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SKU: 9781264273416-SOLUTIONS

Chapter 1

ECONOMICS: THE CORE ISSUES

WHAT IS THIS CHAPTER ALL ABOUT?

The chapter introduces students to the basic building blocks of economics and the operation of markets. It presents the vocabulary, graphs, and key concepts essential for the study of economics.

This chapter also establishes the central theme of market reliance vs. government direction. Current public opinion and a brief historical view of how the balance has shifted in world economies are illustrated by references to Adam Smith, Karl Marx, and John Maynard Keynes.

The first chapter focuses student attention on the core problem of scarcity. The four factors of production are limited, requiring choices to be made, illustrated with a production possibilities curve. Students should compare different economies according to how they answer the three fundamental questions of economics:

1. **WHAT to produce with our limited resources.**
2. **HOW to produce the goods and services we select.**
3. **FOR WHOM goods and services are produced – that is, who should get them.**

LEARNING OBJECTIVES

After reading this chapter, the students should know:

1. What scarcity is.
2. How scarcity creates opportunity costs.
3. What the production possibilities curve represents.
4. The three core economic questions that every society must answer.
5. How market and government approaches to economic problems differ.

LECTURE LAUNCHERS

How long will this chapter take? Two 75-minute class periods.

Where should you start?

1. Begin your discussion by defining the term opportunity cost.
   a. *Define the term opportunity cost, then explain that each student has an opportunity cost of being in class. For example, they could be sleeping, working, attending another class, etc. However, only their most valuable alternative will be their*

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opportunity cost of being in class. For example, they may value sleeping more than working or attending another class or other activities. So, sleeping would be their opportunity cost of attending class.

b. Ask a few students what they could be doing rather than being in class today.

c. Discussions about what they could (or would rather) be doing instead of being in class are excellent introductions to opportunity cost concepts and production-possibility curves.

d. Explain how they give up more than just money to attend class or go to the movies. Try to prioritize so that the "next best alternative" can be identified.

2. Define the terms scarcity and economics.
Once you have defined the concept of opportunity cost, you can explain that students have a scarce amount of time that they must choose how to allocate among the many competing uses.

3. Remember the three questions: What, How and For Whom.
When introducing the study of economics, it is important to note that we make choices. An effective way to stimulate class discussions is to take an extreme stance on whether our economy should be pure market or government directed. Once students start to object to your stance, have them defend their answers.

A stimulating discussion question is, "How many people would attend school if education was provided only by the private market?" If you teach in a state school, many people would say they could not attend college without state subsidies. If you teach in a private school, ask how many students receive guaranteed student loans, Pell grants, etc. Follow this discussion with the question "Then is there a role for government in subsidizing education?"

COMMON STUDENT ERRORS

Students often believe the following statements, printed in *italics*, are true. The correct answer is explained after the incorrect statement is presented.

1. *Words mean the same thing in economics that they do in our everyday conversation.*
Words used in everyday conversation very often have different meanings when they are used in economics. You will have to be very careful here. Words are used with precision in economics. Like many subjects, to study economics, you must understand the language. Failure to do so will result in misinterpreting what your professor is saying or asking, especially on the exams. You will have difficulty if you confuse a term's everyday meaning with its economic meaning. For example, the term "capital" in economics means "final goods produced for use in the production of other goods." In everyday usage, it may mean money, machines, a loan, or even the British response to the question "How are you feeling?"

2. *Economic models are abstractions from the real world and are therefore useless in predicting and explaining economic behavior.*
Economic models are abstractions from the real world and as a result are useful in predicting and explaining economic behavior. You have to be willing to deal with abstractions if you want to get anything accomplished in economics. By using economic models based on specific assumptions, we can make reasonable judgments about what's going on around us. We try not to disregard any useful information. However, to try to

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include everything (such as what cereal we like for breakfast) would be fruitless. For example, the production-possibilities frontier is an abstraction. No economist would argue that it is an economy! However, it certainly is useful in focusing on choices, such as the choice between televisions and shoes.

3. *Because economics is a "science", all economists should come up with the same answer to any given question.*
   Economics is a science, but there is often room for disagreement in trying to answer a given question. Economics is a social science, and the entire society and economy represent the economist's laboratory. Economists often cannot run the kind of experiments that are done by physical scientists (For example, Esther Duflo is an economist at MIT who runs experiments which test the efficacy of antipoverty programs). Therefore, without experiments, economists may attack a given problem or question in different ways using different models. They may come up with different answers, but since there is no answer book, you cannot say which is right. The solution is, then, to do more testing, refine our models, compare results, and so on. By the way, discoveries by physicists using the Hubble space telescope have given physicists cause to reevaluate much of their theory concerning the solar system, and there is much controversy concerning what the new evidence means. Nevertheless, physics is still a science, as is economics!

4. *Increasing opportunity cost results from increasing inefficiency.*
   Increasing opportunity cost occurs even when resources are being used at their peak efficiency. Increasing opportunity cost and inefficiency are confused because both result in a lower amount of output per unit of input. However, inefficiency results from poor utilization or underemployment of resources, while increasing opportunity results from the increasing difficulty of adapting resources to production as more of a good is produced. Inefficiency can be represented as a movement inward toward the origin from the production-possibilities curve, while increasing opportunity cost can be measured in movements along the production-possibilities curve. Specifically, opportunity cost is measured by the absolute value of the slope of the production-possibilities curve. A production possibility curve that is curved away from the origin demonstrates increasing opportunity cost. As the slope becomes steeper in movements down the production-possibilities curve, the good on the x-axis experiences increasing opportunity cost (a steeper slope). Similarly, a movement up along the production-possibilities curve represents a higher opportunity cost for the good on the y-axis – this time in the form of a flatter slope as more of the good on the y-axis is produced.

