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Choice in a World of Scarcity

In November 1968, the Rolling Stones recorded a song called: “You Can’t Always Get What You Want.” But economists had already been singing a similar tune for many years. For example, an English economist named Lionel Robbins (1898–1984) wrote *An Essay on the Nature and Significance of Economic Science* in 1932, in which he described the problem of not always getting what you want in this way:

The time at our disposal is limited. There are only twenty-four hours in the day. We have to choose between the different uses to which they may be put. The services which others put at our disposal are limited. The material means of achieving ends are limited. We have been turned out of Paradise. We have neither eternal life nor unlimited means of gratification. Everywhere we turn, if we choose one thing we must relinquish others which, in different circumstances, we would wish not to have relinquished. Scarcity of means to satisfy given ends is an almost ubiquitous condition of human nature. Here then, is the unity of subject of Economic Science, the forms assumed by human behavior in disposing of scarce means.

Economics studies how every person, every firm, and every society must make choices, because none of them can have everything that they desire. Consider the problem faced by Ph.D. students in psychology, who are typically required to do an internship which, during the 2003–2004 academic year, had a salary of \$17,000 to \$22,000. In this situation of scarce resources, what choices should a student make about how much to consume of different goods? A publication of the American Psychological Association of Graduate Students proposed a sample budget for someone living on an internship that pays \$17,000. After taxes are paid,

this internship provides a monthly income of \$1,165. The suggested budget is for the student to spend \$500 on rent each month, along with \$200 on food, \$75 on utilities, \$80 on transportation, \$110 on insurance, \$100 on entertainment, and \$100 on miscellaneous other expenses like travel. Of course, some students will make different choices about how to allocate their income, while other students might borrow money to be repaid after graduation or try to earn some additional income. But making different choices about what to consume, how much to work, or how much to borrow does not eliminate the reality of scarcity and the need to make choices.

This chapter begins with a discussion of three broad categories of choices made by individuals and households: choices about which goods to consume, how many hours to work, and how much to borrow or save.⁴ Not coincidentally, these three categories of choices match the three main markets of microeconomics discussed in the circular flow diagram in Chapter 1: the markets for goods, labor, and financial capital. The chapter then discusses how firms also face a situation of scarcity, in the sense that they do not have the power to generate unlimited profits—or sometimes to earn any profit at all. The discussion then introduces a framework for thinking about society’s choices. For example, when the government produces a budget, it must make choices about how much to spend on different programs. Finally, the chapter discusses some concerns over whether the economic approach to facing scarcity and making choices describes accurately either how choices *are* actually made or how choices *should* be made.

Choosing What to Consume

People live in a world of scarcity: that is, they can’t have all the time, money, possessions, and experiences they wish. Since people must choose, they inevitably face trade-offs, in which they have to give up things that they desire to get other things that they desire more. When economists analyze how individuals make these choices, they divide the decision process into two steps. The first step is to consider what choices are possible for individuals. The second step is to think about which choices individuals actually make, based on their individual preferences. The model that economists use for illustrating the process of individual choice in a situation of scarcity is the **budget constraint**, sometimes also called the **opportunity set**, a diagram which shows what choices are possible.

budget constraint: A diagram which shows what choices are possible, given the prices.

opportunity set: Another name for the budget constraint.

A Consumption Choice Budget Constraint

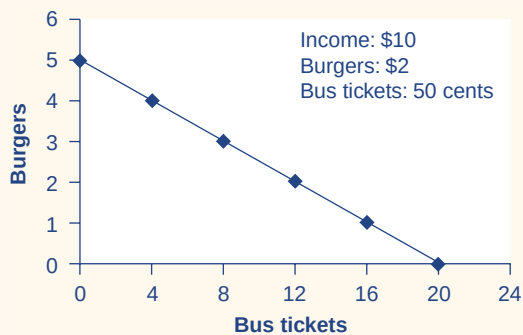
To illustrate how the budget constraint model applies to choices about how much of each good to consume, consider the case of Alphonso, illustrated in Exhibit 2-1. Each graph in Exhibit 2-1 shows a different combination of Alphonso’s income and the prices for two goods, burgers and bus tickets. In Exhibit 2-1a, Alphonso has \$10 in spending money each week that he can allocate between bus tickets for getting to work and the burgers that he eats for lunch. Burgers cost \$2 a piece, and bus tickets in Alphonso’s town are 50 cents. Different combinations of choices that are possible for Alphonso are shown in the table and also depicted graphically in the accompanying budget constraint. Each combination of burgers and bus tickets shown in the table and the budget constraint adds up to exactly \$10. Thus, the points along the budget constraint represent what consumption opportunities are possible for Alphonso.

Exhibit 2-1 Alphonso's Consumption Choice Opportunity Set

Each point on the opportunity set represents a combination of burgers and bus tickets whose total cost adds up to Alphonso's income of \$10. The slope of the budget line is determined by the relative price of burgers and bus tickets. All along the budget set, giving up a burger means gaining four bus tickets.

If Alphonso's income increases from \$10 to \$12, his opportunity set shifts to the right of the original budget set. The lower line is the original budget set, and the upper line is the new budget set. On the new budget set, each combination of burgers and bus tickets now adds up to a total cost of \$12. However, because the trade-off of burgers for bus tickets is unchanged—still one burger for every four bus tickets—the slope of the budget line is unchanged.

In this case, Alphonso's income remains at \$10, as in (a), but the cost of bus tickets rises from 50 cents to \$1. This change causes the budget set to swing inward, as if on a hinge at the upper left. If Alphonso wishes to purchase only burgers, the change in price of bus tickets doesn't alter how many he can buy. However, giving up a burger now adds only two bus tickets, not four. The budget line slopes more steeply as a result.



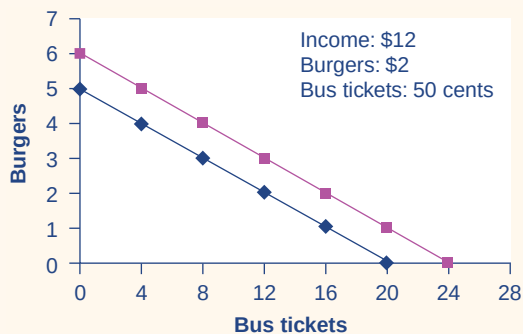
(a) First set of choices: Total income \$10.

Quantity of Burgers
(at \$2)

0
1
2
3
4
5

Quantity of Bus Tickets
(at 50 cents)

20
16
12
8
4
0



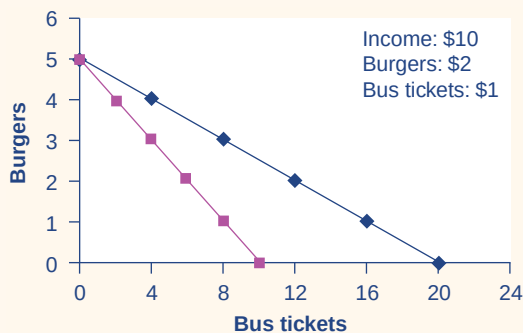
(b) Second set of choices: Total income \$12.

Quantity of Burgers
(at \$2)

0
1
2
3
4
5
6

Quantity of Bus Tickets
(at 50 cents)

24
20
16
12
8
4
0



(c) Third set of choices: Total income \$10.

Quantity of Burgers
(at \$2)

0
1
2
3
4
5

Quantity of Bus Tickets
(at \$1)

10
8
6
4
2
0

CLEARING IT UP**Sketching Budget Constraints**

As an economics student, you will need to know how to sketch budget constraints quickly and accurately. Here's a suggestion for how to do it: Start by calculating how much of each good the person could buy if the person were not buying any of the other good. This calculation will determine the points on the two axes of the budget constraint. Because the trade-off between burgers and bus tickets does not change in Alphonso's case, it's always one burger for four bus tickets—the other points then line up in a straight line between these choices.

How Changes in Income and Prices Affect the Budget Constraint

Changes in income will alter the budget constraint. For example, say that Alphonso's spending money increases to \$12 per week. Exhibit 2-1b shows both his original budget constraint and his new budget constraint. In the new budget constraint, each combination of burgers and bus tickets at the given prices now adds up to \$12. A higher income level means that the budget constraint will be to the right of the original budget constraint; conversely, a lower income level means that the budget constraint will lie to the left of the original budget constraint.

