


1 CHAPTER

The Nature and Method of Economics

Want is a growing giant whom the coat of Have was never large enough to cover.

Ralph Waldo Emerson, The Conduct of Life, 1860

PEOPLE'S ECONOMIC WANTS are multitudinous and diverse. Biologically, humans need only air, water, food, clothing, and shelter. But in contemporary society we also seek the many goods and services associated with a comfortable or affluent standard of living. Fortunately, society is blessed with productive resources—labor and managerial talent, tools and machinery, land and mineral deposits—that are used to produce goods and services. This production satisfies many of our economic wants and occurs through the organizational mechanism called the *economic system* or, more simply, the *economy*. ■ The blunt reality, however, is that our economic wants far exceed the productive capacity of our limited or scarce resources. So the complete satisfaction of society's economic wants is impossible. This unyielding truth provides our definition of **economics**: *It is the social science concerned with the efficient use of scarce resources to achieve the maximum satisfaction of economic wants.* ■ Numerous problems and issues are rooted in the challenge of using limited resources efficiently. Although it would be tempting to plunge into them, that sort of analysis must wait. In this chapter, we need to discuss some important preliminaries.  1.1

■ The Economic Perspective


Economists view things through a unique perspective. This **economic perspective** or *economic way of thinking* has several critical and closely interrelated features.

Scarcity and Choice

From our definition of economics, it is easy to see why economists view the world through the lens of scarcity. Since human and property resources are

scarce (limited), it follows that the goods and services we produce must also be limited. Scarcity limits our options and necessitates that we make choices. Because we “can’t have it all,” we must decide what we will have, and what we must forgo.

At the core of economics is the idea that “there is no free lunch.” You may get treated to lunch, making it “free” to you, but there is a cost to someone—ultimately to society. Scarce inputs of land, equipment, farm labor, the labor of cooks and waiters, and

managerial talent are required. Because these resources could be used in alternative production activities, they and the other goods and services they could have produced are sacrificed in making the lunch available. Economists call these sacrifices *opportunity costs*. To get more of one thing, you forgo the opportunity of getting something else. So the cost of that which you get is the value of that which is sacrificed to obtain it. We will say much more about opportunity costs in Chapter 2.  1.1

Rational Behavior

Economics is grounded on the assumption of “rational self-interest.” Individuals pursue actions that will enable them to achieve their greatest satisfaction. Rational behavior means that individuals will make different choices under different circumstances. For example, Jones may decide to buy Coca-Cola in bulk at a warehouse store rather than at a convenience store where it is much more expensive. That will leave him with extra money to buy something else that provides satisfaction. Yet, while driving home from work, he may stop at the convenience store to buy a single can of Coca-Cola.

Rational self-interest also means that individuals will make different choices. High school graduate Alvarez may decide to attend college to major in business. Baker may opt to take a job at a warehouse and buy a new car. Chin may accept a signing bonus and join the Navy. All three choices reflect the pursuit of self-interest and are rational, but they are based on differing preferences and circumstances.

Of course, rational decisions may change as costs and benefits change. Jones may switch to Pepsi when it is on sale. And, after taking a few business courses, Alvarez may decide to change her major to social work.


It is clear that rational self-interest is not the same as selfishness. People make personal sacrifices to help family members or friends, and they contribute to charities because they derive pleasure from doing so. Parents help pay for their children’s education for the same reason. These self-interested, but unselfish, acts help maximize the givers’ satisfaction as much as any personal purchase of goods or services. Self-interest behavior is simply behavior that enables a person to achieve personal satisfaction, however it may be derived.

Marginalism: Benefits and Costs

The economic perspective focuses largely on **marginal analysis**—comparisons of *marginal benefits* and *marginal costs*. (Used this way, “marginal” means “extra,” “additional,” or “a change in.”) Most choices or decisions involve changes in the status quo (the existing state of affairs). Should you attend school for another year or not? Should you study an extra hour for an exam? Should you add fries to your fast-food order? Similarly, should a business expand or reduce its output? Should government increase or decrease its funding for a missile defense system?

Each option involves marginal benefits and, because of scarce resources, marginal costs. In making choices rationally, the decision maker must compare those two amounts. Example: You and your fiancé are shopping for an engagement ring. Should you buy a $\frac{1}{4}$ -carat diamond, a $\frac{1}{2}$ -carat diamond, a $\frac{3}{4}$ -carat diamond, or a larger one? The marginal cost of the larger-size diamond is the added expense beyond the cost of the smaller-size diamond. The marginal benefit is the greater lifetime pleasure (utility) from the larger-size stone. If the marginal benefit of the larger diamond exceeds its marginal cost, you should buy the larger stone. But if the marginal cost is more than the marginal benefit, you should buy the smaller diamond instead.

In a world of scarcity, the decision to obtain the marginal benefit associated with some specific option always includes the marginal cost of forgoing something else. The money spent on the larger-size diamond means forgoing something else. Again, there is no free lunch!

One somewhat surprising implication of decisions based on marginal analysis is that there can be too much of a good thing. Although certain goods and services seem inherently desirable—education, health care, a pristine environment—we can in fact have too much of them. “Too much” occurs when we keep obtaining them beyond the point where their marginal cost (the value of the forgone options) equals their marginal benefit. Then we are sacrificing alternative products that are more valuable *at the margin*—the place where we consider the very last units of each. Society can have too much health care, and you can have too many CDs. (Key Question 1)  1.2

This chapter’s Last Word provides an everyday application of the economic perspective.

Why Study Economics?

Is studying economics worth your time and effort? More than half a century ago John Maynard Keynes (1883–1946), one of the most influential economists of this century, said:

The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else. Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.

Most of the ideologies of the modern world have been shaped by prominent economists of the past—Adam Smith, David Ricardo, John Stuart Mill, Karl Marx, and John Maynard Keynes. And current world leaders routinely solicit the advice and policy suggestions of today's economists.

For example, the president of the United States benefits from the recommendations of his Council of Economic Advisers. The broad range of economic issues facing political leaders is suggested by the contents of the annual *Economic Report of the President*. Areas covered typically include unemployment, inflation, economic growth, taxation, poverty, international trade, health care, pollution, discrimination, immigration, regulation, and education, among others. And the Federal Reserve (the U.S. central bank) relies heavily on economic analysis in shaping its monetary policies.

Economics for Citizenship

A basic understanding of economics is essential if we are to be well-informed citizens. Most of today's political problems have important economic aspects: Should we use Federal budget surpluses to pay off the public debt, expand various government programs, or reduce income taxes? How can we make the social security retirement program financially secure? Why do we continue to have large international trade deficits? What must we do to keep inflation in check? What can be done to keep income inequality from growing? How should we respond to growing market dominance by a few firms in some high-technology sectors of the economy?

As voters, we can influence the decisions of our elected officials in responding to such questions. But intelligence at the polls requires a basic working

knowledge of economics. And a sound grasp of economics is even more helpful to the politicians themselves.

A survey by the National Center for Research in Economic Education suggests that economic illiteracy is widespread in the United States. The public, including high school seniors and college seniors, shows a broad lack of knowledge of the basic economics needed to understand economic events and changes in the national economy.

Professional and Personal Applications

Economics lays great stress on precise, systematic analysis. Thus, studying economics invariably helps students improve their analytical skills, which are in great demand in the workplace. Also, the study of economics helps us make sense of the everyday activity we observe around us. How is it that so many different people, in so many different places, doing so many different things, produce the goods and services we want to buy? Economics provides an answer.

Economics is also vital to business. An understanding of the basics of economic decision making and the operation of the economic system enables business managers and executives to increase profit. The executive who understands when to use new technology, when to merge with another firm, when to expand employment, and so on, will outperform the executive who is less deft at such decision making. The manager who understands the causes and consequences of recessions (downturns in the overall economy) or inflation (rising prices) can make more intelligent business decisions during these periods.

