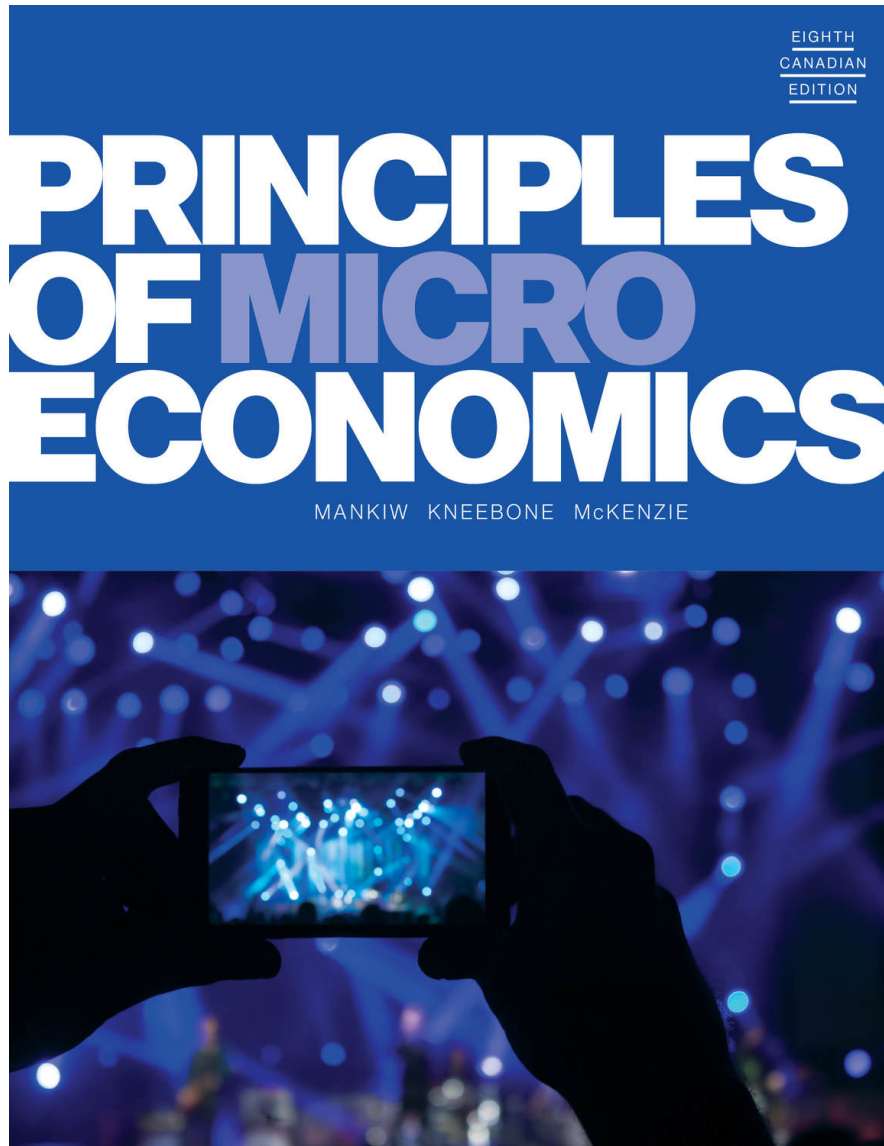


# INSTRUCTOR SOLUTIONS MANUAL

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to accompany



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University of Calgary

**NELSON**

# NELSON

**Principles of Microeconomics**, Eighth Canadian Edition  
by N. Gregory Mankiw, Ronald D. Kneebone, and Kenneth J. McKenzie

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# Chapter 1

## Ten Principles of Economics

### SOLUTIONS TO TEXTBOOK PROBLEMS

#### Quick Quizzes

1. *Describe an important tradeoff you recently faced. • Give an example of some action that has both a monetary and nonmonetary opportunity cost. • Describe an incentive your parents and/or guardians offered to you in an effort to influence your behaviour.*

Usually students are able to come up with standard examples of tradeoffs: buy a textbook instead of a ticket to a favourite performance, go to a group study session instead of a birthday party, etc. Instructors may wish to point out less straightforward instances of how the principles work. For instance, when discussing incentives instructors may point out perverse effects of incentives. Other examples include the invention of the seat belt, or crosswalk countdown signals, discussed in the text. Examples of actions that have both monetary and nonmonetary opportunity costs are watching a movie (time + money) and driving a car (money + pollution + traffic congestion). Parents and/or guardians may offer their children gifts conditional on good results in school.

2. *Why is a country better off not isolating itself from all other countries? • Why do we have markets and, according to economists, what roles should government play in them?*

A country is better off not isolating itself from other countries for the simple reason that doing so would prevent it from engaging in mutually beneficial trade, which gives consumers access to more diverse and cheaper products.

Markets are usually a good way of organizing economic activity because they allocate resources to their most efficient use, maximizing the size of the economic pie. This is because market prices convey information about the scarcity of various resources, which provides important signals to consumers and producers when making their decisions.

