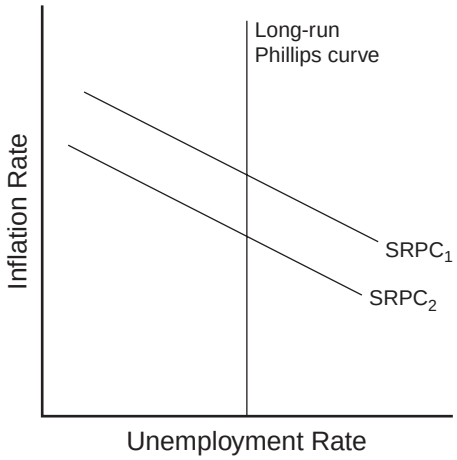
Problems and Applications: Answers

1. Figure 33-4 shows two different short-run Phillips curves depicting these four points. Points *a* and *d* are on $SRPC_1$ because both have expected inflation of 3 percent. Points *b* and *c* are on $SRPC_2$ because both have expected inflation of 5 percent.

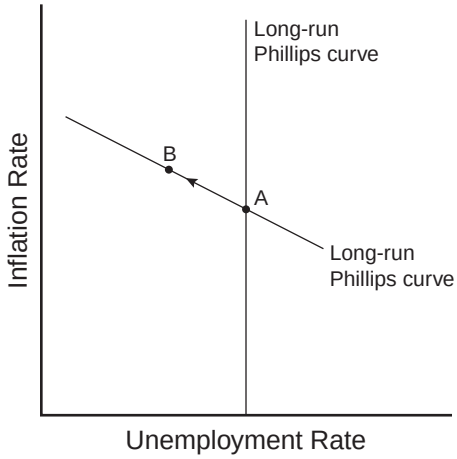
2. a. A rise in the natural rate of unemployment shifts the long-run Phillips curve to the right, as shown in Figure 33-5. The economy is initially on $LRPC_1$ and $SRPC_1$ at an inflation rate of 3 percent, which is also the expected rate of inflation. The increase in the natural rate of unemployment shifts the long-run Phillips curve to $LRPC_2$ and the short-run Phillips curve to $SRPC_2$, with the expected rate of inflation remaining equal to 3 percent.



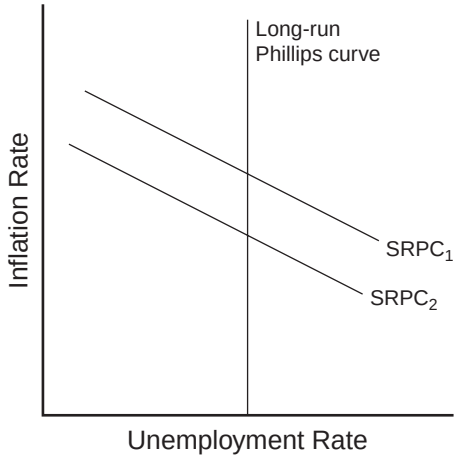
b. A decline in the price of imported oil shifts the short-run Phillips curve down, as shown in Figure 33-6, from $SRPC_1$ to $SRPC_2$. For any given unemployment rate, the inflation rate is lower, since oil is such a significant aspect of production costs in the economy.



