

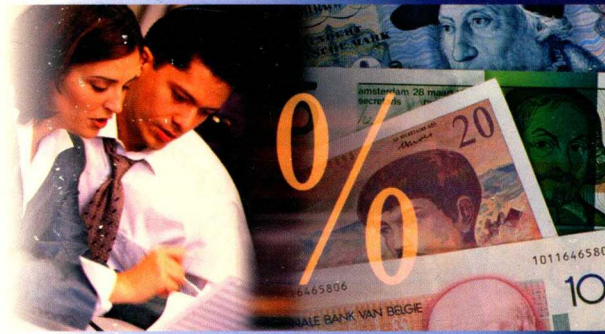
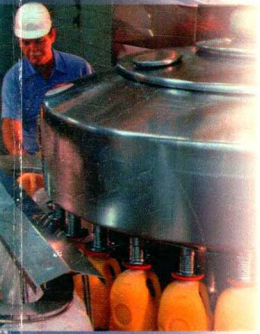
Principles of Microeconomics

ECON1320

Instructor:
Rob Poulton

Graceland University

Economics





**Primis
Online**

Economics

Course:

**Principles of Microeconomics
ECON1320**

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Economics

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IN THIS CHAPTER YOU WILL LEARN:

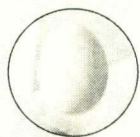
- The definition of economics and the features of the economic perspective.
- The role of economic theory in economics.
- The distinction between microeconomics and macroeconomics.
- The categories of scarce resources and the nature of the economizing problem.
- About production possibilities analysis, increasing opportunity costs, and economic growth.



Limits, Alternatives, and Choices

(An appendix on understanding graphs follows this chapter. If you need a quick review of this mathematical tool, you might benefit by reading the appendix first.) People's wants are numerous and varied. Biologically, people need only air, water, food, clothing, and shelter. But in modern society people also desire goods and services that provide a more comfortable or affluent standard of living. We want bottled water, soft drinks, and fruit juices, not just water from the creek. We want salads, burgers, and pizzas, not just berries and nuts. We want jeans, suits, and coats, not just woven reeds. We want apartments, condominiums, or houses, not just mud huts. And, as the saying goes, "that is not the half of it." We also want DVD players, Internet service, education, homeland security, cell phones, health care, and much more.

Fortunately, society possesses productive resources, such as labor and managerial talent, tools and machinery, and land and mineral deposits. These resources, employed in the economic system (or simply the economy), help us produce goods and services that satisfy many of our economic



○ 1.1

Origin of the term
“Economics”

wants. But the blunt reality is that our economic wants far exceed the productive capacity of our scarce (limited) resources. We are forced to make choices. This unyielding truth underlies the definition of **economics**, which is the social science concerned with how individuals, institutions, and society make optimal (best) choices under conditions of scarcity.

The Economic Perspective

Economists view things from 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, we can easily see why economists view the world through the lens of scarcity. Scarce economic resources mean limited goods and ser-

VICES. Scarcity restricts options and demands 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 be treated to lunch, making it “free” from your perspective, but someone bears a cost—ultimately, society. Scarce inputs of land, equipment, farm labor, the labor of cooks and waiters, and managerial talent are required. Because society could have used these resources to produce something else, it sacrifices those other goods and services in making the lunch available. Economists call such sacrifices **opportunity costs**: To obtain more of one thing, society forgoes the opportunity of getting the next best thing. That sacrifice is the opportunity cost of the choice.

CONSIDER THIS ...

Free for All?

Free products are seemingly everywhere. Sellers offer free software, free cell phones, and free checking accounts. Dentists

give out free toothbrushes. At state visitor centers, there are free brochures and maps.

Does the presence of so many free products contradict the economist’s assertion “There is no free lunch”? No! Resources are used to produce each of these products, and because those resources have alternative uses, society gives up something else to get the “free” good. Where resources are used to produce goods or services, there is no free lunch.

So why are these goods offered for free? In a word: marketing! Firms sometimes offer free products to entice people to try them, hoping they will then purchase those goods later. The free software may eventually entice you to buy the producer’s upgraded software. In other instances, the free brochures contain advertising for shops and restaurants, and that free e-mail program is filled with ads. In still other cases, the product is free only in conjunction with a larger purchase. To get the free bottle of soda, you must buy the large pizza. To get the free cell phone, you need to sign up for a year’s worth of cell phone service.

So “free” products may or may not be truly free to individuals. They are never free to society.

Purposeful Behavior

Economics assumes that human behavior reflects “rational self-interest.” Individuals look for and pursue opportunities to increase their **utility**—the pleasure, happiness, or satisfaction obtained from consuming a good or service. They allocate their time, energy, and money to maximize their satisfaction. Because they weigh costs and benefits, their economic decisions are “purposeful” or “rational,” not “random” or “chaotic.”

Consumers are purposeful in deciding what goods and services to buy. Business firms are purposeful in deciding what products to produce and how to produce them. Government entities are purposeful in deciding what public services to provide and how to finance them.

“Purposeful behavior” does not assume that people and institutions are immune from faulty logic and therefore are perfect decision makers. They sometimes make mistakes. Nor does it mean that people’s decisions are unaffected by emotion or the decisions of those around them. “Purposeful behavior” simply means that people make decisions with some desired outcome in mind.

