

CHAPTER 1

Economics: The Study of Choice

START UP: ECONOMICS IN THE NEWS

2008 seemed to be the year of economic news. From the worst financial crisis since the Great Depression to the possibility of a global recession, to gyrating gasoline and food prices, and to plunging housing prices, economic questions were the primary factors in the presidential campaign of 2008 and dominated the news generally.

What causes the prices of some good to rise while the prices of some other goods fall? Price determination is one of the things that we will study in this book. We will also consider factors that lead an economy to fall into a recession—and the attempts to limit it.

While the investigation of these problems surely falls within the province of economics, economics encompasses a far broader range of issues. Ultimately, economics is the study of choice. Because choices range over every imaginable aspect of human experience, so does economics. Economists have investigated the nature of family life, the arts, education, crime, sports, job creation—the list is virtually endless because so much of our lives involves making choices.

How do individuals make choices: Would you like better grades? More time to relax? More time watching movies? Getting better grades probably requires more time studying, and perhaps less relaxation and entertainment. Not only must we make choices as individuals, we must make choices as a society. Do we want a cleaner environment? Faster economic growth? Both may be desirable, but efforts to clean up the environment may conflict with faster economic growth. Society must make choices.

Economics is defined less by the subjects economists investigate than by the way in which economists investigate them. Economists have a way of looking at the world that differs from the way scholars in other disciplines look at the world. It is the *economic way of thinking*; this chapter introduces that way of thinking.

1. DEFINING ECONOMICS

LEARNING OBJECTIVES

1. Define economics.
2. Explain the concepts of scarcity and opportunity cost and how they relate to the definition of economics.
3. Understand the three fundamental economic questions: What should be produced? How should goods and services be produced? For whom should goods and services be produced?

economics

A social science that examines how people choose among the alternatives available to them.

Economics is a social science that examines how people choose among the alternatives available to them. It is social because it involves people and their behavior. It is a science because it uses, as much as possible, a scientific approach in its investigation of choices.

1.1 Scarcity, Choice, and Cost

All choices mean that one alternative is selected over another. Selecting among alternatives involves three ideas central to economics: scarcity, choice, and opportunity cost.

Scarcity

Our resources are limited. At any one time, we have only so much land, so many factories, so much oil, so many people. But our wants, our desires for the things that we can produce with those resources, are unlimited. We would always like more and better housing, more and better education—more and better of practically everything.

If our resources were also unlimited, we could say yes to each of our wants—and there would be no economics. Because our resources are limited, we cannot say yes to everything. To say yes to one thing requires that we say no to another. Whether we like it or not, we must make choices.

Our unlimited wants are continually colliding with the limits of our resources, forcing us to pick some activities and to reject others. **Scarcity** is the condition of having to choose among alternatives. A **scarce good** is one for which the choice of one alternative requires that another be given up.

Consider a parcel of land. The parcel presents us with several alternative uses. We could build a house on it. We could put a gas station on it. We could create a small park on it. We could leave the land undeveloped in order to be able to make a decision later as to how it should be used.

Suppose we have decided the land should be used for housing. Should it be a large and expensive house or several modest ones? Suppose it is to be a large and expensive house. Who should live in the house? If the Lees live in it, the Nguyens cannot. There are alternative uses of the land both in the sense of the type of use and also in the sense of who gets to use it. The fact that land is scarce means that society must make choices concerning its use.

Virtually everything is scarce. Consider the air we breathe, which is available in huge quantity at no charge to us. Could it possibly be scarce?

The test of whether air is scarce is whether it has alternative uses. What uses can we make of the air? We breathe it. We pollute it when we drive our cars, heat our houses, or operate our factories. In effect, one use of the air is as a garbage dump. We certainly need the air to breathe. But just as certainly, we choose to dump garbage in it. Those two uses are clearly alternatives to each other. The more garbage we dump in the air, the less desirable—and healthy—it will be to breathe. If we decide we want to breathe cleaner air, we must limit the activities that generate pollution. Air is a scarce good because it has alternative uses.

Not all goods, however, confront us with such choices. A **free good** is one for which the choice of one use does not require that we give up another. One example of a free good is gravity. The fact that gravity is holding you to the earth does not mean that your neighbor is forced to drift up into space! One person's use of gravity is not an alternative to another person's use.

There are not many free goods. Outer space, for example, was a free good when the only use we made of it was to gaze at it. But now, our use of space has reached the point where one use can be an alternative to another. Conflicts have already arisen over the allocation of orbital slots for communications satellites. Thus, even parts of outer space are scarce. Space will surely become more scarce as we find new ways to use it. Scarcity characterizes virtually everything. Consequently, the scope of economics is wide indeed.

scarcity

The condition of having to choose among alternatives.

scarce good

A good for which the choice of one alternative requires that another be given up.

free good

A good for which the choice of one use does not require that another be given up.

Scarcity and the Fundamental Economic Questions

The choices we confront as a result of scarcity raise three sets of issues. Every economy must answer the following questions:

1. **What should be produced?** Using the economy's scarce resources to produce one thing requires giving up another. Producing better education, for example, may require cutting back on other services, such as health care. A decision to preserve a wilderness area requires giving up other uses of the land. Every society must decide what it will produce with its scarce resources.
2. **How should goods and services be produced?** There are all sorts of choices to be made in determining how goods and services should be produced. Should a firm employ a few skilled or a lot of unskilled workers? Should it produce in its own country or should it use foreign plants? Should manufacturing firms use new or recycled raw materials to make their products?
3. **For whom should goods and services be produced?** If a good or service is produced, a decision must be made about who will get it. A decision to have one person or group receive a good or service usually means it will not be available to someone else. For example, representatives of the poorest nations on earth often complain that energy consumption per person in the United States is 17 *times* greater than energy consumption per person in the world's 62 poorest countries. Critics argue that the world's energy should be more evenly allocated. Should it? That is a "for whom" question.