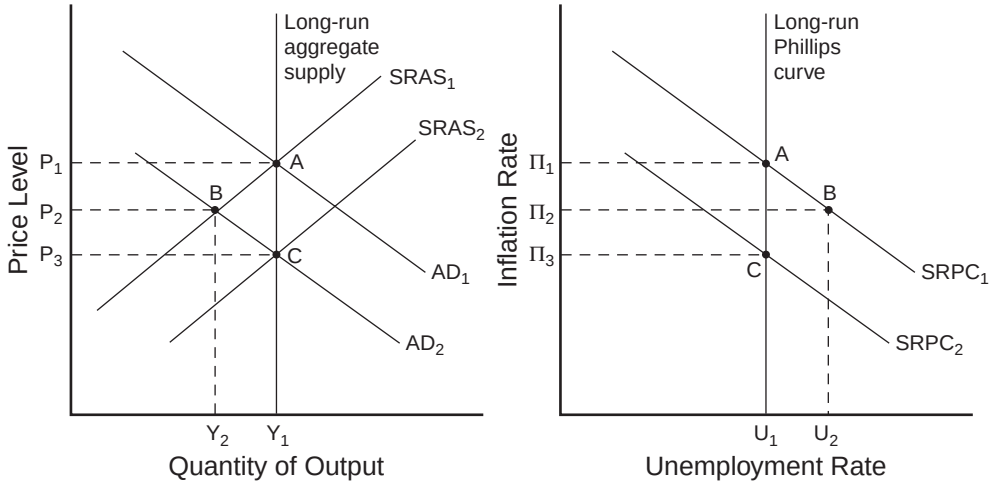
c. A rise in government spending represents an increase in aggregate demand, so it moves the economy along the short-run Phillips curve, as shown in Figure 33-7. The economy moves from point A to point B, with a decline in the unemployment rate and an increase in the inflation rate.



d. A decline in expected inflation causes the short-run Phillips curve to shift down, as shown in Figure 33-8. The lower rate of expected inflation shifts the short-run Phillips curve from $SRPC_1$ to $SRPC_2$.



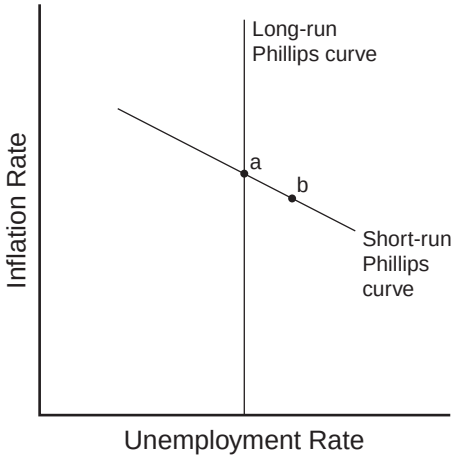
3. a. Figure 33-9 shows how a reduction in consumer spending causes a recession in both an aggregate-supply/aggregate-demand diagram and a Phillips-curve diagram. In both diagrams, the economy begins at full employment at point A. The decline in consumer spending reduces aggregate demand, shifting the aggregate-demand curve to the left from AD_1 to AD_2. The economy initially remains on the short-run aggregate-supply curve $SRAS_1$, so the new equilibrium occurs at point B. The movement of the aggregate-demand curve along the short-run aggregate-supply curve leads to a movement along short-run Phillips curve $SRPC_1$, from point A to point B. The lower price level in the aggregate-supply/aggregate-demand diagram corresponds to the lower inflation rate in the Phillips-curve diagram. The lower level of output in the aggregate-supply/aggregate-demand diagram corresponds to the higher unemployment rate in the Phillips-curve diagram.



b. If expected inflation is unchanged, the recession and high unemployment rate eventually cause wages to decline in the economy. As this occurs, the price of production declines, shifting the short-run aggregate-supply curve down from $SRAS_1$ to $SRAS_2$, and shifting the short-run Phillips curve down from $SRPC_1$ to $SRPC_2$. In both diagrams, the economy eventually gets to point C, which is back on the long-run aggregate-supply curve and long-run Phillips curve.

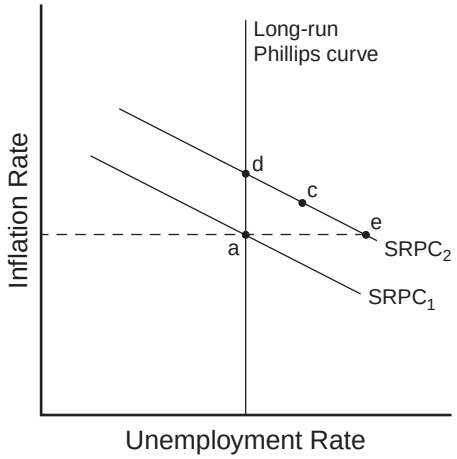
If expected inflation changes, the movement of the economy to $SRAS_2$ and $SRPC_2$ happens faster than if the economy adjusts through a decline in nominal wages. But in either case, the economy eventually gets to point C on both diagrams.

