Chapter 1: Economics: The Core Issues
Solutions Manual

Learning Objectives for Chapter 1

After reading this chapter, you should know
LO 01-01. How scarcity creates opportunity costs.
LO 01-02. What the production-possibilities curve represents.
LO 01-03. The three core economic questions that every society must answer.
LO 01-04. How market and government approaches to economic problems differ.

Questions for Discussion

1. What opportunity costs did you incur in reading this chapter? If you read another chapter today, would your opportunity costs (per chapter) increase? Explain. **(LO 01-01)**

   Answer: Opportunity cost is what you must give up to get the next best alternative. In this case, opportunity costs include the things you could have done with your time instead of reading this chapter. The most desired activity you give up is the value of the opportunity cost. As you first begin to read, you first give up the alternative activities that have the least value to you. As you spend more time studying, you begin giving up activities that have increasing value to you. For example, the first hour of studying may have resulted in you not watching a TV show. The second hour of studying may result in you not using your PlayStation 4, which you believe offers more satisfaction than the first TV show that you gave up, and so on.

2. How much time could you spend on homework in a day? How much do you spend? How do you decide? **(LO 01-01)**

   Answer: You theoretically could spend 24 hours in a day doing homework. However, in reality, there is a limit to the amount of time in which you can effectively complete your homework. Most students spend substantially less than 24 hours per day because there are competing needs for their time, such as work, sleep, and social time. A person decides how much time to spend on homework based on the perceived payoff (an improvement in learning or your course grade) and compares this to the value of what must be given up to complete the homework. Those activities that are perceived as giving the most benefit are usually the activities completed first. At some point, the perceived benefit from completing additional homework is less than the benefit from other activities, and you stop working on homework.

3. What's the real cost of the food in the "free lunch" cartoon on page 6? **(LO 01-01)**

   Answer: Even if a bar doesn't charge for lunch, preparation of the lunch requires the use of scarce resources. The workers at this bar will spend considerable time preparing this lunch and could potentially have spent this time doing something else. The cost of the lunch is the best alternative use of that land, labor, and capital. In addition, the value of the patron's time is a cost that he or she must pay for the lunch.

4. How might a nation's production possibilities be affected by the following? **(LO 01-02)**
   a. New solar technology.
   b. An increase in immigration.
   c. An increase in military spending.
   d. An increase in college tuition.

   Answer:
   (a) In general, a nation's production possibilities curve will shift due to a change in resources, a change in the quality of resources, or a change in technology. New solar technology is an example of an advancement in technology which causes an increase in a country's production possibilities. Better technology allows a country to have a greater capacity in the long run leading to more output.
   (b) An increase in immigration is an example of an increase in resources for a nation. An increase in immigration certainly is an increase in the number of labors, which would necessarily increase the production possibilities. These immigrants also have varying levels of skills and education (human capital) that also will increase the production possibilities of a nation.
   (c) An increase in military spending will, in general, simply move the economy from one point on the production possibilities curve to a different point on the curve since this is nothing more than a trade-off in the government spending pattern. If the increase in spending results in new research and development that improves technology that has civilian applications, then the production possibilities could potentially increase over time.
   (d) An increase in college tuition would, in the short run, result in a movement along the production possibilities curve as people spend their income on other goods and services. Over time, the quality of the labor force will begin to diminish and the production possibilities would decline.

5. What are the opportunity costs of developing wind farms to generate "clean" electricity? Should we make the investment? **(LO 01-01)**

   Answer: Wind is freely available (when it is actually blowing of course). However, we need a lot of capital investment to harness that wind power. Wind turbines and wind farms don't come free. Nor do wind-powered electrical charging stations, wind power plants, or the electrical grids that distribute electricity to users. It takes real factors of production—land, labor, capital, and entrepreneurship—to develop wind farms. These resources, worth trillions of dollars, could be used to produce something else. If we invested that many resources in

medical technology, we might cure cancer. To invest all those resources in wind development implies that wind development is more valuable than all other social goals. In deciding whether to make the investment, we have to assess opportunity costs—what goods and services we implicitly forsake in order to harness the wind.