Rational self-interest is not the same as selfishness. In the economy, increasing one’s own wage, rent, interest, or



○ 1.2

Utility

profit normally requires identifying and satisfying *somebody else's* wants! Also, people make personal sacrifices to others. They contribute time and money 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-interested behavior is simply behavior designed to increase personal satisfaction, however it may be derived.

CONSIDER THIS ...



Fast-Food Lines

The economic perspective is useful in analyzing all sorts of behaviors. Consider an everyday example: the behavior of fast-

food customers. When customers enter the restaurant, they go to the shortest line, believing that line will 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 from the shorter line (marginal benefit) as exceeding the cost of moving from their present line (marginal cost). 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. 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.

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 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.

Marginal Analysis: Benefits and Costs

The economic perspective focuses largely on **marginal analysis**—comparisons of marginal benefits and marginal costs, usually for decision making. To economists, “marginal” means “extra,” “additional,” or “a change in.” Most choices or decisions involve changes in the status quo, meaning the existing state of affairs.

Should you attend school for another year? Should you study an extra hour for an exam? Should you supersize your fries? 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 fiancée are shopping for an engagement ring. Should you buy a $\frac{1}{2}$ -carat diamond, a $\frac{5}{8}$ -carat diamond, a $\frac{3}{4}$ -carat diamond, a 1-carat diamond, or something even



O 1.3

Marginal analysis

larger? The marginal cost of a larger-size diamond is the added expense beyond the cost of the smaller-size diamond. The marginal benefit is the perceived lifetime pleasure (utility) from the larger-size stone. If the marginal benefit of the larger diamond exceeds its marginal cost (and you can afford it), buy the larger stone. But if the marginal cost is more than the marginal benefit, buy the smaller diamond instead, even if you can afford the larger stone!

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 some other product. Opportunity costs are present whenever a decision is made. (**Key Question 3**)

Theories, Principles, and Models

Like the physical and life sciences, as well as other social sciences, economics relies on the **scientific method**. That procedure consists of several elements:

- The observation of real-world behavior and outcomes.
- Based on those observations, the formulation of a possible explanation of cause and effect (hypothesis).

6 PART ONE
Introduction to Economics and the Economy

- 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 an economic law or an **economic principle**—a statement about economic behavior or the economy that enables prediction of the probable effects of certain actions. Combinations of such laws or principles are incorporated into models, which are simplified representations of how something works, such as a market or segment of the economy.

Economists develop theories of the behavior of individuals (consumers, workers) and institutions (businesses, governments) engaged in the production, exchange, and consumption of goods and services. Theories, principles, and models are “purposeful simplifications.” The full scope of economic reality itself is too complex and bewildering to be understood as a whole. In developing theories, principles, and models economists remove the clutter and simplify.

Economic principles and models are highly useful in analyzing economic behavior and understanding how the economy operates. They are the tools for ascertaining cause and effect (or action and outcome) within the economic system. Good theories 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.

There are some other things you should know about economic principles.

- **Generalizations** Economic principles are generalizations relating to economic behavior or to the economy itself. Economic principles are expressed as the tendencies of typical or average consumers, workers, or business firms. For example, economists say that consumers buy more of a particular product when its price falls. Economists recognize that 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** In constructing their theories, economists use the *ceteris paribus* or **other-things-equal assumption**—the assumption

that factors other than those being considered do not change. They assume that all 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. 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. This is helpful because the economist can then focus on the “price of Pepsi–purchases of Pepsi” relationship without being confused by changes in other variables.



O 1.4

Ceteris paribus

- **Graphical Expression** Many economic models are expressed graphically. Be sure to read the special appendix at the end of this chapter as a review of graphs.

Macroeconomics and Microeconomics

Economists develop economic principles and models 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.

Figuratively, macroeconomics looks at the beach, not the pieces of sand, the rocks, and the shells.

Microeconomics

Microeconomics is the part of economics concerned with individual units such as a person, a household, a firm, or an industry. 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 look at decision making by individual customers, workers, households, and business firms. 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, rock, 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 production), economists recognize that the decisions made by *individual* workers on how long to search for jobs and the way *specific* labor markets encourage or impede hiring are also critical in determining the unemployment rate. (**Key Question 5**)

Positive and Normative Economics

Both macroeconomics and microeconomics contain 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.

Economic policy, 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 (policy economics). 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*, whereas normative economics embodies subjective feelings about *what ought to be*. Examples: Positive statement: “The unemployment rate in France is higher than that in the United States.” Normative statement: “France ought to undertake policies to make its labor market more flexible to reduce unemployment rates.” Whenever words such as “ought” or “should” appear in a sentence, you are very likely encountering a normative statement.

Most of the disagreement among economists involves normative, value-based policy questions. Of course, economists sometime disagree about which theories or models

best represent the economy and its parts; but they agree on a full range of economic principles. Most economic controversy thus reflects differing opinions or value judgments about what society should be like.

QUICK REVIEW 1.1

- Economics examines how individuals, institutions, and society make choices under conditions of scarcity.
- 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.
- Economists use the scientific method to establish economic theories—cause-effect generalizations about the economic behavior of individuals and institutions.
- 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”).