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ANNOTATED OUTLINE

I. Introduction

A. The American people view their president as the country's "Economist-in-Chief." Rightly or wrongly, the public holds the president responsible for the country's economic security.
B. The public's expectations for economic security are wide-ranging:
    1. Growth promotion
    2. Job creation
    3. Prevention of excessive price increases
    4. Protection of the environment
    5. Assurance of economic justice
    6. Protection of America's position in the global economy
C. Constitutional limits exist on the president's power to make economic decisions; presidents can propose policies, but their implementation requires approval by the U.S. Congress. Furthermore, the economy is buffeted by international and natural forces (e.g., COVID-19) that no president can control.
D. Policies to promote a prosperous and growing economy with rising living standards requires a knowledge of what makes an economy tick; this is the overarching goal of this course – to understand how the economy works. To that end we explore
    1. First, how markets shape economic outcomes.
    2. Second, the role that government can and does play in (re)shaping economic performance.
E. The first step in this exploration is to recognize a harsh reality, namely, that **we live in a world of limited resources**.
    1. If it weren't so, we could produce enough to make everyone rich; the "Economist in Chief" could deliver everything voters asked for, and more!
    2. These limits force us to make difficult decisions about how *best* to use our time, our money, and our resources. These are *economic* decisions.
F. In this first chapter, we examine how the problem of limited resources arises and the kinds of choices it forces us to make.
G. The three core choices that must be addressed are:
    1. **WHAT to produce with our limited resources.**
    2. **HOW to produce the goods and services we select.**
    3. **FOR WHOM goods and services are produced; that is, who should get them.**
H. We also have to decide who should answer these questions, and the battle over *who* should answer the core questions is often as contentious as the questions themselves.

II. The Economy Is Us

A. "The Economy" is simply an abstraction that refers to the sum of all our individual production and consumption activities. In this sense, the economy is us, the aggregation of all of our supply and demand decisions.
B. We may not always be happy with the output of the economy. Nevertheless, we cannot ignore the link between individual action and collective outcomes.

III. Scarcity: The Core Problem

A. Although we can change economic outcomes, we cannot have everything we want. Like every other nation, we have to grapple with the core problem of scarcity – the fact that available resources are insufficient to satisfy all desired uses thereof.

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B. Factors of Production
    1. **Definition: Factors of Production** – Resource inputs used to produce goods and services, e.g., land, labor, capital, entrepreneurship.
    2. There are four basic factors of production.
        - **Land** – Refers not just to the ground but to all natural resources such as crude oil, water, air and minerals.
        - **Labor** – Refers to the skills and abilities to produce goods and services. Hence, both the quantity and the quality of human resources are included in the "labor" factor.
        - **Capital –** Fishing nets are a final good in Thailand that are themselves a factor of production in obtaining the final goods (fish) that people desire.
            - **Definition: Capital –** Final goods produced for use in the production of other goods (e.g., equipment, structures).
        - **Entrepreneurship –** It's not just a matter of what resources you have but also of how well you use them.
            - **Definition: Entrepreneurship** – The assembling of resources to produce new or improved products and technologies.

C. Limits to Output
    1. No matter how an economy is organized there is a limit to how much it can produce.
    2. The most evident limit is the amount of resources available for producing goods and services.
    3. The imbalance between our desires and available resources – forces us to make economic choices.
    4. **Definition: Economics** – the study of how best to allocate scarce resources among competing uses.

IV. Opportunity Costs

A. Every time we choose to use scarce resources in one way we give up the opportunity to use them in other ways.
    1. **Definition: Opportunity Cost** – The most desired goods or services that are forgone in order to obtain something else.
    2. Everything we do involves an opportunity cost.

B. Guns vs. Butter
    1. One of the persistent choices about resource use entails defense spending.
    2. The U.S. government spends roughly $650 billion a year on national defense. This amounts to approximately 3.2 percent of total output.
    3. From an economic view, those defense expenditures represent an enormous claim on scarce resources.
        - The 1.4 million men and women serving in the armed forces aren't available to build schools, program computers, or teach economics
        - The land, labor, capital, and entrepreneurship devoted to producing military hardware are not available for producing civilian goods, thus the "guns versus butter" dilemma.

V. Production Possibilities

A. The Production Possibilities Curve
    1. **Definition Production Possibilities** – The alternative combinations of final goods and services that could be produced in a given time period with all available resources and technology.

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2. The production possibilities curve (Figure 1.1) is a graphic illustration of the production possibilities schedule in Table 1.1.

B. Choices, Choices
   1. Each point on the production possibilities curve (PPC) depicts an alternative mix of output, hence it represents a menu of output choices an economy confronts.
   2. The production possibilities curve illustrates two essential principles:
      - **Scarce resources** – There is a limit to the amount we can produce in a given time period with available resources and technology.
      - **Opportunity costs** – We can obtain additional quantities of any desired good only by reducing the potential production of another good.
   3. In response to the COVID-19 pandemic, the mix of output was altered away from things like autos and distilled spirits and toward much need ventilators and hand sanitizer.

C. Increasing Opportunity Costs (Figure 1.1)
   1. The shape of the production possibilities curve reflects another limitation on our choices.
   2. The production possibilities curve illustrated in Figure 1.1 demonstrates increasing opportunity costs.
   3. Increasing opportunity costs are reflected in the outward bend of the PPC.
   4. Why do opportunity costs increase? Mostly because it is difficult to move resources from one industry to another.
   5. The "law" of increasing opportunity cost says that we must give up ever-increasing quantities of other goods and services in order to get more of a particular good.

D. The Cost of North Korea's Military (Figure 1.2)
   1. North Korea maintains the fourth largest army in the world.
   2. To do so, it must allocate as much as 20 percent of all its resources to feeding, clothing, and equipping its military forces.
   3. As a result, there aren't enough resources available to produce food.
   4. **WORLD VIEW: "WORLD'S LARGEST ARMIES"**
      In terms of personnel, North Korea (population 26 million) maintains a military equal to that of the United States (population 340 million).
      WORLD VIEW: "NORTH KOREAN FOOD RATIONS CUT"
      The United Nations estimates that 40 percent of North Korea's population—10.4 million people—experienced "food insecurity" in 2019.
      WORLD VIEW: "NORTH KOREA RESUMES MISSILE LAUNCHES"
      Analysts estimate that North Korea is now spending close to $2 billion a year on its nuclear and missile programs.
   5. The military share of total output for selected countries is shown in Figure 1.3.