4. a. Figure 33-10 shows the economy in long-run equilibrium at point *a*, which is on both the long-run and short-run Phillips curves.



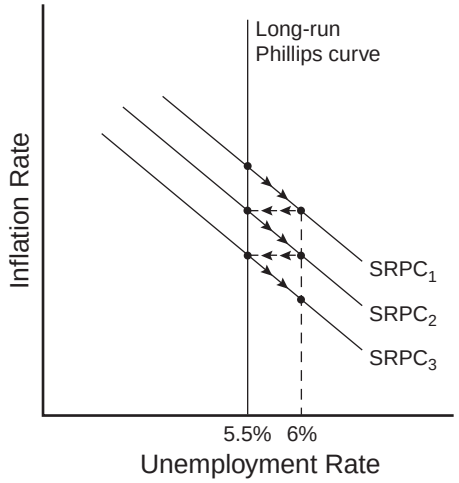
b. A wave of business pessimism reduces aggregate demand, moving the economy to point *b* in the figure. The unemployment rate rises and the inflation rate declines. If the Fed undertakes expansionary monetary policy, it can increase aggregate demand, offsetting the pessimism and returning the economy to point *a*, with the initial inflation rate and unemployment rate.

c. Figure 33-11 shows the effects on the economy if the price of imported oil rises. The higher price of imported oil shifts the short-run Phillips curve up from $SRPC_1$ to $SRPC_2$. The economy moves from point *a* to point *c*, with a higher inflation rate and higher unemployment rate. Now if the Fed engages in expansionary monetary policy, it can return the economy to its original unemployment rate at point *d*, but the inflation rate will be higher. If the Fed engages in contractionary monetary policy, it can return the economy to its original inflation rate at point *e*, but the unemployment rate will be higher. This situation differs from that in part (b) because in part (b) the economy stayed on the same short-run Phillips curve, but in part (c) the economy moved to a higher short-run Phillips curve.



5. If the Fed acts on its belief that the natural rate of unemployment is 6 percent, when the natural rate is in fact 5.5 percent, the result will be a spiraling down of the inflation rate, as shown in Figure 33-12. Starting from a point on the long-run Phillips curve, with an unemployment rate of 5.5 percent, the Fed will think that the economy is overheating, since the unemployment rate is below what it thinks is the natural rate. So the Fed will contract the money supply, moving the economy along the short-run Phillips curve $SRPC_1$. The inflation rate will decline and the unemployment rate will rise to 6 percent. As the inflation rate declines, people's expectations of inflation will

eventually decline, and the short-run Phillips curve will shift to the left to $SRPC_2$. This process will continue, and the inflation rate will spiral downwards.



6. a. If wage contracts have short durations, a recession induced by contractionary monetary policy will be less severe, since wage contracts can be adjusted more rapidly to reflect the lower inflation rate. This will allow a more rapid movement of the short-run aggregate-supply curve and short-run Phillips curve to restore the economy to long-run equilibrium.

   b. If there is little confidence in the Fed's determination to reduce inflation, a recession induced by contractionary monetary policy will be more severe. It will take longer for people's inflation expectations to adjust downwards, the less confidence they have in the Fed's willingness to bear the costs of reducing inflation.

   c. If expectations of inflation adjust quickly to actual inflation, a recession induced by contractionary monetary policy will be less severe. In this case, people's expectations adjust quickly, so the short-run Phillips curve shifts quickly to restore the economy to long-run equilibrium at the natural rate of unemployment.

7. Economists who believe the short-run Phillips curve is relatively steep and shifts quickly in response to changes in the economy would be more likely to favor using contractionary policy to reduce inflation than economists with the opposite views. If the short-run Phillips curve is relatively steep, then the unemployment rate doesn't rise much because of contractionary policy. And if the short-run Phillips curve shifts quickly in response to changes in the economy, then the economy won't be off the long-

run Phillips curve for long in response to contractionary monetary policy. Thus, the costs of disinflation will be very small.