Individuals’ Economizing Problem

A close examination of the **economizing problem**—the need to make choices because economic wants exceed economic means—will enhance your understanding of economic models and the difference between microeconomic and macroeconomic analysis. Let’s first build a microeconomic model of the economizing problem faced by an individual.

Limited Income

We all have a finite amount of income, even the wealthiest among us. Even Donald Trump must decide how to spend his money! And the majority of us have much more limited means. Our income comes to us in the form of wages, interest, rent, and profit, although we may also receive money from government programs or family members. As Global Perspective 1.1 shows, the average income of Americans in 2004 was \$41,400. In the poorest nations, it was less than \$500.

Unlimited Wants

For better or worse, most people have virtually unlimited wants. We desire various goods and services that provide utility. Our wants extend over a wide range of products, from *necessities* (for example, food, shelter, and clothing) to *luxuries* (for example, perfumes, yachts, and sports cars).



GLOBAL PERSPECTIVE I.1

Average Income, Selected Nations

Average income (total income/population) and therefore typical individual budget constraints vary greatly among nations.

Country	Per Capita Income, 2004 (U.S. dollars, based on exchange rates)
Switzerland	\$48,230
United States	41,400
Japan	37,180
France	30,090
South Korea	13,980
Mexico	6,770
Brazil	3,090
China	1,290
Pakistan	600
Nigeria	390
Rwanda	220
Liberia	110

Source: World Bank, www.worldbank.org.

Some wants such as basic food, clothing, and shelter have biological roots. Other wants, for example, specific kinds of food, clothing, and shelter, arise from the conventions and customs of society.

Over time, as new products are introduced, economic wants tend to change and multiply. Only recently have people wanted MP3 players, Internet service, digital cameras, or camera phones because those products did not exist a few decades ago. Also, the satisfaction of certain wants may trigger others: the acquisition of a Ford Focus or a Honda Civic has been known to whet the appetite for a Lexus or a Mercedes.

Services, as well as goods, satisfy our wants. Car repair work, the removal of an inflamed appendix, legal and accounting advice, and haircuts all satisfy human wants. Actually, we buy many goods, such as automobiles and washing machines, for the services they render. The differences between goods and services are often smaller than they appear to be.

For most people, the desires for goods and services cannot be fully satisfied. Bill Gates may have all that he wants for himself, but his massive charitable giving

suggests that he keenly wants better health care for the world's poor. Our desires for a particular good or service can be satisfied; over a short period of time we can surely get enough toothpaste or pasta. And one appendectomy is plenty. But our desire for goods and services in general seem to be another story.

Because we have only limited income (usually through our work) but seemingly insatiable wants, it is in our self-interest to economize: to pick and choose goods and services that create maximum utility.

A Budget Line

We can clarify the economizing problem facing consumers by visualizing a **budget line** (or, more technically, a *budget constraint*). It is a schedule or curve that shows various combinations of two products a consumer can purchase with a specific money income. Although we assume two products, the analysis generalizes to the full range of products available to an individual consumer.

To understand the idea of a budget line, suppose that you received a Barnes & Noble (or Borders) gift card as a birthday present. The \$120 card is soon to expire. You take the card to the store and confine your purchase decisions to two alternatives: DVDs and paperback books. DVDs are \$20 each and paperback books are \$10 each. Your purchase options are shown in the table in Figure 1.1.

At one extreme, you might spend all of your \$120 “income” on 6 DVDs at \$20 each and have nothing left to spend on books. Or, by giving up 2 DVDs and thereby gaining \$40, you can have 4 DVDs at \$20 each and 4 books at \$10 each. And so on to the other extreme, at which you could buy 12 books at \$10 each, spending your entire gift card on books with nothing left to spend on DVDs.

The graph in Figure 1.1 shows the budget line. Note that the graph is not restricted to whole units of DVDs and books as is the table. Every point on the graph represents a possible combination of DVDs and books, including fractional quantities. The slope of the graphed budget line measures the ratio of the price of books (P_b) to the price of DVDs (P_{dvd}); more precisely, the slope is $P_b/P_{dvd} = \$10/\$20 = \frac{1}{2}$, or $-.5$. So you must forgo 1 DVD (measured on the vertical axis) to buy 2 books (measured on the horizontal axis). This yields a slope of $-\frac{1}{2}$ or $-.5$.

The budget line illustrates several ideas.

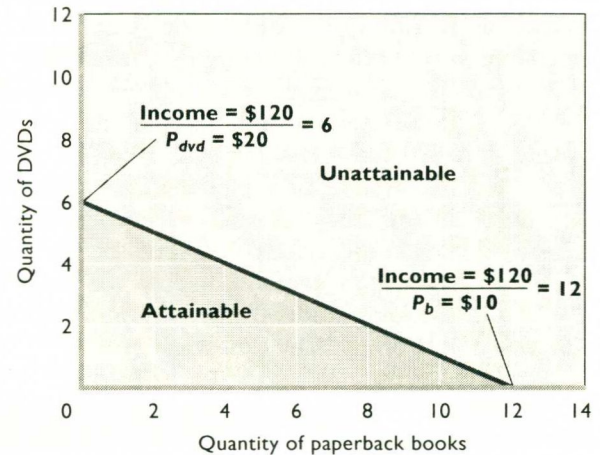
Attainable and Unattainable Combinations

All the combinations of DVDs and books on or inside the budget line are *attainable* from the \$120 of money income. You can afford to buy, for example, 3 DVDs at \$20 each

FIGURE 1.1 A consumer's budget line. The budget line (or budget constraint) shows all the combinations of any two products that can be purchased, given the prices of the products and the consumer's money income.