Economics helps consumers and workers make better buying and employment decisions. How can you spend your limited money income to maximize your satisfaction? How can you hedge against the reduction in the dollar's purchasing power that accompanies inflation? Is it more economical to buy or lease a car? Should you use a credit card or pay cash? Which occupations pay well; which are most immune to unemployment?

Similarly, an understanding of economics makes for better financial decisions. Someone who understands the relationship between budget surpluses and interest rates, between foreign exchange rates and

exports, between interest rates and bond prices, is in a better position to successfully allocate personal savings. So, too, is someone who understands the business implications of emerging new technologies.

In spite of these practical benefits, however, you should know that economics is *mainly* an academic, not a vocational, subject. Unlike accounting, advertising, corporate finance, and marketing, economics is not primarily a how-to-make-money area of study. Knowledge of economics and mastery of the economic perspective will help you run a business or manage your personal finances, but that is not the subject's primary objective. Instead, economics ultimately examines problems and decisions from the *social*, rather than the *personal*, point of view. The production, exchange, and consumption of goods and services are discussed from the viewpoint of society's best interest, not strictly from the standpoint of one's own pocketbook.

QUICK REVIEW 1.1

- Economics is concerned with obtaining maximum satisfaction through the efficient use of scarce resources.
- The economic perspective stresses (a) resource scarcity and the necessity of making choices, (b) the assumption of rational behavior, and (c) comparisons of marginal benefit and marginal cost.
- Your study of economics will help you as a voting citizen as well as benefit you professionally and personally.

■ Economic Methodology

Like the physical and life sciences, as well as other social sciences, economics relies on the **scientific method**. It consists of a number of elements:

- The observation of facts (real-world data).
- Based on those facts, the formulation of a possible explanation of cause and effect (hypothesis).
- The testing of this explanation by comparing the outcomes of specific events to the outcome predicted by the hypothesis.
- The acceptance, rejection, or modification of the hypothesis, based on these comparisons.
- The continued testing of the hypothesis against the facts. As favorable results accumulate, the

hypothesis evolves into a *theory*. A very well tested and widely accepted theory is referred to as a *law* or *principle*. Combinations of such laws or principles are incorporated into *models*—simplified representations of how something works, such as a market or segment of the economy.

Laws, principles, and models enable the economist, like the natural scientist, to understand and explain reality and to predict the various outcomes of particular actions. But as we will soon see, economic laws and principles are usually less certain than the laws of physics or chemistry.

Theoretical Economics

Economists develop models of the behavior of individuals (consumers, workers) and institutions (businesses, governments) engaged in the production, exchange, and consumption of goods and services. They start by gathering facts about economic activities and economic outcomes. Because the world is cluttered with innumerable interrelated facts, economists, like all scientists, must select the useful information. They must determine which facts are relevant to the problem under consideration. But even when this sorting process is complete, the relevant information may at first seem random and unrelated.

The economist draws on the facts to establish cause-effect hypotheses about economic behavior. Then the hypotheses are tested against real-world observation and data. Through this process, the economist tries to discover hypotheses that rise to the level of theories and principles (or laws)—well-tested and widely accepted generalizations about how individuals and institutions behave. The process of deriving theories and principles is called **theoretical economics** (see the lower box in Figure 1.1). *The role of economic theorizing is to systematically arrange facts, interpret them, and generalize from them.* Theories and principles bring order and meaning to facts by arranging them in cause-and-effect order.

Observe that the arrow from “theories” to “facts” in Figure 1.1 moves in both directions. Some understanding of factual, real-world evidence is required to formulate meaningful hypotheses. And hypotheses are tested through gathering and organizing factual data to see if the hypotheses can be verified.

Economic theories and **principles** are *statements about economic behavior or the economy that enable prediction of the probable effects of certain actions.* Good

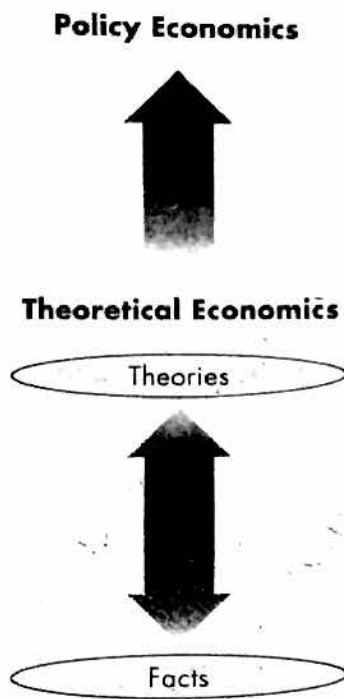


Figure 1.1

The relationship between facts, theories, and policies in economics. *Theoretical economics* involves establishing economic theories by gathering, systematically arranging, and generalizing from facts. Good economic theories are tested for validity against facts. Economists use these theories—the most reliable of which are called *laws* or *principles*—to explain and analyze the economy. *Policy economics* entails using the economic laws and principles to formulate economic policies.

theories are those that do a good job of explaining and predicting. They are supported by facts concerning how individuals and institutions actually behave in producing, exchanging, and consuming goods and services. But these facts may change in time, so economists must continually check theories against the shifting economic environment.

Theories, laws, and principles are highly useful in analyzing economic behavior and understanding how the economy operates. They are the ingredients of *analytical economics*—the ascertaining of cause and effect, of action and outcome, within the economic system.

Several other points relating to economic principles are important to know.


Terminology Economists speak of “hypotheses,” “theories,” “laws,” and “principles.” Some of these

terms overlap, but they usually reflect a gradation of confidence in the generalizations. A hypothesis needs initial testing; a theory has been tested but needs more testing; a law or principle is a theory that has provided strong predictive accuracy, over and over. The terms “economic laws” and “principles” are useful even though they imply a degree of exactness, universal application, and even moral rightness that is rare in any social science. The word “theory” is often used in economics even though many people incorrectly believe theories have nothing to do with real-world applications. Economists often use the term “model,” which combines principles into a simplified representation of reality.


In this book, custom or convenience will govern the use of “theory,” “law,” “principle,” and “model.” Thus, to describe the relationship between the price of a product and the amount of it purchased, we will use the term *law of demand*, rather than theory or principle of demand, simply because this is the custom. We will refer to the *circular flow model*, not the circular flow law, because the concept combines several ideas into a single representation.

Generalizations As we have already mentioned, economic theories, principles, and laws are **generalizations** relating to economic behavior or to the economy itself. They are imprecise because economic facts are usually diverse; no two individuals or institutions act in exactly the same way. *Economic principles are expressed as the tendencies of typical or average consumers, workers, or business firms.* For example, when economists say that consumer spending rises when personal income increases, they are well aware that some households may save *all* of an increase in their incomes. But, on average, and for the full economy, spending goes up when income increases. Similarly, economists say that consumers buy more of a particular product when its price falls. Some consumers may increase their purchases by a large amount, others by a small amount, and a few not at all. This “price-quantity” principle, however, holds for the typical consumer and for consumers as a group.

Other-Things-Equal Assumption Like other scientists, economists use the *ceteris paribus* or **other-things-equal assumption** to construct their generalizations. They assume that all other variables except those under immediate consideration are held constant for a particular analysis. For example,

consider the relationship between the price of Pepsi and the amount of it purchased. It helps to assume that, of all the factors that might influence the amount of Pepsi purchased (for example, the price of Pepsi, the price of Coca-Cola, and consumer incomes and preferences), only the price of Pepsi varies. The economist can then focus on the “price of Pepsi—purchases of Pepsi” relationship without being confused by changes in other variables.  1.3

Natural scientists such as chemists or physicists can usually conduct controlled experiments where “all other things” are in fact held constant (or virtually so). They can test with great precision the assumed relationship between two variables. For example, they might examine the height from which an object is dropped and the length of time it takes to hit the ground. But economics is not a laboratory science. Economists test their theories using real-world data, which are generated by the actual operation of the economy. In this rather bewildering environment, “other things” *do* change. Despite the development of complex statistical techniques designed to hold other things equal, control is less than perfect. As a result, economic principles are less certain and less precise than those of laboratory sciences. That also means they are more open to debate than many scientific theories (for example, the law of gravity).