Every economy must determine what should be produced, how it should be produced, and for whom it should be produced. We shall return to these questions again and again.

Opportunity Cost

It is within the context of scarcity that economists define what is perhaps the most important concept in all of economics, the concept of opportunity cost. **Opportunity cost** is the value of the best alternative forgone in making any choice.

The opportunity cost to you of reading the remainder of this chapter will be the value of the best other use to which you could have put your time. If you choose to spend \$20 on a potted plant, you have simultaneously chosen to give up the benefits of spending the \$20 on pizzas or a paperback book or a night at the movies. If the book is the most valuable of those alternatives, then the opportunity cost of the plant is the value of the enjoyment you otherwise expected to receive from the book.

The concept of opportunity cost must not be confused with the purchase price of an item. Consider the cost of a college or university education. That includes the value of the best alternative use of money spent for tuition, fees, and books. But the most important cost of a college education is the value of the forgone alternative uses of time spent studying and attending class instead of using the time in some other endeavor. Students sacrifice that time in hopes of even greater earnings in the future or because they place a value on the opportunity to learn. Or consider the cost of going to the doctor. Part of that cost is the value of the best alternative use of the money required to see the doctor. But, the cost also includes the value of the best alternative use of the time required to see the doctor. The essential thing to see in the concept of opportunity cost is found in the name of the concept. Opportunity cost is the value of the best opportunity forgone in a particular choice. It is not simply the amount spent on that choice.

The concepts of scarcity, choice, and opportunity cost are at the heart of economics. A good is scarce if the choice of one alternative requires that another be given up. The existence of alternative uses forces us to make choices. The opportunity cost of any choice is the value of the best alternative forgone in making it.

opportunity cost

The value of the best alternative forgone in making any choice.

KEY TAKEAWAYS

- Economics is a social science that examines how people choose among the alternatives available to them.
- Scarcity implies that we must give up one alternative in selecting another. A good that is not scarce is a free good.
- The three fundamental economic questions are: What should be produced? How should goods and services be produced? For whom should goods and services be produced?
- Every choice has an opportunity cost and opportunity costs affect the choices people make. The opportunity cost of any choice is the value of the best alternative that had to be forgone in making that choice.

T R Y I T !

Identify the elements of scarcity, choice, and opportunity cost in each of the following:

1. The Environmental Protection Agency is considering an order that a 500-acre area on the outskirts of a large city be preserved in its natural state, because the area is home to a rodent that is considered an endangered species. Developers had planned to build a housing development on the land.
2. The manager of an automobile assembly plant is considering whether to produce cars or sport utility vehicles (SUVs) next month. Assume that the quantities of labor and other materials required would be the same for either type of production.
3. A young man who went to work as a nurses' aide after graduating from high school leaves his job to go to college, where he will obtain training as a registered nurse.

Case in Point: The Rising Cost of Energy



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Oil is an exhaustible resource. The oil we burn today will not be available for use in the future. Part of the opportunity cost of our consumption of goods such as gasoline that are produced from oil includes the value people in the future might have placed on oil we use today.

It appears that the cost of our use of oil may be rising. We have been using "light crude," the oil found in the ground in deposits that can be readily tapped. As light crude becomes more scarce, the world may need to turn to so-called "heavy crude," the crude oil that is found in the sandy soil of places such as Canada and Venezuela. That oil exists in such abundance that it propels Venezuela to the top of the world list of available oil. Saudi Arabia moves to the second position; Canada is third.

The difficulty with the oil mixed in the sand is that extracting it is far more costly than light crude, both in terms of the expenditures required and in terms of the environmental damage that mining it creates. Northern Alberta, in Canada, boasts a Florida-sized area whose sandy soils are rich in crude oil. Some of that oil is 1,200 feet underground. Extracting it requires pumping steam into the oily sand and then pumping up the resultant oily syrup. That syrup is then placed into huge, industrial-sized washing machines that separate crude oil. What is left over is toxic and will be placed in huge lakes that are being created by digging pits in the ground 200 feet deep. The oil produced from these sands has become important—Alberta is the largest foreign supplier of oil to the United States.

Sands that are closer to the surface are removed by bulldozers and giant cranes; the forest over it is cleared away. The oily sand is then hauled off in two-story dump trucks which, when filled, weigh more than a Boeing 747. Total SA, a French company, is leading the race to develop Canada's oil. Jean Luc-Guiziou, the president of Total SA's Canadian operations, says that the extraordinarily costly process of extracting heavy crude is something the world is going to have to get used to. "The light crude undiscovered today is getting scarcer and scarcer," he told *The Wall Street Journal*. "We have to accept the reality of geoscience, which is that the next generation of oil resources will be heavier."

Already, Total SA has clear-cut thousands of acres of forest land in order to gain access to the oily sand below. The process of extracting heavy crude oil costs the company \$25 a barrel—compared to the \$6 per barrel cost of extracting and refining light crude. Extracting heavy crude generates three times as much greenhouse gas per barrel as does light crude. By 2015, Fort McMurray, the small (population 61,000) town that has become the headquarters of Northern Alberta's crude oil boom, will emit more greenhouse gas than the entire country of Denmark (population 5.4 million). Canada will exceed its greenhouse gas quota set by the Kyoto Accords—an international treaty aimed at limiting global warming—largely as a result of developing its heavy crude deposits.

No one even considered the extraction of heavy crude when light crude was cheap. In the late 1990s, oil cost just \$12 per barrel, and deposits of heavy crude such as those in Canada attracted little attention. By mid-2006, oil sold for more than \$70 per barrel, and Canada's heavy crude was suddenly a hot commodity. "It moved from being just an interesting experiment in northern Canada to really this is the future source of oil supply," Greg Stringham of the Canadian Association of Petroleum Producers told Al Jazeera.