A fundamental role of government is to define and enforce property rights for scarce resources, to allow markets to work in an efficient manner. In some cases, however, markets may nonetheless fail to allocate resources in an efficient manner, and governments can intervene to improve market outcomes. This is the case when market failures exist, such as externalities and market power.

Another role for government can be to address concerns about the equitable distribution of the economic pie. While in the absence of market failures markets will lead to an efficient outcome (maximizing the size of the economic pie), there is no guarantee that the outcome will be equitable (result in a fair distribution of the pie). Governments can therefore play a role in pursuing equity objectives. However, this often requires interventions that may impinge upon efficiency, shrinking the overall size of the economic pie; thus the notion of the efficiency-equity tradeoff.

3. *List and briefly explain the three principles that describe how the economy as a whole works.*

The three principles that describe how the economy as a whole works are: (1) a country's standard of living depends on its ability to produce goods and services; (2) prices rise when the government prints too much money; and (3) society faces a short-run tradeoff between inflation and unemployment. A country's standard of living depends on its ability to produce goods and services, which in turn depends on its productivity, which is a function of the education of workers and the access workers have to the necessary tools and technology. Prices rise when the government prints too much money because more money in circulation reduces the value of money, causing inflation. Society faces a short-run tradeoff between inflation and unemployment that is only temporary, and policymakers have some ability to exploit this relationship using various policy instruments.

### Questions for Review

1. *What is a tradeoff? Give two examples of tradeoffs that you face in your life.*

A tradeoff is what you give up in order to get something else. 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 \$15 to purchase a pizza or to buy an online study guide for that tough economics course).

2. *What is the opportunity cost of seeing a movie?*

The opportunity cost of seeing a movie includes the monetary cost of admission plus the time cost of going to the theatre 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 may be small, but if it's working an extra three hours at your job, the time cost is the money you could have earned.

3. *Water is necessary for life. Is the marginal benefit of a glass of water large or small?*

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. *Why should policymakers think about incentives?*

Policymakers need to think about incentives so they can understand how people will respond to the policies they put in place. The text's examples of seat belts and crosswalk countdown signals show 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. *Why isn't trade among countries like a game, with some winners and some losers?*

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 can improve everyone's welfare.

6. *What does the "invisible hand" of the marketplace do?*

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 is good for society as a whole.

7. *Explain the two main causes of market failure and give an example of each.*

The two main causes of market failure are externalities and market power. An externality is the impact of one person's actions on the well-being of a bystander, such as from pollution or the creation of knowledge. Market power refers to the ability of a single person (or small group of people) to unduly influence market prices, such as in a town with only one well or only one cable television company.

8. *Why is productivity important?*

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. *What is inflation, and what causes it?*

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

10. *How are inflation and unemployment related in the short run?*

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.

**Quick Check Multiple Choice**

1. *Economics is best defined as the study of which of the following?*
  - a. *how society manages its scarce resources*
  - b. *how to run a business most profitably*
  - c. *how to predict inflation, unemployment, and stock prices*
  - d. *how the government can stop the harm from unchecked self-interest*
2. *What is your opportunity cost of going to a movie?*
  - a. *the price of the ticket*
  - b. *the price of the ticket plus the cost of any soda and popcorn you buy at the theatre*
  - c. *the total cash expenditure needed to go to the movie plus the value of your time*
  - d. *zero, as long as you enjoy the movie and consider it a worthwhile use of time and money*
3. *Which of the following describes a marginal change?*
  - a. *one that is NOT important for public policy*
  - b. *one that incrementally alters an existing plan*
  - c. *one that makes an outcome inefficient*
  - d. *one that does NOT influence incentives*

4. *What is Adam Smith's "invisible hand"?*
  - a. *the subtle and often hidden methods that businesses use to profit at consumers' expense*
  - b. *the ability of free markets to reach desirable outcomes despite the self-interest of market participants*
  - c. *the ability of government regulation to benefit consumers even if the consumers are unaware of the regulations*
  - d. *the way in which producers or consumers in unregulated markets impose costs on innocent bystanders*
  
5. *When policymakers make policies that change the costs and benefits that people face, what is the result for society?*
  - a. *people's behaviours are altered*
  - b. *people ignore incentives*
  - c. *inflation occurs*
  - d. *government revenue is reduced*
  
6. *If a nation has high and persistent inflation, what is the most likely explanation?*
  - a. *the central bank is creating excessive amounts of money*
  - b. *unions bargaining for excessively high wages*
  - c. *the government is imposing excessive levels of taxation*
  - d. *firms are using their monopoly power to enforce excessive price hikes*

1. a
2. c
3. b
4. b
5. a
6. a

### **Problems and Applications**

1. *Describe some of the tradeoffs faced by each of the following.*
  - a. *a family deciding whether to buy a new car*
  - b. *a member of Parliament deciding how much to spend on national parks*
  - c. *a company president deciding whether to open a new factory*
  - d. *a professor deciding how much to prepare for class*
  - 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 Parliament 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 defence or on the police force. Or, instead of spending more money on the park system, taxes could be reduced.
  - 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 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. *You are trying to decide whether to take a vacation. Most of the costs of the vacation (airfare, hotel, forgone wages) are measured in dollars, but the benefits of the vacation are psychological. How can you compare the benefits to the costs?*

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 are worth the psychological costs incurred to earn the money to pay for the vacation.