Abstractions Economic principles, or theories, are *abstractions*—simplifications that omit irrelevant facts and circumstances. Economic models do *not* mirror the full complexity of the real world. The very process of sorting out and analyzing facts involves simplification and removal of clutter. Unfortunately, this “abstraction” leads some people to consider economic theory impractical and unrealistic. That is simply nonsense! Economic theories are practical precisely because they are abstractions. The full scope of economic reality itself is too complex and bewildering to be understood as a whole. Economists abstract—that is, develop theories and build models—to give meaning to an otherwise overwhelming and confusing maze of facts. Theorizing for this purpose is highly practical.  1.2

Graphical Expression Many of the economic models in this book are expressed graphically; the most important are labeled Key Graphs. Be sure to read the appendix to this chapter as a review of graphs.

Policy Economics

Policy economics recognizes that theories and data can be used to formulate *policies*—courses of action based on economic principles and intended to resolve a specific economic problem or further an economic goal. Economic theories are the foundation of economic policy, as shown in the upper part of Figure 1.1. Economic policy normally is applied to problems after they arise. However, if economic analysis can predict some undesirable event such as unemployment, inflation, or an increase in poverty, then it may be possible to avoid or moderate that event through economic policy. For example, you may read in the newspaper that the Federal Reserve has reduced interest rates to increase private spending and prevent a recession.

Economic Policy The creation of policies to achieve specific goals is no simple matter. Here are the basic steps in policymaking:

- **State the goal.** The first step is to make a clear statement of the economic goal. If we say that we want “full employment,” do we mean that everyone between, say, 16 and 65 years of age should have a job? Or do we mean that everyone who *wants* to work should have a job? Should we allow for some unemployment caused by inevitable changes in the structure of industry and workers voluntarily changing jobs? The goal must be specific.
- **Determine the policy options.** The next step is to formulate alternative policies designed to achieve the goal and determine the possible effects of each policy. This requires a detailed assessment of the economic impact, benefits, costs, and political feasibility of the alternative policies. For example, to achieve full employment, should government use fiscal policy (which involves changing government spending and taxes), monetary policy (which entails altering the supply of money), an education and training policy that enhances worker employability, or a policy of wage subsidies to firms that hire disadvantaged workers?
- **Implement and evaluate the policy that was selected.** After implementing the policy, we need to evaluate how well it worked. Only through unbiased evaluation can we improve on economic policy. Did a specific change in taxes or the money supply alter the level of employment to the extent predicted? Did deregulation of a

particular industry (for example, banking) yield the predicted beneficial results? If not, why not? What were the harmful side effects, if any? How might the policy be altered to make it work better? (**Key Question 5**)

Economic Goals If economic policies are designed to achieve certain economic goals, then we need to recognize a number of goals that are widely accepted in the United States and many other countries. They include:

- **Economic growth** Produce more and better goods and services, or, more simply, develop a higher standard of living.
- **Full employment** Provide suitable jobs for all citizens who are willing and able to work.
- **Economic efficiency** Achieve the maximum fulfillment of wants using the available productive resources.
- **Price-level stability** Avoid large upswings and downswings in the general price level; that is, avoid inflation and deflation.
- **Economic freedom** Guarantee that businesses, workers, and consumers have a high degree of freedom in their economic activities.
- **Equitable distribution of income** Ensure that no group of citizens faces poverty while most others enjoy abundance.
- **Economic security** Provide for those who are chronically ill, disabled, laid off, aged, or otherwise unable to earn minimal levels of income.
- **Balance of trade** Seek a reasonable overall balance with the rest of the world in international trade and financial transactions.

Although most of us might accept these goals as generally stated, we might also disagree substantially on their specific meanings. What are “large” changes in the price level? What is a “high degree” of economic freedom? What is an “equitable” distribution of income? How can we measure precisely such abstract goals as “economic freedom”? These objectives are often the subject of spirited public debate.

Also, some of these goals are complementary; when one is achieved, some other one will also be realized. For example, achieving full employment means eliminating unemployment, which is a basic cause of inequitable income distribution. But other goals may conflict or even be mutually exclusive. They may entail **tradeoffs**, meaning that to achieve one we must sacrifice another. For example, efforts to equalize the distribution of income may weaken

incentives to work, invest, innovate, and take business risks, all of which promote economic growth. Taxing high-income people heavily and transferring the tax revenues to low-income people is one way to equalize the distribution of income. But then the incentives to high-income individuals may diminish because higher taxes reduce their rewards for working. Similarly, low-income individuals may be less motivated to work when government stands ready to subsidize them.

When goals conflict, society must develop a system to prioritize the objectives it seeks. If more economic freedom is accompanied by less economic security and more economic security allows less economic freedom, society must assess the tradeoffs and decide on the optimal (best) balance between them.

QUICK REVIEW 1.2

- Economists use the scientific method to establish theories, laws, and principles. Economic theories (laws, principles, or models) are generalizations relating to the economic behavior of individuals and institutions; good theories are grounded in facts.
- Theoretical economics involves formulating theories (or laws and principles) and using them to understand and explain economic behavior and the economy; policy economics involves using the theories to fix economic problems or promote economic goals.
- Policymaking requires a clear statement of goals, a thorough assessment of options, and an unbiased evaluation of results.
- Some of society’s economic goals are complementary, while others conflict; where conflicts exist, tradeoffs arise.

■ Macroeconomics and Microeconomics

Economists derive and apply principles about economic behavior at two levels.

Macroeconomics

Macroeconomics examines either the economy as a whole or its basic subdivisions or aggregates, such as the government, household, and business sectors. An **aggregate** is a collection of specific economic units treated as if they were one unit. Therefore, we

might lump together the millions of consumers in the U.S. economy and treat them as if they were one huge unit called “consumers.”

In using aggregates, macroeconomics seeks to obtain an overview, or general outline, of the structure of the economy and the relationships of its major aggregates. Macroeconomics speaks of such economic measures as *total* output, *total* employment, *total* income, *aggregate* expenditures, and the *general* level of prices in analyzing various economic problems. No or very little attention is given to specific units making up the various aggregates. Macroeconomics examines the beach, not the sand, rocks, and shells.

Microeconomics

Microeconomics looks at specific economic units. At this level of analysis, the economist observes the details of an economic unit, or very small segment of the economy, under a figurative microscope. In microeconomics we talk of an individual industry, firm, or household. We measure the price of a *specific* product, the number of workers employed by a *single* firm, the revenue or income of a *particular* firm or household, or the expenditures of a *specific* firm, government entity, or family. In microeconomics, we examine the sand, rocks, and shells, not the beach.

The macro-micro distinction does not mean that economics is so highly compartmentalized that every topic can be readily labeled as either macro or micro; many topics and subdivisions of economics are rooted in both. Example: While the problem of unemployment is usually treated as a macroeconomic topic (because unemployment relates to *aggregate* spending), economists recognize that the decisions made by *individual* workers in searching for jobs and the way *specific* product and labor markets operate are also critical in determining the unemployment rate. (Key Question 7)

Positive and Normative Economics

Both macroeconomics and microeconomics involve facts, theories, and policies. Each contains elements of *positive* economics and *normative* economics. **Positive economics** focuses on facts and cause-and-effect relationships. It includes description, theory development, and theory testing (theoretical economics). Positive economics avoids value judgments, tries to establish scientific statements about economic behavior, and deals with what the economy is

actually like. Such scientific-based analysis is critical to good policy analysis.

Policy economics, on the other hand, involves **normative economics**, which incorporates value judgments about what the economy should be like or what particular policy actions should be recommended to achieve a desirable goal. Normative economics looks at the desirability of certain aspects of the economy. It underlies expressions of support for particular economic policies.