E. Efficiency (Figures 1.1 and 1.2)
   1. Although not all the choices on the production possibilities curve are equally desirable, they are all efficient.
   2. Efficiency means obtaining the most output possible from an economy's available resources – that is, using factors of production in the most productive way.
   3. **Definition: Efficiency** – Maximum output of a good from the resources used in production.
   4. All points on the PPC curve demonstrate efficiency.

F. Inefficiency (Figure 1.4)
   1. There's no guarantee, of course, that we'll always use resources efficiently.
   2. A production possibilities curve shows potential output, not necessarily actual output.

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3. If we are inefficient, actual output will be less than the potential output.
4. All points inside the PPC curve demonstrate inefficiency.

G. Unemployment
1. Countries may also end up inside their production possibilities curve if all available resources aren't used.
2. In October 2009, for example, over 15 million Americans were unemployed.
3. As a result, we were stuck inside the production possibilities curve producing less output than we could have.
   - **FRONT PAGE ECONOMICS: "JOBLESS WORKERS OUTNUMBER MANUFACTURING WORKERS"**
     15.0 million Americans unemployed exceeded the number holding jobs in manufacturing in 2009.
4. The same problem surfaced in 2020 when the COVID-19 pandemic threw millions out of work and pushed the economy well below its production possibilities.
5. Unemployment means that we are not producing to our capabilities. We are definitely inside the PPC.

H. Economic Growth (Figure 1.5)
1. In Figure 1.4, point X lies outside the production possibilities curve.
2. It suggests that we could get more goods than we are currently capable of producing!
3. All output combinations that lie outside the production possibilities curve are unattainable with available resources and technology.
4. Over time, population increases and we get more labor. Also, if we would build more factories and machinery, the stock of available capital would also increase.
5. The quality of labor and capital can also increase if we train workers and pursue new technologies.
6. All of these changes will increase potential output and will shift the production possibilities curve outward.
7. With more resources or better technology, our production possibilities increase.
8. **Definition: Economic Growth** – An increase in output (real GDP); an expansion of production possibilities.

VI. Three Basic Decisions

A. **WHAT** – There are millions of points along a production possibilities curve, and each one represents a specific mix of output. We can choose only one of these points at any time.
B. **HOW** – Decisions must also be made about HOW to produce.
C. **FOR WHOM** – After we've decided what to produce and how, we must address a third basic question: FOR WHOM? Who is going to get the output produced? Should everyone get an equal share?

VII. The Mechanisms of Choice

A. Answers to the question of WHAT, HOW, and FOR WHOM largely define an economy. But who formulates the answers?
B. The Invisible Hand of a Market Economy
1. Adam Smith, in *The Wealth of Nations*, said the "invisible hand" determines what gets produce, how, and for whom.
2. For example, in the auto industry, the interactions between consumers and producers determine how many cars are produced rather than some central planning agency.

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3. **Definition: Market Mechanism** – The use of market prices and sales to signal desired outputs (or resource allocations).
4. The essential feature of the market mechanism is the price signal.
5. The market mechanism can also answer the **HOW** and **FOR WHOM** questions.
   - To maximize their profits, producers will seek to use the lowest-cost method of producing a good.
   - A market distributes goods to the highest bidder. Individuals who are willing and able to pay the most for a good tend to get it in a pure market economy.
6. **Definition: Laissez Faire** – The doctrine of "leave it alone", of nonintervention by government in the market mechanism.

C. Government Intervention
1. The laissez-faire policy Adam Smith favored has always had its share of critics.
2. Karl Marx emphasized how free markets tend to concentrate wealth and power in the hands of the few, at the expense of the many.
   - As Marx saw it, unfettered markets permit the capitalists (those who own the machinery and factories) to enrich themselves while the proletariat (the workers) toil long hours for subsistence wages.
   - Marx argued that the government not only had to intervene but had to own all the means of production.
3. John Maynard Keynes seemed to offer a less drastic solution.
   - The market, he conceded, was pretty efficient in organizing production and building better mousetraps.
   - However, individual producers and workers had no control over the broader economy. He believed the cumulative actions of so many economic agents could easily tip the economy in the wrong direction.
   - In Keynes' view, government should play an active but no all-inclusive role in managing the economy.

D. Conservatives vs. Liberals
1. The core of most debates is some variation of the WHAT, HOW, or FOR WHOM questions.
2. Conservatives favor Adam Smith's laissez-faire approach with minimum government interference.
3. Liberals tend to think government intervention is needed to improve market outcomes.
4. **WORLD VIEW: "MARKET RELIANCE VS. GOVERNMENT RELIANCE?"**
   This World View gives the results of a 2010 poll of 15 countries regarding the effectiveness of the free market economic system. The consensus was that it is the best system for the world's future; especially in Brazil, China, and Germany.
5. **WORLD VIEW: "INDEX OF ECONOMIC FREEDOM"**
   This World View highlights the Heritage Foundation's 2020 country rankings in terms of economic freedom. Hong Kong, Singapore, and New Zealand rank at the top of the list while North Korea and Venezuela rank at the bottom. The U.S. is ranked as "mostly-free" at #17 (of 186).
6. Countries answer the basic economic questions differently and their answers change over time.

E. A Mixed Economy
1. Most countries use a combination of market signals and government directives to select economic outcomes.
2. **Definition: Mixed Economy** – An economy that uses both market signals and government directives to allocate goods and resources.

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F. Market Failure
    1. When market signals don't give the best possible answers to the WHAT, HOW, and FOR WHOM questions, we say that the market mechanism has failed.
    2. **Definition: Market Failure** – An imperfection in the market mechanism that prevents optimal outcomes.
    3. Examples of market failures:
        - Leaded gasoline was banned decades ago because of its harmful effects on the brain. The harmful health effect from leaded gasoline is a negative externality. Generally speaking, markets produce too much of a good that generates negative externalities .
        - Monopolies tend to restrict supply (produce less than competitive markets) and charge higher prices.
        - In the case of COVID-19, there was near universal consensus that government intervention (regulation, subsidized care, etc.) was needed to get better results. Markets, in effect, would have produced too little of needed devices, treatment, and practices (e.g., social distancing & mask usage).