3. *You were planning to spend Saturday working at your part-time job, but a friend asks you to go skiing. What is the true cost of going skiing? Now suppose that you had been planning to spend the day studying at the library. What is the cost of going skiing in this case? Explain.*

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, including the opportunity cost of the wages you are 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, including the cost to you of getting a lower grade in your course.

4. *You win \$100 in a hockey pool. You have a choice between spending the money now or putting it away for a year in a bank account that pays 5 percent interest. What is the opportunity cost of spending the \$100 now?*

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

5. *The company that you manage has invested \$5 million in developing a new product, but the development is not quite finished. At a recent meeting, your salespeople report that the introduction of competing products has reduced the expected sales of your new product to \$3 million. If it would cost \$1 million to finish development and make the product, should you go ahead and do so? What is the most that you should pay to complete development?*

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're 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. *The welfare system provides income for people who are very poor, with low incomes and few assets. If a recipient of welfare payments decides to work and earn some money, the amount he or she receives in welfare payments is reduced.*
- a. How does this affect the incentive to work?*
  - b. How does this feature of the welfare system represent the tradeoff between equality and efficiency?*

- The provision of welfare payments lowers an individual's incentive to work by imposing an implicit tax on labour earnings. For example, if an individual who receives \$100 in welfare payments loses 50 percent of those payments for each dollar in extra income earned, this is like a tax on labour earnings, which will discourage work.
- By targeting welfare payments at low-income people and reducing payments as their earned income increases, the system is addressing equity concerns. However, this comes at the cost of efficiency due to the decrease in work effort discussed in part a.

7. *Your roommate is a better and faster cook than you are, but you can clean more quickly than your roommate can. If your roommate did all of the cooking and you did all of the cleaning, would your chores take you more or less time than if you divided each task evenly? Give a similar example of how specialization and trade can make two countries both better off.*

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.

8. *Nations with corrupt police and court systems typically have lower standards of living than nations with less corruption. Why might that be the case?*

These activities tend to lessen the efficiency of an economic system, hence reducing the economic productivity of a nation. Lower productivity means lower standards of living.

9. *Explain whether each of the following government activities is motivated by a concern about equity or a concern about efficiency. In the case of efficiency, discuss the type of market failure involved.*
- a. regulating cable TV prices*
  - b. providing some poor people with free prescription drugs*
  - c. prohibiting smoking in public places*
  - d. preventing mergers between major banks*
  - e. imposing higher personal income tax rates on people with higher incomes*
  - f. instituting laws against driving while intoxicated*

- Efficiency: The market failure comes from the market power of a small number of cable TV firms.
- Equity

- c. Efficiency: An externality arises because secondhand smoke harms nonsmokers in public places.
- d. Efficiency: The market failure comes from the market power that might occur from potential mergers.
- e. Equity
- f. Efficiency: An externality exists because of accidents caused by drunk drivers.
10. *Discuss each of the following statements from the standpoints of equity and efficiency.*
- a. *"Everyone in society should be guaranteed the best health care possible."*
- b. *"When workers are laid off, they should be able to collect unemployment benefits until they find a new job."*
- a. If everyone were guaranteed the best health care possible, much more of our nation's output would be devoted to health care than is now the case. Would that be efficient? If you believe that doctors have market power and restrict health care to keep their incomes high, you might think efficiency would increase by providing more health care. 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 equality, 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 equal slice of the economic pie, though the pie would consist of more health care and fewer other goods.
- b. When workers are laid off, equality considerations argue for the unemployment benefits system to provide them with some income until they can find new jobs. After all, no one plans to be laid off, so unemployment benefits are a form of insurance. But there is an efficiency problem—why work if you can get income for doing nothing? The economy is not operating efficiently if people remain unemployed for a long time, and unemployment benefits encourage unemployment. Thus, there is a tradeoff between equality and efficiency. The more generous unemployment benefits are, the less income is lost by an unemployed person, but the more that person is encouraged to remain unemployed. So greater equality reduces efficiency.
11. *In what ways is your standard of living different from that of your parents or grandparents when they were your age? Why have these changes occurred?*
- Since average income in Canada 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.
12. *Suppose Canadians decide to save more of their incomes. If banks lend this extra saving to businesses, which use the funds to build new factories, how might this lead to faster growth in productivity? Who do you suppose benefits from the higher productivity? Is society getting a free lunch?*
- If Canadians save more and it leads to more spending on factories, there will usually 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 is no such thing as a free lunch, however, because when people save more, they are giving up spending. They get higher incomes in the future at the cost of buying fewer goods today.