Positive economics concerns *what is*, while normative economics embodies subjective feelings about *what ought to be*. Examples: Positive statement: “The unemployment rate in several European nations is higher than that in the United States.” Normative statement: “European nations ought to undertake policies to reduce their unemployment rates.” A second positive statement: “Other things equal, if tuition is substantially increased, college enrollment will fall.” Normative statement: “College tuition should be lowered so that more students can obtain an education.” Whenever words such as “ought” or “should” appear in a sentence, there is a strong chance you are encountering a normative statement.

Most of the disagreement among economists involves normative, value-based policy questions. Of course, there is often some disagreement about which theories or models best represent the economy and its parts. But economists agree on a full range of economic principles. Most economic controversy thus reflects differing opinions or value judgments about what society should be like. (Key Question 8)

QUICK REVIEW 1.3

- Macroeconomics examines the economy as a whole; microeconomics focuses on specific units of the economy.
- Positive economics deals with factual statements (“what is”); normative economics involves value judgments (“what ought to be”). Theoretical economics is “positive”; policy economics is “normative.”

■ Pitfalls to Objective Thinking

Because they affect us so personally, we often have difficulty thinking objectively about economic issues. Here are some common pitfalls to avoid in successfully applying the economic perspective.

Biases

Most people bring a bundle of biases and preconceptions to the field of economics. For example, some might think that corporate profits are excessive or that lending money is always superior to borrowing money. Others might believe that government is necessarily less efficient than businesses or that more government regulation is always better than less. Biases cloud thinking and interfere with objective analysis. All of us must be willing to shed biases and preconceptions that are not supported by facts.

Loaded Terminology

The economic terminology used in newspapers and popular magazines is sometimes emotionally biased, or loaded. The writer or the interest group he or she represents may have a cause to promote or an axe to grind and may slant an article accordingly. High profits may be labeled “obscene,” low wages may be called “exploitive,” or self-interested behavior may be “greed.” Government workers may be referred to as “mindless bureaucrats,” and those favoring stronger government regulations may be called “socialists.” To objectively analyze economic issues, you must be prepared to reject or discount such terminology.

Definitions

Some of the terms used in economics have precise technical definitions that are quite different from those implied by their common usage. This is generally not a problem if everyone understands these definitions and uses them consistently. For example, “investment” to the average citizen means the purchase of stocks and bonds in security markets, as when someone “invests” in Microsoft stock or government bonds. But to the economist, “investment” means the purchase of newly created real capital assets such as machinery and equipment or the construction of a new factory building. It does not mean the purely financial transaction of swapping cash for securities. **!** 1.3

Fallacy of Composition

Another pitfall in economic thinking is the assumption that what is true for one individual or part of a whole is necessarily true for a group of individuals or the whole. This is a logical fallacy called

the **fallacy of composition**; the assumption is *not* correct. A statement that is valid for an individual or part is *not* necessarily valid for the larger group or whole.

Consider the following example from outside of economics: You are at a football game and the home team makes an outstanding play. In the excitement, you leap to your feet to get a better view. A valid statement: “If you, *an individual*, stand, your view of the game is improved.” But is this also true for the group—for everyone watching the play? Not necessarily. If *everyone* stands to watch the play, probably nobody—including you—will have a better view than when all remain seated.

A second example comes from economics: An *individual* farmer who reaps a particularly large crop is likely to realize a sharp gain in income. But this statement cannot be generalized to farmers as a *group*. The individual farmer’s large or “bumper” crop will not noticeably influence (reduce) crop prices because each farmer produces a negligible fraction of the total farm output. But for *all* farmers as a group, prices decline when total output increases. Thus, if all farmers reap bumper crops, the total output of farm products will rise, depressing crop prices. If the price declines are relatively large, total farm income might actually *fall*.

Recall our earlier distinction between macroeconomics and microeconomics: *The fallacy of composition reminds us that generalizations valid at one of these levels of analysis may or may not be valid at the other.*

Causation Fallacies

Causation is sometimes difficult to identify in economics. Two important fallacies often interfere with economic thinking.

Post Hoc Fallacy You must think very carefully before concluding that because event A precedes event B, A is the cause of B. This kind of faulty reasoning is known as the *post hoc, ergo propter hoc*, or “**after this, therefore because of this,**” fallacy.

Example: Suppose that early each spring the medicine man of a tribe performs a special dance. A week or so later the trees and grass turn green. Can we safely conclude that event A, the medicine man’s dance, has caused event B, the landscape’s turning green? Obviously not. The rooster crows before dawn, but that does not mean the rooster is responsible for the sunrise!

Fast-Food Lines: An Economic Perspective

How can the economic perspective help us understand the behavior of fast-food consumers?

You enter a fast-food restaurant. Do you immediately look to see which line is the shortest? What do you do when you are in the middle of a long line and a new serving station opens? Have you ever gone to a fast-food restaurant, seen very long lines, and then left? Have you ever become annoyed when someone in front of you in line placed an order that took a long time to fill?

The economic perspective is useful in analyzing the behavior of fast-food customers. These consumers are at the restaurant because they expect the marginal benefit from the food they buy to match or exceed its marginal cost. When customers enter the restaurant, they go to the shortest line, believing that that line will

A professional football team hires a new coach and the team's record improves. Is the new coach the cause? Maybe. But perhaps the presence of more experienced and talented players or an easier schedule is the true cause.

Correlation versus Causation Do not confuse correlation, or connection, with causation. Correlation between two events or two sets of data indicates only that they are associated in some systematic and dependable way. For example, we may find that when variable X increases, Y also increases. But this correlation does not necessarily mean that there is causation—that an increase in X is the cause of an increase in Y . The relationship could be purely coincidental or dependent on some other factor, Z , not included in the analysis.

Here is an economic example: Economists have found a positive correlation between education and income. In general, people with more education earn higher incomes than those with less education. Common sense suggests education is the cause and higher incomes are the effect; more education implies a more knowledgeable and productive worker, and such workers receive larger salaries.

But causation could also partly run the other way. People with higher incomes could buy more

minimize their time cost of obtaining food. They are acting purposefully; time is limited, and people prefer using it in some way other than standing in line.

If one fast-food line is temporarily shorter than other lines, some people will move to that line. These movers apparently view the time saving associated with the shorter line to exceed the cost of moving from their present line. The line switching tends to equalize line lengths. No further movement of customers between lines occurs once all lines are about equal.

Fast-food customers face another cost-benefit decision when a clerk opens a new station at the counter. Should they move to the new station or stay put? Those who shift to the new line decide that the time saving from the move exceeds the extra cost of physically moving. In so deciding, customers must also consider just how quickly they can get to the new station compared with others who may be contemplating the same move. (Those who hesitate in this situation are lost!)

Customers at the fast-food establishment do not have perfect information when they select lines. For example, they do not first survey those in the lines to determine what they are ordering before deciding which line to enter. There are two reasons for this. First, most customers would tell them "It's none of your business," and therefore no information would be forthcoming. Second, even

education, just as they buy more furniture and steaks. Or is part of the relationship explainable in still other ways? Are education and income correlated because the characteristics required to succeed in education—ability and motivation—are the same ones required to be a productive and highly paid worker? If so, then people with those traits will probably obtain more education *and* earn higher incomes. But greater education will not be the sole cause of the higher income. (Key Question 9)

■ A Look Ahead

The ideas in this chapter will come into much sharper focus as you advance through Part 1, where we develop specific economic principles and models. Specifically, in Chapter 2 we build a model of the production choices facing an economy. In Chapter 3 we develop laws of demand and supply that will help you understand how prices and quantities of goods and services are established in markets. In Chapter 4 we combine all markets in the economy to see how the *market system* works. And in Chapters 5 and 6 we examine important sectors (components) of the economy, specifically, the private sector, the government sector, and the international sector.

if they could obtain the information, the amount of time necessary to get it (a cost) would most certainly exceed any time saving associated with finding the best line (the benefit). Because information is costly to obtain, fast-food patrons select lines without perfect information. Thus, not all decisions turn out as expected. For example, you might enter a short line and find someone in front of you is ordering hamburgers and fries for 40 people in the



Greyhound bus parked out back (and the employee is a trainee)! Nevertheless, at the time you made your decision, you thought it was optimal.