Alberta's energy minister, Greg Melchin, defends the province's decision to proceed with the exploitation of its oily sand. "There is a cost to it, but the benefits are substantially greater," he insists.

Not everyone agrees. George Poitras, a member of the Mikisew Cree tribe, lives downstream from the oil sands development. "You see a lot of the land dug up, a lot of the boreal forest struck down and it's upsetting, it fills me with rage," he says. Diana Gibson of the Parkland Institute, an environmental advocacy group, says that you can see the environmental damage generated by the extraction of oil sands around Fort McMurray from the moon. "What we are going to be having is destruction of very, very valuable ecosystems, and permanent pollution," she says.

Sources: "Alberta's Heavy Oil Burden," *Al Jazeera English*, March 17, 2008 (see english.aljazeera.net); and Russell Gold, "As Prices Surge, Oil Giants Turn Sludge into Gold," *The Wall Street Journal Online*, March 27, 2006, A1.

ANSWERS TO TRY IT! PROBLEMS

1. The 500-acre area is scarce because it has alternative uses: preservation in its natural state or a site for homes. A choice must be made between these uses. The opportunity cost of preserving the land in its natural state is the forgone value of the land as a housing development. The opportunity cost of using the land as a housing development is the forgone value of preserving the land.
2. The scarce resources are the plant and the labor at the plant. The manager must choose between producing cars and producing SUVs. The opportunity cost of producing cars is the profit that could be earned from producing SUVs; the opportunity cost of producing SUVs is the profit that could be earned from producing cars.
3. The man can devote his time to his current career or to an education; his time is a scarce resource. He must choose between these alternatives. The opportunity cost of continuing as a nurses' aide is the forgone benefit he expects from training as a registered nurse; the opportunity cost of going to college is the forgone income he could have earned working full-time as a nurses' aide.

2. THE FIELD OF ECONOMICS

LEARNING OBJECTIVES

1. Explain the distinguishing characteristics of the economic way of thinking.
2. Distinguish between microeconomics and macroeconomics.

We have examined the basic concepts of scarcity, choice, and opportunity cost in economics. In this section, we will look at economics as a field of study. We begin with the characteristics that distinguish economics from other social sciences.

2.1 The Economic Way of Thinking

Economists study choices that scarcity requires us to make. This fact is not what distinguishes economics from other social sciences; all social scientists are interested in choices. An anthropologist might study the choices of ancient peoples; a political scientist might study the choices of legislatures; a psychologist might study how people choose a mate; a sociologist might study the factors that have led to a rise in single-parent households. Economists study such questions as well. What is it about the study of choices by economists that makes economics different from these other social sciences?

Three features distinguish the economic approach to choice from the approaches taken in other social sciences:

1. Economists give special emphasis to the role of opportunity costs in their analysis of choices.
2. Economists assume that individuals make choices that seek to maximize the value of some objective, and that they define their objectives in terms of their own self-interest.
3. Individuals maximize by deciding whether to do a little more or a little less of something. Economists argue that individuals pay attention to the consequences of small changes in the levels of the activities they pursue.

The emphasis economists place on opportunity cost, the idea that people make choices that maximize the value of objectives that serve their self-interest, and a focus on the effects of small changes are ideas of great power. They constitute the core of economic thinking. The next three sections examine these ideas in greater detail.

Opportunity Costs Are Important

If doing one thing requires giving up another, then the expected benefits of the alternatives we face will affect the ones we choose. Economists argue that an understanding of opportunity cost is crucial to the examination of choices.

As the set of available alternatives changes, we expect that the choices individuals make will change. A rainy day could change the opportunity cost of reading a good book; we might expect more reading to get done in bad than in good weather. A high income can make it very costly to take a day off; we might expect highly paid individuals to work more hours than those who are not paid as well. If individuals are maximizing their level of satisfaction and firms are maximizing profits, then a change in the set of alternatives they face may affect their choices in a predictable way.

The emphasis on opportunity costs is an emphasis on the examination of alternatives. One benefit of the economic way of thinking is that it pushes us to think about the value of alternatives in each problem involving choice.

Individuals Maximize in Pursuing Self-Interest

What motivates people as they make choices? Perhaps more than anything else, it is the economist's answer to this question that distinguishes economics from other fields.

Economists assume that individuals make choices that they expect will create the maximum value of some objective, given the constraints they face. Furthermore, economists assume that people's objectives will be those that serve their own self-interest.

Economists assume, for example, that the owners of business firms seek to maximize profit. Given the assumed goal of profit maximization, economists can predict how firms in an industry will respond to changes in the markets in which they operate. As labor costs in the United States rise, for example, economists are not surprised to see firms moving some of their manufacturing operations overseas.

Similarly, economists assume that maximizing behavior is at work when they examine the behavior of consumers. In studying consumers, economists assume that individual consumers make choices aimed at maximizing their level of satisfaction. In the next chapter, we will look at the results of the shift from skiing to snowboarding; that is a shift that reflects the pursuit of self-interest by consumers and by manufacturers.

In assuming that people pursue their self-interest, economists are not assuming people are selfish. People clearly gain satisfaction by helping others, as suggested by the large charitable contributions people make. Pursuing one's own self-interest means pursuing the things that give one satisfaction. It need not imply greed or selfishness.

Choices Are Made at the Margin

Economists argue that most choices are made “at the margin.” The **margin** is the current level of an activity. Think of it as the edge from which a choice is to be made. A **choice at the margin** is a decision to do a little more or a little less of something.

Assessing choices at the margin can lead to extremely useful insights. Consider, for example, the problem of curtailing water consumption when the amount of water available falls short of the amount people now use. Economists argue that one way to induce people to conserve water is to raise its price. A common response to this recommendation is that a higher price would have no effect on water consumption, because water is a necessity. Many people assert that prices do not affect water consumption because people “need” water.