G. Government Failure
    1. Government intervention may move us closer to our economic goals. But government intervention may fail as well.
    2. **Definition: Government Failure** – Government intervention that fails to improve economic outcomes.
    3. Examples of government failures include:
        - Forcing an industry to clean up its pollution in a manner that is excessive.
        - Mandating pollution control technologies that are too expensive or even obsolete.
        - Imposing excessive taxes and transfer payments so that the total economic pie shrinks making society as a whole worse off.
    4. Newly introduced incentives, including increased private ownership, moved China away from a centrally planned economy in an effort to increase productivity and growth.

H. Seeking Balance
    1. None of these failures has to occur, but they might.
    2. The challenge for any society is to minimize failures by selecting the appropriate balance of market signals and government directives.
    3. It requires that we know how markets work and why they sometimes fail.
    4. We also need to know what policy options the government has and how and when they might work.

VIII. What Economics Is All About

A. Understanding how economies function is the basic purpose of studying economics – to learn how an economy:
    1. is organized
    2. behaves
    3. successfully achieves it basic objectives.

B. Ends vs. Means
    1. Economists don't formulate an economy's objectives.
    2. Instead, they focus on the means available for achieving given goals.

C. Normative vs. Positive Analysis
    1. Normative analysis incorporates subjective judgments what ought to be done.
    2. Positive analysis focuses on how things might be done, without subjective judgments of what is "best".

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D. Macro vs. Micro
    1. **Definition: Macroeconomics** – The study of aggregate economic behavior, of the economy as a whole.
    2. **Definition: Microeconomics** – The study of individual behavior in the economy, of the components of the larger economy.
    3. For example, in macroeconomics, we might be concerned about how much money, in total, consumers will spend on goods and services. In microeconomics, economists focus attention on how much consumers spend on specific goods.
    4. Although the study of microeconomics and macroeconomics operate at different levels of abstraction, they are intrinsically related. Macro (aggregate) outcomes depend on micro behavior, and micro (individual) behavior is affected by macro outcomes.

E. Theory vs. Reality
    1. The distinction between macroeconomics and microeconomics is one of many simplifications we make in studying economic behavior.
    2. The economy is much too vast and complex to describe and explain in one course (or one lifetime).
    3. We therefore focus on basic relationships.
    4. We develop basic principles of economic behavior and then use those principles to predict economic events and develop economic policies,
    5. We formulate theories, or models, of economic behavior and then use those theories to evaluate and design economic policy.
    6. In these theories, we typically ignore the possibility that many things can change at one time.
    7. **Definition: *Ceteris Paribus*** – The assumption of nothing else changing.
    8. Although the assumption of ceteris paribus makes it easier to formulate economic theory and policy, it also increases the risk of error. If other things do change in significant ways, our predictions (and policies) may fail.
    9. A word of warning: our knowledge is imperfect.
        - It may be impossible to understand and explain how the economy works without getting tangled up in subjective value judgments.
        - It is not clear where the truth lies. For more than 200 years, economists have argued about what makes the economy tick.
        - We want to develop a reasonable perspective on economic behavior, an understanding of basic principles.

IX. Decisions for Tomorrow: What Is the Cost of Going Green?

A. Continued population and production growth have raised concerns about global warming.
    1. A proposed Green New Deal calls for the complete elimination of carbon-based energy – the cause of global warming – by 2030.
    2. The U.S. now gets 80 percent of its energy from coal, petroleum, and natural gas—all carbon-based fuels.
    3. So, while everyone might share the goal of an emissions-free future, we have to ask how we get from here to there.

B. Opportunity Costs
    1. Although the sun's rays are free, you would still need a lot of capital investment to harness that solar power; to develop a nationwide, complete solar power infrastructure would cost trillions of dollars.
    2. We'd also have to change the technology embedded in our transportation systems, office buildings, homes, and even farms. Retrofitting existing

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infrastructure would cost billions of dollars. Building new transportation systems would cost even more.
3. The dollar cost of "going green" would be tens of trillions.
4. In deciding whether and how intensively to develop clean energy, we have to assess opportunity costs—what goods and services we implicitly forsake in order to "go green."

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DISCUSSION PROMPT, EXTENDING THE DISCUSSION, AND DISCUSSION PROJECT

Discussion Prompt

Do we work too hard?

One constraint in our economy is time. As a society, we make choices about the allocation of time between work and other pursuits. In the U.S., most workers are eligible for overtime pay if they work more than 40 hours a week, whereas most European workers become eligible at 35 hours per week. In addition, workers in Europe have guaranteed vacation time – five weeks in France – a benefit not available in the U.S. As a result, the typical U.S. worker puts in about 2,000 hours per year compared to 1,700 hours per year in France and Germany.

Should U.S. laws be changed to require a shorter workweek and longer vacation time?

For each side of the question list three strong arguments. Use the following concepts from the chapter at least once:

Production possibilities curve
Economic growth
Market mechanism
Market failure

Teaching notes

Classroom discussion often encourages students to debate one another. Although lively, such discussion usually involves a minority of students. A cooperative controversy ensures that every student is involved in the discussion while using a relatively short period of class time. Moreover, it can help students see the arguments on both sides of an issue, often a difficult task for college students. Finally, the technique helps focus on an outcome such as identification of the strongest argument on each side. These outcomes may be useful later, if students are assigned an appropriate essay.

Format: Organize students into groups of two. (Use instructor assignment or random assignment so that friends don't work together.) One half of the groups take the pro side; the other half takes the con side. Each pair lists the strongest arguments for their position. Then, pairs combine into groups of four, with one pair on each side of the discussion. One pair reads their reasons while the other side listens. Then they reverse roles and repeat. Finally, each group of four selects the strongest argument on each side and, if appropriate, reaches a consensus on a final position.

Sample answers:

No
1) A reduction in the work week would shift the **production possibilities curve** in, reducing the capacity of the economy to produce. Americans value the output that would be lost more highly than the leisure time they lose by choosing to do it. If that were not the case, they wouldn't be working those hours.

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2) The reduction in production capacity would not just occur in the present. It would also affect the future. If the production possibilities curve shifts in, it seems likely that there will be less consumption goods **and** less capital goods produced. That will mean slower **economic growth** in addition to lower production in the present.