Now suppose Alphonso's income remains the same, but the price of one of the goods increases. Changes in the price of goods will affect Alphonso's budget constraint. In other words, his income level stays at \$10 per week, but the price of bus tickets rises to \$1 each, while the price of burgers remains at \$2. Exhibit 2-1c shows how this change in price alters the budget constraint. A higher price for one good causes a budget constraint to shift inward; more specifically, the budget constraint swings inward as if on a hinge attached to the vertical axis or the horizontal axis—depending on which good's price has risen. Conversely, a lower price for one good would lead to an outward shift of the budget constraint.

A change in income causes the budget constraint to shift so that the new budget constraint is parallel to the original. However, a change in prices causes the slope of the budget constraint to change so that the budget constraint is steeper or flatter. Why are the effects different? The slope of the budget constraint is determined by the relative price of the two goods, which is calculated by taking the price of one good and dividing it by the price of the other good. The *relative price* conveys the trade-off between the two goods, burgers and bus rides. In Alphonso's first budget constraint in Exhibit 2-1a, if he gives up one burger, he can take four additional bus trips because the price of a burger is four times the price of a bus trip (that is, \$2 versus 50 cents). The slope of this budget constraint shows that a loss of 1 burger equals a gain of 4 bus tickets. In Exhibit 2-1b, income changes but the relative prices of the two goods don't change, and so the slope of the budget constraint doesn't change either. In Exhibit 2-1c, however, giving up one burger means gaining only two bus trips (that is, \$2 versus \$1), and so the slope of the budget constraint changes to a loss of 1 burger means a gain of only 2 bus tickets.

Personal Preferences Determine Specific Choices

What choice will Alphonso make along his budget constraint? The answer is simple: Alphonso will choose what he personally prefers. In economics, **utility** refers to the level of satisfaction or pleasure that people receive from their choices. Thus, when people make the choices that provide the highest level of satisfaction, economists say that they are "maximizing utility." In Alphonso's case, if he prefers to sit at home and eat,

utility: The level of satisfaction or pleasure that people receive from their choices.

The Origins of Economic Utility

In the late eighteenth century, a philosopher and occasional economist named Jeremy Bentham (1748–1832) constructed a philosophy called “utilitarianism,” which was based on the “happiness principle” that all of society’s decisions ought to be made according to the amount of pleasure and pain that they cause individuals. Bentham wrote: “The greatest happiness of the greatest number is the foundation of morals and legislation.”

Utilitarianism may not sound very radical, but consider some of its implications for the world of the late eighteenth and early nineteenth century. The utilitarian philosophy did not say that the happiness of a king, queen, or member of the nobility was more important than the happiness of an

average person. It did not place the happiness of men above the happiness of women. It did not say that the happiness of the unemployed, criminals, children, or the poor was any less important than the happiness of anyone else.

Bentham was the unofficial leader of a group called the Philosophical Radicals, who favored voting rights for all with a secret ballot, government programs to provide jobs for the unemployed, government-run banks to help the poor save money, better conditions in prisons, limits on child labor, and—important to economists—market competition and free trade among countries. The Philosophical Radicals weren’t always right, but at least by modern standards, they were on the side of the angels more often than not.

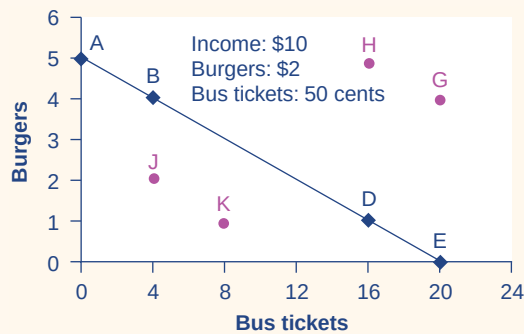


Exhibit 2-2 Personal Preferences Determine the Actual Choice

If Alphonso likes burgers a lot, he will probably choose points *A* or *B*. If he likes bus tickets a lot, he will probably choose points *D* or *E*. Points *H* and *G* beyond the opportunity set are unattainable, given his level of income, no matter how much Alphonso might like them. Points *J* and *K* would be wasteful. For example, rather than choosing point *J*, he could have both more burgers and the same number of bus tickets at point *B*. Similarly, instead of choosing point *K*, he could have the same number of burgers but many more bus tickets at point *D*.

he buys a lot of burgers and chooses some point like *A* or *B* on the budget constraint in Exhibit 2-2. If he prefers to travel around town, he buys lots of bus tickets and chooses some point like *D* or *E* on the budget constraint. It’s Alphonso’s choice.

However, the logic of the budget constraint dictates that Alphonso’s choice will be a point on the actual budget constraint itself: choice *B* with four burgers and four bus tickets—not a choice that is above the budget set or below it. Alphonso might desire a point like *H* in Exhibit 2-2 with five burgers and 16 bus tickets, offering more of both goods than choice *B*. However, choice *H* is outside the budget constraint, which means that Alphonso can’t afford it. Conversely, Alphonso won’t choose a point like *J* with two burger and four bus tickets, which is inside the boundary of the budget constraint, because he could instead select a choice on the budget set itself like *B* that would have at least as much of one good and more of the other—or a choice that would offer even more of both goods. In this simple model, Alphonso doesn’t have any other goods on which to spend his money, and so if he doesn’t spend his money, it is wasted.

The budget constraint diagram shows what choices are possible, but it does not specify which choice is made. If two people have the same income and face the same prices, then they have identical budget constraints; but if those two people have different personal preferences, they can still make very different choices.

From a Model with Two Goods to the Real World of Many Goods

The budget constraint diagram containing just two goods may seem so simple as to be simple-minded. In a modern economy, people choose from thousands of goods, not just two.

However, thinking about a model with many goods is straightforward. Instead of drawing just one budget constraint, showing the trade-off between two goods, you can draw multiple budget constraints, showing the possible trade-offs between many different pairs of goods. Or in more advanced classes in economics, you would start using mathematical equations that include many possible goods and services that can be purchased, together with their quantities and prices, and show how the total spending adds up to the overall amount of money available. However, the graph with two goods clearly illustrates three basic concepts: (1) how the shape of a budget constraint is determined by income and prices; (2) how changes in income or relative prices cause a budget constraint to shift; and (3) how the personal preferences of an individual are represented by the point that is chosen on the budget constraint.

Choosing Between Labor and Leisure

The budget constraint applies to the labor-leisure choice just as it does to the decision of what quantity of goods to consume. But in the labor-leisure budget constraint, the decision isn't about what quantities of goods to buy, given a limited amount of income; instead, it's about what number of hours to work, given the limited number of hours in a day. Again, the first step is to use the budget constraint to show what is possible, while the second step is for each individual to make their personally preferred choice that maximizes utility.

An Example of a Labor-Leisure Budget Constraint

Beulah has a job as an assistant manager of a fast-food restaurant. She can work as many as 60 hours per week if she chooses. Of course, most people don't have jobs that let them choose exactly how many hours to work each week; but most people have at least have some flexibility about whether to look for a part-time or a full-time job or whether to work overtime or take on a second job. Thus, it isn't unreasonable to imagine people making choices about the number of hours they work. Exhibit 2-3 shows two of Beulah's labor-leisure budget constraints.

In Exhibit 2-3a, Beulah's wage is \$9 per hour. The table and the budget constraint show the trade-off that she faces between income and leisure. Because Beulah receives an hourly wage, the more hours she works, the more her income rises and her leisure diminishes. The horizontal axis of the exhibit measures both labor hours and leisure hours *at the same time*, but in opposite directions. The quantity of hours of leisure is measured from left to right, while the quantity of hours of labor is measured from right to left. Since Beulah has a total of 60 hours available that she could work, the horizontal axis shows how she divides up this time between leisure and work.

How a Change in Wages Affects the Labor-Leisure Budget Constraint

A change in the wage will shift Beulah's budget constraint. If her wage rises to \$11 per hour, perhaps because she has gained more experience or training, then the

The labor-leisure budget constraint involves illustrating three factors—hours of labor, hours of leisure, and dollars of income—on two axes. This illustration only works because both the hours of labor and leisure appear on the horizontal axis. After all, all leisure means no labor, and all labor means no leisure. On the horizontal axis, hours of leisure are measured from left to right, but hours of labor are measured from right to left. The trade-off here is between the two goods of leisure and income because labor is not a “good” in itself but instead a mechanism for earning income.