But choices in water consumption, like virtually all choices, are made at the margin. Individuals do not make choices about whether they should or should not consume water. Rather, they decide whether to consume a little more or a little less water. Household water consumption in the United States totals about 105 gallons per person per day. Think of that starting point as the edge from which a choice at the margin in water consumption is made. Could a higher price cause you to use less water brushing your teeth, take shorter showers, or water your lawn less? Could a higher price cause people to reduce their use, say, to 104 gallons per person per day? To 103? When we examine the choice to consume water at the margin, the notion that a higher price would reduce consumption seems much more plausible. Prices affect our consumption of water because choices in water consumption, like other choices, are made at the margin.

The elements of opportunity cost, maximization, and choices at the margin can be found in each of two broad areas of economic analysis: microeconomics and macroeconomics. Your economics course, for example, may be designated as a “micro” or as a “macro” course. We will look at these two areas of economic thought in the next section.

2.2 Microeconomics and Macroeconomics

The field of economics is typically divided into two broad realms: microeconomics and macroeconomics. It is important to see the distinctions between these broad areas of study.

Microeconomics is the branch of economics that focuses on the choices made by individual decision-making units in the economy—typically consumers and firms—and the impacts those choices have on individual markets. **Macroeconomics** is the branch of economics that focuses on the impact of choices on the total, or aggregate, level of economic activity.

Why do tickets to the best concerts cost so much? How does the threat of global warming affect real estate prices in coastal areas? Why do women end up doing most of the housework? Why do senior citizens get discounts on public transit systems? These questions are generally regarded as microeconomic because they focus on individual units or markets in the economy.

Is the total level of economic activity rising or falling? Is the rate of inflation increasing or decreasing? What is happening to the unemployment rate? These are questions that deal with aggregates, or totals, in the economy; they are problems of macroeconomics. The question about the level of economic activity, for example, refers to the total value of all goods and services produced in the economy. Inflation is a measure of the rate of change in the average price level for the entire economy; it is a macroeconomic problem. The total levels of employment and unemployment in the economy represent the aggregate of all labor markets; unemployment is also a topic of macroeconomics.

Both microeconomics and macroeconomics give attention to individual markets. But in microeconomics that attention is an end in itself; in macroeconomics it is aimed at explaining the movement of major economic aggregates—the level of total output, the level of employment, and the price level.

We have now examined the characteristics that define the economic way of thinking and the two branches of this way of thinking: microeconomics and macroeconomics. In the next section, we will have a look at what one can do with training in economics.

margin

The current level of an activity.

choice at the margin

A decision to do a little more or a little less of something.

microeconomics

The branch of economics that focuses on the choices made by consumers and firms and the impacts those choices have on individual markets.

macroeconomics

The branch of economics that focuses on the impact of choices on the total, or aggregate, level of economic activity.

2.3 Putting Economics to Work

Economics is one way of looking at the world. Because the economic way of thinking has proven quite useful, training in economics can be put to work in a wide range of fields. One, of course, is in work as an economist. Undergraduate work in economics can be applied to other careers as well.

Careers in Economics

Economists work in three types of organizations. About 58% of economists work for government agencies.^[1] The remainder work for business firms or in colleges and universities.

Economists working for business firms and government agencies sometimes forecast economic activity to assist their employers in planning. They also apply economic analysis to the activities of the firms or agencies for which they work or consult. Economists employed at colleges and universities teach and conduct research.

Peruse the website of your college or university's economics department. Chances are the department will discuss the wide variety of occupations that their economics majors enter. Unlike engineering and accounting majors, economics and other social science majors tend to be distributed over a broad range of occupations.

Applying Economics to Other Fields

Suppose that you are considering something other than a career in economics. Would choosing to study economics help you?

The evidence suggests it may. Suppose, for example, that you are considering law school. The study of law requires keen analytical skills; studying economics sharpens such skills. Economists have traditionally argued that undergraduate work in economics serves as excellent preparation for law school. Economist Michael Nieswiadomy of the University of North Texas collected data on Law School Admittance Test (LSAT) scores for undergraduate majors listed by 2,200 or more students taking the test in 2003. Table 1.1 gives the scores, as well as the ranking for each of these majors, in 2003 and in two previous years in which the rankings were compiled. In rankings for all three years, economics majors recorded the highest scores.

TABLE 1.1 LSAT Scores and Undergraduate Majors

Here are the average LSAT scores and rankings for the 12 undergraduate majors with more than 2200 students taking the test to enter law school in the 2003–2004 academic year.

Major field	LSAT average 2003–2004	2003–2004 Rank	1994–1995 Rank	1991–1992 Rank
Economics	156.6	1	1	1
Engineering	155.4	2	4	2
History	155.0	3	2	3
English	154.3	4	3	4
Finance	152.6	5	6	5
Political science	152.1	6	9	9
Psychology	152.1	7	7	8
Accounting	151.1	8	8	6
Communications	150.5	9	10	10
Sociology	150.2	10	12	13
Bus. Administration	149.6	11	13	12
Criminal Justice	144.7	12	14	14

Source: Michael Nieswiadomy, "LSAT Scores of Economics Majors: 2003–2004 Class Update," *Journal of Economic Education*, 37(2) (Spring 2006): 244–247 and Michael Nieswiadomy, "LSAT Scores of Economics Majors" *Journal of Economic Education*, 29(4) (Fall 1998): 377–379.

Did the strong performance by economics, engineering, and history majors mean that training in those fields sharpens analytical skills tested in the LSAT, or that students with good analytical skills are more likely to major in them? Both factors were probably at work. Economics clearly attracts students with good analytical skills—and studying economics helps develop those skills.