3) Government should not further involve itself in regulating hours of work or number of holidays. This is something that ought to be left to the market. To understand why, think about a simple example: suppose that compensation has only two dimensions: wages and paid vacation. Employers compete for workers by offering different mixes of compensation. Some offer higher wages and fewer weeks of paid vacation, others offer lower wages and more weeks of vacation. Workers will go to work for the employers offering the most attractive mix. As a result of this competition for workers, employers have a strong incentive to offer vacation benefits that reflect the preferences of workers.

Yes
1) It is tempting to think that Americans working 2,000 hours per year, on average, simply reflects the preference of Americans. But **market mechanisms** don't always produce the optimal mix of output; **market failures** occur. It's possible that choices made through the market lead to our economy producing less leisure than would be optimal. This might be true, for example, if there were externalities imposed on third parties as a result of long hours of work. For example, maybe children spend many hours in bad day care as a result of their parents working long hours. If parents don't fully understand the consequences to society, in terms of future aggressive behavior, or if they value the extra income more highly than they value well-socialized children, from society's point of view they may work too many hours in the market and too few hours caring for their children.

2) To argue that **market mechanisms** will automatically get employers to offer vacation benefits that reflect worker preferences is to believe too readily in the power of the market. While there are times when employers are competing intently for workers, for many jobs, at many times, workers are in surplus. If the economy is operating inside its production possibilities frontier, for example during a recession, employers are free to think more about what is best for the business and less about getting the mix of wages and weeks of vacation right from the employee's point of view.

Extending the Discussion

Too much for the military—or not enough?

The allocation of resources to the military is a major policy choice for the US. First, find out how much currently is spent on military programs from the Center for Defense Information an independent watchdog on U.S. military spending at:
http://www.cdi.org

In Washington, DC, research organizations provide information to political leaders regarding the military budget. At the following two sites find three arguments in favor of the current budget level (or increasing it) and three arguments for reducing the current spending level. Select one argument from each side as the most important reason for increasing/maintaining/reducing military spending. Then write a response to this argument, pointing out its weak points.

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The Heritage Foundation is a think tank to promote conservative public policies based on a strong national defense.
http://www.heritage.org

Project on Defense Alternatives is a think tank to promote the broadest range of defense options that will allow significant reductions in the level of armed forces and military spending.
http://www.comw.org/pda

Teaching notes

Possible student answers:

Raise the military budget.

1) The Four Percent for Freedom Solution: We should maintain a defense budget of 4 percent of gross domestic product (GDP) over the next five to 10 years or else the U.S. will be unable maintain its forces to secure America. "The Four Percent for Freedom solution would help to reassure financial markets about American strength, reduce risk within the international community, and promote economic growth both at home and abroad."

2) Army Modernization Is Essential: "The President's 2008 budget request of $3.7 billion to continue development of the FCS includes $100 million in procurement funding. FCS is the Army's primary modernization program; this would be the first upgrade of this magnitude in nearly four decades. Given that the Army went to war in Iraq in 2003 with equipment that was already more than 20 years old, FCS is critical not only for future missions but also for soldiers on the battlefield today."
http://www.heritage.org/defense/report/follow-the-leader-the-house-and-senate-fiscal-year-2008-defense-appropriations-bills

Reduce the military budget.

1) Reducing America's excess warfare spending can equal major savings. "During the fiscal year 2008, US national defense spending will significantly surpass the $650 billion mark. Since 1998, the nation has allocated about $4.5 trillion to defense adding more than $3 trillion to the gross federal debt – much of it borrowed from social security. Sometime in the middle of the next decade, Social Security will stop generating surplus revenues for use elsewhere, and the period of repaying – rather than borrowing from – the trust funds will begin."
http://www.comw.org/pda/0708bm42.html

2) "In February 2007, the Gallup polling organization asked a representative sample of US citizens if they thought the United States was spending too little, too much, or just the right amount on defense and the military… For the first time since the mid-1990s, a plurality of Americans said that the country was spending too much. Currently the Pentagon plans to spend more than $2.75 trillion during the next five years – not counting the incremental cost of future combat operations. This is not easily reconciled with bringing the national debt under control, while also meeting pending demands on social security and Medicare."
http://www.comw.org/pda/0703bm41.html

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Discussion Project

What is economic progress? What is freedom?

Two research organizations rank countries by their economic competitiveness with quite different results.

- Why do they do reach different conclusions?
- Which ranking best describes the state of the world economy?

One ranking comes from the World Economic Forum:
http://www.weforum.org

It describes itself as follows:

> The World Economic Forum is an independent international organization committed to improving the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas.
>
> Incorporated as a not-for-profit foundation in 1971, and headquartered in Geneva, Switzerland, the Forum is not tied to any political, partisan or national interests.

The report on competitiveness is available at:
http://www.weforum.org/reports/global-competitiveness-report-2014-2015

Another ranking, described in the textbook comes from the Heritage Foundation:
http://www.heritage.org

It describes itself as follows:

> Founded in 1973, The Heritage Foundation is a research and educational institute - a think tank – whose mission is to formulate and promote conservative public policies based on the principles of free enterprise, limited government, individual freedom, traditional American values, and a strong national defense.

The report is available at:
http://www.heritage.org/index/Default.aspx

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MEDIA EXERCISE

Chapter 1
Economics: The Core Issues

Name:
Section:
Grade:

Find an article that describes a tradeoff between two goods or services. Use the article you have found to fulfill the following instructions and questions.

1. Save a copy of the article to a form (e.g., Word doc) that you can modify (i.e., have room at the bottom to insert answers to the questions given below).

2. What are the two goods or services (or groups of goods or services) involved in the tradeoff?
   - Highlight each good or service (or groups of goods or services) in the article. You should insert at least two highlights, but not more than two, in your article.
   - Below the article draw a pair of axes for a production-possibilities curve. Write the name of one of the goods or services on the horizontal axis and the other on the vertical axis.

3. Highlight the phrase (not more than a sentence) that indicates that there is a tradeoff between the two goods or services.

4. Are there increasing opportunity costs in the tradeoff between the two goods or services? Under the article, write one of the following:
   - Increasing opportunity costs exist.
   - No increasing opportunity costs exist.