The Budget Line: Whole-Unit Combinations of DVDs and Paperback Books Attainable with an Income of \$120

Units of DVDs (Price = \$20)	Units of Books (Price = \$10)	Total Expenditure
6	0	(\$120 = \$120 + \$0)
5	2	(\$120 = \$100 + \$20)
4	4	(\$120 = \$80 + \$40)
3	6	(\$120 = \$60 + \$60)
2	8	(\$120 = \$40 + \$80)
1	10	(\$120 = \$20 + \$100)
0	12	(\$120 = \$0 + \$120)



and 6 books at \$10 each. You also can obviously afford to buy 2 DVDs and 5 books, if so desired, and not use up the value on the gift card. But to achieve maximum utility you will want to spend the full \$120.

In contrast, all combinations beyond the budget line are *unattainable*. The \$120 limit simply does not allow you to purchase, for example, 5 DVDs at \$20 each and 5 books at \$10 each. That \$150 expenditure would clearly exceed the \$120 limit. In Figure 1.1 the attainable combinations are on and within the budget line; the unattainable combinations are beyond the budget line.

Tradeoffs and Opportunity Costs The budget line in Figure 1.1 illustrates the idea of tradeoffs arising from limited income. To obtain more DVDs, you have

to give up some books. For example, to obtain the first DVD, you trade off 2 books. So the opportunity cost of the first DVD is 2 books. To obtain the second DVD the opportunity cost is also 2 books. The straight-line budget constraint, with its constant slope, indicates constant opportunity cost. That is, the opportunity cost of

1 extra DVD remains the same (= 2 books) as more DVDs are purchased. And, in reverse, the opportunity cost of 1 extra book does not change (= $\frac{1}{2}$ DVD) as more books are bought.

Choice Limited income forces people to choose what to buy and what to forgo to fulfill wants. You will select the combination of DVDs and paperback books that you think is “best.” That is, you will evaluate your marginal benefits and marginal costs (here, product price) to make choices that maximize your satisfaction. Other people, with the same \$120 gift card, would undoubtedly make different choices.

CONSIDER THIS ...



Did Gates, Winfrey, and Rodriguez Make Bad Choices?

Opportunity costs come into play in decisions well beyond simple buying decisions. Consider the different choices people make with respect to college. College graduates usually earn about 50 percent more during their lifetimes than persons with just high

school diplomas. For most capable students, “Go to college, stay in college, and earn a degree” is very sound advice.

Yet Microsoft cofounder Bill Gates and talk show host Oprah Winfrey* both dropped out of college, and baseball star Alex Rodriguez (“A-Rod”) never even bothered to start classes. What were they thinking? Unlike most students, Gates faced enormous opportunity costs for staying in college. He had a vision for his company, and his starting work young helped ensure Microsoft’s success. Similarly, Winfrey landed a spot in local television news when she was a teenager, eventually producing and starring in the *Oprah Winfrey Show* when she was 32 years old. Getting a degree in her twenties might have interrupted the string of successes that made her famous talk show possible. And Rodriguez knew that professional athletes have short careers. Therefore, going to college directly after high school would have taken away 4 years of his peak earning potential.

So Gates, Winfrey, and Rodriguez understood opportunity costs and made their choices accordingly. The size of opportunity costs greatly matters in making individual decisions.

*Winfrey eventually went back to school and earned a degree from Tennessee State University when she was in her thirties.

Income Changes The location of the budget line varies with money income. An increase in money income shifts the budget line to the right; a decrease in money income shifts it to the left. To verify this, recalculate the table in Figure 1.1, assuming the card value (income) is

(a) \$240 and (b) \$60, and plot the new budget lines in the graph. No wonder people like to have more income: That shifts their budget lines outward and enables them to buy more goods and services. But even with more income, people will still face spending tradeoffs, choices, and opportunity costs. (**Key Question 7**)



W 1.1

Budget lines

QUICK REVIEW 1.2

- Because wants exceed incomes, individuals face an economizing problem; they must decide what to buy and what to forgo.
- A budget line (budget constraint) shows the various combinations of two goods that a consumer can purchase with a specific money income.
- Straight-line budget constraints imply constant opportunity costs associated with obtaining more of either of the two goods.

Society's Economizing Problem

Society must also make choices under conditions of scarcity. It, too, faces an economizing problem. Should it devote more of its limited resources to the criminal justice system (police, courts, and prisons) or to education (teachers, books, and schools)? If it decides to devote more resources to both, what other goods and services does it forgo? Health care? Energy development?

Scarce Resources

Society has limited or scarce **economic resources**, meaning all natural, human, and manufactured resources that go into the production of goods and services. This includes the entire set of factory and farm buildings and all the equipment, tools, and machinery used to produce manufactured goods and agricultural products; all transportation and communication facilities; all types of labor; and land and mineral resources.

Resource Categories

Economists classify economic resources into four general categories.