Economics majors shine in other areas as well. According to the Bureau of Labor Statistics *Occupational Outlook Handbook*, a strong background in economic theory, mathematics, and statistics provides the basis for competing for the best job opportunities, particularly research assistant positions, in a broad range of fields. Many graduates with bachelor's degrees will find good jobs in industry and

business as management or sales trainees or as administrative assistants. Because economists are concerned with understanding and interpreting financial matters, among other subjects, they will also be attracted to and qualified for jobs as financial managers, financial analysts, underwriters, actuaries, securities and financial services sales workers, credit analysts, loan and budget officers, and urban and regional planners.

Table 1.2 shows average yearly salary offers for bachelor degree candidates for May 2006 and the outlook for related occupations to 2014.

TABLE 1.2 Average Yearly Salary Offers, May 2006 and Occupational Outlook 2004–2014, Selected Majors/Occupations

Undergraduate major	Average \$ Offer May, 2006	Projected % Change in Total Employment in Occupation 2004–2014
Computer Engineering	\$54,200	10.1
Electrical/Electronic Engineering	54,053	11.8
Computer Science	50,892	25.6
Accounting	46,188	22.4
Economics and Finance	45,058	12.4
Management Information Systems	44,755	25.9
Logistics and Materials Management	43,426	13.2
Business Administration	40,976	17.0
Environmental Sciences (including forestry and conservation science)	39,750	6.3
Other Business Majors (e.g., Marketing)	37,446	20.8
Human Resources (incl. Labor Relations)	36,256	15.9
Geology and Geological Sciences	35,034	8.3
Sociology	33,752	4.7
Political Science/Government	33,151	7.3
Liberal Arts & Sciences (general studies)	32,627	na
Public Relations	32,623	21.7
Special Education	31,817	23.3
Elementary Education	31,778	18.2
Foreign Languages	31,364	na
Letters (incl. English)	31,204	20.4
Other Social Sciences (Including Criminal Justice and History)	30,788	12.3
Psychology	30,308	9.9
Pre-elementary Education	27,550	22.4
Social Work	25,865	19.6
Visual and Performing Arts	21,726	15.2

Sources: National Association of Colleges and Employers, Salary Survey, Spring 2006 <http://nacweb.org>; Bureau of Labor Statistics, 2006–2007 edition of the Occupational Outlook Handbook; Occupational Employment, Training, and Earnings: Educational Level Report (May, 2006) URL: <http://data.bls.gov/oep/voetd/empoptd.jsp> (note: na = not reported; that is, no specific occupation was reported in BLS report; Other business majors, Other social sciences, Social work (including Sociology), and Environmental Sciences are weighted averages of various disciplines, calculated by authors.)

One's choice of a major, or minor, is not likely to be based solely on considerations of potential earnings or the prospect of landing a spot in law school. You will also consider your interests and abilities in making a decision about whether to pursue further study in economics. And, of course, you will consider the expected benefits of alternative courses of study. What is *your* opportunity cost of pursuing study of economics? Does studying more economics serve your interests and will doing so maximize your satisfaction level? These considerations may be on your mind as you begin to study economics at the college level and obviously students will make many different choices. But, should you decide to pursue a major or minor in economics, you should know that a background in this field is likely to serve you well in a wide range of careers.

KEY TAKEAWAYS

- Economists focus on the opportunity costs of choices, they assume that individuals make choices in a way that maximizes the value of an objective defined in terms of their own self-interest, and they assume that individuals make those choices at the margin.
- Economics is divided into two broad areas: microeconomics and macroeconomics.
- A wide range of career opportunities is open to economics majors. Empirical evidence suggests that students who enter the job market with a major in economics tend to earn more than do students in most other majors. Further, economics majors do particularly well on the LSAT.

TRY IT!

The Department of Agriculture estimated that the expenditures a middle-income, husband–wife family of three would incur to raise one additional child from birth in 2005 to age 17 would be \$250,530. In what way does this estimate illustrate the economic way of thinking? Would the Department’s estimate be an example of microeconomic or of macroeconomic analysis? Why?

Case in Point: The Financial Payoff to Studying Economics



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College economics professors have long argued that studying economics is good preparation for a variety of careers. A recent study suggests they are right and that studying economics is even likely to make students more prosperous. Students who major in economics but did not pursue graduate work are likely to earn more than students in virtually every other college major. Students who major in economics and then go on to law school or an MBA program are likely to earn more than students who approach those areas of study having majored in most other areas.

Economists Dan A. Black, Seth Sanders, and Lowell Taylor used the 1993 National Survey of College Graduates, which included more than 86,000 college-educated workers between the ages of 25 and 55 that asked what field they had majored in. They then controlled for variables such as gender, race, and ethnicity. They found that students who had not done graduate work and had majored in economics earned more than students in any other major except engineering. Specifically, economics majors earned about 13% more than other social sciences majors, 11% more than business administration majors, and about the same as natural science and accounting majors. The economics majors in their survey, like those who majored in other social sciences and business administration and unlike those who majored in engineering or accounting, were spread out over a wide range of occupations but with many in management positions.

Based on the survey they used, over 40% of economics majors went on to earn graduate degrees, many in law and business. Economics majors ranked first in terms of wages, as compared to other law school graduates with the 12 most common pre-law majors (including such majors as business administration, finance, English, history, psychology, and political science). MBA graduates who had majored in economics earned more than those who had majored in any other field except chemical engineering. Specifically, undergraduate economics majors with MBAs earned about 15% more than those who had majored in other disciplines represented in the survey, including business-related majors.

It is remarkable that all of the business-related majors generated salaries much lower than those earned by economics majors with an MBA. One could argue that this reflects self-selection; that students who major in economics are simply brighter. But, students who major in physics have high SAT scores, yet they, too, earned wages that were about 20% lower than MBA students who had majored in economics. This finding lends some credence to the notion that the marketplace rewards training in the economic way of thinking.