5. What would the production-possibilities curve between the two goods or services look like? Carefully and neatly, draw a production-possibilities curve for the two goods or services. Don't use any numbers. Be very careful to draw the correct shape of the production-possibilities curve on the evidence of the applicability or inapplicability of the law of increasing opportunity cost (see your answer in number 4 above).

6. On the basis of information in the article, is there a possible shift of the production-possibilities curve or a movement along it? The shift or movement may have occurred already, may be occurring presently, or may occur in the future. Possibly, the author of the article is implicitly advocating a shift or a movement. Highlight the single word, phrase, or sentence (not more than a sentence) that indicates a shift or a movement.

7. Insert an arrow or your graph to indicate what direction there would be a movement along the production-possibilities curve or in what direction the curve would shift as a result of the event that you have just highlighted.

8. In the remaining space below your article, indicate the source (name of publication), title (e.g., newspaper headline or magazine article title), date, and page for the article you have chosen. Use this format:

   Source: _____ Date: _____ Page: _____
   Title: _____

   If this information also appears in the article itself, highlight each item.

9. Neatness counts.

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Professor's Note

Learning Objective for Media Exercise

To test student's understanding of increasing opportunity cost, the concept of tradeoff, and the difference between shifts of and movements along the production-possibilities curve.

Suggestions for Correcting Media Exercise

1. Check that the items indicated with an arrow correspond to what is on the axes of the production-possibilities curve that the student has drawn.

2. Check for the consistency between the students' drawing of the opportunity cost curve and his or her choice about whether or not there is increasing opportunity cost.

3. Check that the passage highlighted in number 6 indicates a shift or a movement along the production-possibilities curve. Then see if the student has correctly pointed the arrow in the diagram to indicate the shift.

Likely Student Mistakes and Lecture Opportunities

There are likely to be many articles about budgetary disputes in Congress. These disputes appear to be mainly disputes about money. However, *budgetary disputes over money are really disputes pertaining to the opportunity costs of the resources used to produce a good. If the result of dispute over the budget for Peace Corp is that its budget is slashed, more resources can be devoted to military goods.*

1. The students are likely not to have a firm grasp on the difference between shifts of and movements along the production-possibilities curve. This assignment and a short lecture on the issue should clear up the difference quickly.

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SUPPLEMENTARY RESOURCES

Buchanan, J.M., "The Adam Smith Lecture: On the Structure of an Economy: A reemphasis of Some Classical Foundations," *Business Economics*, January 1989, pp. 6–12. Provides an introduction to the fundamental arguments for the invisible hand.

Gintis, Herbert, "New Economic Rule of the Game," *Challenge*, September–October 1992, pp. 47–54. Gintis views the market and state as complements rather than alternatives in promoting economic growth and introduces different schools of thought.

Heilbroner, Robert, "Analysis and Vision in the History of Modern Economic Thought," *Journal of Economic Literature*, September 1990, Vol. XXVIII, pp. 1097–1114. Provides a dramatic, easily readable explanation of the great capitalist and socialist theories and experiments of the twentieth century.

Landes, David S., *The Wealth and Poverty of Nations: Why Some Are So Rich and Some So Poor*. W.W. Norton 1999. Economic history including an epilogue on current economic tensions.

Check out the Econ Everyday blog to bring current, student-centered content into your course throughout the semester. Short articles written for principles level students are tagged by topic to bring currency into your course. Discussion questions are also provided to help you drive the conversation forward. Visit www.econeveryday.com and subscribe for updates.

You can send your students to the site and access the site yourself to use relevant, relatable content into your classroom.

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Chapter 1: Economics: The Core Issues
Solutions Manual

Learning Objectives for Chapter 1

After reading this chapter, you should know
LO1-1. What scarcity is.
LO1-2. How scarcity creates opportunity costs.
LO1-3. What the production possibilities curve represents.
LO1-4. The three core economic questions that every society must answer.
LO1-5. 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. **(LO1-2)**

   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 5, 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? **(LO1-2)**

   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 a "free lunch," as mentioned in the discussion of "Opportunity Cost"? **(LO1-2)**

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Answer: There is no such thing as a "free lunch." Every time we use scarce resources in one way, we give up the opportunity to use them in other ways. A free lunch's opportunity cost is what could be produced or consumed otherwise with those resources that were used for the lunch.

4. How might a nation's production possibilities be affected by the following? **(LO1-3)**
   (a) Discovery of a new oil field.
   (b) A decrease in immigration.
   (c) An increase in military spending.
   (d) More job training.

   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. Discovery of a new oil field is an example of a change in resources, which causes an increase in a country's production possibilities. Discovering a new oil field allows a country to have a greater capacity in the long run, leading to more output.
   (b) A decrease in immigration is an example of a decrease in resources for a nation. A decrease in immigration certainly is a decrease in the number of laborers, which would necessarily decrease the production possibilities. These immigrants also have varying levels of skills and education (human capital) that also will decrease 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 job training makes workers more productive. This increased productivity means that more output can be produced with the existing number of workers, which would increase a nation's production possibilities curve.

5. What was the opportunity cost of more hand sanitizers during the COVID-19 crisis? **(LO1-2)**

   Answer: Every time we use scarce resources in one way, we give up the opportunity to use them in other ways. The opportunity cost is the most desired goods or services that are forgone in order to obtain something else. The opportunity cost of more hand sanitizers is what those resources could be used for otherwise (e.g., vaccines, toilet paper, etc.).

6. Who would go to college in a completely private (market) college system? How does government intervention change this FOR WHOM outcome? **(LO1-4)**

   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

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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 "Market Reliance vs. Government Reliance")? **(LO1-5)**

   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. What is the connection between North Korea's missile program and its hunger problem? (World View "North Korean Food Rations Cut") **(LO1-2)**

   Answer: North Korea is a relatively small country: Its population of 26 million ranks 50th 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 as much as 20 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).

9. Explain why there are limits to output and how these limits force economies to make trade-offs. **(LO1-1)**

   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 trade-off in the form of a reduction in the production of another good must happen.

10. If climate change was in fact the greatest threat to society, should all our resources be used to combat it? What percentage of our output should be devoted to the pursuit of a carbon-neutral economy? **(LO1-2)**

    Answer: In general, no, not all resources should be used for a single use. One must always remember the opportunity costs for using a resource. Students' answers for the second part will vary, but students should explain their reasoning using the concepts of scarcity, opportunity cost, and trade-offs.