Land Land means much more to the economist than it does to most people. To the economist **land** includes all natural resources (“gifts of nature”) used in the production process, such as arable land, forests, mineral and oil deposits, and water resources.

Labor The resource **labor** consists of the physical and mental talents of individuals used in producing goods and services. The services of a logger, retail clerk, machinist, teacher, professional football player, and nuclear physicist all fall under the general heading “labor.”

Capital For economists, **capital** (or capital goods) includes all manufactured aids used in producing consumer goods and services. Included are all factory, storage, transportation, and distribution facilities, as well as tools and machinery. Economists refer to the purchase of capital goods as **investment**.

Capital goods differ from consumer goods because consumer goods satisfy wants directly, whereas capital goods do so indirectly by aiding the production of consumer goods. Note that the term “capital” as used by economists refers not to money but to tools, machinery, and other productive equipment. Because money produces nothing, economists do not include it as an economic resource. Money (or money capital or financial capital) is simply a means for purchasing capital goods.

Entrepreneurial Ability Finally, there is the special human resource, distinct from labor, called **entrepreneurial ability**. The entrepreneur performs several functions:

- The entrepreneur takes the initiative in combining the resources of land, labor, and capital to produce a good or a service. Both a sparkplug and a catalyst, the entrepreneur is the driving force behind production and the agent who combines the other resources in what is hoped will be a successful business venture.
- The entrepreneur makes the strategic business decisions that set the course of an enterprise.
- The entrepreneur is an innovator. He or she commercializes new products, new production techniques, or even new forms of business organization.
- The entrepreneur is a risk bearer. The entrepreneur has no guarantee of profit. The reward for the entrepreneur's time, efforts, and abilities may be profits or losses. The entrepreneur risks not only his or her invested funds but those of associates and stockholders as well.

Because land, labor, capital, and entrepreneurial ability are combined to produce goods and services, they are called the **factors of production**, or simply “inputs.”

Production Possibilities Model

Society uses its scarce resources to produce goods and services. The alternatives and choices it faces can best be understood through a macroeconomic model of production possibilities. To keep things simple, let’s initially assume:

- **Full employment** The economy is employing all its available resources.
- **Fixed resources** The quantity and quality of the factors of production are fixed.
- **Fixed technology** The state of technology (the methods used to produce output) is constant.
- **Two goods** The economy is producing only two goods: pizzas and industrial robots. Pizzas symbolize **consumer goods**, products that satisfy our wants directly; industrial robots (for example, the kind used to weld automobile frames) symbolize **capital goods**, products that satisfy our wants indirectly by making possible more efficient production of consumer goods.

Production Possibilities Table

A production possibilities table lists the different combinations of two products that can be produced with a specific set of resources, assuming full employment. Table 1.1 presents a simple, hypothetical economy that is producing pizzas and industrial robots; the data are, of course, hypothetical. At alternative A, this economy would be devoting all its available resources to the production of industrial robots (capital goods); at alternative E, all resources would go to pizza production (consumer goods). Those alternatives are unrealistic extremes; an economy typically produces both capital goods and consumer goods, as in B, C, and D. As we move from alternative A to E, we increase the production of pizzas at the expense of the production of industrial robots.

TABLE 1.1 Production Possibilities of Pizzas and Industrial Robots

Type of Product	Production Alternatives				
	A	B	C	D	E
Pizzas (in hundred thousands)	0	1	2	3	4
Robots (in thousands)	10	9	7	4	0

Because consumer goods satisfy our wants directly, any movement toward E looks tempting. In producing more pizzas, society increases the current satisfaction of its wants. But there is a cost: More pizzas means fewer industrial robots. This shift of resources to consumer goods catches up with society over time because the stock of capital goods does not expand at the current rate, with the result that some potential for greater future production is lost. By moving toward alternative E, society chooses “more now” at the expense of “much more later.”

By moving toward A, society chooses to forgo current consumption, thereby freeing up resources that can be used to increase the production of capital goods. By building up its stock of capital this way, society will have greater future production and, therefore, greater future consumption. By moving toward A, society is choosing “more later” at the cost of “less now.”

Generalization: At any point in time, a fully employed economy must sacrifice some of one good to obtain more of another good. Scarce resources prohibit such an economy from having more of both goods. Society must choose among alternatives. There is no such thing as a free pizza, or a free industrial robot.

Production Possibilities Curve

The data presented in a production possibilities table are shown graphically as a **production possibilities curve**. Such a curve displays the different combinations of goods and services that society can produce in a fully employed economy, assuming a fixed availability of supplies of resources and constant technology. We arbitrarily represent the economy’s output of capital goods (here, industrial robots) on the vertical axis and the output of consumer goods (here, pizzas) on the horizontal axis, as shown in **Figure 1.2 (Key Graph)**.