Imperfect information also explains why some people who arrive at a fast-food restaurant and observe long lines decide to leave. These people conclude that the marginal cost (monetary plus time costs) of obtaining the fast food is too large relative to the mar-

ginal benefit. They would not have come to the restaurant in the first place had they known the lines would be so long. But getting that information by, say, employing an advance scout with a cellular phone would cost more than the perceived benefit.

Finally, customers must decide what food to order when they arrive at the counter. In making their choices, they again compare marginal costs and marginal benefits in attempting to obtain the greatest personal satisfaction or well-being for their expenditure.

Economists believe that what is true for the behavior of customers at fast-food restaurants is true for economic behavior in general. Faced with an array of choices, consumers, workers, and businesses rationally compare marginal costs and marginal benefits in making decisions.

SUMMARY

1. Economics is the study of the efficient use of scarce resources in the production of goods and services to achieve the maximum satisfaction of economic wants.
2. The economic perspective includes three elements: scarcity and choice, rational behavior, and marginalism. It sees individuals and institutions making rational decisions based on comparisons of marginal costs and marginal benefits.
3. Knowledge of economics contributes to effective citizenship and provides useful insights for politicians, consumers, and workers.
4. Economists employ the scientific method, in which they form and test hypotheses of cause-and-effect relationships to generate theories, laws, and principles. Economists often combine theories into representations called models.
5. Generalizations stated by economists are called principles, theories, laws, or models. The derivation of these principles is the object of theoretical economics. Good theories explain real-world relationships and predict real-world outcomes.
6. Because economic principles are valuable predictors, they are the bases for economic policy, which is designed to identify and solve problems to the greatest extent possible and at the least possible cost. This type of application of economics is called policy economics.
7. Our society accepts certain shared economic goals, including economic growth, full employment, economic efficiency, price-level stability, economic freedom, equity in the distribution of income, economic security, and a reasonable balance in international trade and finance. Some of these goals are complementary; others entail tradeoffs.
8. Macroeconomics looks at the economy as a whole or its major aggregates; microeconomics examines specific economic units or institutions.
9. Positive statements state facts ("what is"); normative statements express value judgments ("what ought to be").
10. In studying economics, we encounter such pitfalls as biases and preconceptions, unfamiliar or confusing terminology, the fallacy of composition, and the difficulty of establishing clear cause-effect relationships.

TERMS AND CONCEPTS

economics
economic perspective
marginal analysis
scientific method
theoretical economics

principles
generalizations
other-things-equal
assumption
policy economics

tradeoffs
macroeconomics
aggregate
microeconomics
positive economics

normative economics
fallacy of composition
"after this, therefore
because of this," fallacy

STUDY QUESTIONS

1. **Key Question** Use the economic perspective to explain why someone who is normally a light eater at a standard restaurant may become a bit of a glutton at a buffet-style restaurant that charges a single price for all you can eat.
2. What is the scientific method, and how does it relate to theoretical economics? What is the difference between a hypothesis and an economic law or principle?
3. Why is it significant that economics is not a laboratory science? What problems may be involved in deriving and applying economic principles?
4. Explain the following statements:
 - a. Good economic policy requires good economic theory.
 - b. Generalization and abstraction are nearly synonymous.
 - c. Facts serve to sort out good and bad hypotheses.
 - d. The *other-things-equal assumption* helps isolate key economic relationships.
5. **Key Question** Explain in detail the interrelationships between economic facts, theory, and policy. Critically evaluate this statement: "The trouble with economic theory is that it is not practical. It is detached from the real world."
6. To what extent do you accept the eight economic goals stated and described in this chapter? What priorities do you assign to them?
7. **Key Question** Indicate whether each of the following statements applies to microeconomics or macroeconomics:
 - a. The unemployment rate in the United States was 4.2 percent in January 2001.
 - b. The Alpo dog-food plant in Bowser, Iowa, laid off 15 workers last month.
 - c. An unexpected freeze in central Florida reduced the citrus crop and caused the price of oranges to rise.
 - d. U.S. output, adjusted for inflation, grew by 5 percent in 2000.
 - e. Last week Wells Fargo Bank lowered its interest rate on business loans by one-half of 1 percentage point.
 - f. The consumer price index rose by 3.4 percent in 2000.
8. **Key Question** Identify each of the following as either a positive or a normative statement:
 - a. The high temperature today was 89 degrees.
 - b. It was too hot today.
 - c. Other things equal, higher interest rates reduce the total amount of borrowing.
 - d. Interest rates are too high.
9. **Key Question** Explain and give an example of (a) the fallacy of composition, and (b) the "after this, therefore because of this," fallacy. Why are cause-and-effect relationships difficult to isolate in economics?
10. Suppose studies show that students who study more hours receive higher grades. Does this relationship guarantee that any particular student who studies longer will get higher grades?
11. Studies indicate that married men on average earn more income than unmarried men of the same age. Why must we be cautious in concluding that marriage is the *cause* and higher income is the *effect*?
12. (**Last Word**) Use the economic perspective to explain the behavior of the *workers* (rather than the customers) observed at a fast-food restaurant. Why are these workers there, rather than, say, cruising around in their cars? Why do they work so diligently? Why do so many of them quit these jobs once they have graduated high school?
13. **Web-Based Question: Three economic goals—are they being achieved?** Three major economic goals are economic growth (rises in real GDP), full employment (less than 5 percent unemployment), and price-level stability (less than 2 percent inflation as measured by the consumer price index, or CPI). The White House statistical website, www.whitehouse.gov/fsbr/esbr.html, provides links to economic information produced by a number of federal agencies. Visit the separate links for Employment, Output, and Prices to assess whether the United States is currently meeting each of these three goals.
14. **Web-Based Question: Normative economics—Republicans versus Democrats** Visit both the Republicans' www.rnc.org/ and the Democrats' www.democrats.org/ websites. Identify an economic issue that both parties address, and compare and contrast their views on that issue. Generally speaking, how much of the disagreement is based on normative economics compared to positive economics? Give an example of loaded terminology from each site.

Graphs and Their Meaning

If you glance quickly through this text, you will find many graphs. Some seem simple, while others seem more formidable. All are included to help you visualize and understand economic relationships. Physicists and chemists sometimes illustrate their theories by building arrangements of multicolored wooden balls, representing protons, neutrons, and electrons, which are held in proper relation to one another by wires or sticks. Economists most often use graphs to illustrate their models. By understanding these "pictures," you can more readily comprehend economic relationships. Most of our principles or models explain relationships between just two sets of economic facts, which can be conveniently represented with two-dimensional graphs.

Construction of a Graph

A *graph* is a visual representation of the relationship between two variables. Table 1 is a hypothetical illustration showing the relationship between income and consumption for the economy as a whole. Without even studying economics, we would expect intuitively that people would buy more goods and services when their incomes go up. Thus we are not surprised to find in Table 1 that total consumption in the economy increases as total income increases.

The information in Table 1 is expressed graphically in Figure 1. Here is how it is done: We want to show visually or graphically how consumption

changes as income changes. Since income is the determining factor, we represent it on the **horizontal axis** of the graph, as is customary. And because consumption depends on income, we represent it on the **vertical axis** of the graph, as is also customary. Actually, what we are doing is representing the *independent variable* on the horizontal axis and the *dependent variable* on the vertical axis.

Now we arrange the vertical and horizontal scales of the graph to reflect the ranges of values of consumption and income, and we mark the scales in convenient increments. As you can see, the values marked on the scales cover all the values in Table 1. The increments on both scales are \$100 for approximately each $\frac{1}{2}$ inch.