Source: Dan A. Black, Seth Sanders, and Lowell Taylor, "The Economic Reward for Studying Economics," *Economic Inquiry*, 41(3), July 2003, 365–377.

ANSWER TO TRY IT! PROBLEM

The information given suggests one element of the economic way of thinking: assessing the choice at the margin. The estimate reflects the cost of one more child for a family that already has one. It is not clear from the information given how close the estimate of cost comes to the economic concept of opportunity cost. The Department of Agriculture's estimate included such costs as housing, food, transportation, clothing, health care, child care, and education. An economist would add the value of the best alternative use of the additional time that will be required for the child. If the couple is looking far ahead, it may want to consider the opportunity cost of sending a child to college. And, if it is looking very far ahead, it may want to consider the fact that nearly half of all parents over the age of 50 support at least one child over the age of 21. This is a problem in microeconomic analysis, because it focuses on the choices of individual households.

3. THE ECONOMISTS' TOOL KIT

LEARNING OBJECTIVES

1. Explain how economists test hypotheses, develop economic theories, and use models in their analyses.
2. Explain how the all-other-things unchanged (*ceteris paribus*) problem and the fallacy of false cause affect the testing of economic hypotheses and how economists try to overcome these problems.
3. Distinguish between normative and positive statements.

Economics differs from other social sciences because of its emphasis on opportunity cost, the assumption of maximization in terms of one's own self-interest, and the analysis of choices at the margin. But certainly much of the basic methodology of economics and many of its difficulties are common to every social science—indeed, to every science. This section explores the application of the scientific method to economics.

Researchers often examine relationships between variables. A **variable** is something whose value can change. By contrast, a **constant** is something whose value does not change. The speed at which a car is traveling is an example of a variable. The number of minutes in an hour is an example of a constant.

variable

Something whose value can change.

constant

Something whose value does not change.

scientific method

A systematic set of procedures through which knowledge is created.

hypothesis

An assertion of a relationship between two or more variables that could be proven to be false.

theory

A hypothesis that has not been rejected after widespread testing and that wins general acceptance.

law

A theory that has been subjected to even more testing and that has won virtually universal acceptance.

model

A set of simplifying assumptions about some aspect of the real world.

ceteris paribus

A Latin phrase that means, "all other things unchanged."

Research is generally conducted within a framework called the **scientific method**, a systematic set of procedures through which knowledge is created. In the scientific method, hypotheses are suggested and then tested. A **hypothesis** is an assertion of a relationship between two or more variables that could be proven to be false. A statement is not a hypothesis if no conceivable test could show it to be false. The statement "Plants like sunshine" is not a hypothesis; there is no way to test whether plants like sunshine or not, so it is impossible to prove the statement false. The statement "Increased solar radiation increases the rate of plant growth" is a hypothesis; experiments could be done to show the relationship between solar radiation and plant growth. If solar radiation were shown to be unrelated to plant growth or to retard plant growth, then the hypothesis would be demonstrated to be false.

If a test reveals that a particular hypothesis is false, then the hypothesis is rejected or modified. In the case of the hypothesis about solar radiation and plant growth, we would probably find that more sunlight increases plant growth over some range but that too much can actually retard plant growth. Such results would lead us to modify our hypothesis about the relationship between solar radiation and plant growth.

If the tests of a hypothesis yield results consistent with it, then further tests are conducted. A hypothesis that has not been rejected after widespread testing and that wins general acceptance is commonly called a **theory**. A theory that has been subjected to even more testing and that has won virtually universal acceptance becomes a **law**. We will examine two economic laws in the next two chapters.

Even a hypothesis that has achieved the status of a law cannot be proven true. There is always a possibility that someone may find a case that invalidates the hypothesis. That possibility means that nothing in economics, or in any other social science, or in any science, can ever be *proven* true. We can have great confidence in a particular proposition, but it is always a mistake to assert that it is "proven."

3.1 Models in Economics

All scientific thought involves simplifications of reality. The real world is far too complex for the human mind—or the most powerful computer—to consider. Scientists use models instead. A **model** is a set of simplifying assumptions about some aspect of the real world. Models are always based on assumed conditions that are simpler than those of the real world, assumptions that are necessarily false. A model of the real world cannot *be* the real world.

We will encounter our first economic model in Chapter 35. For that model, we will assume that an economy can produce only two goods. Then we will explore the model of demand and supply. One of the assumptions we will make there is that all the goods produced by firms in a particular market are identical. Of course, real economies and real markets are not that simple. Reality is never as simple as a model; one point of a model is to simplify the world to improve our understanding of it.

Economists often use graphs to represent economic models. The appendix to this chapter provides a quick, refresher course, if you think you need one, on understanding, building, and using graphs.

Models in economics also help us to generate hypotheses about the real world. In the next section, we will examine some of the problems we encounter in testing those hypotheses.

3.2 Testing Hypotheses in Economics

Here is a hypothesis suggested by the model of demand and supply: an increase in the price of gasoline will reduce the quantity of gasoline consumers demand. How might we test such a hypothesis?

Economists try to test hypotheses such as this one by observing actual behavior and using empirical (that is, real-world) data. The average retail price of gasoline in the United States rose from an average of \$2.12 per gallon on May 22, 2005 to \$2.88 per gallon on May 22, 2006. The number of gallons of gasoline consumed by U.S. motorists rose 0.3% during that period.

The small increase in the quantity of gasoline consumed by motorists as its price rose is inconsistent with the hypothesis that an increased price will lead to an reduction in the quantity demanded. Does that mean that we should dismiss the original hypothesis? On the contrary, we must be cautious in assessing this evidence. Several problems exist in interpreting any set of economic data. One problem is that several things may be changing at once; another is that the initial event may be unrelated to the event that follows. The next two sections examine these problems in detail.