G 1.1

Production possibilities curve

Each point on the production possibilities curve represents some maximum output of the two products. The curve is a “constraint” because it shows the limit of attainable outputs. Points on the curve are attainable as long as the economy uses all its available resources. Points lying inside the curve are also attainable, but they reflect less total output and therefore are not as desirable as points on the curve. Points inside the curve imply that the economy could have more of both industrial robots and pizzas if it achieved full employment of its resources. Points lying beyond the production possibilities curve, like *W*, would represent a greater output than the output

keygraph

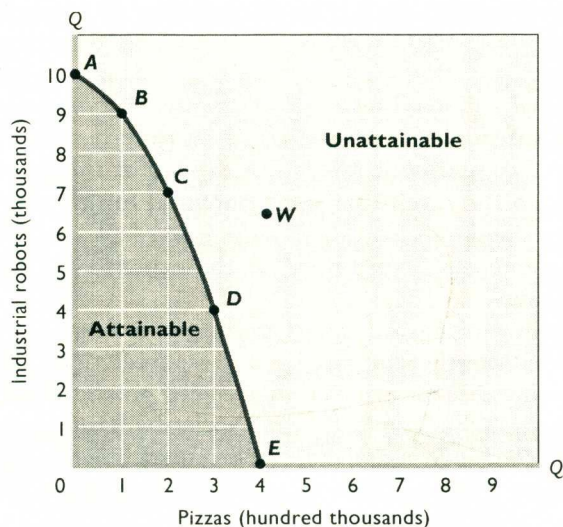


FIGURE 1.2 The production possibilities curve. Each point on the production possibilities curve represents some maximum combination of two products that can be produced if resources are fully employed. When an economy is operating on the curve, more industrial robots means less pizzas, and vice versa. Limited resources and a fixed technology make any combination of industrial robots and pizzas lying outside the curve (such as at *W*) unattainable. Points inside the curve are attainable, but they indicate that full employment is not being realized.

QUICK QUIZ 1.2

- Production possibilities curve *ABCDE* is bowed out from the origin because:
 - the marginal benefit of pizzas declines as more pizzas are consumed.
 - the curve gets steeper as we move from *E* to *A*.
 - it reflects the law of increasing opportunity costs.
 - resources are scarce.
- The marginal opportunity cost of the second unit of pizza is:
 - 2 units of robots.
 - 3 units of robots.
 - 7 units of robots.
 - 9 units of robots.
- The total opportunity cost of 7 units of robots is:
 - 1 unit of pizza.
 - 2 units of pizza.
 - 3 units of pizza.
 - 4 units of pizza.
- All points on this production possibilities curve necessarily represent:
 - society's optimal choice.
 - less than full use of resources.
 - unattainable levels of output.
 - full employment.

Answers: 1. c; 2. a; 3. b; 4. d

at any point on the curve. Such points, however, are unattainable with the current availability of resources and technology.

Law of Increasing Opportunity Cost

Figure 1.2 clearly shows that more pizzas means fewer industrial robots. The number of units of industrial robots that must be given up to obtain another unit of pizzas, of course, is the opportunity cost of that unit of pizzas.

In moving from alternative *A* to alternative *B* in Table 1.1, the cost of 1 additional unit of pizzas is 1 fewer unit of industrial robots. But when additional units are considered—*B* to *C*, *C* to *D*, and *D* to *E*—an important

economic principle is revealed: For society, the opportunity cost of each additional unit of pizzas is greater than the opportunity cost of the preceding one. When we move from *A* to *B*, just 1 unit of industrial robots is sacrificed for 1 more unit of pizzas; but in going from *B* to *C* we sacrifice 2 additional units of industrial robots for 1 more unit of pizzas; then 3 more of industrial robots for 1 more of pizzas; and finally 4 for 1. Conversely, confirm that as we move from *E* to *A*, the cost of an additional unit of industrial robots (on average) is $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$, and 1 unit of pizzas, respectively, for the four successive moves.

Our example illustrates the **law of increasing opportunity costs**. As the production of a particular good increases, the opportunity cost of producing an additional unit rises.

Shape of the Curve The law of increasing opportunity costs is reflected in the shape of the production possibilities curve: The curve is bowed out from the origin of the graph. Figure 1.2 shows that when the economy moves from *A* to *E*, it must give up successively larger amounts of industrial robots (1, 2, 3, and 4) to acquire equal increments of pizzas (1, 1, 1, and 1). This is shown in the slope of the production possibilities curve, which becomes steeper as we move from *A* to *E*.

Economic Rationale The economic rationale for the law of increasing opportunity costs is that economic resources are not completely adaptable to alternative uses. Many resources are better at producing one type of good than at producing others. Some land is highly suited to growing the ingredients necessary for pizza production, but as pizza production expands society has to start using land that is less bountiful for farming. Other land is rich in mineral deposits and therefore well-suited to producing the materials needed to make industrial robots. As society steps up the production of robots, it must use land that is less and less adaptable to making their components.

If we start at *A* and move to *B* in Figure 1.2, we can shift resources whose productivity is relatively high in pizza production and low in industrial robots. But as we move from *B* to *C*, *C* to *D*, and so on, resources highly productive of pizzas become increasingly scarce. To get more pizzas, resources whose productivity in industrial robots is relatively great will be needed. Increasingly more of such resources, and hence greater sacrifices of industrial robots, will be needed to achieve each 1-unit increase in pizzas. This lack of perfect flexibility, or interchangeability, on the part of resources is the cause of increasing opportunity costs for society. (**Key Question 10**)



W 1.2
Production possibilities

Optimal Allocation

Of all the attainable combinations of pizzas and industrial robots on the curve in Figure 1.2, which is optimal (best)? That is, what specific quantities of resources should be allocated to pizzas and what specific quantities should be allocated to industrial robots in order to maximize satisfaction?