Because the graph has two dimensions, each point within it represents an income value and its associated consumption value. To find a point that represents one of the five income-consumption combinations in Table 1, we draw perpendiculars from the appropriate values on the vertical and horizontal

Table 1
The Relationship between Income and Consumption

Income per Week	Consumption per Week	Point
\$ 0	\$ 50	a
100	100	b
200	150	c
300	200	d
400	250	e

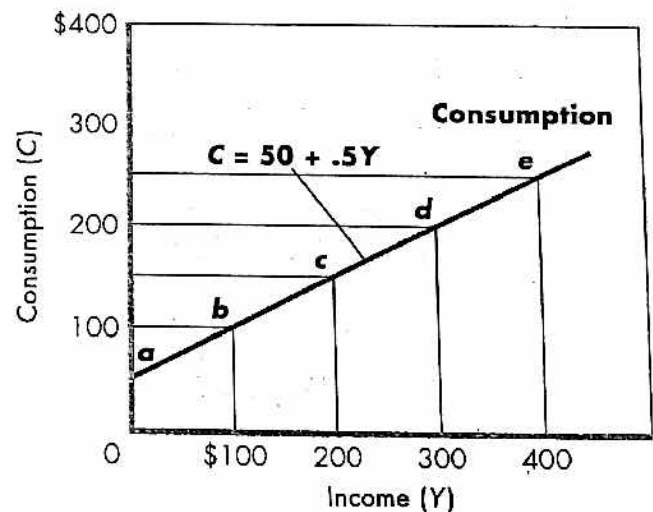


Figure 1
Graphing the direct relationship between consumption and income. Two sets of data that are positively or directly related, such as consumption and income, graph as an upsloping line.

axes. For example, to plot point *c* (the \$200 income–\$150 consumption point), we draw perpendiculars up from the horizontal (income) axis at \$200 and across from the vertical (consumption) axis at \$150. These perpendiculars intersect at point *c*, which represents this particular income-consumption combination. You should verify that the other income-consumption combinations shown in Table 1 are properly located in Figure 1. Finally, by assuming that the same general relationship between income and consumption prevails for all other incomes, we draw a line or smooth curve to connect these points. That line or curve represents the income-consumption relationship.

If the graph is a straight line, as in Figure 1, we say the relationship is *linear*.

Direct and Inverse Relationships

The line in Figure 1 slopes upward to the right, so it depicts a direct relationship between income and consumption. By a **direct relationship** (or positive relationship) we mean that two variables—in this case, consumption and income—change in the *same* direction. An increase in consumption is associated with an increase in income; a decrease in consumption accompanies a decrease in income. When two sets of data are positively or directly related, they always graph as an *upsloping* line, as in Figure 1.

In contrast, two sets of data may be inversely related. Consider Table 2, which shows the relationship between the price of basketball tickets and game attendance at Gigantic State University (GSU). Here we have an **inverse relationship** (or negative relationship) because the two variables change in *opposite* directions. When ticket prices decrease, attendance increases. When ticket prices increase, attendance decreases. The six data points in Table 2 are plotted

Table 2
The Relationship between Ticket Prices and Attendance

Ticket Price	Attendance, Thousands	Point
\$50	0	<i>a</i>
40	4	<i>b</i>
30	8	<i>c</i>
20	12	<i>d</i>
10	16	<i>e</i>
0	20	<i>f</i>

in Figure 2. Observe that an inverse relationship always graphs as a *downsloping* line.

Dependent and Independent Variables

Although it is not always easy, economists seek to determine which variable is the “cause” and which is the “effect.” Or, more formally, they seek the independent variable and the dependent variable. The **independent variable** is the cause or source; it is the variable that changes first. The **dependent variable** is the effect or outcome; it is the variable that changes because of the change in the independent variable. As noted in our income-consumption example, income generally is the independent variable and consumption the dependent variable. Income causes consumption to be what it is rather than the other way around. Similarly, ticket prices (set in advance of the season) determine attendance at GSU basketball games; attendance at games does not determine the ticket prices for those games. Ticket price is the independent variable, and the quantity of tickets purchased is the dependent variable.

You may recall from your high school courses that mathematicians always put the independent variable (cause) on the horizontal axis and the dependent

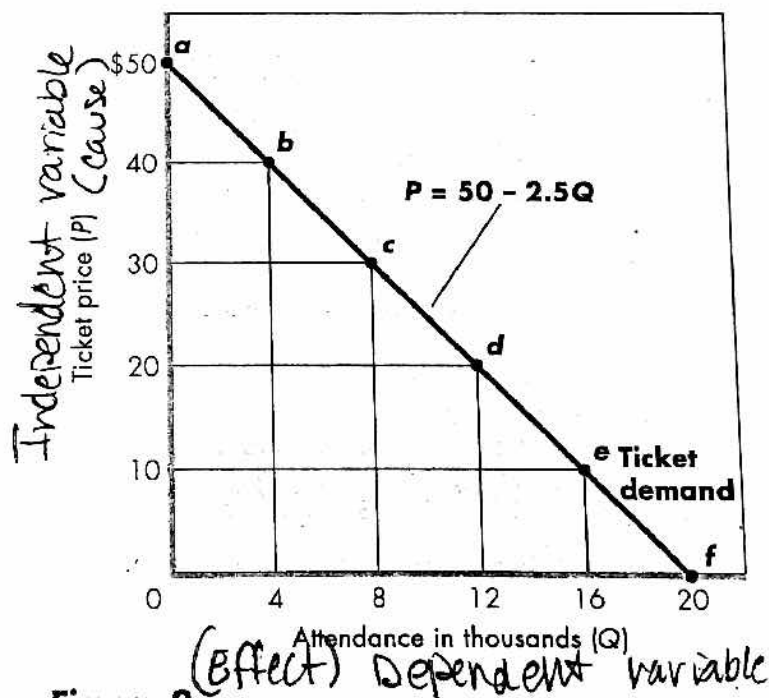


Figure 2

Graphing the inverse relationship between ticket prices and game attendance. Two sets of data that are negatively or inversely related, such as ticket price and the attendance at basketball games, graph as a downsloping line.

dent variable (effect) on the vertical axis. Economists are less tidy; their graphing of independent and dependent variables is more arbitrary. Their conventional graphing of the income-consumption relationship is consistent with mathematical presentation, but economists put price and cost data on the vertical axis. Hence, economists' graphing of GSU's ticket price-attendance data conflicts with normal mathematical procedure.

Other Things Equal

Our simple two-variable graphs purposely ignore many other factors that might affect the amount of consumption occurring at each income level or the number of people who attend GSU basketball games at each possible ticket price. When economists plot the relationship between any two variables, they employ the *ceteris paribus* (other-things-equal) assumption. Thus, in Figure 1 all factors other than income that might affect the amount of consumption are presumed to be constant or unchanged. Similarly, in Figure 2 all factors other than ticket price that might influence attendance at GSU basketball games are assumed constant. In reality, "other things" are not equal; they often change, and when they do, the relationship represented in our two tables and graphs will change. Specifically, the lines we have plotted would shift to new locations.

Consider a stock market "crash." The dramatic drop in the value of stocks might cause people to feel less wealthy and therefore less willing to consume at each level of income. The result might be a downward shift of the consumption line. To see this, you should plot a new consumption line in Figure 1, assuming that consumption is, say, \$20 less at each income level. Note that the relationship remains direct; the line merely shifts downward to reflect less consumption spending at each income level.

Similarly, factors other than ticket prices might affect GSU game attendance. If GSU loses most of its games, attendance at GSU games might be less at each ticket price. To see this, redraw Figure 2, assuming that 2000 fewer fans attend GSU games at each ticket price. (Key Appendix Question 2)

Slope of a Line

Lines can be described in terms of their slopes. The **slope of a straight line** is the ratio of the vertical change (the rise or drop) to the horizontal change (the run) between any two points of the line.