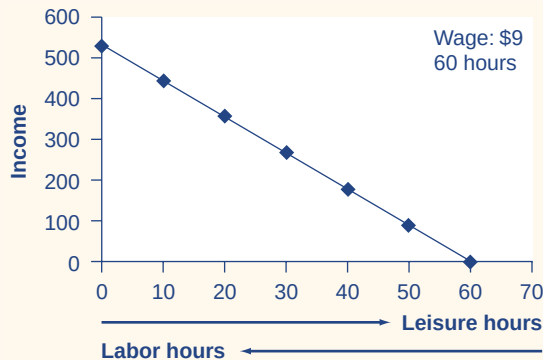
CLEARING IT UP

Measuring Labor and Leisure on the Same Axis

Exhibit 2-3 Beulah’s Labor-Leisure Opportunity Set

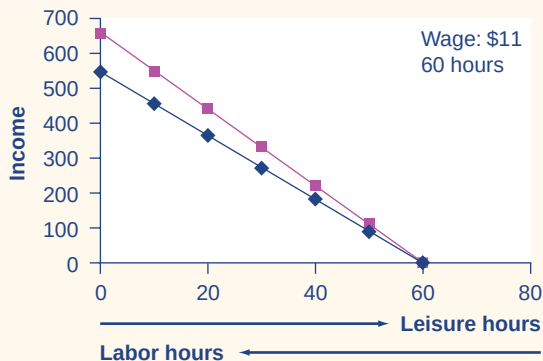
(a) The points on the opportunity set show what combinations of leisure and income that Beulah can have with her 60 hours of time, given that she can earn a wage of \$9 per hour. The trade-off between leisure and income, which is the wage \$9 per hour, determines the slope of the line.

(b) If Beulah’s wage increases from \$9 per hour to \$11 per hour, her 60 hours of time has not changed, but the trade-off that she faces between leisure and income has changed. With the higher wage, giving up a certain number of hours of leisure brings a higher income, so the budget set rotates upward.



Hours worked	Leisure time	Income
0	60	\$0
10	50	\$90
20	40	\$180
30	30	\$270
40	20	\$360
50	10	\$450
60	0	\$540

(a) First set of choices: Wage \$9 per hour.



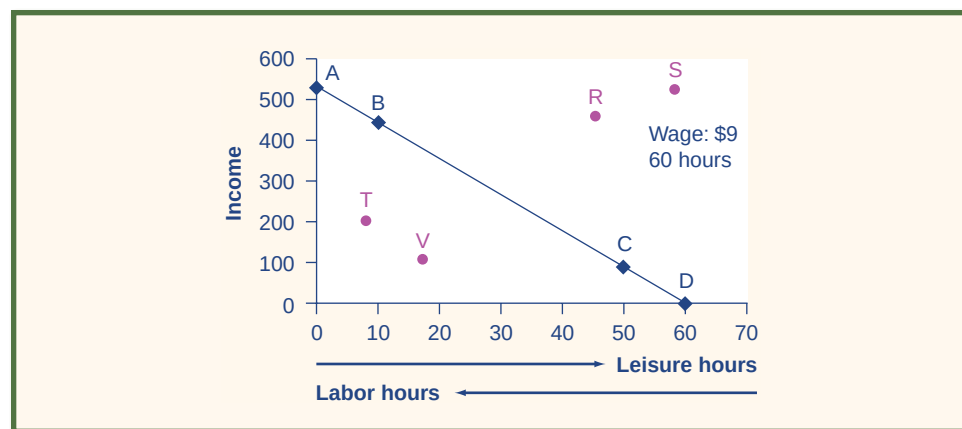
Hours worked	Leisure time	Income
0	60	\$0
10	50	\$110
20	40	\$220
30	30	\$330
40	20	\$440
50	10	\$550
60	0	\$660

(b) Second set of choices: Wage \$11 per hour.

trade-offs that she faces change as well. Both her original budget constraint and her new set of trade-offs are shown in Exhibit 2-3b. A new wage changes the slope of the budget constraint because a new wage means a different trade-off between hours of leisure and income.

Exhibit 2-4 Beulah's Personal Choice on a Labor-Leisure Opportunity Set

If Beulah strongly prefers income, she will work a lot of hours and choose a point like *A* or *B*. If she strongly prefers leisure, she will work few hours and make a choice like *C* or *D*. Given that she has 60 hours of time and a wage of \$9 per hour, she cannot choose points like *R* or *S* that are outside her budget set. Points like *T* or *V* inside her budget set would be wasteful; they would be like giving up hours of leisure but not being paid.



Making a Choice Along the Labor-Leisure Budget Constraint

Living in a world of scarcity—no one has more than 24 hours in a day—requires that people must make choices about how to spend their time, but the fact of scarcity doesn't dictate what choices they make. In deciding how many hours to work, Beulah will make a choice that maximizes her utility; that is she will choose according to her preferences for leisure time and income. If she chooses to work 60 hours per week, she will have more income to spend on food, rent, clothing, cars, vacations, or other material goods. However, if she prefers leisure time over material satisfactions, she may choose to work fewer hours so that she has more time for family, friends, and low-cost hobbies such as reading or yoga. Exhibit 2-4 illustrates both possibilities. If Beulah prefers a relatively high level of income, then she will choose a point close to *A*, with \$540 of income, 60 hours of work and no leisure. If she prefers instead a relatively high level of leisure, she might choose a point like *C* with 50 hours of leisure, 10 hours of work, and \$90 in income.

Beulah might desire a combination of income and leisure that is outside her budget constraint; for example, she would probably like to have both 60 hours of leisure and \$540 of income, which is the choice shown at point *S*. However, the budget constraint shows the limits of what choices are possible, given the wage and hours available, and choices beyond the budget constraint are not possible. Moreover, Beulah will not choose a point inside the budget constraint like *T*, which is 50 hours of labor, 10 hours of leisure, and \$200 of income. In effect, a choice like *T* would mean that Beulah was working for only \$4 per hour (that is, \$200 of income divided by 50 hours of work), when she can actually earn a wage of \$9 per hour. Thus, the labor-leisure budget constraint illustrates: (1) how the budget set of possible choices for leisure and income are determined by the wage rate and the total quantity of hours that can be worked; (2) how changes in the wage rate cause the budget constraint to shift; and (3) how the personal preferences of an individual for choosing between leisure and income are represented by the point that is chosen on the budget constraint.

Choosing Between Present and Future Consumption

An intertemporal choice reaches across time. Borrowing money is an intertemporal choice, because it involves borrowing money to spend in the present but promising to repay in the future. Saving money is also an intertemporal choice, because it involves less consumption

in the present, but the ability to consume more in the future. The intertemporal choice budget constraint shows the trade-off between present and future consumption.

Interest Rates: The Price of Intertemporal Choice

In the consumption choice budget constraint, the trade-off between goods is determined by the relative prices of the two goods. In the labor-leisure budget constraint, the trade-off between leisure and income is based on the wage. In the intertemporal choice budget constraint, the trade-off between present consumption and future consumption is based on the interest rate or the rate of return. The price of borrowing money is the interest that you pay on the loan. The reward for saving money is the interest that you receive. Interest rates are worth more discussion, because they may seem less familiar or more complicated than other prices.

The key to understanding the economic function of interest rates is to recognize that \$100 you will receive in the future has less economic value than \$100 you receive today. Imagine that a friend owes you \$100, and when the time comes to pay, the friend says: “Hey, no problem, I’ll have the money for you in five years.” You protest, and your supposed friend says, “Hey, it’s still the same \$100, so you are still getting repaid in full, so what are you complaining about?” You probably aren’t going to persuade this loser, your former friend, to repay you sooner, but you can offer three arguments as to why \$100 in the future doesn’t have the same value as \$100 today:

1. *Risk of not being repaid.* The future is uncertain. Your friend could get hit by a bus. You could get hit by a bus. (The way this friendship is going, you could run over your former friend with a bus.) Having \$100 in your pocket is a sure thing. Having a promise of \$100 is uncertain. Anytime someone borrows money, whether the lender is a friend or a bank, the lender must be concerned about the risk of not being repaid. Part of the interest rate is a **risk premium**, that is, a payment to make up for the risk of not being repaid in full.
2. *Inflation.* In most years, there is a rise in the price level called **inflation**. In recent U.S. history, this increase has typically been 1-3% per year, but in some other countries the rate of inflation has been much higher. If the overall level of prices rises by 3% then on average a dollar will buy 3% less in terms of goods and services at the end of the year. If that 3% is being subtracted each year from the buying power of the currency, then being repaid \$100 in the future will provide less buying power than receiving the money immediately. A lender demands an interest rate in part to compensate for any expected inflation, so that the money that is repaid in the future will have at least as much buying power as the money that was originally loaned. (The concept of inflation, along with its underlying causes and policy solutions, is discussed at length in the macroeconomics section of the book.)
3. *Time value of money.* Even if you knew with complete certainty that the \$100 will be repaid in the future, and even if the rate of inflation is zero, it is still annoying to wait several years for repayment. If you have the money now, you can spend it on something now if you wish to do so and receive benefits from that spending. Being forced to wait is an intangible cost, but still a cost. This cost of having to wait is referred to as the **time value of money**.