8. With a sacrifice ratio of 5, a reduction of inflation by 2 percentage points requires a loss of output of 5 x 2 = 10 percentage points. Since this will take place over 5 years, output will have to average 10/5 = 2 percentage points per year below its trend level. Since the unemployment rate will be 1/2 percentage point higher for each percentage point that output is below its trend level, the unemployment rate will be 1/2 x 2 = 1 percentage point higher than its natural rate of 6 percent, so the unemployment rate will have to average 7 percent for 5 years.

9. If the Fed announces a disinflation, but nominal wages have been set in three-year contracts, then the lower rate of inflation will mean real wages are too high until the contracts can be renegotiated in three years. As a result, firms won't hire as much labor and there will be unemployment. So the disinflation would be costly. To reduce the cost of disinflation, the Fed could announce that it would reduce inflation three years from now, so contracts could be adjusted. Alternatively, the Fed could reduce inflation very slowly, so real wages wouldn't be too high by very much, and the costs of disinflation would be lower.

10. Even though inflation is unpopular, elected leaders don't always support efforts to reduce inflation because of the short-run costs associated with disinflation. In particular, as disinflation occurs, the unemployment rate rises, and when unemployment is high people tend not to vote for incumbent politicians, blaming them for the bad state of the economy. Thus politicians tend not to support disinflation.

    Economists believe that countries with independent central banks can reduce the cost of disinflation because in those countries politicians can't interfere with central banks' disinflation efforts. People will believe the central bank when it announces a disinflation because they know politicians can't stop the disinflation. In countries with central banks that aren't independent, people know that a disinflation could be stopped by politicians who are worried they won't be reelected. As a result, the credibility of the central bank is lower and thus the costs of disinflation are higher.

Chapter 34: Five Debates over Macroeconomic Policy

[Chapter 22: Five Debates over Macroeconomic Policy]

Questions for Review: Answers

1. The lags in the effect of monetary and fiscal policy on aggregate demand are caused by the fact that many households and firms set their spending plans in advance, so it takes time for changes in interest rates to alter the aggregate demand for goods and services. As a result, it's more difficult to engage in activist stabilization policy, because the economy won't respond immediately to policy changes.

2. A central banker might be motivated to cause a political business cycle by trying to influence the outcome of elections. A central banker who is sympathetic to the incumbent knows that if the economy is doing well at election time, the incumbent is likely to be reelected. So the central banker could stimulate the economy before the election. To prevent this, it might be desirable to have monetary policy set by rules, rather than discretion.

3. Credibility might affect the cost of reducing inflation because it influences how quickly the short-run Phillips curve adjusts. If the Fed announces a credible plan to reduce inflation, the short-run Phillips curve will shift down quickly and the cost of disinflation will be low. But if the plan isn't credible, people won't adjust their expectations of inflation, the short-run Phillips curve won't shift, and the cost of disinflation will be high.

4. Some economists are against a target of zero inflation because they believe the costs of reaching zero inflation are large and the benefits are small.

5. Two ways in which a government budget deficit hurts a future worker are: (1) taxes on future workers are higher to pay off the government debt; and (2) budget deficits lead to a reduction in the economy's capital stock, so future workers have lower incomes.

6. Two situations in which a budget deficit is justifiable are: (1) in wartime, so tax rates won't have to be increased so much that they lead to large deadweight losses; and (2) during a temporary downturn in economic activity, during which balancing the budget would force the government to increase taxes and cut spending, making the downturn even worse.

7. An example of how the government might hurt young generations while reducing the government debt they inherit occurs if the government reduces spending on education.

Then the government debt will be smaller, so future generations will pay less in taxes. But they'll also be less educated, so they'll have less human capital and thus have lower incomes. So future generations might be worse off in this case.

8. The government can run a budget deficit forever because population and productivity continuously increase. Thus the economy's capacity to pay off its debt grows over time. So as long as the government debt grows slower than the economy's income, government deficits can grow forever.