Recall that economic decisions center on comparisons of marginal benefit (MB) and marginal cost (MC). Any economic activity should be expanded as long as marginal benefit exceeds marginal cost and should be reduced if marginal cost exceeds marginal benefit. The optimal

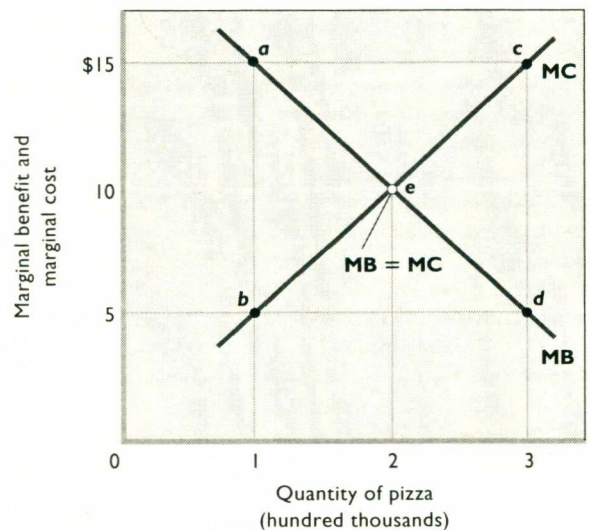
amount of the activity occurs where $MB = MC$. Society needs to make a similar assessment about its production decision.

Consider pizzas. We already know from the law of increasing opportunity costs that the marginal costs of additional units of pizzas will rise as more units are produced. We also know that we obtain extra or marginal benefits from additional units of pizzas. However, although economic wants in the aggregate are insatiable, the assumption that successive units of a particular product yield fewer additional benefits to society than prior units is reasonable.

The optimal quantity of pizza production is indicated by point *e* at the intersection of the MB and MC curves: 200,000 units in Figure 1.3. Why is this amount the optimal quantity? If only 100,000 units of pizzas were produced, the marginal benefit of an extra unit of them (point *a*) would exceed its marginal cost (point *b*). In money terms, MB is \$15, while MC is only \$5. When society gains something worth \$15 at a marginal cost of only \$5, it is better off. In Figure 1.3, net gains can continue to be realized until pizza-product production has been increased to 200,000.

In contrast, the production of 300,000 units of pizzas is excessive. There the MC of an added unit is \$15 (point *c*) and its MB is only \$5 (point *d*). This means that 1 unit of pizzas is worth only \$5 to society but costs it \$15 to obtain. This is a losing proposition for society!

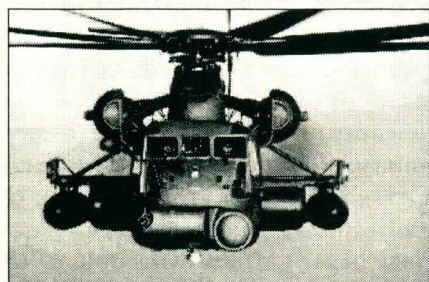
FIGURE 1.3 Optimal output: $MB = MC$. Achieving the optimal output requires the expansion of a good's output until its marginal benefit (MB) and marginal cost (MC) are equal. No resources beyond that point should be allocated to the product. Here, optimal output occurs at point *e*, where 200,000 units of pizzas are produced.



So resources are being efficiently allocated to any product when the marginal benefit and marginal cost of its output are equal ($MB = MC$). Suppose that by applying the same analysis to industrial robots, we find that the optimal ($MB = MC$) output of robots is 7000. This would

mean that alternative *C* (200,000 units of pizzas and 7000 units of industrial robots) on the production possibilities curve in Figure 1.2 would be optimal for this economy. (**Key Question 11**)

CONSIDER THIS ...



The Economics of War

Production possibilities analysis is helpful in assessing the costs and benefits of waging the broad war on terrorism,

including the wars in Afghanistan and Iraq. An October 2005 estimate places the total cost of these efforts, including rebuilding expenses, at \$350 billion.

If we categorize all U.S. production as either “defense goods” or “civilian goods,” we can measure them on the axes of a production possibilities diagram such as that shown in Figure 1.2. The opportunity cost of using more resources for defense goods is the civilian goods sacrificed. In a fully employed economy, more defense goods are achieved at the opportunity cost of fewer civilian goods—health care, education, pollution control, personal computers, houses, and so on. The cost of war and defense is the other goods forgone. The benefits are numerous and diverse but clearly include the gains from protecting against future loss of American lives, assets, income, and well-being.

Society must assess the marginal benefit (MB) and marginal cost (MC) of additional defense goods to determine their optimal amounts—where to locate on the defense goods–civilian goods production possibilities curve. Although estimating marginal benefits and marginal costs is an imprecise art, the MB–MC framework is a useful way of approaching choices. An optimal allocation of resources requires that society expand production of defense goods until $MB = MC$.

The events of September 11, 2001, and the future threats they foreshadowed increased the marginal benefits of defense goods, as perceived by Americans. If we label the horizontal axis in Figure 1.3 “defense goods” and draw in a rightward shift of the MB curve, you will see that the optimal quantity of defense goods rises. In view of the concerns relating to September 11, the United States allocated more of its resources to defense. But the MB–MC analysis also reminds us we can spend too much on defense, as well as too little. The United States should not expand defense goods beyond the point where $MB = MC$. If it does, it will be sacrificing civilian goods of greater value than the defense goods obtained.