Thus, when explaining to your friend why you should receive interest payments if you need to wait five years for your money, you can point out that an interest rate has three components:

risk premium: A payment to make up for the risk of not being repaid in full.

inflation: Rise in the overall level of prices.

time value of money: The cost of having to wait for repayment.

$$\text{Interest rate} = \text{Risk premium} + \text{Expected rate of inflation} + \text{Time value of money.}$$

In effect, interest payments are a compensation for the risk of not being repaid, the fact that inflation tends to reduce the buying power of money over time, and the unpleasantness of having to wait to have money available.

Thinking about these three components of interest rates helps to explain why interest rates differ across times and places. At times and places when inflation is high, interest rates will also be high. Differences in interest rates at a point in time can usually be traced to the different risk premiums involved. For example, when the U.S. government borrows money the interest rate is quite low, perhaps an annual rate of 3–4%, because the chance that the federal government will not repay what it has borrowed is quite low. A large corporation might pay an annual interest rate of 6–7% because, although the firm is still unlikely not to pay back the loan, the risk is greater than with a federal government. A medium-size or small firm would pay a still higher interest rate because it has a greater risk of not repaying the loan. Individuals pay a relatively low interest rate when they borrow money from a bank to purchase a home because the bank (the lender) does a careful credit check before lending any money in the first place. The credit check ensures that a home buyer has the financial means to cover the cost; if the buyer is unable to meet the payments, the bank can take the house and sell it. However, individuals pay a higher interest rate on credit card borrowing because there is a greater risk that such loans will not be repaid.

The Power of Compound Interest

Interest rates are usually expressed in annual terms. For example, an annual interest rate of 7% means that if you borrow \$100 you will need to repay \$107 a year from now, or if you save \$100 you will receive \$7 in interest payments a year from now. But what if you are planning to save money for a period of many years, allowing the interest to accumulate over time? The formula for starting with a certain amount of money in the present, and a certain interest rate or rate of return, and figuring how much it would be worth at a date in the future is:

$$(\text{Amount at present}) \times (1 + \text{interest rate})^{\text{number of years}} = \text{Amount at future time}$$

For example, Christopher is planning to make a financial investment of \$500. He will put this money in a savings account that pays an interest rate of 6% annually and leave it in the account for some years as the interest accumulates.

Exhibit 2-5 applies this formula for Christopher and shows what his financial investment would be worth at various dates in the future. Notice that if he leaves the financial investment alone for 20 years, the original \$500 will more than triple in value to \$1,603; if he leaves the financial investment alone for 40 years, it will increase more than 10-fold to \$5,143. How can a seemingly moderate interest rate like 6% per year produce such large increases? The answer lies in the power of **compound interest**, which refers to the situation when interest payments are allowed to accumulate, so that in later time periods, the interest rate is paid not only on the original amount, but also on the interest that has been earned in previous years. In the equation for how a financial investment increases in value over time, the number of years is an exponent. When quantities are raised to high exponential powers, they will eventually expand very quickly. The exponent represents the power of compound interest—as time goes by, Christopher is not just earning interest on his original \$500, but also on the earlier interest he earned. If interest rates are relatively low, compound interest doesn't make

compound interest: When interest payments accumulate, so that in later time periods, the interest rate is paid on the interest that has been earned and reinvested in previous years.

Starting with \$500, interest rate of 6%

After 1 year	$\$500 (1 + .06)^1 = \$530$	After 10 years	$\$500 (1 + .06)^{10} = \$895$
After 2 years	$\$500 (1 + .06)^2 = \$562$	After 20 years	$\$500 (1 + .06)^{20} = \$1,603$
After 5 years	$\$500 (1 + .06)^5 = \$669$	After 40 years	$\$500 (1 + .06)^{40} = \$5,143$

Exhibit 2-5

Christopher's Potential Savings

much of a practical difference over a short time period of a few years. But over several decades, even a relatively low interest rate will compound in way that yields significant returns on the initial financial investment.

An Example of Intertemporal Choice

Consider the case of Desdemona, who is lucky enough to receive a gift of \$10,000 from a wealthy aunt. She faces a choice: how much money should she consume now, and how much should she save for future consumption? Again, the first step is to use the budget constraint to show the range of possible choices, while the second step is to illustrate the individually preferred choice that maximizes her utility.

In the intertemporal choice budget constraint, the two axes represent consumption in the present and consumption in the future. Let's assume that if Desdemona saves some of the money, she can earn an annual interest rate of 9% for the next 10 years. Exhibit 2-6 shows Desdemona's choices in both a table and a budget constraint. The levels of future consumption that are available to her 10 years from now are calculated by using the formula for compound interest. At one extreme, she can consume all of the \$10,000 in the present and have nothing left in the future. At the other extreme, she can save the entire \$10,000, consume none of it in the present, and have \$23,673 to spend 10 years from now.

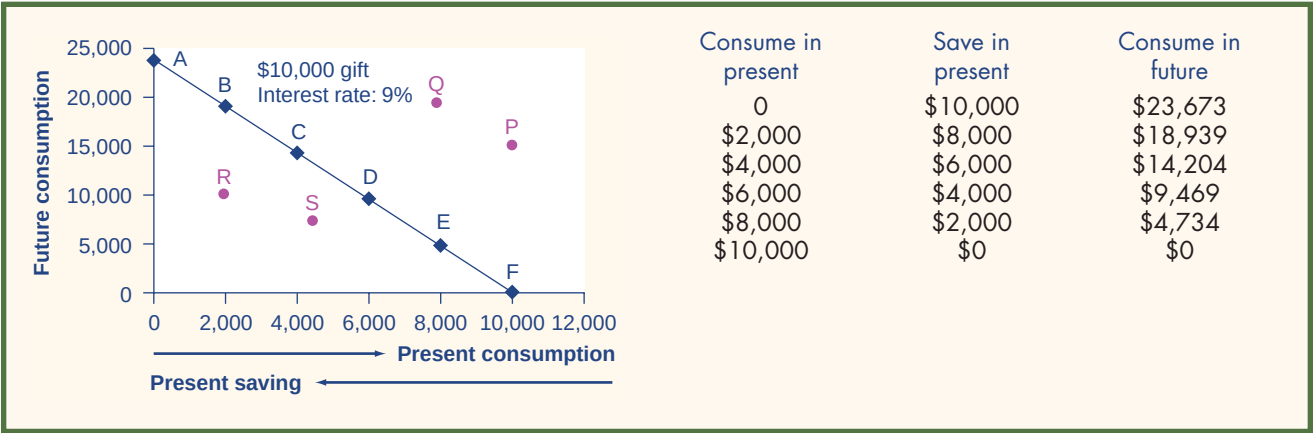
In Exhibit 2-6, both present consumption and present savings are shown on the horizontal axis. Consumption is measured from left to right; saving is measured from right to left. In effect, the horizontal axis shows how the income that is available in the present is divided into either consumption or savings. (This approach applies the same logic as the way in which hours of labor and leisure were both shown on the horizontal axis in the labor-leisure budget constraint.) If the interest rate rises, then the budget constraint has a steeper slope; a lower interest rate causes the budget constraint to shift downward to a flatter slope.

Desdemona will seek to maximize her utility and choose the option that brings her the greatest degree of satisfaction. Inevitably, this choice will be one of the points on the budget constraint such as *A*, *B*, *C*, *D*, *E*, or *F*. Even if Desdemona wants to choose a point like *Q*, with \$8,000 of consumption in the present, \$2,000 of savings, and \$20,000 of future consumption high, she can't have it because choice *Q* is outside her budget constraint. Moreover, Desdemona will not choose a point inside the budget constraint like *R*, with \$2,000 in present consumption and \$10,000 in future consumption because such a choice would be like throwing away money. Instead of choosing *R*, Desdemona would certainly prefer a choice like *C* with more consumption in both the present and the future.