The All-Other-Things-Unchanged Problem

The hypothesis that an increase in the price of gasoline produces a reduction in the quantity demanded by consumers carries with it the assumption that there are no other changes that might also affect consumer demand. A better statement of the hypothesis would be: An increase in the price of gasoline will reduce the quantity consumers demand, *ceteris paribus*. **Ceteris paribus** is a Latin phrase that means "all other things unchanged."

But things changed between May 2005 and May 2006. Economic activity and incomes rose both in the United States and in many other countries, particularly China, and people with higher incomes are likely to buy more gasoline. Employment rose as well, and people with jobs use more gasoline as they drive to work. Population in the United States grew during the period. In short, many things happened during the period, all of which tended to increase the quantity of gasoline people purchased.

Our observation of the gasoline market between May 2005 and May 2006 did not offer a conclusive test of the hypothesis that an increase in the price of gasoline would lead to a reduction in the quantity demanded by consumers. Other things changed and affected gasoline consumption. Such problems are likely to affect any analysis of economic events. We cannot ask the world to stand still while we conduct experiments in economic phenomena. Economists employ a variety of statistical methods to allow them to isolate the impact of single events such as price changes, but they can never be certain that they have accurately isolated the impact of a single event in a world in which virtually everything is changing all the time.

In laboratory sciences such as chemistry and biology, it is relatively easy to conduct experiments in which only selected things change and all other factors are held constant. The economists' laboratory is the real world; thus, economists do not generally have the luxury of conducting controlled experiments.

The Fallacy of False Cause

Hypotheses in economics typically specify a relationship in which a change in one variable causes another to change. We call the variable that responds to the change the **dependent variable**; the variable that induces a change is called the **independent variable**. Sometimes the fact that two variables move together can suggest the false conclusion that one of the variables has acted as an independent variable that has caused the change we observe in the dependent variable.

Consider the following hypothesis: People wearing shorts cause warm weather. Certainly, we observe that more people wear shorts when the weather is warm. Presumably, though, it is the warm weather that causes people to wear shorts rather than the wearing of shorts that causes warm weather; it would be incorrect to infer from this that people cause warm weather by wearing shorts.

Reaching the incorrect conclusion that one event causes another because the two events tend to occur together is called the **fallacy of false cause**. The accompanying essay on baldness and heart disease suggests an example of this fallacy.

Because of the danger of the fallacy of false cause, economists use special statistical tests that are designed to determine whether changes in one thing actually do cause changes observed in another. Given the inability to perform controlled experiments, however, these tests do not always offer convincing evidence that persuades all economists that one thing does, in fact, cause changes in another.

In the case of gasoline prices and consumption between May 2005 and May 2006, there is good theoretical reason to believe the price increase should lead to a reduction in the quantity consumers demand. And economists have tested the hypothesis about price and the quantity demanded quite extensively. They have developed elaborate statistical tests aimed at ruling out problems of the fallacy of false cause. While we cannot prove that an increase in price will, *ceteris paribus*, lead to a reduction in the quantity consumers demand, we can have considerable confidence in the proposition.

Normative and Positive Statements

Two kinds of assertions in economics can be subjected to testing. We have already examined one, the hypothesis. Another testable assertion is a statement of fact, such as "It is raining outside" or "Microsoft is the largest producer of operating systems for personal computers in the world." Like hypotheses, such assertions can be demonstrated to be false. Unlike hypotheses, they can also be shown to be correct. A statement of fact or a hypothesis is a **positive statement**.

Although people often disagree about positive statements, such disagreements can ultimately be resolved through investigation. There is another category of assertions, however, for which investigation can never resolve differences. A **normative statement** is one that makes a value judgment. Such a judgment is the opinion of the speaker; no one can "prove" that the statement is or is not correct. Here are some examples of normative statements in economics: "We ought to do more to help the poor." "People in the United States should save more." "Corporate profits are too high." The statements are based on the values of the person who makes them. They cannot be proven false.

Because people have different values, normative statements often provoke disagreement. An economist whose values lead him or her to conclude that we should provide more help for the poor will disagree with one whose values lead to a conclusion that we should not. Because no test exists for these values, these two economists will continue to disagree, unless one persuades the other to adopt a different set of values. Many of the disagreements among economists are based on such differences in values and therefore are unlikely to be resolved.

dependent variable

A variable that responds to change.

independent variable

A variable that induces a change.

fallacy of false cause

The incorrect assumption that one event causes another because the two events tend to occur together.

positive statement

A statement of fact or a hypothesis.

normative statement

A statement that makes a value judgment.

KEY TAKEAWAYS

- Economists try to employ the scientific method in their research.
- Scientists cannot prove a hypothesis to be true; they can only fail to prove it false.
- Economists, like other social scientists and scientists, use models to assist them in their analyses.
- Two problems inherent in tests of hypotheses in economics are the all-other-things-unchanged problem and the fallacy of false cause.
- Positive statements are factual and can be tested. Normative statements are value judgments that cannot be tested. Many of the disagreements among economists stem from differences in values.

TRY IT!

Look again at the data in Table 1.1. Now consider the hypothesis: "Majoring in economics will result in a higher LSAT score." Are the data given consistent with this hypothesis? Do the data prove that this hypothesis is correct? What fallacy might be involved in accepting the hypothesis?

Case in Point: Does Baldness Cause Heart Disease?



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A website called embarrassingproblems.com received the following email:

"Dear Dr. Margaret,

"I seem to be going bald. According to your website, this means I'm more likely to have a heart attack. If I take a drug to prevent hair loss, will it reduce my risk of a heart attack?"