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Problems

1. According to Table 1.1 (or Figure 1.1), what is the opportunity cost of the second truck produced? **(LO1-2)**

   Answer: 0.7 tank.

   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. Opportunity cost is the most desired goods or services that are forgone to obtain something else. In this case, the opportunity cost to produce more trucks is fewer tanks. To calculate opportunity cost, identify how many tanks must be given up to produce one more truck.

   If this economy desires to produce its *second* truck, this implies that the economy is producing one truck (current production: truck production = 1, tank production = 4.5, or at point *E*). To produce the second truck, tank production must decrease because some resources must be diverted from tank production to truck production (new production: truck production = 2, tank production = 3.8, or at point *D*). The opportunity cost of this second truck is the number of tanks the economy must give up when moving from point *E* to point *D* (= 4.5 tanks – 3.8 tanks = 0.7 tank). Therefore, the opportunity cost of the second truck is 0.7 tank.

2. (a) Compute the opportunity cost in forgone consumer goods (millions of pounds of butter) for each additional unit of military output produced (number of planes): **(LO1-3)**

Military output	0	1	2	3	4	5
Consumer output	100	95	80	60	35	0
Opportunity cost	—	—	—	—	—	—

   (b) As military output increases, are opportunity costs increasing, decreasing, or remaining constant?

   Answers:

(a) Opportunity cost	**0**	**5**	**15**	**20**	**25**	**35**

   (b) Opportunity costs are increasing.

   Feedback: (a) When military production is increased from 0 to 1 plane, the production of consumer goods falls from 100 to 95 million pounds of butter. The opportunity cost to produce one more plane in terms of butter given up is 5 million pounds of butter (= 100 million pounds of butter – 95 million pounds of butter = 5 million pounds of butter).

   When military production is increased from 1 to 2 planes, the production of consumer goods falls from 95 to 80 million pounds of butter. The opportunity cost to produce one more plane in terms of butter given up is 15 million pounds of butter (= 95 million pounds of butter – 80 million pounds of butter = 15 million pounds of butter).

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When military production is increased from 2 to 3 planes, the production of consumer goods falls from 80 to 60 million pounds of butter. The opportunity cost to produce one more plane in terms of butter given up is 20 million pounds of butter (= 80 million pounds of butter – 60 million pounds of butter = 20 million pounds of butter).

When military production is increased from 3 to 4 planes, the production of consumer goods falls from 60 to 35 million pounds of butter. The opportunity cost to produce one more plane in terms of butter given up is 25 million pounds of butter (= 60 million pounds of butter – 35 million pounds of butter = 25 million pounds of butter).

When military production is increased from 4 to 5 planes, the production of consumer goods falls from 35 to 0 million pounds of butter. The opportunity cost to produce one more plane in terms of butter given up is 35 million pounds of butter (= 35 million pounds of butter – 0 million pounds of butter = 35 million pounds of butter).

(b) In this example, opportunity costs increase as we increase the production of military goods. This is due in large part because it is difficult to move resources from one industry to another. In the economy, the resources used to produce butter do not transform into manufacturing planes easily. Farmers who make butter may not have the same skills for plane manufacturing. As we continue to transfer resources (land, labor, capital, and entrepreneurship) from one industry to the other, an economy usually must give up more butter for each plane produced. This is the concept of increasing opportunity costs.

3. According to Figure 1.2, how much food production is sacrificed when North Korea moves from point *P* to point *N*? **(LO1-3)**

Answer: G – C units of food.

Feedback: Point *P* indicates that North Korea is producing a combination of G units of food and H units of military output per year. Moving along the PPC from point *P* to point *N*, North Korea now produces a combination of C units of food and D units of military output per year. Therefore, military output increases by D − H and food output decreases by G − C.

4. (a) If the average North Korean farmer produces 1,500 pounds of food per year, what is the opportunity cost, in pounds of food, of North Korea's army (World View "World's Largest Armies")?
(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? **(LO1-2)**

Answers: (a) 1,920,000,000 pounds of food per year.
(b) 3,840,000 people.

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Feedback: (a) According to the World View, North Korea has 1,280,000 active military members. If all of these soldiers were instead farmers, 1,920,000,000 pounds of food could have been produced (= 1,280,000 farmers × 1,500 pounds of food per year).
(b) This food could have fed 3,840,000 people per year (= 1,920,000,000 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 3.2 to 3.4 percent of a $22 trillion economy? **(LO1-2)**

Answer: $44 billion.

Feedback: If a $22 trillion economy allocates 3.2 percent to defense spending, the country will spend $704 billion on defense (= 3.2% × $22 trillion = 0.032 × $22,000,000,000,000 = $704,000,000,000 = $704 billion). If defense spending increases to 3.4 percent, defense spending would now be equal to $748 billion (= 3.4% × $22 trillion = 0.034 × $22,000,000,000,000 = $748,000,000,000 = $748 billion). The opportunity cost of this increase in defense spending is $44 billion of other output produced (= $748 billion – $704 billion = $44 billion).

6. According to Figure 1.3, what percent of output consists of nonmilitary goods in **(LO1-5)**
(a) Jamaica?
(b) Russia?

Answers: (a) 99.2 percent.
(b) 96.1 percent.

Feedback: (a) According to the figure, Jamaica devotes 0.8 percent of its output to the military. This means that 99.2 percent of its output consists of nonmilitary goods (= 100% of output − 0.8% devoted to military).
(b) According to the figure, Russia devotes 3.9 percent of its output to the military. This means that 96.1 percent of its output consists of nonmilitary goods (= 100% of output − 3.9% devoted to military).

7. According to the figure below (similar to Figure 1.4) **(LO1-3)**
(a) At which point(s) is this society producing some of each type of output but 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 unattainable with available resources and technology?
(d) Show the change that would occur if the resources of this society increased. Label this curve PPC_2.