In the real world, the trade-off between present and future consumption is considerably more complex than the basic intertemporal budget constraint shown here. Instead of making one decision in the present about whether to consume now or save for 10 years from now, people receive income in many different years and make decisions about how much to save over different periods of time. Moreover, financial investments

Exhibit 2-6 Desdemona’s Intertemporal Budget Constraint

The points along the budget set represent the combinations of present and future consumption that are available to Desdemona, based on her inheritance of \$10,000 and an interest rate of 9% per year. The trade-off between present consumption and future consumption—and thus the slope of the budget line—is determined by the interest rate. Choices like Q or P are unavailable to Desdemona, even if she would like them. She will not make choices like R or S because they give up present consumption without taking future consumption, which would be wasteful. Thus, she will choose among points like A through F, based on her personal preferences.



usually don’t pay a guaranteed rate of return, so people need take into account the risk and uncertainty of investments. Later chapters will take up the details of financial investing in greater detail. But the basic intertemporal budget constraint here illustrates three themes: (1) how the budget constraint of possible choices for present and future consumption are determined by the quantity of income in the present and the interest rate; (2) how changes in the interest rate will cause the intertemporal budget constraint to shift; and (3) how the personal preferences of an individual for present and future consumption are represented by the point that is chosen on the intertemporal budget constraint.

Three Implications of Budget Constraints: Opportunity Cost, Marginal Decision-Making, and Sunk Costs

When the budget constraint framework is examined carefully it has a number of implications for how a sensible utility-maximizing individual will make decisions. Let’s now draw out three of those implications, involving *opportunity cost*, *marginal decision making*, and *sunk costs*.

Opportunity Cost

When most people want to know the cost of an item or a service, they look for a price tag. When economists want to determine cost, they go one step further. They use the idea of **opportunity cost**, which is whatever must be given up to obtain something that is desired. In the examples discussed earlier, if Alphonso wants more burgers, the opportunity cost is measured in bus tickets; if he wants more bus tickets, the opportunity cost is measured in burgers. In Beulah’s labor-leisure choice, if she wants more income,

opportunity cost:
Whatever must be given up to obtain something that is desired.

Opportunity Cost in the Airport

After the terrorist plane hijackings on September 11, 2001, many steps were proposed to improve air travel safety. For example, the federal government could provide armed “sky marshals” who would travel inconspicuously with the rest of the passengers. The cost of having a sky marshal on every flight would approach \$3 billion per year. In addition, having the federal government take over all airport security screening would cost about \$1 billion per year. Retrofitting all U.S. planes with reinforced cockpit doors to make it harder for terrorists to take over the plane would have a price tag of \$450 million. Buying more sophisticated security equipment for airports, like three-dimensional baggage scanners and cameras linked to face recognition software, could cost another \$2 billion.

But the single biggest cost of greater airline security doesn’t involve spending money. It’s the opportunity cost of

additional waiting time at the airport. About 600 million plane trips are taken in the United States in a given year.[†] Since the 9/11 hijackings, security screening has become more intensive, and consequently, the procedure takes longer than in the past. Say that, on average, each air passenger spends one extra hour in the airport. Economists commonly place a value on time to convert an opportunity cost in time into a monetary figure. Because many air travelers are relatively high-paid business people, conservative estimates set the average price of time for air travelers at \$20 per hour. By these estimates, the opportunity cost of delay in airports is 600 million hours $\times$ 20 dollars/hour, or \$12 billion per year. Clearly, the opportunity costs of waiting time can exceed the costs that involve direct spending.

the opportunity cost is hours of leisure; if she wants more leisure time, the opportunity cost is dollars of income. In Desdemona’s intertemporal choice, the opportunity cost of greater consumption in the present is less consumption in the future and vice versa. The idea of opportunity cost, as its name implies, is that the cost of one item is the lost opportunity to do or consume something else.

In many cases, it is reasonable to refer to the opportunity cost as the price. If your cousin buys a new bicycle for \$300, then \$300 measures the amount of “other consumption” that he has given up. For practical purposes, there may be no special need to identify the specific alternative product or products that could have been bought with that \$300, but sometimes the price as measured in dollars may not accurately capture the true opportunity cost. This problem can loom especially large when costs of time are involved. For example, consider a boss who decides that all employees will attend a two-day retreat to “build team spirit.” The out-of-pocket monetary cost of the event may involve hiring an outside consulting firm to run the retreat. But an opportunity cost exists as well: during the two days of the retreat, none of the employees are doing any other work. Attending college is another case where the opportunity cost exceeds the monetary cost. The out-of-pocket costs of attending college include tuition, books, room and board, and other expenses. But in addition, during the hours that you are attending class and studying, it is impossible to work at a paying job. Thus, college imposes both an out-of-pocket cost and an opportunity cost of lost earnings—and both costs should be taken into account.

In some cases, making the opportunity cost explicit can alter behavior. Imagine, for example, that you are an employee who goes out to lunch every day and spends \$8 at a local restaurant. You may know perfectly well that bringing a lunch from home would only cost \$3 a day, but somehow referring to the opportunity cost of buying lunch at the restaurant as \$5 each day (that is, the \$8 it costs minus the \$3 your lunch from home would cost) doesn’t seem to matter much. However, if you work 250 days a year, that \$5 per day adds up to \$1,250 for a year—which is the cost of a pretty nice vacation. If the opportunity cost is described as “a nice vacation” instead of “\$5 a day,” you might make different choices.

Can Economics Take Pride in Being the “Dismal Science”?

Economics is often called the dismal science. Yet few people would toss that phrase around so easily if they knew its origin. The “dismal science” phrase originated with British essayist Thomas Carlyle (1795-1881). In an 1849 article, Carlyle described the study of “political economy,” as economics was then called, as a “dreary, desolate and indeed quite abject and distressing one; what we might call, by way of eminence, the *dismal science*.”

This put-down has echoed through time. But not many people know *why* Carlyle disliked economics. The “dismal science” comment appeared in his essay “Occasional Discourse on the Negro Question.” In that essay, Carlyle made the racist argument that white landowners should

compel black people in the West Indies to give up their natural laziness and instead to work hard and have some purpose in their otherwise meaningless lives. Carlyle didn’t just believe that black people should be ordered around by whites; he believed that all the “weak” people, black and white alike, should be compelled by the strong to do “the work they were appointed for,” as he put it.

Carlyle thought economics was the “dismal science” because it rested on the assumption that people, regardless of race and social status, were best suited to make their own decisions about their own lives. Carlyle’s insult is one that economists can wear with pride.

marginal analysis:

Comparing the benefits and costs of choosing a little more or a little less of a good.

Marginal Decision-Making and Diminishing Marginal Utility

The budget constraint framework helps to emphasize that most choices in the real world aren’t about getting all of one thing or all of another; that is, they aren’t about choosing either the point at one end of the budget constraint or else the point all the way at the other end. Instead, most choices involve **marginal analysis**, which involves comparing the benefits and costs of choosing a little more or a little less of a good.

The utility that a person receives from consuming the first unit of a good is typically more than the utility received from consuming the fifth or the tenth unit of that same good. When Alphonso makes his choice between burgers and bus tickets, for example, the first few bus rides that he chooses might provide him with a great deal of utility—perhaps they help him get to a job interview or a doctor’s appointment. But later bus rides might provide much less utility—they may only serve to kill time on a rainy day. Similarly, the first burger that Alphonso chooses to buy may be on a day when he missed breakfast and is ravenously hungry. However, if Alphonso has a burger every single day, the last few burgers may taste pretty boring. Similarly, if Beulah is working 60 hours per week and thinking about whether to take a few hours of leisure, that break may provide her with a great deal of utility. But if she is working only 10 hours a week, with 50 hours of leisure already, then taking a few more hours of leisure seems likely to provide much less utility.

The general pattern that consumption of the first few units of any good tends to bring a higher level of utility to a person than consumption of later units is a common pattern. Economists refer to this pattern the **law of diminishing marginal utility**, which means that as a person receives more of a good, the additional or marginal utility from each additional unit of the good declines.

The law of diminishing marginal utility explains why people and societies rarely make all-or-nothing choices. You wouldn’t say, “My favorite food is (say) ice cream, so I will eat nothing but ice cream from now on.” Instead, even if you get a very high level of utility from your favorite food, if you ate it exclusively, the additional or marginal utility from those last few servings would not be very high. Similarly, most workers don’t say: “I enjoy leisure, so I’ll never work.” Instead, workers recognize that even though some leisure is very nice, a combination of all leisure and no income isn’t so attractive. Thus, the budget constraint framework suggests that when people make choices in a world of scarcity, they will use marginal analysis and think about whether they would prefer a little more or a little less.

law of diminishing marginal utility:

As a person receives more of a good, the marginal utility from each additional unit of the good is smaller than from the previous unit.