What did Dr. Margaret answer? Most importantly, she did not recommend that the questioner take drugs to treat his baldness, because doctors do not think that the baldness causes the heart disease. A more likely explanation for the association between baldness and heart disease is that both conditions are affected by an underlying factor. While noting that more research needs to be done, one hypothesis that Dr. Margaret offers is that higher testosterone levels might be triggering both the hair loss and the heart disease. The good news for people with early balding (which is really where the association with increased risk of heart disease has been observed) is that they have a signal that might lead them to be checked early on for heart disease.

Source: <http://www.embarrassingproblems.com/problems/problempage230701.htm>.

ANSWER TO TRY IT! PROBLEM

The data are consistent with the hypothesis, but it is never possible to prove that a hypothesis is correct. Accepting the hypothesis could involve the fallacy of false cause; students who major in economics may already have the analytical skills needed to do well on the exam.

4. REVIEW AND PRACTICE

Summary

Choices are forced on us by scarcity; economists study the choices that people make. Scarce goods are those for which the choice of one alternative requires giving up another. The opportunity cost of any choice is the value of the best alternative forgone in making that choice.

Some key choices assessed by economists include what to produce, how to produce it, and for whom it should be produced. Economics is distinguished from other academic disciplines that also study choices by an emphasis on the central importance of opportunity costs in evaluating choices, the assumption of maximizing behavior that serves the interests of individual decision makers, and a focus on evaluating choices at the margin.

Economic analyses may be aimed at explaining individual choice or choices in an individual market; such investigations are largely the focus of microeconomics. The analysis of the impact of those individual choices on such aggregates as total output, the level of employment, and the price level is the concern of macroeconomics.

Working within the framework of the scientific method, economists formulate hypotheses and then test them. These tests can only refute a hypothesis; hypotheses in science cannot be proved. A hypothesis that has been widely tested often comes to be regarded as a theory; one that has won virtually universal acceptance is a law. Because of the complexity of the real world, economists rely on models that rest on a series of simplifying assumptions. The models are used to generate hypotheses about the economy that can be tested using real-world data.

Statements of fact and hypotheses are positive statements. Normative statements, unlike positive statements, cannot be tested and provide a source for potential disagreement.

P R O B L E M S

1. Why does the fact that something is scarce require that we make choices?
2. Does the fact that something is abundant mean it is not scarce in the economic sense? Why or why not?
3. In some countries, such as Cuba and North Korea, the government makes most of the decisions about what will be produced, how it will be produced, and for whom. Does the fact that these choices are made by the government eliminate scarcity in these countries? Why or why not?
4. Explain what is meant by the opportunity cost of a choice.
5. What is the approximate dollar cost of the tuition and other fees associated with the economics course you are taking? Does this dollar cost fully reflect the opportunity cost to you of taking the course?
6. In the Case in Point essay "The Rising Cost of Energy," what would be some of the things that would be included in an estimate of the opportunity cost of preserving part of northern Alberta Canada by prohibiting heavy crude oil extraction? Do you think that the increased extraction represents the best use of the land? Why or why not?
7. Indicate whether each of the following is a topic of microeconomics or macroeconomics:
 - a. The impact of higher oil prices on the production of steel
 - b. The increased demand in the last 15 years for exotic dietary supplements
 - c. The surge in aggregate economic activity that hit much of Asia late in the early 2000s
 - d. The sharp increases in U.S. employment and total output that occurred between 2003 and 2007
 - e. The impact of preservation of wilderness areas on the logging industry and on the price of lumber
8. Determine whether each of the following raises a "what," "how," or "for whom" issue. Are the statements normative or positive?
 - a. A requirement that aluminum used in cars be made from recycled materials will raise the price of automobiles.
 - b. The federal government does not spend enough for children.
 - c. An increase in police resources provided to the inner city will lower the crime rate.
 - d. Automation destroys jobs.
 - e. Efforts to improve the environment tend to reduce production and employment.
 - f. Japanese firms should be more willing to hire additional workers when production rises and to lay off workers when production falls.
 - g. Access to health care should not be limited by income.
9. Your time is a scarce resource. What if the quantity of time were increased, say to 48 hours per day, and everyone still lived as many days as before. Would time still be scarce?
10. Most college students are under age 25. Give two explanations for this—one based on the benefits people of different ages are likely to receive from higher education and one based on the opportunity costs of a college education to students of different ages.
11. Some municipal water companies charge customers a flat fee each month, regardless of the amount of water they consume. Others meter water use and charge according to the quantity of water customers use. Compare the way the two systems affect the cost of water use at the margin.
12. How might you test each of the following hypotheses? Suggest some problems that might arise in each test due to the ceteris paribus (all-other-things-unchanged) problem and the fallacy of false cause.
 - a. Reducing the quantity of heroin available will increase total spending on heroin and increase the crime rate.
 - b. Higher incomes make people happier.
 - c. Higher incomes make people live longer.
13. Many models in physics and in chemistry assume the existence of a perfect vacuum (that is, a space entirely empty of matter). Yet we know that a perfect vacuum cannot exist. Are such models valid? Why are models based on assumptions that are essentially incorrect?
14. Suppose you were asked to test the proposition that publishing students' teacher evaluations causes grade inflation. What evidence might you want to consider? How would the inability to carry out controlled experiments make your analysis more difficult?
15. Referring to the Case in Point "Baldness and Heart Disease," explain the possible fallacy of false cause in concluding that baldness makes a person more likely to have heart disease.
16. In 2005 the Food and Drug Administration ordered that Vioxx and other popular drugs for treating the pain of arthritis be withdrawn from the market. The order resulted from a finding that people taking the drugs had an increased risk of cardiovascular problems. Some researchers criticized the government's action, arguing that concluding that the drugs caused the cardiovascular problems represented an example of the fallacy of false cause. Can you think of any reason why this might be the case?

ENDNOTES

1. Bureau of Labor Statistics *Occupational Outlook* at <http://www.bls.gov/oco/>.