# Chapter 2

## Thinking Like an Economist

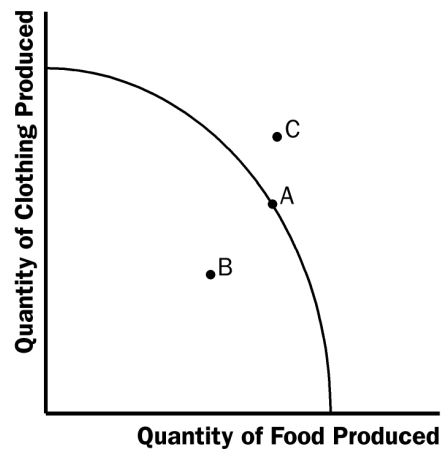
### SOLUTIONS TO TEXTBOOK PROBLEMS

#### Quick Quizzes

1. *In what sense is economics like a science? • Draw a production possibilities frontier for a society that produces food and clothing. Show an efficient point, an inefficient point, and an infeasible point. Show the effects of a drought. • Define microeconomics and macroeconomics.*

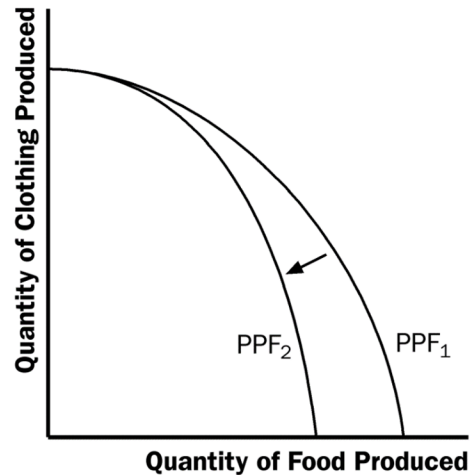
Economics is like a science because economists devise theories, collect data, and analyze the data in an attempt to verify or refute their theories. In other words, economics is based on the scientific method.

Figure 1 shows the production possibilities frontier for a society that produces food and clothing. Point A is an efficient point (on the frontier), point B is an inefficient point (inside the frontier), and point C is an infeasible point (outside the frontier).



**Figure 1**

The effects of a drought are shown in Figure 2. The drought reduces the amount of food that can be produced, shifting the production possibilities frontier inward.



**Figure 2**

Microeconomics is the study of how households and firms make decisions and how they interact in markets. Macroeconomics is the study of economy-wide phenomena, including inflation, unemployment, and economic growth.

2. *Give an example of a positive statement and an example of a normative statement. • Name three parts of government that regularly rely on advice from economists.*

An example of a positive statement is "higher taxes discourage work effort" (many other answers are possible). That is a positive statement because it describes the effects of higher taxes, describing the world as it is. An example of a normative statement is "the government should reduce tax rates." That is a normative statement because it is a claim about how the world should be.

Parts of the government that regularly rely on advice from economists are Finance Canada in designing tax policy, Industry Canada in designing and enforcing Canada's antimonopoly laws, and International Trade Canada in helping to negotiate trade agreements with other countries.

3. *Why might economic advisers to the Prime Minister disagree about a question of policy?*

Economic advisers to the Prime Minister might disagree about a question of policy because of differing scientific judgments or differences in values.

### Questions for Review

1. *In what ways is economics like a science?*

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 are limited in their ability to run controlled experiments. Instead, they must rely on natural experiments.

2. *Why do economists make assumptions?*

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

3. *Should an economic model describe reality exactly?*

An economic model cannot 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. *Name a way that your family interacts in the factor market and a way that it interacts in the product market.*

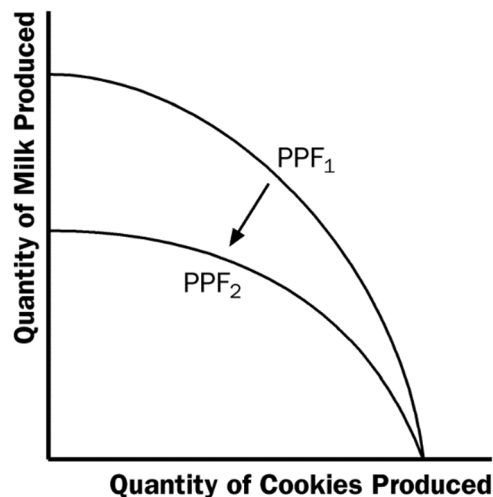
There are many possible answers.

5. *Name one economic interaction that isn't covered by the simplified circular-flow diagram.*

There are many possible answers.