Sunk Costs

In the budget constraint framework, all decisions involve making decisions in the present about what will happen next: that is, what quantities of goods will be consumed, how many hours will be worked, or how much will be saved. These decisions do not look back to past choices. Thus, the budget constraint framework assumes that **sunk costs**, which are costs that were incurred in the past and cannot be recovered, should not affect the current decision.

Consider the case of Edgar who pays \$8 to see a movie, but after watching the film for 30 minutes he knows that it's truly terrible. Should he stay and watch the rest of the movie because he paid \$8, or should he leave? The money he spent is a sunk cost and unless the theater manager is feeling kindly, Edgar won't get a refund. But staying in the movie still means paying an opportunity cost in time. Thus, Edgar's choice is whether to spend the next 90 minutes suffering through a cinematic disaster or to do something—anything—else. The lesson of sunk costs is to forget about the money that's irretrievably gone and instead to focus on the marginal costs and benefits of future options.

For people and firms alike, dealing with sunk costs can be frustrating. It often means admitting an earlier error in judgment. Many firms, for example, find it hard to give up on a new product that is doing poorly because they spent so much money in creating and launching the products. But the lesson of sunk costs is to ignore them and make decisions based on what will happen in the future.

The budget constraint or opportunity set framework provides a framework for thinking about how individuals make economic decisions like what to consume, how much to work, and how much to save. The purpose of this model is not to tell utility-maximizing individuals what they *should* do, but only to convey the range of available choices for what individuals *could* do, and to provide a way of showing what choices people actually make.

sunk cost: Costs that were incurred in the past and cannot be recovered, and thus should not affect current decisions.

The Behavior of Profit-Seeking Firms

The circular flow diagram in Chapter 1 showed how households interact with firms in markets for goods and services, labor, and financial capital. The budget constraint model shows that households must make decisions and face trade-offs. But how do firms—those entities on the other side of the circular flow diagram—behave? The basic economic theory of how firms make decisions about what to produce and how to produce it is straightforward: Firms seek to maximize the profits that they earn. However, just as individuals cannot have everything they want in a world of scarcity, firms also face constraints that limit the profits they can earn.

Defining Profits

Every firm earns revenue by selling its products, but faces costs that it must pay to employees and suppliers. **Total revenue** is equal to the quantity of goods and services sold by the firm multiplied by the selling price of these goods and services. A firm's **total cost** includes all the costs that the firm must incur in the process of production: for example, such costs would include hiring workers, buying physical inputs from suppliers, the costs of machinery and buildings. Thus, the **profit** that a firm earns is defined as:

$$\text{Profit} = \text{Total revenues} - \text{Total costs}$$

total revenue: The quantity of goods and services sold by the firm multiplied by the selling price of these goods and services.

total cost: All the costs that a firm must incur in the process of production.

profit: Total revenues minus total costs for a firm.

Or equivalently:

$$\text{Profit} = (\text{Quantity produced}) (\text{Price}) - (\text{Quantity of inputs}) (\text{Price of inputs})$$

loss: When total cost exceeds total revenue for a firm loss: when total cost exceeds total revenue for a firm.

If the total cost exceeds total revenue, the outcome is referred to as a **loss**.

Why Earning High Profits Isn't Easy

The definition of profit suggests that the way for a firm to earn high profits is to increase total revenues, decrease total costs, or both. Firms can increase their total revenue in one of two ways: they can either sell larger quantities of their products or they can charge higher prices. Firms can also decrease their costs in two main ways: they can either pay a lower price for the inputs that they buy or they can figure out how to produce with less. However, these choices all create difficulties of their own because firms in a market-oriented economy do not act in a vacuum. Instead, firms must interact with customers and face competition from other firms in the market.

For example, a firm that seeks higher profits by raising its price must be ready for some of its customers—perhaps many of its customers—to purchase fewer of its products. The firm runs the risk of losing its customers to another company that is selling a similar product for less. A firm might attempt to boost sales or encourage customers to pay more by building a positive image through advertising, expanding their sales force, extending their hours and guaranteeing service, and even inventing desirable new products, but all of these approaches have costs of their own and none of them offer a guarantee of success. Similarly, a firm that tries to earn higher profits by paying lower wages to employees had better be ready to see some—perhaps many—of those workers quit and take jobs elsewhere. In fact, the firm's best workers may be most likely to quit, because they probably have the best options for finding jobs with other firms.

Because raising prices to consumers and cutting wages for workers are uncertain or even possibly counterproductive paths to increasing profits, many profit-seeking firms focus their efforts on trying to make consumers more eager to purchase their products. For example, they may create unique products that the competition can't easily duplicate: perhaps a smaller, faster, Internet-linked wireless phone, or a unique style of clothing. Alternatively, firms may find methods for producing at a lower average cost per unit by using workers and machines in more effective ways. But even firms that invent new products and produce at lower cost have no guarantee of higher profits, since consumers may not desire their new products or other competing firms may inventing even more attractive products. While firms have no certain route to earning high profits, the possibility of profits can often be of great benefit to consumers because it encourages firms to race against each other in seeking out new ways to satisfy customers and to produce more efficiently.

The Production Possibilities Frontier and Social Choices

In a world of scarcity, individuals cannot have everything they want and must instead make a choice along a budget constraint. Firms cannot have all the profits they want and must struggle to come up with new ways of pleasing customers. Society as a whole cannot have everything it might want, either. A production possibilities frontier is a graph that shows the combinations of output that are possible for an economy to

produce. In effect, a **production possibilities frontier** is a budget constraint for the economy as a whole.

An example of a production possibilities frontier faced by every economy is the macroeconomic choice between consumption and real investment. Consumption refers to goods and services that are used up this year. Real investment (as opposed to financial investment) refers to expenditures in equipment (like machinery) that can be used to produce goods or services for some years into the future. Thus, expenditures on consumption often serve a more immediate need or desire, but expenditures on investment typically help to increase the economy's level of output in the future. Exhibit 2-7 shows the level of investment in several countries, measured as a share of the country's economy. For example, China's economy displays a high level of investment, and not coincidentally, it has also grown rapidly in the last few decades.

A production possibilities frontier for the choice between consumption and investment is shown in Exhibit 2-8 by the line labeled PPF_1 . At point A, the economy is devoting all of its resources to producing goods for current consumption and nothing to investment. At points B, C, and D, the economy is gradually shifting toward lower levels of consumption and higher levels of investment. At point E, at the other end of the production possibilities frontier, the economy is devoting all of its resources to producing goods for real investment and no resources to current consumption. In a

production possibilities frontier: A diagram that shows the combinations of output that are possible for an economy to produce.

Real Investment as a Percentage of the Overall Economy in 2003

World Average 21%

Some High-Income
Countries Around
the World

United States	18%
Canada	20%
France	19%
Germany	17%
Japan	24%
Sweden	16%

Some Middle-Income
Countries Around
the World

Brazil	20%
Korea	30%
Mexico	21%

Some Low-Income
Countries Around
the World

China	38%
India	27%
Nigeria	24%
Ethiopia	23%

Exhibit 2-7 The Investment vs. Consumption Trade-Off

Every country must strike a balance between consumption in the present and real investment to increase production in the future. A common way to compare the choices of different countries is to measure their real investment as a percentage of their overall economy.

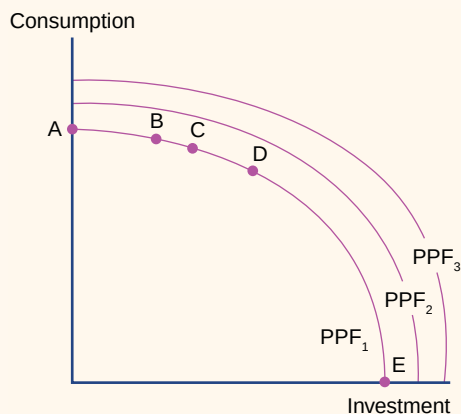


Exhibit 2-8 The Consumption and Investment Trade-Off

A production possibilities frontier shows the possible combinations of output that a society can produce. Points A, B, C, and D illustrate some possible choices along PPF_1 , moving from all consumption at A to greater investment at B, C, and D. PPF_2 and PPF_3 show an outward shift of the frontier, which would happen as an economy grows and can afford more of both consumption and investment.

market-oriented economy, the choice between consumption and real investment is not made by the government or by any single organization, but rather is the result of many decisions made by households and firms. However, government policies can use taxes, regulations and other policies to influence the choices of individuals as to how much they should consume or save, and also to influence the extent to which firms are enthusiastic about making real investments. Just as different people will make different choices along a budget constraint, according to their personal preferences, different societies will make choices about how much to consume and to invest.