6. Who would go to college in a completely private (market) college system? How does government intervention change this FOR WHOM outcome? **(LO 01-03)**

   Answer: Financial aid and guaranteed student loans make college accessible to more people. Many states also subsidize in-state students with low tuition so that more individuals can afford school. In a completely private system, many people with the intellectual ability, without access to adequate funds, would not be able to attend.

7. Why do people around the world have so much faith in free markets (World View, p. 15)? **(LO 01-04)**

   Answer: Market-based incomes based on private property may motivate higher productivity; thus more should be produced in total. Incomes and standards of living are higher in market-based economies. Also, free markets give people more freedom in their choices and ensure property rights over what they have produced and the incomes they earn.

8. How many resources should we allocate to space exploration? How will we make this decision? **(LO 01-04)**

   Answer: As a society, we have to make important choices about the economy tomorrow, including space exploration. Do we want to journey to Mars? If so, how fast do we want to get there? How many earthly goods and services do we want to give up to pay for the journey? Every year the president and the U.S. Congress have to answer these questions. Their answers are reflected in the funds allocated to NASA (rather than other programs) in each year's federal budget. The key to making this decision is understanding the opportunity costs of space exploration.

9. What is the connection between North Korea's missile program and its hunger problem? (World View, p. 10) **(LO 01-01)**

   Answer: North Korea is a relatively small country: its population of 24 million ranks 40th in the world. Yet North Korea maintains an extremely large army and continues to develop a nuclear weapons capability. To do so, it must allocate 16 percent of all its resources to feeding, clothing, and equipping its military forces. As a consequence, there aren't enough resources available to produce food. Currently Korea's farmers can't feed the country's population. This is an example of a "guns versus butter" choice. When North Korea uses

more resources for missiles (guns), it necessarily has fewer resources available to produce food (butter).

10. Why might more reliance on markets rather than government be desirable? When and how might it be undesirable? **(LO 01-04)**

Answer: Markets don't require any direct contact between consumers and producers. Communication is indirect and transmitted by market prices and sales. In fact, it is the view of many that the price signals and responses of the marketplace will likely do a better job of allocating resources than any government could**.** If the market fails, however, we end up with a suboptimal mix of output. In a market-driven economy, for example, producers will select production methods based on cost. Cost-driven production methods might encourage a factory to pollute rather than use a cleaner but more expensive method of production. In cases such as these, government intervention may be necessary to move us closer to our economic goals.

Problems

1. According to Table 1.1 (or Figure 1.1), what is the opportunity cost of the first truck produced? **(LO 01-01)**

   Answer: 0.5 tanks.

   Feedback: A production possibilities curve (PPC) describes the various output combinations that could be produced in a given time period with available resources and technology. In order to move from producing 0 trucks (Point *F*) to producing 1 truck (Point *E*), we must give up the production of a half tank. The opportunity cost of the first truck is, therefore, 0.5 tanks.

2. (a) Compute the opportunity cost in forgone tanks for each additional truck produced:

Truck output	0	1	2	3	4	5
Tank output	5	4.5	3.8	3.0	2.0	0
Opportunity cost	—	—	—	0.8	—	—

   (b) As truck output increases, are opportunity costs (A) increasing, (B) decreasing, or (C) remaining constant? **(LO 01-02)**

   Answers:
   (a) Opportunity cost 0 0.5 0.7 0.8 1 2.
   (b) A—increasing.