QUICK REVIEW 1.3

- Economists categorize economic resources as land, labor, capital, and entrepreneurial ability.
- The production possibilities curve illustrates several ideas: (a) scarcity of resources is implied by the area of unattainable combinations of output lying outside the production possibilities curve; (b) choice among outputs is reflected in the variety of attainable combinations of goods lying along the curve; (c) opportunity cost is illustrated by the downward slope of the curve; (d) the law of increasing opportunity costs is implied by the bowed-outward shape of the curve.
- A comparison of marginal benefits and marginal costs is needed to determine the best or optimal output mix on a production possibilities curve.

Unemployment, Growth, and the Future

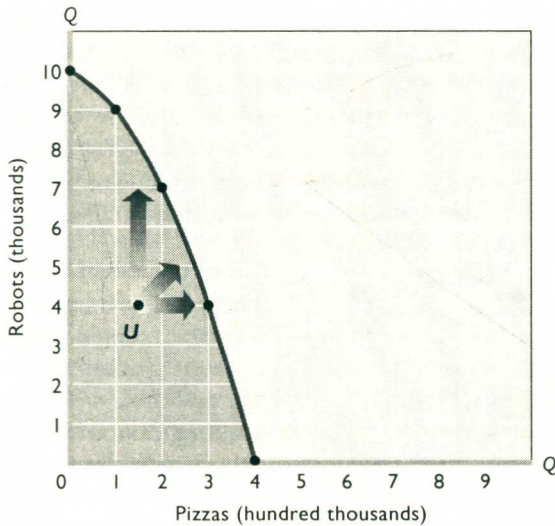
In the depths of the Great Depression of the 1930s, one-quarter of U.S. workers were unemployed and one-third of U.S. production capacity was idle. The United States has suffered a number of considerably milder downturns since then, the latest occurring in 2001. In that year total production fell one-half a percentage point and unemployment increased by about 2 million workers.

Almost all nations have experienced widespread unemployment and unused production capacity from business downturns at one time or another. Since 1995, for example, several nations—including Argentina, Japan, Mexico, Germany, and South Korea—have had economic downturns and unemployment.

How do these realities relate to the production possibilities model? Our analysis and conclusions change if we relax the assumption that all available resources are fully employed. The five alternatives in Table 1.1 represent maximum outputs; they illustrate the combinations of pizzas and industrial robots that can be produced when the economy is operating at full employment. With unemployment, this economy would produce less than each alternative shown in the table.

Graphically, we represent situations of unemployment by points inside the original production possibilities curve (reproduced here in Figure 1.4). Point *U* is one such point. Here the economy is falling short of the various maximum combinations of pizzas and industrial robots represented

FIGURE 1.4 Unemployment and the production possibilities curve. Any point inside the production possibilities curve, such as *U*, represents unemployment or a failure to achieve full employment. The arrows indicate that by realizing full employment, the economy could operate on the curve. This means it could produce more of one or both products than it is producing at point *U*.



by the points on the production possibilities curve. The arrows in Figure 1.4 indicate three possible paths back to full employment. A move toward full employment would yield a greater output of one or both products.

A Growing Economy

When we drop the assumptions that the quantity and quality of resources and technology are fixed, the production possibilities curve shifts positions and the potential maximum output of the economy changes.

Increases in Resource Supplies Although resource supplies are fixed at any specific moment, they change over time. For example, a nation's growing population brings about increases in the supplies of labor and entrepreneurial ability. Also, labor quality usually improves over time. Historically, the economy's stock of capital has increased at a significant, though unsteady, rate. And although some of our energy and mineral resources are being depleted, new sources are also being discovered. The development of irrigation programs, for example, adds to the supply of arable land.

The net result of these increased supplies of the factors of production is the ability to produce more of both consumer goods and capital goods. Thus 20 years from now, the production possibilities may supersede those shown in Table 1.1. The new production possibilities might look like those in the table in Figure 1.5. The

greater abundance of resources will result in a greater potential output of one or both products at each alternative. The economy will have achieved economic growth in the form of expanded potential output. Thus, when an increase in the quantity or quality of resources occurs, the production possibilities curve shifts outward and to the right, as illustrated by the move from the inner curve to curve *A'B'C'D'E'* in Figure 1.5. This sort of shift represents growth of economic capacity, which, when used, means **economic growth**: a larger total output.

Advances in Technology An advancing technology brings both new and better goods and improved ways of producing them. For now, let's think of technological advance as being only improvements in the methods of production, for example, the introduction of computerized systems to manage inventories and schedule production. These advances alter our previous discussion of the economizing problem by allowing society to produce more goods with available resources. As with increases in

FIGURE 1.5 Economic growth and the production possibilities curve. The increase in supplies of resources, improvements in resource quality, and technological advances that occur in a dynamic economy move the production possibilities curve outward and to the right, allowing the economy to have larger quantities of both types of goods.

Type of Product	Production Alternatives				
	A'	B'	C'	D'	E'
Pizzas (in hundred thousands)	0	2	4	6	8
Robots (in thousands)	14	12	9	5	0

