**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.

1. 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.

1. 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.

1. How might a nation’s production possibilities be affected by the following? **(LO 01-03)**

 a. New solar technology.

 b. An increase in immigration.

 c. An increase in military spending.

 d. A natural disaster.

**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) A natural disaster in the short run would decrease the productive capabilities of the economy due to the destruction of capital goods and infrastructure, such as roads, factories, equipment, and offices, leading the economy to operate at less than its full capacity. The economy would be operating inside its production possibilities curve, but production would be focused on rebuilding and increasing capital goods. The economy would likely return to producing on its production possibilities curve once the area that was subject to the disaster had recovered. A natural disaster would likely need to be widespread and extremely severe to cause the production possibilities curve to move inward, which would signify a significant loss of technology and knowledge as well as productive capacity and resources.

1. 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.

1. 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.

1. Why do people around the world have so much faith in free markets (World View, Market Reliance vs. Government Reliance)? **(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.

1. Why did both presidents Obama and Trump reduce spending on America’s space exploration program? **(LO 01-02)**

 **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.

1. What is the connection between North Korea’s missile program and its hunger problem? (World View North Korea’s Food Shortage Grows) **(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).

1. 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.

1. Explain why there are limits to output and how these limits force economies to make tradeoffs.

**Answer:** There’s a limit to the amount of output an economy can produce in a given time period because available resources and technology are scarce. As long as resources are scarce, their use entails an opportunity cost which means an economy can obtain additional quantities of any particular good only by reducing the potential production of another good. For example, if a country desires to produce more trucks, a tradeoff in the form of a reduction in the production of another good must happen.

**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:

Military output 0 1 2 3 4 5

Consumer output 100 90 75 55 30 0

Opportunity cost \_\_ \_\_ \_\_ \_\_ \_\_ \_\_

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

**Answers:**

**(a) Opportunity cost 0 10 15 20 25 30**

**(b) A—increasing.**

**Feedback:**

(a) For the first output mix, we are putting all of our resources into producing 100 consumer goods, and we are using no resources to produce military goods (0 Military Goods produced). There is zero opportunity cost in forgone consumer goods at this point of production (keep in mind, however, that the military goods we aren’t producing are an opportunity cost—“there is no such thing as a free lunch”). When we increase military good production to 1.0, we can then produce only 90 consumer goods whereas we previously produced 100 consumer goods, so our opportunity cost in forgone consumer goods is 10. We are giving up ten consumer goods to produce our first military good. Producing the second military good costs us 75 consumer goods (90 – 15) because when we move to the production of two military goods we are able to produce 75 consumer goods. Similarly, producing the third military good costs us 20 forgone consumer goods (75-20), producing the fourth military good costs us 25 forgone consumer goods (55-30), and moving to the point where we are using all of our resources to produce the fifth military good costs us 30 forgone consumer goods (30-30).

(b) Opportunity costs increase as we increase the production of one good (military goods, for example). This is due in large part because it’s difficult to move resources from one industry to another. In the real world, consumer goods do not transform into military goods easily. Workers who assemble consumer goods may not have the skills for military good assembly. As we continue to transfer labor from one industry to the other, we start giving up more consumer goods (increasing opportunity costs) for each military good that we gain.

3. According to Figure 1.3, how much food production is sacrificed when North Korea moves from point P to point N? **(LO 01-03)**

**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) If the average North Korean farmer produces 1,800 pounds of food per year, what is the opportunity cost, in pounds of food, of North Korea's army?

(b) If a person needs at least 500 pounds of food per year to survive, how many people could have been fed with the forgone food output? **(LO 01-02)**

**Answers:**

**(a) 2,142,000,000 pounds of food per year.**

**(b) 4,284,000 people.**

**Feedback:**

(a) According to the World View, North Korea has 1,190,000 active military members. If all of these soldiers were instead farmers, 2,142,000,000 pounds of food could have been produced (= 1,190,000 farmers × 1,800 pounds of food per year).

(b) This food could have fed 4,284,000 people per year (= 2,142,000,000 pounds of food/500 pounds of food per person).

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 $20 trillion economy? **(LO 01-01)**

**Answer:** **$60 billion.**

**Feedback:** If a $20 trillion economy allocates 4.0 percent to defense spending, the country will spend $800 billion on defense (= 4% × $20 trillion = 0.04 × $20,000,000,000,000 = $800,000,000,000 = $800 billion or $0.8 trillion).

If defense spending increases to 4.3 percent, defense spending would now be equal to $860 billion (= 4.3% × $20 trillion = 0.043 × $20,000,000,000,000 = $860,000,000,000 = $860 billion or $0.86 trillion).

The opportunity cost of this increase in defense spending is $60 billion of other output produced (= $860 billion – $800 billion = $60 billion).

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. You have only 20 hours per week to use for either study time or fun time. Suppose the relationship between study time, fun time, and grades is shown in this table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Fun time (hours per week) | 20 | 18 | 14 |   8 |   0 |
|  Study time (hours per week) |   0 |   2 |   6 |  12 | 20 |
| ***Grade point average*** | ***0*** | ***1.0*** | ***2.0*** | ***3.0*** | ***4.0*** |

(a) Draw the (linear) production possibilities curve on the graph below that represents the alternative uses of your time.

(b) On the same graph, show the combination of study time and fun time that would get you a 2.0 grade point average.

(c) What is the cost, in lost fun time, of raising your grade point average from 2.0 to 3.0?

(d) What is the opportunity cost of increasing your grade point average from 3.0 to 4.0? **(LO 01-03)**

**Answers:**

**(a,b) **

**(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.

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 31% 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.

1. According to the World View “World’s Largest Armies,” what percent of the total population is serving in the military in (LO 01-01)

(a) The United States (population = 340 million)?

(b) North Korea (population = 25 million)?

(c) China (population = 1.4 billion)?

**Answers:**

**(a) 0.45%**

**(b) 4.76%**

**(c) 0.17%**

**Feedback:**

(a) The percentage of the population serving in the military in the United States is 0.45 percent (= number of active military/population = 1,492,200/330,000,000 × 100 = 0.45%).

(b) The percentage of the population serving in the military in North Korea is 4.76 percent (= number of active military/population = 1,190,000/25,000,000 × 100 = 4.76%).

(c) The percentage of the population serving in the military in China is 0.17 percent (= number of active military/population = 2,333,000/1,400,000,000 × 100 = 0.17%).he 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.

1. The Economy Tomorrow: What are the opportunity costs of increasing the number of solar panels in use in the United States?

**Answers: The goods and services given up to devote resources to producing solar panels, and The land that was used to produce the solar panels that could have been used to produce something else.**

**Feedback:**

Opportunity cost is the most desired goods or services that are foregone to obtain something else. The opportunity cost of increasing the amount of solar panels in the United States is the use of those resources and what could be produced by those resources if they were used to produce something else.

Remember, economists think in terms of real resources, not money. Paper money doesn’t build solar panels; it takes real factors of production—land, labor, capital, and entrepreneurship. Those resources—worth trillions of dollars—could be used to produce something else.