Feedback:
(a) For the first output mix, we are putting all of our resources into producing 5 tanks, and we are using no resources to produce trucks (0 trucks produced). There is zero opportunity cost in forgone tanks at this point of production (keep in mind, however, that the trucks we aren't producing are an opportunity cost—"there is no such thing as a free lunch"). When we increase truck production to 1.0, we can then produce only 4.5 tanks whereas we previously produced 5 tanks, so our opportunity cost in forgone tanks is 0.5. We are giving up half of one tank to produce our first truck. Producing the second truck costs us 0.7 of a tank (4.5 – 3.8) because when we move to the production of two trucks we are able to produce 3.8 tanks. Similarly, producing the third truck costs us 0.8 of a forgone tank (3.8 – 3.0), producing the fourth truck costs us 1 forgone tank (3.0 – 2.0), and moving to the point where we are using all of our resources to produce the fifth truck costs us 2 forgone tanks (2.0 – 0).
(b) Opportunity costs increase as we increase the production of one good (trucks, for example). This is due in large part because it's difficult to move resources from one industry to another. In the real world, tanks do not transform into trucks easily. Workers who assemble tanks may not have the skills for truck assembly. As we continue to transfer labor from one industry to the other, we start giving up more tanks (increasing opportunity costs) for each truck that we gain.

3. According to Figure 1.2 (p. 9), what is the opportunity cost of North Korea moving from point *P* to point *N* (in terms of food output)? **(LO 01-02)**

   Answer: GC food.

   Feedback: Point *P* indicates that North Korea is producing a combination of *G* units of food and H units of military per year. In order to increase its military buildup, North Korea must give up a certain amount of food output. Moving along the PPC from point *P* to *N*, North Korea increases its military buildup by HD. To achieve this level of military buildup, North Korea must reduce its food output by GC. The opportunity cost of producing at point *N* (from point *P*) is, therefore, GC units of food.

4. (a) What is the cost of the North Korean 2009 missile launch, according to South Korea (p. 10)?
   (b) How many people could have been fed for an entire year at the World Bank standard of $2 per day with that money? **(LO 01-01)**

   Answers:
   (a) Approximately $300 million.
   (b) 410,959 people.

   Feedback:
   (a) According to the World View titled "Rocket Launch Cost Enough to End Famine in North Korea for a Year," the launch itself cost around $300 million.

(b) 410,959 people: $300 million/($2 per person per day × 365 days per year). This is an example of a "guns versus butter" choice and reflects the core problem of scarcity. When North Korea uses more resources for missiles (guns), it necessarily has fewer resources available to produce food (butter).

5. What is the opportunity cost (in civilian output) of a defense buildup that raises military spending from 4.0 to 4.3 percent of a $18 trillion economy? **(LO 01-01)**

   Answer: $54 billion.

   Feedback: In a $18 trillion economy, a 4.0 percent allocation to defense spending is $720 billion. If defense spending increased to 4.3 percent of output, defense spending would increase to $774 billion. The $54 billion increase (from $720 billion to $774 billion) in defense spending amounts to a $54 billion opportunity cost in civilian output.

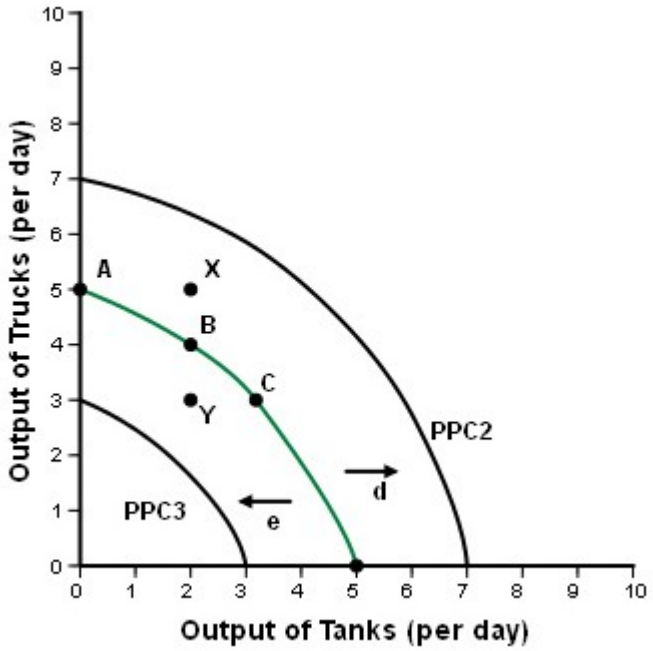
6. What are the three core economic questions societies must answer? **(LO 01-03)**

   Answer: What to produce, how to produce, and for whom to produce.