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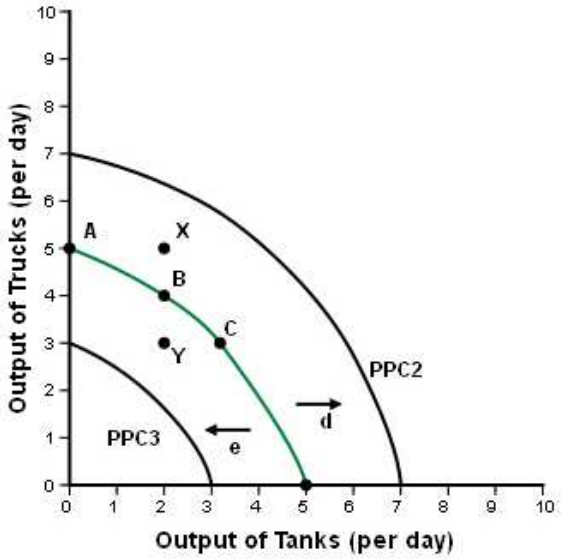
(e) Show the change that would occur with a huge natural disaster that destroyed one-third of production capacity. Label this curve PPC_3.

Answers: (a) Y.
(b) A, B, C.
(c) X.
(d) PPC_1 to PPC_2.
(e) PPC_1 to PPC_3.



Feedback: (a) Point Y: A production possibilities curve shows potential output, not necessarily actual output. If we're inefficient, actual output will be less than potential. Points inside the PPC represent the incomplete use of available resources. Point Y is inside the PPC.
(b) Points A, B, and C: Efficiency is making the most of available resources and maximizing output. Every point on the PPC (A, B, C) is efficient and represents the maximum use of our production capabilities.
(c) Point X: Points outside the PPC (X) are unattainable with available resources and technology.
(d) PPC_1 to PPC_2: PPC_2 is an example of a curve that shifted out from the original PPC. If this society's population increases dramatically, or technology advances, or the stock of capital increases, or any combination of an increase in resources, the economy's production possibilities will increase. This increase in resources would shift the PPC outward, resulting in economic growth.
(e) PPC_1 to PPC_3: PPC_3 is an example of a curve that shifted in from the original PPC. A huge natural disaster that destroyed vast amounts of infrastructure or caused a loss of lives means that there has been a decrease in resources and the economy's production possibilities will decrease. This decrease in resources would shift the PPC inward, resulting in economic contraction.

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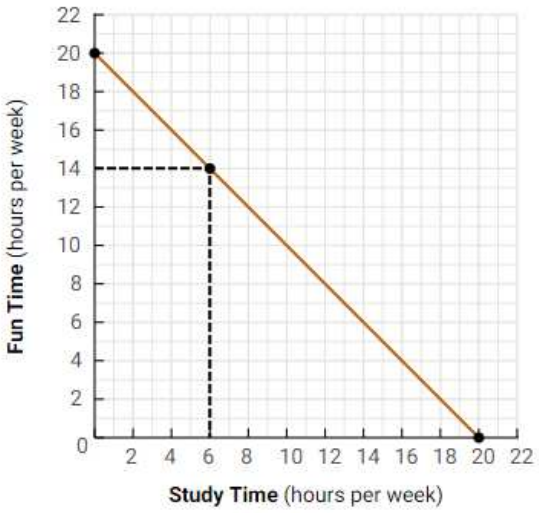
8. You have only 20 hours per week to use for either study time or fun time. Suppose the relationship between study time, fun time, and grades is shown in this table: **(LO1-3)**

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 a graph 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 average.
(c) What is the cost, in lost fun time, of raising your grade point average from 2.0 to 3.0?
(d) **(Connect only content)** What is the opportunity cost of increasing your grade point average from 3.0 to 4.0?

Answers:
(a, b)



(c) 6 hours of fun time.
(d) (Connect only content) 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 point average from a 2.0 to a 3.0 is that you must give up 6 hours of 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 fun time to raise your GPA to a 3.0.

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(d) **(Connect only content)** The opportunity cost of raising your grade point average from a 3.0 to a 4.0 is giving up 8 hours of 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 "Market Reliance vs. Government Reliance," which nation has **(LO1-5)**
(a) The highest level of faith in the market system?
(b) The lowest level of faith in the market system?

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

Feedback: (a) Germany: 68 percent 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 percent 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 student literally had "nothing else to do," **(LO1-2)**
(a) What would be the opportunity cost of doing this homework?
(b) What is the likelihood of that?

Answers: (a) The student's time.
(b) The likelihood is zero or close to zero.

Feedback: (a) Opportunity cost is what is given up to get something else. If a student literally had "nothing else to do," then he or she does not have to be at work or have any chores to do. There is simply nothing to give up except time, which is the opportunity cost associated with doing this homework.
(b) The likelihood of actually having "nothing else to do" is zero (or amazingly close to zero). It is very likely that this student has a million things to do like study for another class, meet up with friends, or participate in a campus club. There is simply always an opportunity cost for every single decision that we make.

11. According to the World View "World's Largest Armies," what percent of the total population is serving in the military in **(LO1-1)**
(a) The United States (population = 340 million)?
(b) North Korea (population = 25 million)?
(c) China (population = 1.4 billion)?

Answers: (a) 0.38 percent.
(b) 5.12 percent.
(c) 0.16 percent.

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Feedback: (a) The percentage of the population serving in the military in the United States is 0.38 percent (= number of active military ÷ population = 1,282,000 ÷ 340,000,000 × 100 = 0.38%).
(b) The percentage of the population serving in the military in North Korea is 5.12 percent (= number of active military ÷ population = 1,280,000 ÷ 25,000,000 × 100 = 5.12%).
(c) The percentage of the population serving in the military in China is 0.16 percent (= number of active military ÷ population = 2,183,000 ÷ 1,400,000,000 × 100 = 0.16%).

12. **Decisions for Tomorrow:** What is the opportunity cost of investing $1 trillion in clean energy technology? **(LO1-02)**

    Answer: The land used to produce the clean energy technology that could have been used to produce something else and the goods and services given up to devote resources to producing the clean energy technology.

    Feedback: Opportunity cost is the most desired goods or services that are forgone to obtain something else. The opportunity cost of investing $1 trillion in clean energy technology 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.

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Micro Economy Today 16th edition Schiller Solutions Manual