6. *Draw and explain a production possibilities frontier for an economy that produces milk and cookies. What happens to this frontier if disease kills half of the economy's cows?*

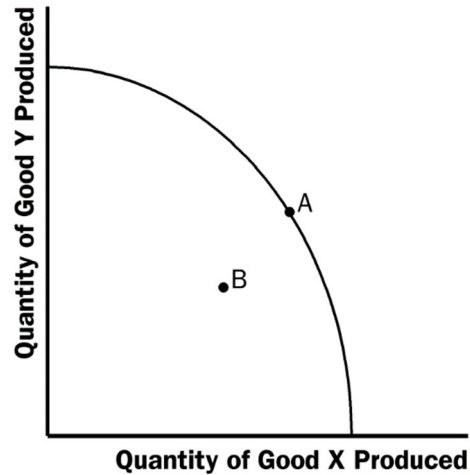
Figure 3 shows a production possibilities frontier between milk and cookies ( $PPF_1$ ). If a disease kills half of the economy's cow population, less milk production is possible, so the PPF shifts inward ( $PPF_2$ ). Note that if the economy produces all cookies so that it doesn't need any cows, then production is unaffected. But if the economy produces any milk at all, then there will be less production possible after the disease hits.



**Figure 3**

7. *Use a production possibilities frontier to describe the idea of "efficiency."*

The idea of efficiency is that an outcome is efficient if the economy is getting all it can from the scarce resources it has available. In terms of the production possibilities frontier, an efficient point is a point on the frontier, such as point A in Figure 4. A point inside the frontier, such as point B, is inefficient since more of one good could be produced without reducing the production of another good.



**Figure 4**

8. *What are the two subfields into which economics is divided? Explain what each subfield studies.*

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 economy-wide phenomena.

9. *What is the difference between a positive and a normative statement? Give an example of each.*

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 is an example. Positive: A rapid growth rate of money is the cause of inflation. Normative: The government should keep the growth rate of money low.

10. *Why do economists sometimes offer conflicting advice to policymakers?*

One reason that economists may disagree is that they have different views regarding the validity of alternative positive theories about how the world works or the magnitude of incentive effects. For example, some economists may interpret the evidence regarding the incentive effects of taxes on work effort differently. Another reason that economists may disagree is they have different normative views about what a policy should try to accomplish, most particularly concerning the equity-efficiency tradeoff.



**Quick Check Multiple Choice**

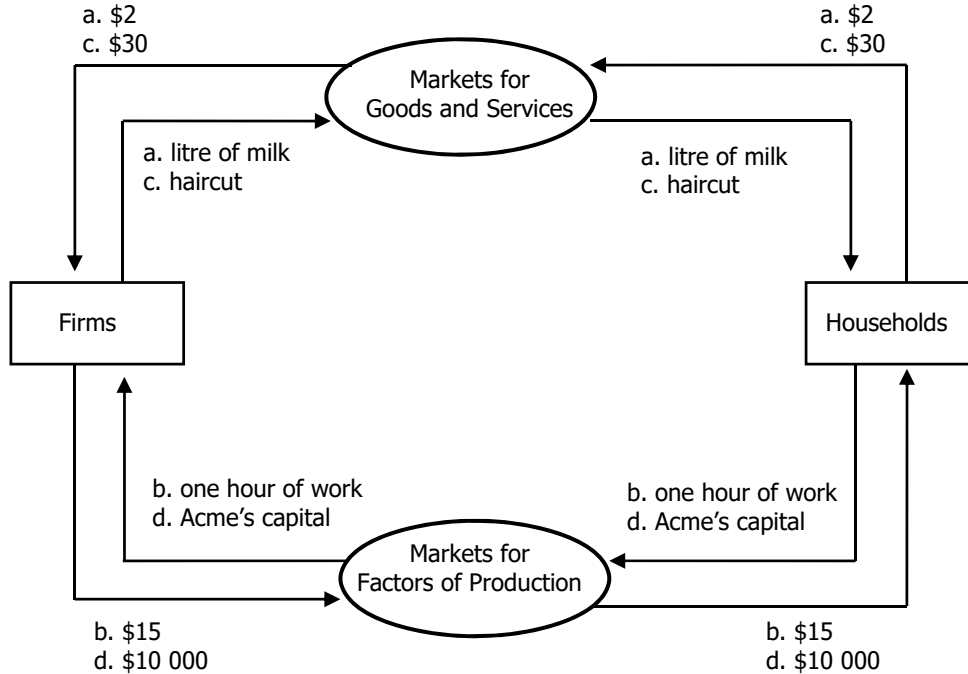
1. *What is an economic model?*
  - a. *a mechanical machine that replicates the functioning of the economy*
  - b. *a fully detailed, realistic description of the economy*
  - c. *a simplified representation of some aspect of the economy*
  - d. *a computer program that predicts the future of the economy*
  
2. *What does the circular-flow diagram illustrate in terms of markets for the factors of production?*
  - a. *Households are sellers and firms are buyers.*
  - b. *Households are buyers and firms are sellers.*
  - c. *Households and firms are both buyers.*
  - d. *Households and firms are both sellers.*
  
3. *Is a point inside the production possibilities frontier efficient and feasible?*
  - a. *efficient but not feasible*
  - b. *feasible but not efficient*
  - c. *both efficient and feasible*
  - d. *neither efficient nor feasible*
  