Positive Slope Between point *b* and point *c* in Figure 1 the rise or vertical change (the change in consumption) is +\$50 and the run or horizontal change (the change in income) is +\$100. Therefore:

$$\text{Slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{+50}{+100} = \frac{1}{2} = .5$$

Note that our slope of $\frac{1}{2}$ or .5 is positive because consumption and income change in the same direction; that is, consumption and income are directly or positively related.

The slope of .5 tells us there will be a \$1 increase in consumption for every \$2 increase in income. Similarly, it indicates that for every \$2 decrease in income there will be a \$1 decrease in consumption.

Negative Slope Between any two of the identified points in Figure 2, say, point *c* and point *d*, the vertical change is -10 (the drop) and the horizontal change is +4 (the run). Therefore:

$$\begin{aligned} \text{Slope} &= \frac{\text{vertical change}}{\text{horizontal change}} = \frac{-10}{+4} \\ &= -2\frac{1}{2} = -2.5 \end{aligned}$$

This slope is negative because ticket price and attendance have an inverse relationship.

Note that on the horizontal axis attendance is stated in thousands of people. So the slope of $-10/+4$ or -2.5 means that lowering the price by \$10 will increase attendance by 4000 people. This is the same as saying that a \$2.50 price reduction will increase attendance by 1000 persons.

Slopes and Measurement Units The slope of a line will be affected by the choice of units for either variable. If, in our ticket price illustration, we had chosen to measure attendance in individual people, our horizontal change would have been 4000 and the slope would have been

$$\text{Slope} = \frac{-10}{+4000} = \frac{-1}{+400} = -.0025$$

The slope depends on the way the relevant variables are measured.

Slopes and Marginal Analysis Recall that economics is largely concerned with changes from the status quo. The concept of slope is important in economics because it reflects marginal changes—

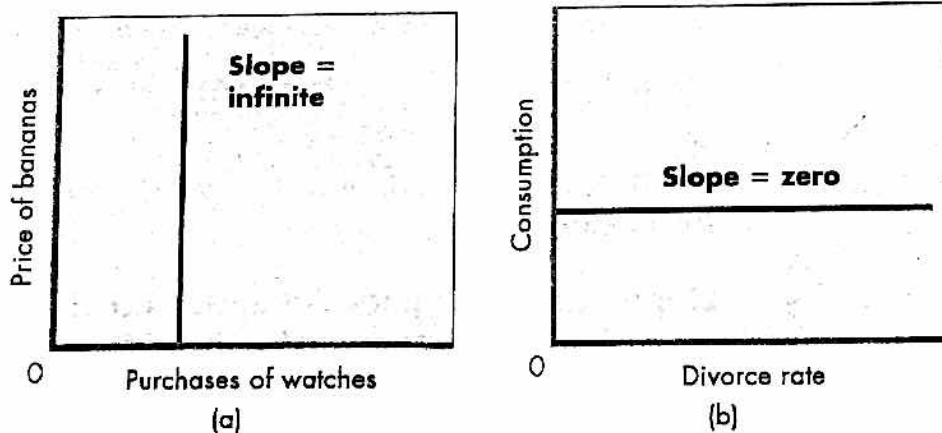
those involving 1 more (or 1 less) unit. For example, in Figure 1 the .5 slope shows that \$.50 of extra or marginal consumption is associated with each \$1 change in income. In this example, people collectively will consume \$.50 of any \$1 increase in their incomes and reduce their consumption by \$.50 for each \$1 decline in income.

Infinite and Zero Slopes Many variables are unrelated or independent of one another. For example, the quantity of wristwatches purchased is not related to the price of bananas. In Figure 3a we represent the price of bananas on the vertical axis and the quantity of watches demanded on the horizontal axis. The graph of their relationship is the line parallel to the vertical axis, indicating that the same quantity of watches is purchased no matter what the price of bananas. The slope of such a line is *infinite*.

Similarly, aggregate consumption is completely unrelated to the nation's divorce rate. In Figure 3b we put consumption on the vertical axis and the divorce rate on the horizontal axis. The line parallel to the horizontal axis represents this lack of relatedness. This line has a slope of *zero*.

Vertical Intercept

A line can be located on a graph (without plotting points) if we know its slope and its vertical intercept. The **vertical intercept** of a line is the point where the line meets the vertical axis. In Figure 1 the intercept is \$50. This intercept means that if current income were zero, consumers would still spend \$50. They might do this through borrowing or by selling some of their assets. Similarly, the \$50 vertical intercept in Figure 2 shows that at a \$50 ticket price, GSU's basketball team would be playing in an empty arena.



Equation of a Linear Relationship

If we know the vertical intercept and slope, we can describe a line succinctly in equation form. In its general form, the equation of a straight line is

$$y = a + bx$$

where y = dependent variable
 a = vertical intercept
 b = slope of line
 x = independent variable

For our income-consumption example, if C represents consumption (the dependent variable) and Y represents income (the independent variable), we can write $C = a + bY$. By substituting the known values of the intercept and the slope, we get

$$C = 50 + .5Y$$

This equation also allows us to determine the amount of consumption C at any specific level of income. You should use it to confirm that at the \$250 income level, consumption is \$175.

When economists reverse mathematical convention by putting the independent variable on the vertical axis and the dependent variable on the horizontal axis, then y stands for the independent variable, rather than the dependent variable in the general form. We noted previously that this case is relevant for our GSU ticket price-attendance data. If P represents the ticket price (independent variable) and Q represents attendance (dependent variable), their relationship is given by

$$P = 50 - 2.5Q$$

where the vertical intercept is 50 and the negative slope is $-2\frac{1}{2}$ or -2.5 . Knowing the value of P lets us solve for Q , our dependent variable. You should use

Figure 3

Infinite and zero slopes. (a) A line parallel to the vertical axis has an infinite slope. Here, purchases of watches remain the same no matter what happens to the price of bananas. (b) A line parallel to the horizontal axis has a slope of zero. Here, consumption remains the same no matter what happens to the divorce rate. In both (a) and (b), the two variables are totally unrelated to one another.

this equation to predict GSU ticket sales when the ticket price is \$15. (Key Appendix Question 3)

Slope of a Nonlinear Curve

We now move from the simple world of linear relationships (straight lines) to the more complex world of nonlinear relationships. The slope of a straight line is the same at all its points. The slope of a line representing a nonlinear relationship changes from one point to another. Such lines are referred to as *curves*. (It is also permissible to refer to a straight line as a “curve.”)

Consider the downsloping curve in Figure 4. Its slope is negative throughout, but the curve flattens as we move down along it. Thus, its slope constantly changes; the curve has a different slope at each point.

To measure the slope at a specific point, we draw a straight line tangent to the curve at that point. A line is *tangent* at a point if it touches, but does not intersect, the curve at that point. Thus line *aa* is tangent to the curve in Figure 4 at point *A*. The slope of the curve at that point is equal to the slope of the tangent line. Specifically, the total vertical change (drop) in the tangent line *aa* is -20 and the total horizontal change (run) is $+5$. Because the slope of the tangent line *aa* is $-20/+5$, or -4 , the slope of the curve at point *A* is also -4 .

Line *bb* in Figure 4 is tangent to the curve at point *B*. Following the same procedure, we find the slope at *B* to be $-5/+15$, or $-\frac{1}{3}$. Thus, in this flatter part of the curve, the slope is less negative. (Key Appendix Question 6)

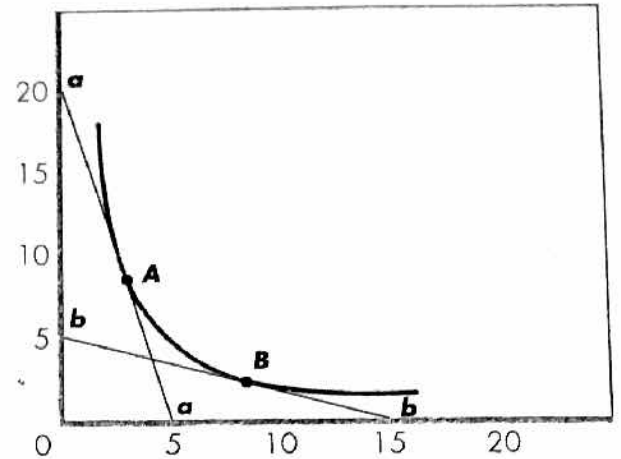


Figure 4

Determining the slopes of curves. The slope of a nonlinear curve changes from point to point on the curve. The slope at any point (say, *B*) can be determined by drawing a straight line that is tangent to that point (line *bb*) and calculating the slope of that line.