Over time, societies that invest a greater share of GDP will tend to expand their ability to produce output. Therefore, a society that chooses a high level of consumption and low level of investment, like point *B*, will find that in the future its production possibilities frontier shifts outward only a bit, perhaps from PPF_1 to PPF_2 . However, a society that consumes relatively less in the present and invests more, like point *D*, will find that in the future its production possibilities frontier has shifted outward more dramatically, from PPF_1 to PPF_3 . Thus, a consumption-investment production possibilities frontier shows the range of choices available to society, illustrates which choice will happen, and even has implications for how the PPF will shift in the future.

The Shape of the Production Possibilities Frontier and Diminishing Marginal Returns

The budget constraints presented earlier in this chapter, showing individual choices about what quantities of goods to consume, how much to work and how much to save, were all straight lines. The reason for these straight lines was that the slope of the budget constraint was determined by relative prices of the two goods in the consumption budget constraint, by the wage in the labor-leisure budget constraint, and by the interest rate in the intertemporal budget constraint. However, the production possibilities frontier for consumption and investment was drawn as a curved line. Why does the PPF have a different shape?

Consider another example of a production possibilities frontier that arises when government decision makers must decide how much money to spend on competing government priorities, like education and improving health. Exhibit 2-9 shows a production possibilities frontier for this trade-off. Again, in this diagram there are no specific numbers on the axes because there is no single way to measure levels of education and health. However, when you think of improvements in education, you can think of accomplishments like more years of school completed, fewer high-school dropouts, and higher scores on standardized tests. When you think of improvements in health, you can think of longer life expectancies, lower levels of infant mortality, and fewer outbreaks of disease. At choice *A*, the government is committing all of its resources to producing health and none to education; at choice *D*, the government is committing all resources to education and none to health. As the economy grows over time this production possibilities frontier will shift to the right, making it possible for society to have more of both education and health. But in the immediate present, choosing more of one means choosing less of the other.

To understand why the PPF is curved, start by considering point *A* at the top left-hand side of the PPF. At point *A*, literally all of the available resources are being devoted to health and literally none to education. This situation is extreme and even somewhat ridiculous. For example, children are seeing a doctor every day, whether they are sick or not, but not attending school. People are having cosmetic surgery on every part of their body, but no high school or college education exists. Now imagine that some of

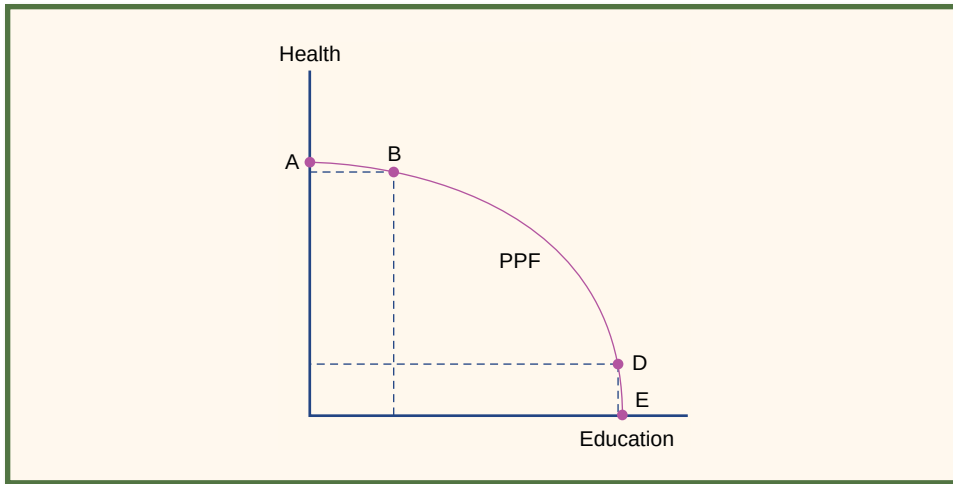


Exhibit 2-9 A Health vs. Education Production Possibilities Frontier

This production possibilities frontier shows a trade-off between devoting social resources to health and devoting them to education. At choices like A and B, most social resources go to health. At choices like D and E, most go to education. The curvature of the PPF shows that when a large share of resources is already devoted to health (as at point B), devoting still more resources to health and moving to point A produces only a small gain in health but a substantial loss in education. Thus, the curvature of the PPF demonstrates the law of diminishing marginal returns.

these resources are diverted from health to education, so that the economy is at point B instead of point A. Diverting some marginal resources away from A to B causes relatively little reduction in health because the last few marginal dollars going into health care services aren't producing much additional gain in health. However, putting those marginal dollars into education, which is completely without resources at point A, can produce relatively large gains. For this reason, the shape of the PPF from A to B is relatively flat, representing a relatively small drop-off in health and a relatively large gain in education.

Now consider the other end, at the lower right, of the production possibilities frontier. Imagine that society starts at choice D, which is devoting nearly all resources to education and very few on health, and moves to point E, which is devoting *all* spending to education and none to health. For the sake of concreteness, you can imagine in the movement from D to E, the last few doctors must become high school science teachers, the last few nurses must become school librarians rather dispensers of vaccinations, and the last few emergency rooms are turned into kindergartens. The gains to education from adding these last few resources to education are very small. However, the opportunity cost loss to health will be fairly large, and thus the slope of the PPF between D and E is steep, showing a small gain in education and a large drop in health.

The lesson here is not that society is likely to make an extreme choice like devoting no resources to education at point A or no resources to health at point E. Instead, the lesson is that the gains from committing additional marginal resources to education depend on how much is already being spent. If very few resources are currently committed to education, then an increase of a certain amount can bring relatively large gains; on the other side, if a large number of resources are already being committed to education, then an increase of a certain amount will bring relatively smaller gains. This pattern is common enough that it has been given a name: **the law of diminishing returns**, which holds that as additional increments of resources are added to a certain purpose, the marginal benefit from those additional increments will decline. This pattern is common. When government spends a certain amount more on reducing crime, for example, the original gains in reducing crime could be relatively large. But additional increases typically cause relatively smaller reductions in crime, and paying for enough police and security to reduce crime to nothing at all would be tremendously expensive.

the law of diminishing returns: Which holds that as additional increments of resources are added to producing a good or service, the marginal benefit from those additional increments will decline.

The curvature of the production possibilities frontier shows that as additional resources are added to education, moving from left to right along the horizontal axis, the original gains are fairly large, but gradually diminish. Similarly, as additional resources are added to health, moving from bottom to top on the vertical axis, the original gains are fairly large, but again gradually diminish. In this way, the law of diminishing returns produces the outward-bending shape of the production possibilities frontier.

Productive Efficiency and Allocative Efficiency

The study of economics does not presume to tell a society what choice it should make along its production possibilities frontier. In a market-oriented economy with a democratic government, the choice will involve a mixture of decisions by individuals, firms, and government. However, economics can point out that some choices are unambiguously better than others. In everyday usage, the concept of efficiency refers to lack of waste. An inefficient machine operates at high cost, while an efficient machine produces without wasting energy or materials. An inefficient organization operates with long delays and high costs, while an efficient organization meets schedules, is focused, and performs within budget.

To an economist, **efficiency** refers to the situation in which it is impossible to get more of one thing without experiencing a trade-off of less of something else. The production possibilities frontier can illustrate two kinds of efficiency: *productive efficiency* and *allocative efficiency*. Exhibit 2-10 illustrates these ideas using a production possibilities frontier between consumption and investment.

Productive efficiency means that, given the available inputs and technology, it is impossible to produce more of one good without decreasing the quantity that is produced of another good. Thus, all choices on the PPF in Exhibit 2-10, including *A*, *B*, *C*, *D*, and *E*, display productive efficiency. As a firm moves from any one of these choices to any other, either consumption increases and investment declines or vice versa. However, any choice inside the production possibilities frontier is productively inefficient and wasteful because it is possible to produce more of one good, the other good, or some combination of both goods. For example, point *R* is productively inefficient because it is possible at choice *C* to have more of both goods: investment on the horizontal axis is higher at point *C* than point *R* (E_2 is greater than E_1) and consumption on the vertical axis is also higher at point *C* than point *R* (H_2 is greater than H_1).