4. *An economy produces hot dogs and hamburgers. If a discovery of the remarkable health benefits of hot dogs were to change consumers' preferences, what would happen?*
  - a. *expand the production possibilities frontier*
  - b. *contract the production possibilities frontier*
  - c. *move the economy along the production possibilities frontier*
  - d. *move the economy inside the production possibilities frontier*
  
5. *Which of the following topics does NOT fall within the study of microeconomics?*
  - a. *the impact of cigarette taxes on the smoking behaviour of teenagers*
  - b. *the role of Microsoft's market power in the pricing of software*
  - c. *the effectiveness of antipoverty programs in reducing homelessness*
  - d. *the influence of the government budget deficit on economic growth*
  
6. *Which of the following is a positive, rather than a normative, statement?*
  - a. *Law X will reduce national income.*
  - b. *Law X is a good piece of legislation.*
  - c. *Parliament ought to pass law X.*
  - d. *Law X will change the distribution of income unfairly.*

1. c
2. a
3. b
4. c
5. d
6. a

**Problems and Applications**

1. Draw a circular-flow diagram. Identify the parts of the model that correspond to the flow of goods and services and the flow of dollars for each of the following activities.
  - a. Selena pays a storekeeper \$2 for a litre of milk.
  - b. Stuart earns \$15 per hour working at a fast-food restaurant.
  - c. Shanna spends \$30 to get a haircut.
  - d. Salma earns \$10 000 from her 10 percent ownership of Acme Industrial.

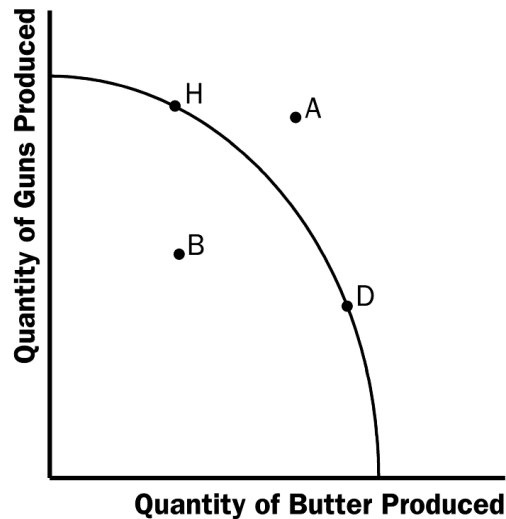
See Figure 5, where the four transactions are shown.



**Figure 5**

2. Imagine a society that produces military goods and consumer goods, which we'll call "guns" and "butter."
  - a. Draw a production possibilities frontier for guns and butter. Explain why it most likely has a bowed-out shape.
  - b. Show a point that is impossible for the economy to achieve. Show a point that is feasible but inefficient.
  - c. Imagine that the society has two political parties, called the Hawks (who want a strong military) and the Doves (who want a smaller military). Show a point on your production possibilities frontier that the Hawks might choose and a point the Doves might choose.
  - d. Imagine that an aggressive neighbouring country reduces the size of its military. As a result, both the Hawks and the Doves reduce their desired production of guns by the same amount. Which party would get the bigger "peace dividend," measured by the increase in butter production? Explain.

- a. Figure 6 shows a production possibilities frontier between guns and butter. It is bowed out because when most of the economy's resources are being used to produce butter, the frontier is steep, and when most of the economy's resources are being used to produce guns, the frontier is very flat. When the economy is producing a lot of guns, workers and machines best suited to making butter are being used to make guns, so each unit of guns given up yields a large increase in the production of butter. Thus, the production possibilities frontier is flat. When the economy is producing a lot of butter, workers and machines best suited to making guns are being used to make butter, so each unit of guns given up yields a small increase in the production of butter. Thus, the production possibilities frontier is steep.

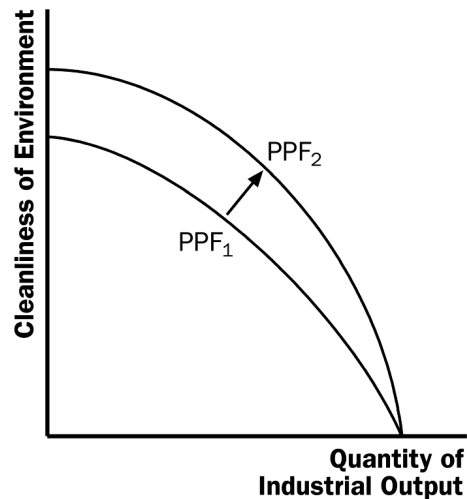


**Figure 6**

- b. Point A is impossible for the economy to achieve; it is outside the production possibilities frontier. Point B is feasible but inefficient because it's inside the production possibilities frontier.
- c. The Hawks might choose a point like H, with many guns and not much butter. The Doves might choose a point like D, with a lot of butter and few guns.
- d. If both Hawks and Doves reduced their desired quantity of guns by the same amount, the Hawks would get a bigger peace dividend because the production possibilities frontier is much flatter at point H than at point D. As a result, the reduction of a given number of guns, starting at point H, leads to a much larger increase in the quantity of butter produced than when starting at point D.