   Feedback: (1) WHAT to produce: Limited as we are by scarce resources, we have to decide how best to use these resources. Every time we use these scarce resources in one way, we give up the opportunity to use them in other ways. This is illustrated by the production possibilities curve, where each point on the curve represents a different mix of output. We can choose only one of these points at any time. The PPC doesn't tell us which mix of output is best; it just lays out a menu of available choices. It's up to us to pick out the one and only mix of output that will be produced at a given time. (2) HOW to produce: There are lots of different ways of producing goods and services, and someone has to decide which production methods to use. The HOW decision is a question not just of efficiency but of social values as well. (3) FOR WHOM to produce: Who is going to get the output produced? To whom will the goods be distributed? And should everyone be allocated an equal share?

7. According to Figure 1.4, **(LO 01-02)**
   (a) At which point(s) is this society producing some of each type of output but still producing inefficiently?
   (b) At which point(s) is this society producing the most output possible with the available resources and technology?
   (c) At which point(s) is the output combination currently unattainable with current available resources and technology?
   (d) Show the change that would occur if the population of this society increased dramatically. Label this curve PPC2.
   (e) Show the change that would occur with a huge natural disaster that destroyed vast amounts of infrastructure. Label this curve PPC3.

Answers:
(a) Y.
(b) A, B, C.
(c) X.
(d) PPC2 would lie outside the original PPC.
(e) PPC3 would lie inside the original PPC.



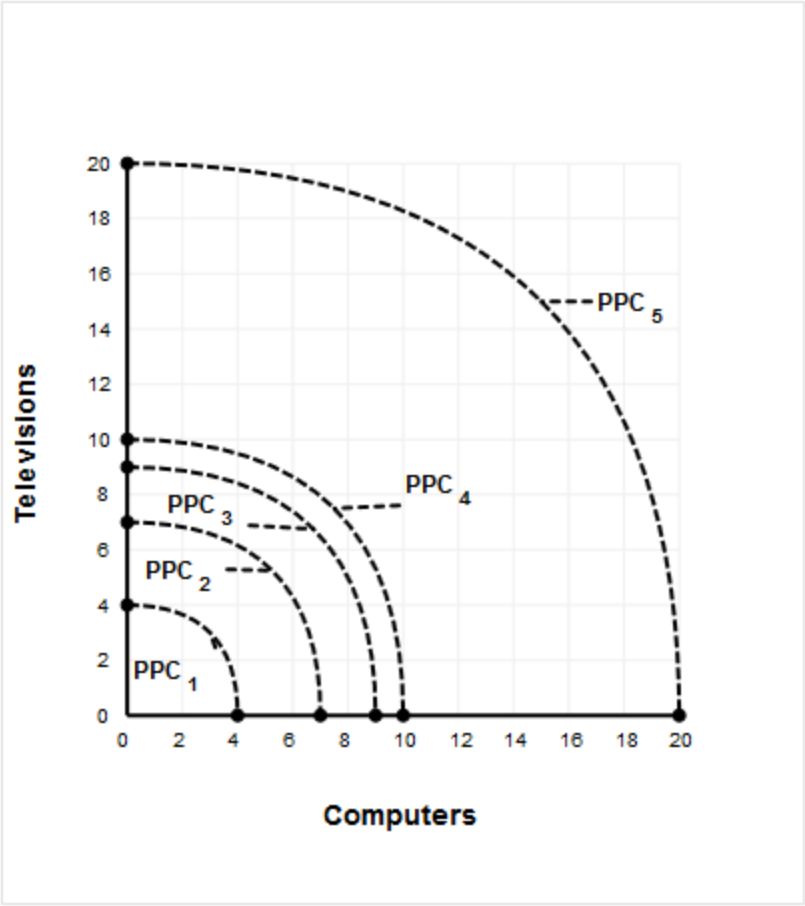
Feedback:
(a) A production possibilities curve shows potential output, not necessarily actual output. If we're inefficient, actual output will be less than that potential. Points inside the PPC represent the incomplete use of available resources. At point Y we're producing only three trucks and two tanks. This is less than our potential. Whenever we're producing inside the production possibilities curve, we are forgoing the opportunity of producing (and consuming) additional output.
(b) Efficiency is making the most of available resources and maximizing output. Every point on the PPC (A, B, C) is efficient and represents maximum use of our production capabilities.
(c) Points outside the PPC (X) are unattainable with available resources and technology.
(d) PPC2 would lie outside the original PPC. If this society's population increases dramatically, this, in essence, is an increase in resources. This increase in available labor (a resource) would indeed shift the PPC outward, leading to potential economic growth.
(e) PPC3 would lie inside the original PPC. A huge natural disaster that destroys vast amounts of infrastructure is a loss of resources that would lead to a decline in production capabilities, and therefore the PPC would shift inward.