APPENDIX SUMMARY

1. Graphs are a convenient and revealing way to represent economic relationships.
2. Two variables are positively or directly related when their values change in the same direction. The line (curve) representing two directly related variables slopes upward.
3. Two variables are negatively or inversely related when their values change in opposite directions. The curve representing two inversely related variables slopes downward.
4. The value of the dependent variable (the “effect”) is determined by the value of the independent variable (the “cause”).
5. When the “other factors” that might affect a two-variable relationship are allowed to change, the graph of the relationship will likely shift to a new location.
6. The slope of a straight line is the ratio of the vertical change to the horizontal change between any two points. The slope of an upsloping line is positive; the slope of a downsloping line is negative.
7. The slope of a line or curve depends on the units used in measuring the variables. It is especially relevant for economics because it measures marginal changes.
8. The slope of a horizontal line is zero; the slope of a vertical line is infinite.
9. The vertical intercept and slope of a line determine its location; they are used in expressing the line—and the relationship between the two variables—as an equation.
10. The slope of a curve at any point is determined by calculating the slope of a straight line tangent to the curve at that point.

APPENDIX TERMS AND CONCEPTS

horizontal axis
vertical axis

direct relationship
inverse relationship

independent variable
dependent variable

slope of a straight line
vertical intercept

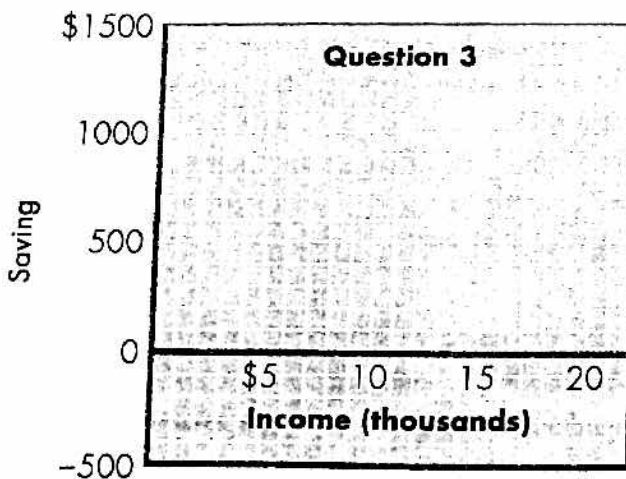
APPENDIX STUDY QUESTIONS

1. Briefly explain the use of graphs as a way to represent economic relationships. What is an inverse relationship? How does it graph? What is a direct relationship? How does it graph? Graph and explain the relationships you would expect to find between (a) the number of inches of rainfall per month and the sale of umbrellas, (b) the amount of tuition and the level of enrollment at a university, and (c) the popularity of an entertainer and the price of her concert tickets.

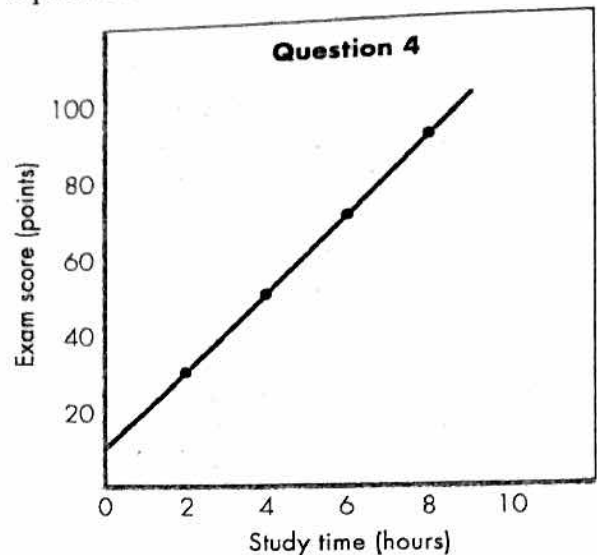
In each case cite and explain how variables other than those specifically mentioned might upset the expected relationship. Is your graph in part b, above, consistent with the fact that, historically, enrollments and tuition have both increased? If not, explain any difference.

2. **Key Appendix Question** Indicate how each of the following might affect the data shown in Table 2 and Figure 2 of this appendix:
- GSU's athletic director schedules higher-quality opponents.
 - An NBA team locates in the city where GSU plays.
 - GSU contracts to have all its home games televised.
3. **Key Appendix Question** The following table contains data on the relationship between saving and income. Rearrange these data into a meaningful order and graph them on the accompanying grid. What is the slope of the line? The vertical intercept? Interpret the meaning of both the slope and the intercept. Write the equation that represents this line. What would you predict saving to be at the \$12,500 level of income?

Income per Year	Saving per Year
\$15,000	\$1,000
0	-500
10,000	500
5,000	0
20,000	1,500

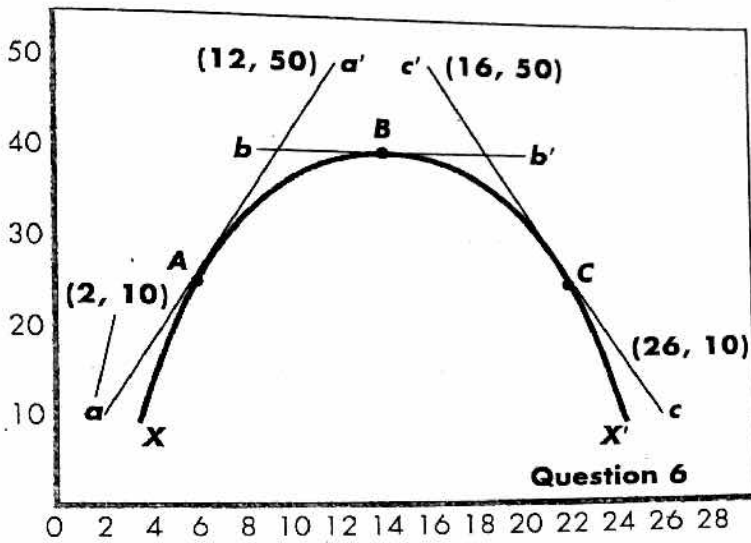


4. Construct a table from the data shown on the graph below. Which is the dependent variable and which the independent variable? Summarize the data in equation form.



5. Suppose that when the interest rate on loans is 16 percent, businesses find it unprofitable to invest in machinery and equipment. However, when the interest rate is 14 percent, \$5 billion worth of investment is profitable. At 12 percent interest, a total of \$10 billion of investment is profitable. Similarly, total investment increases by \$5 billion for each successive 2-percentage-point decline in the interest rate. Describe the relevant relationship between the interest rate and investment in words, in a table, on a graph, and as an equation. Put the interest rate on the vertical axis and investment on the horizontal axis. In your equation use the form $i = a + bI$, where i is the interest rate, a is the vertical intercept, b is the slope of the line (which is negative), and I is the level of investment. Comment on the advantages and disadvantages of the verbal, tabular, graphical, and equation forms of description.

6. **Key Appendix Question** The accompanying graph shows curve XX' and tangents at points A , B , and C . Calculate the slope of the curve at these three points.



7. In the accompanying graph, is the slope of curve AA' positive or negative? Does the slope increase or decrease as we move along the curve from A to A' ? Answer the same two questions for curve BB' .