3. *The first principle of economics discussed in Chapter 1 is that people face tradeoffs. Use a production possibilities frontier to illustrate society's tradeoff between a clean environment and the quantity of industrial output. What do you suppose determines the shape and position of the frontier? Show what happens to the frontier if engineers develop an automobile engine with almost no emissions.*

See Figure 7. 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<sub>1</sub> to PPF<sub>2</sub> shown in the figure.



**Figure 7**

4. *Classify the following topics as relating to microeconomics or macroeconomics.*
- a family's decision about how much income to save*
  - the effect of government regulations on auto emissions*
  - the impact of higher national saving on economic growth*
  - a firm's decision about how many workers to hire*
  - the relationship between the inflation rate and changes in the quantity of money*
- A family's decision about how much income to save is microeconomics.
  - The effect of government regulations on auto emissions is microeconomics.
  - The impact of higher national saving on economic growth is macroeconomics.
  - A firm's decision about how many workers to hire is microeconomics.
  - The relationship between the inflation rate and changes in the quantity of money is macroeconomics.

5. *Classify each of the following statements as positive or normative. Explain.*
- Society faces a short-run tradeoff between inflation and unemployment.*
  - A reduction in the rate of growth of money will reduce the rate of inflation.*
  - The Bank of Canada should reduce the rate of growth of money.*
  - Society ought to require welfare recipients to look for jobs.*
  - Lower tax rates encourage more work and more saving.*
- 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 is a short-run negative relationship between inflation and unemployment, the statement is a fact; thus it is a positive statement.
  - 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.
  - The statement that the Bank of Canada 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.
  - 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.
  - 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 have found a negative relationship in both cases. The statement reflects how the world is, and is thus a positive statement.
6. *If you were Prime Minister, would you be more interested in your economic advisers' positive views or their normative views? Why?*

As the Prime Minister, 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 would be most likely to call on them about questions of fact—positive analysis. Since you are the Prime Minister, you are the one who has to 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 own views, not necessarily your views or the electorate's views.

7. *An economy consists of three workers: Larry, Moe, and Curly. Each works for ten hours per day and can produce two services: mowing lawns and washing cars. In an hour, Larry can either mow one lawn or wash one car, Moe can either mow one lawn or wash two cars, and Curly can either mow two lawns or wash one car.*

a. *Calculate how much of each service is produced under the following circumstances, which we label A, B, C, and D:*

- *All three spend all their time mowing lawns. (A)*
- *All three spend all their time washing cars. (B)*
- *All three spend half their time on each activity. (C)*
- *Larry spends half his time on each activity, while Moe only washes cars and Curly only mows lawns. (D)*

b. *Graph the production possibilities frontier for this economy. Using your answers to part (a), identify points A, B, C, and D on your graph.*

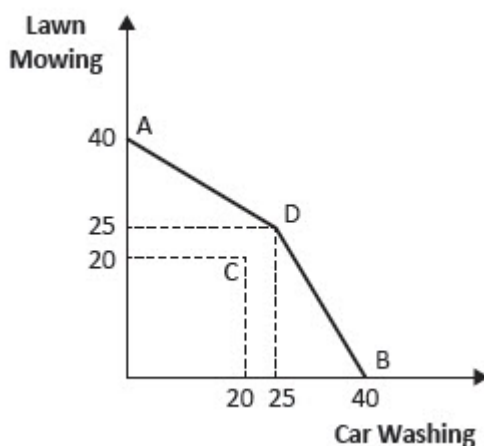
c. *Explain why the production possibilities frontier has the shape it does.*

d. *Are any of the allocations calculated in part (a) inefficient? Explain.*

- a. The following table gives the outcomes in the four cases. For example, when each uses half their time in each sector, Larry washes 5 cars and mows 5 lawns in 10 hours, etc.

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
Lawn mowing	40	0	20	25
Car washing	0	40	20	25

- b. The following graph shows the production possibilities frontier based on the numbers in the table.



**Figure 8**

- c. The upper part is flatter because the opportunity cost of increasing the number of cars from 0 to 25 is less than 1 lawn per car; moving from 0 cars takes advantage of Moe's better ability to wash cars than to mow lawns. However, when the number of cars exceeds 25, we start losing Curly's better skill in mowing lawns; therefore, the opportunity cost of an extra car increases above 1 forgone mowed lawn per extra washed car.

- d. Allocation C is inefficient. Although all workers use all their time, they do not use their specific skills wisely.