8. Suppose either computers or televisions can be assembled with the following labor inputs:

Units produced	1	2	3	4	5	6	7	8	9	10
Total labor used	3	7	12	18	25	33	42	54	70	90

(a) Draw the production possibilities curve for an economy with 42 units of labor. Label it P42.
(b) What is the opportunity cost of the sixth computer?
(c) Suppose immigration brings in 28 more workers. Redraw the production possibilities curve to reflect this added labor. Label the new curve P70.
(d) Suppose advancing technology (e.g., the miniaturization of electronic circuits) increases the productivity of the 70-laborer workforce by 10 percent. Draw a third production possibilities curve (PT) to illustrate this change. **(LO 01-02)**

Answers:
(a) Shown as the curve PPC2.
(b) 8 televisions.
(c) Shown as the curve PPC3.
(d) Shown as the curve PPC4.



Feedback:
(a) With 42 units of labor this economy can produce either 7 computers and no televisions or 7 televisions and no computers (as well as the many combinations in between). This is represented as PPC2.
(b) When the sixth computer is produced, it requires the addition of 8 more units (33- 25) of labor into the production process. With these last 8 units of labor, two televisions could have been produced.
(c) If immigration brings in 28 more workers, this economy now has 70 units of labor available (42 + 28). This economy now has the ability to produce either 9 computers and no televisions or 9 televisions and no computers (as well as the many combinations in between).
(d) If advancing technology increases the productivity of the 70-laborer workforce by 10 percent, this economy now has the ability to produce 10 percent more than it did previously. The 70-laborer workforce described in the table had the possibility of producing 9 televisions or 9 computers. Increasing the production possibilities by 10 percent increases television and/or computer production to 9.9 (= [9 × 0.10] + 9). Therefore, with this technological advancement this economy has the ability to produce 9.9 computers and no televisions or 9.9 televisions and no computers.

9. According to the World View on page 15, which nation has
(a) The highest level of faith in the market system?
(b) The lowest level of faith in the market system? **(LO 01-04)**

Answers:
(a) Germany.
(b) France.

Feedback:
(a) Germany: 68% polled agree that the free enterprise system and free-market economy is the best system on which to base the future of the world.
(b) France: Only 36% felt that the market system is the best. French people distrust market signals to a larger extent than people in the other polled countries.

10. If a person literally had "nothing else to do,"
(a) What would be the opportunity cost of doing these problems?
(b) What is the likelihood of that? **(LO 01-01)**

Answers:
(a) Zero.
(b) Zero.