9. Income from capital is taxed twice in the case of dividends on corporate stock. The income is taxed once by the corporate income tax and a second time by the individual income tax on dividend income.

10. Examples, other than tax policy, of how our society discourages saving include: (1) the fact that some government benefits, such as welfare and Medicaid, are means-tested, so people who save get reduced benefits; and (2) the fact that colleges and universities grant financial aid inversely to the wealth of students and their families, so people who save get less financial aid.

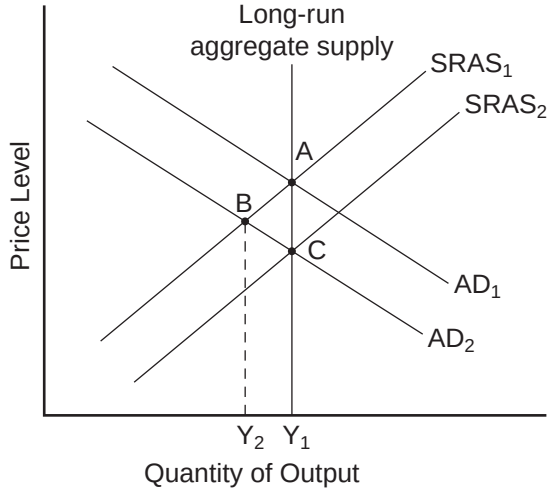
11. Tax incentives to raise saving may have the adverse effect of raising the government budget deficit, which reduces public saving. Thus national saving may not increase even though private saving rises.

Problems and Applications: Answers

1. a. Figure 34-1 illustrates the short-run effect of a fall in aggregate demand. The economy starts at point A on aggregate-demand curve AD_1 and short-run aggregate-supply curve $SRAS_1$. The decline in aggregate demand shifts the aggregate-demand curve from AD_1 to AD_2 and the economy moves to point B. Total output falls from Y_1 to Y_2, so income and employment fall as well.

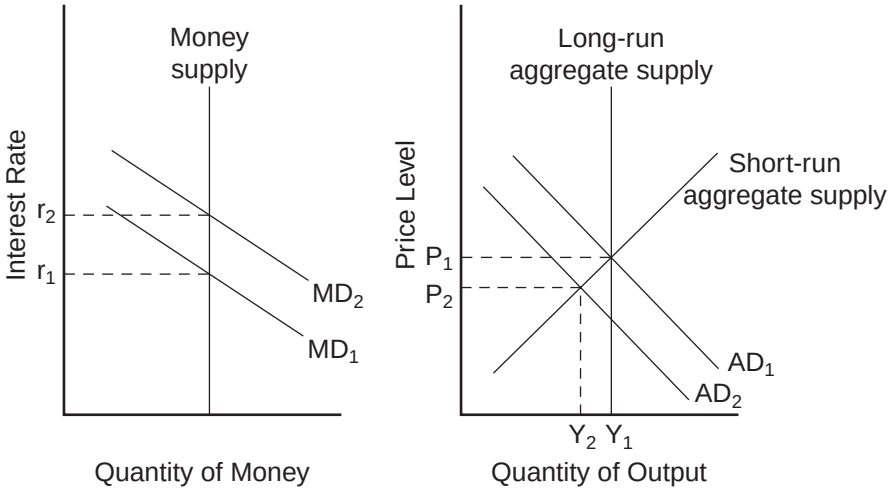
   b. With no policy changes, the economy restores itself gradually over time. The recession induces declines in wages, so the cost of production declines, and the short-run aggregate-supply curve shifts down to $SRAS_2$. The economy ends up at point C, with a lower price level, but with output back at Y_1. However, this process may take years to complete.

   c. The economy does restore itself, but very slowly.