### Appendix Problems and Applications

A1. Consider the linear demand curve:

$$Q^D = 56 - 4P$$

- a. Determine the  $x$ - and  $y$ -intercepts of this demand curve.  
 b. Determine the slope of this demand curve.
- a. To determine the  $x$ -intercept, set  $P = 0$  and solve for  $Q^D$ , giving  $Q^D = 56$ ; so the  $x$ -intercept is 56. To determine the  $y$ -intercept, set  $Q^D = 0$  and solve for  $P$ , giving  $0 = 56 - 4P$ ,  $P = 56/4$ ,  $P = 14$ .
- b. The slope is the rise over the run, where "rise" is the  $y$ -intercept and "run" is the  $x$ -intercept. Thus, slope =  $-14/56 = -1/4$ .

A2. Using the general functional form for a linear demand curve,  $Q^D = a - bP$ , and the data in Table 2A.1,

- a. Determine the values for  $a$  and  $b$  for Emma when her income is \$30 000.  
 b. Determine the  $x$ - and  $y$ -intercepts of this demand curve.  
 c. Determine the slope of this demand curve.  
 d. Draw it on a diagram along with the demand curves when her income is \$40 000 and \$50 000, identifying the  $x$ - and  $y$ -intercepts in each case.
- a. At  $P = 10$ ,  $Q = 2$  and at  $P = 9$ ,  $Q = 6$ . Therefore,  
 $2 = a - 10b$   
 $6 = a - 9b$   
 Solve simultaneously for  $a$  and  $b$ : the first equation gives  $a = 2 + 10b$ ; substitute into the second equation to get  $6 = 2 + 10b - 9b$ , and solve for  $b = 4$ ; therefore  $a = 2 + (10)(4) = 42$ . Thus,  $Q^D = 42 - 4P$ .
- b.  $x$ -intercept = 42,  $y$ -intercept = 10.5
- c. slope =  $-10.5/42 = -1/4$
- d.

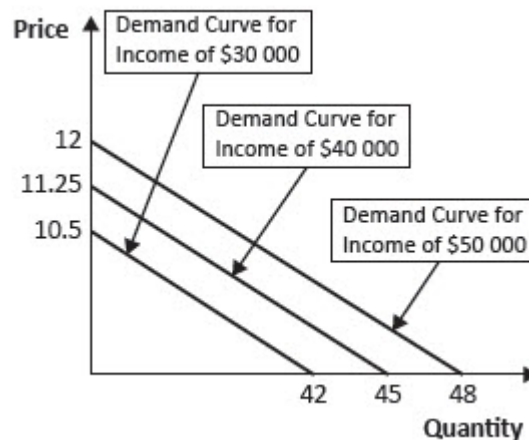


Figure 9





# Chapter 3

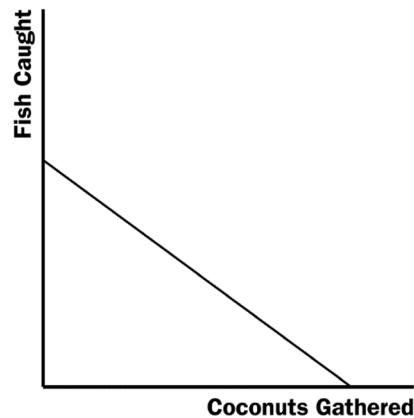
## Interdependence and the Gains from Trade

### SOLUTIONS TO TEXTBOOK PROBLEMS

#### Quick Quizzes

1. *Draw an example of a production possibilities frontier for Robinson Crusoe, a shipwrecked sailor who spends his time gathering coconuts and catching fish. Does this frontier limit Crusoe's consumption of coconuts and fish if he lives by himself? Does he face the same limits if he can trade with natives on the island?*

Figure 1 shows a production possibilities frontier for Robinson Crusoe between gathering coconuts and catching fish. If Crusoe lives by himself, this frontier limits his consumption of coconuts and fish, but if he can trade with natives on the island, he will be able to consume at a point outside his production possibilities frontier.



**Figure 1**

2. *Robinson Crusoe can gather 10 coconuts or catch 1 fish per hour. His friend Friday can gather 30 coconuts or catch 2 fish per hour. What is Crusoe's opportunity cost of catching one fish? What is Friday's? Who has an absolute advantage in catching fish? Who has a comparative advantage in catching fish?*

Crusoe's opportunity cost of catching one fish is 10 coconuts, since he can gather 10 coconuts in the same amount of time it takes to catch one fish. Friday's opportunity cost of catching one fish is 15 coconuts, since he can gather 30 coconuts in the same amount of time it takes to catch two fish. Friday has an absolute advantage in catching fish, since he can catch two per hour while Crusoe can only catch one per hour. But Crusoe has a comparative advantage in catching fish, since his opportunity cost of catching a fish is less than Friday's.

3. *Suppose that a skilled brain surgeon also happens to be the world's fastest typist. Should he do his own typing or hire a secretary? Explain.*

If the world's fastest typist happens to be trained in brain surgery, he should hire a secretary. He has an absolute advantage in typing but a comparative advantage in brain surgery, since his opportunity cost in brain surgery is low compared to the opportunity cost for other people.