Feedback:
(a) Opportunity cost is what is given up to get something else. If a person literally had "nothing else to do," then there is simply nothing to give up and no opportunity cost associated with doing these problems.

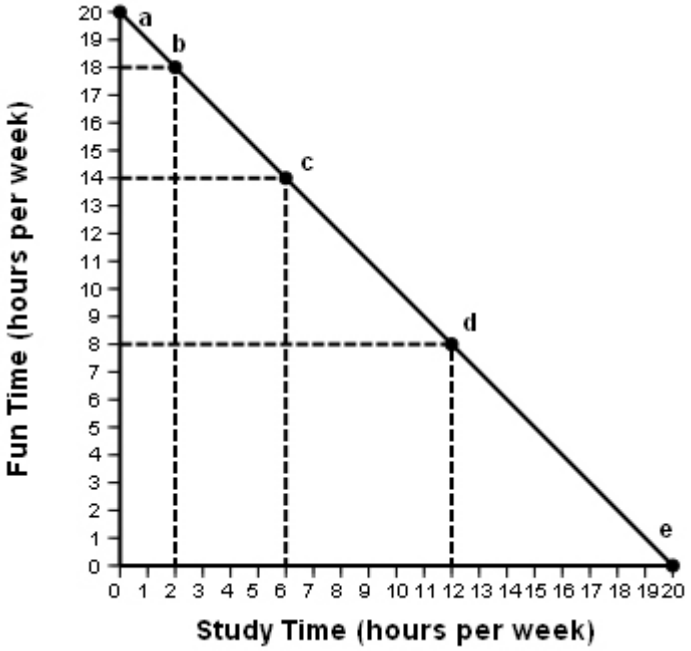
(b) The likelihood of a person literally having "nothing else to do" is zero (or amazingly close to zero). There is simply always an opportunity cost for every single decision that we make.

11. Suppose there's a relationship of the following sort between study time and grades:

	(a)	(b)	(c)	(d)	(e)
Study time (hours per week)	0	2	6	12	20
Grade point average	0	1.0	2.0	3.0	4.0

If you have only 20 hours per week to use for either study time or fun time,
(a) Draw the (linear) production possibilities curve on the graph below that represents the alternative uses of your time.
(b) Indicate on the graph the point *C* that would get you a 2.0 grade average.
(c) What is the cost, in lost fun time, of raising your grade point average from 2.0 to 3.0? Illustrate this effort on the graph (point *C* to point *D*).
(d) What is the opportunity cost of increasing your grade point average from 3.0 to 4.0? Illustrate as point *D* to *E*. **(LO 01-02)**

Answers:
(a) Graph is provided.
(b) C is included on the graph with 14 hours of fun time and 6 hours of study time.
(c) 6 hours of fun time.
(d) 8 hours of fun time.



Feedback:
(a) Graph study time (in hours per week) on the *x*-axis, ranging from 0 to 20. Graph fun time (in hours per week) on the *y*-axis, ranging from 0 to 20. The amount of fun time corresponding to study time is 20 minus the amount of study time per week.
(b) A 2.0 grade point average would require 6 hours of study time per week. This corresponds to 6 on the *x*-axis (study time) and 14 on the *y*-axis (fun time).
(c) The opportunity cost of raising your grade from a 2.0 to a 3.0 is that you must give up 6 hours of leisure or fun time. It takes 6 hours of studying to obtain a grade point average (GPA) of 2.0, whereas it takes 12 hours to obtain a GPA of 3.0. Thus, you must sacrifice 6 more hours of leisure time to raise your GPA to a 3.0.
(d) The opportunity cost of raising your grade from a 3.0 to a 4.0 is giving up 8 hours of leisure or fun time. It takes 12 hours of studying to obtain a GPA of 3.0, whereas it takes 20 hours to obtain a GPA of 4.0. Therefore, it is necessary to sacrifice 8 additional hours of fun time to raise your GPA to a 4.0.