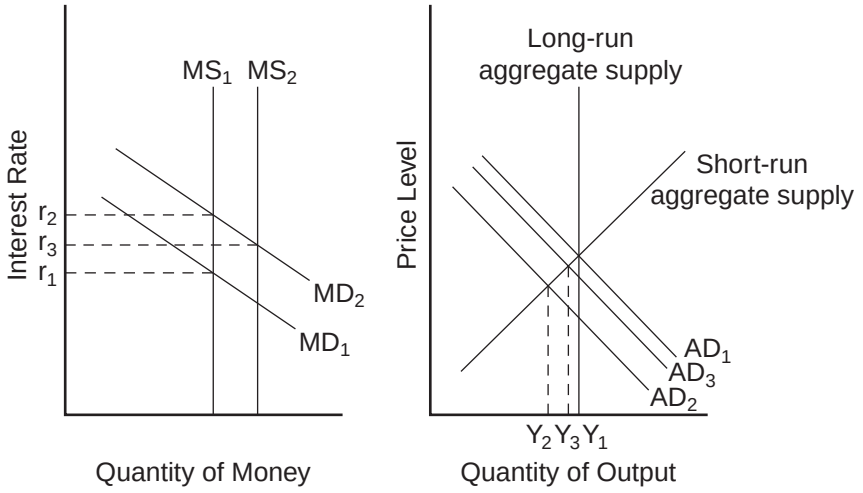


2. It is difficult for policymakers to choose the appropriate strength of their actions because of lags between when policy is changed and when it affects aggregate demand, as well as the difficulty in forecasting the economy's future condition.

3. a. If money demand rises, the interest rate increases for a given money supply, as shown in Figure 34-2. The rise in the interest rate from r_1 to r_2 reduces consumption and investment spending, shifting the aggregate-demand curve to the left from AD_1 to AD_2. The result is a decline in output from Y_1 to Y_2 and a reduction of the price level from P_1 to P_2.



b. If the Fed's rule responded to the unemployment rate, then the effects in part *a* would be modified, as shown in Figure 34-3. After output declines to Y_2 as in part *a*, which causes a rise in the unemployment rate, the Fed increases the money supply to from MS_1 to MS_2, thus reducing the interest rate from r_2 to r_3. This stimulates consumption and investment spending, so the aggregate-demand curve shifts from AD_2 to AD_3. The result is a rise in output from Y_2 to Y_3.



c. Having an element of feedback in the Fed's rule, as in part *b*, helps to stabilize the economy. If shocks to aggregate demand can be anticipated, as in the case of changes in fiscal policy, then it would help if the Fed's rule responded to predicted unemployment instead of current unemployment, especially given the lags in the effects of policy. For example, suppose the government announced a cut in spending to occur in a year. Then forecasts of the economy would show rising unemployment in the future because of the reduction in aggregate demand. If the Fed's rule could respond to those forecasts, the money supply could increase today, so that interest rates would decline today, causing spending in the future to increase, offsetting the contractionary fiscal policy.

4. a. If investors believe that capital taxes will remain low, then a reduction in capital taxes leads to increased investment.

b. After the increase in investment has occurred, the government has an incentive to renege on its policy because it can get more tax revenue by increasing taxes on the higher income from the larger capital stock.

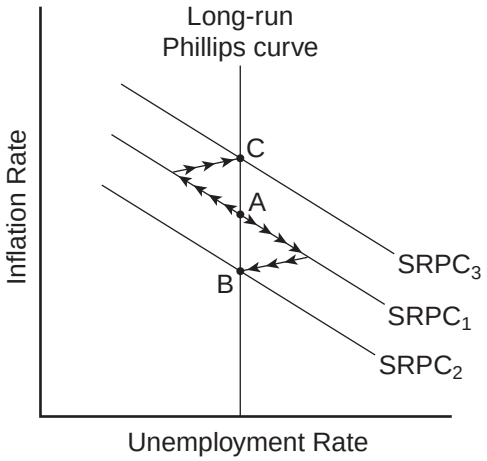
c. Given the government's obvious incentive to renege on its promise, firms will be reluctant to increase investment when the government reduces tax rates. The government can increase the credibility of its tax change by somehow committing to low future tax rates. For example, it could write a law that guarantees low future tax rates for all capital income from investments made within the next year, or write a law penalizing itself if it raises future taxes.

d. This situation is similar to the time-inconsistency problem facing monetary policymakers because the government's incentives change over time. In both cases, the policymaker has an incentive to tell people one thing, then to do another once people have made an economic decision. For example, in the case of monetary policy, policymakers could announce an intention to lower inflation, so firms and workers will enter labor contracts with lower nominal wages, then the policymakers could increase inflation to reduce real wages and stimulate the economy.

5. Issues about whether the costs of inflation are large or small are positive statements, as is the question about the size of the costs of reducing inflation. But the question of whether the Fed should reduce inflation to zero is a normative question.

6. The benefits of reducing inflation are permanent and the costs are temporary. Figure 34-4 illustrates this. The economy starts at point A. To reduce inflation, the Fed uses contractionary policy to move the economy down the short-run Phillips curve $SRPC_1$. Inflation declines and unemployment rises, so there are costs to reducing inflation. But the costs are only temporary, since the short-run Phillips curve eventually shifts down to $SRPC_2$, and the economy ends up at point B. Since inflation is lower at point B than at point A, and point B is on the long-run Phillips curve, the benefits of reducing inflation are permanent.

   The costs of increasing inflation are permanent and the benefits are temporary for similar reasons. Again, suppose the economy starts at point A. To increase inflation, the Fed uses expansionary policy to move the economy up the short-run Phillips curve $SRPC_1$. Inflation rises and unemployment declines, so there are benefits to increasing inflation. But the benefits are only temporary, since the short-run Phillips curve eventually shifts up to $SRPC_3$, and the economy ends up at point C. Since inflation is higher at point C than at point A, and point C is on the long-run Phillips curve, the costs of increasing inflation are permanent.



7. a. An increase in the budget deficit redistributes income from young to old, since future generations will have to pay higher taxes and will have a lower capital stock.

   b. More generous subsidies for education loans redistribute income from old to young, since future generations benefit from having higher human capital.

   c. Greater investments in highways and bridges redistribute income from old to young, since future generations benefit from having a higher level of public capital than otherwise.

   d. The indexation of Social Security benefits to inflation redistributes income from young to old, since old people get higher benefits than they would in the absence of indexation.

8. People's opposition to budget deficits may be stronger in principle than in practice because people want the budget deficit to be lower, but they also don't want to cut government spending or to have increased taxes.

9. In a recession, the government can use a budget deficit to increase aggregate demand, thus boosting income and output. But in the long run, budget deficits raise interest rates, reducing investment, thus leading to a lower capital stock and reduced future income. The ideal fiscal policy would be one that allows budget deficits in the short run to combat recessions, but requires that the budget be balanced over time so that it doesn't have a detrimental effect on future income.

10. The government can reduce taxes on capital income but avoid redistributing income from poor to rich by taxing consumption spending rather than income or increasing tax rates on those with higher incomes.

11. The fundamental tradeoff that society faces if it chooses to save more is that it will have to reduce its consumption. So society can consume less today and save more if it wants higher future income and consumption. The choice is really one of consumption today versus consumption in the future.

12. a. A reduction in the tax rate on income from saving would most directly benefit wealthy people who have a lot of capital income.

    b. The increased incentive to save would reduce the interest rate, thus increasing investment, so the capital stock would be larger. As capital per worker rises, productivity would increase, as well as the real wage paid to workers.

    c. Thus, in the long run, everyone, not just the wealthy, would benefit from reducing the tax rate on income from savings.

13. a. In the choice of whether or not to have stabilization policy, if policymakers didn't stabilize the economy, poorer people would be most likely to become unemployed and small businesses would be most likely to go bankrupt in a downturn.

    In the choice of whether to reduce inflation to zero, if disinflation were pursued, the lost income from a recession would be concentrated on vulnerable workers with low skills or little experience who would be laid off.

    In the choice of whether to balance the budget, if the budget isn't balanced, future generations will bear a greater burden as they'll pay higher taxes and have a lower capital stock.

    b. Most of the debates focus on efficiency considerations. But the uneven distribution of the costs of these policies suggests that equity considerations are also likely to be important, too.