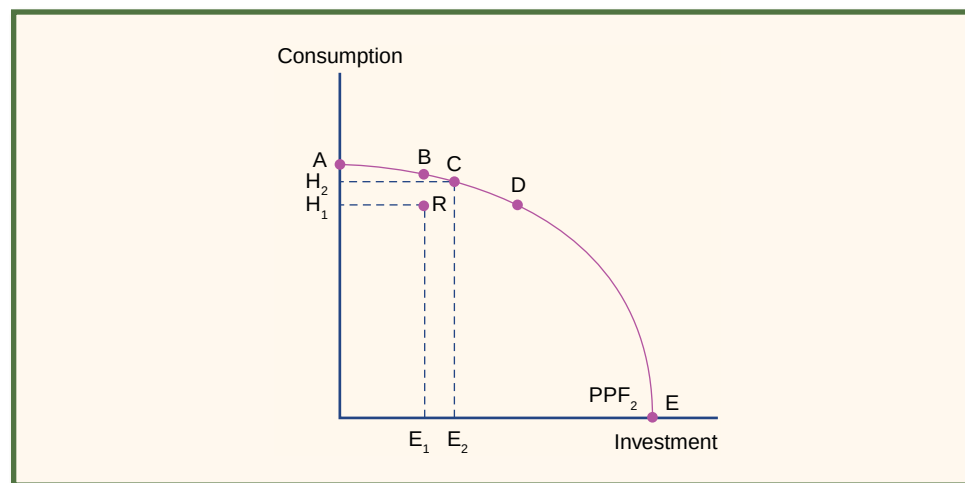
efficiency: When it is impossible to get more of something without experiencing a trade-off of less of something else.

productive efficiency: When it is impossible to produce more of one good without decreasing the quantity produced of another good.

Exhibit 2-10

Productive and Allocative Efficiency

Productive efficiency means it is impossible to produce more of one good without decreasing the quantity that is produced of another good. Thus, all choices along a given PPF display productive efficiency. Allocative efficiency means that the particular mix of goods being produced—that is, the specific choice along the production possibilities frontier—represents the allocation that society most desires.



Allocative efficiency means that the particular mix of goods being produced—that is, the specific choice along the production possibilities frontier—represents the allocation that society most desires. How to determine what a society desires can be a controversial question, and it will be addressed in political science, sociology and philosophy classes as well as in economics. Only one of the productively efficient choices will be the allocatively efficient choice for society as a whole.

allocative efficiency:

When the mix of goods being produced represents the allocation that society most desires.

Why Society Must Choose

Every economy faces two situations in which it may be able to expand consumption of all goods. In the first case, a society may discover that it has been using its resources inefficiently, in which case by improving efficiency and moving to the production possibilities frontier it can have more of all goods. In the second case, as an economy grows over a period of years, the production possibilities frontier for a society will tend to shift outward and society will be able to afford more of all goods. But improvements in productive efficiency take time to discover and implement, and economic growth happens only gradually. Thus, a society must face scarcity and choose between trade-offs in the present. For government, this process often involves trying to identify where additional spending could do the most good and where reductions in spending would do the least harm. At the individual and firm level, the market economy coordinates a process in which firms seek to produce goods and services in the quantity, quality, and price that people want. But for both the government and the market economy in the short term, increases in production of one good typically mean offsetting decreases somewhere else in the economy.

Confronting Objections to the Economic Approach

It's one thing to understand the economic approach to decision-making and another thing to feel comfortable applying it. The sources of discomfort typically fall into two categories: that people don't act in the way that fits the economics model, and that even if people did act that way, they should try not to. Let's consider these arguments in turn.

A First Objection: People, Firms, and Society Don't Act Like This

The economic approach to decision-making seems to require more information than most individuals possess and more careful decision-making than most individuals actually display. After all, do you or any of your friends draw a budget constraint and mutter to yourself about maximizing utility before you head to the shopping mall? In a business context, some firms (especially larger firms) have detailed multiyear plans to maximize their level of profits, but even these plans often prove to be not very useful when unexpected events occur. Many other firms just fumble along day-to-day, struggling to earn a profit. Do members of the U.S. Congress contemplate production possibilities frontiers before they vote on the annual budget? The messy ways in which people, firms and governments operate somehow doesn't look much like neat budget constraints, formulas for earning profit, or smoothly curving production possibilities frontiers.

However, the economics approach can be a useful way to analyze and understand the trade-offs of economic decisions even if it doesn't describe how those decisions are actually made. To appreciate this point, imagine for a moment that you are playing basketball,

The Budget Constraint and the Production Possibilities Frontier

When you study economics, you may feel buried under an avalanche of diagrams: diagrams in the text, diagrams in the lectures, diagrams in the problems, diagrams on exams. Your goal should be to recognize the common underlying logic and pattern of the diagrams, not to memorize each of the individual diagrams.

This chapter uses only one basic diagram, although it is presented with different sets of labels. The consumption choice budget constraint, the labor-leisure budget constraint, and the intertemporal choice budget constraint for individuals, along with the production possibilities frontier for society as a whole, are all the same basic diagram. The exhibit shows an individual budget constraint and a production possibilities frontier for two goods, Good 1 and Good 2. The trade-off diagram always illustrates three basic themes: scarcity, trade-offs, and economic efficiency.

The first theme is scarcity. It is not feasible to have unlimited amounts of both goods. Budget constraints can shift, either as a result of movements of income or of prices. Production possibilities frontiers can shift, too, either as a national economy expands or as the trade-offs between the two goods shift. But even if the budget constraint or a PPF shifts, scarcity remains—just at a different level.

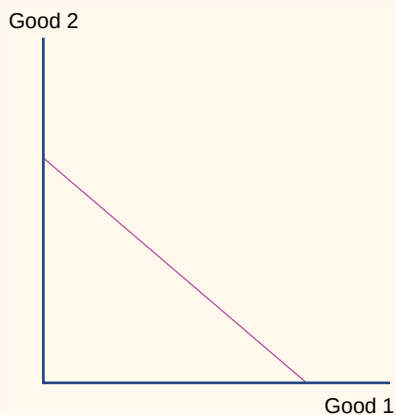
The second theme is trade-offs. As depicted in the budget constraint or the production possibilities frontier, it is necessary to give up some of one good to gain more of the other good. The details of this trade-off vary. In an budget constraint, the trade-off is determined by the relative prices of the goods: that is, the relative price of two goods in the consumption choice budget constraint; the relative price of labor and leisure (the wage) in the labor-leisure budget constraint; and the relative price of present and future

consumption (the principal saved plus the interest rate or rate of return) in the intertemporal choice budget constraint. These trade-offs appear as a straight line. However, the trade-offs in many production possibilities frontiers are represented by a curved line because the law of diminishing returns holds that as resources are added to an area, the marginal gains tend to diminish. But regardless of the specific shape, trade-offs remain.

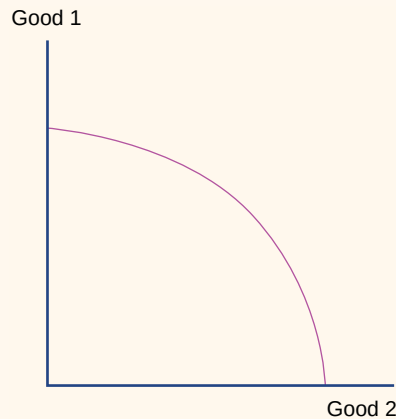
The third theme is economic efficiency or getting the most benefit from scarce resources. All choices on the production possibilities frontier show productive efficiency because in such cases, there is no way to increase the quantity of one good without decreasing the quantity of the other. Similarly, when an individual makes a choice along a budget constraint, there is no way to increase the quantity of one good without decreasing the quantity of the other. The choice on a production possibilities set that is socially preferred, or the choice on an individual's budget constraint that is personally preferred, will display allocative efficiency.

The basic budget constraint/production possibilities frontier diagram will recur throughout this book. Some examples include using these trade-off diagrams to analyze one source of the gains from international trade and to examine the trade-offs between environmental protection and economic output, between equality of incomes and economic output, and the macroeconomic trade-off between consumption and investment. Don't be confused by the different labels. The budget constraint/production possibilities frontier diagram is always just a tool for thinking carefully about scarcity, trade-offs, and efficiency in a particular situation.

The Trade-Off Diagram



(a) An individual opportunity set.



(b) A social production possibilities frontier.

dribbling to the right, and throwing a bounce-pass to the left to a teammate who is running toward the basket. A physicist or engineer could work out the correct speed and trajectory for the pass, given the different movements involved and the weight and bounciness of the ball. But when you're playing basketball, you don't perform any of these calculations. You just pass the ball, and if you're a good player, you will do so with high accuracy. Someone might argue: "The scientist's formula of the bounce-pass requires a far greater knowledge of physics and far more specific information about speeds of movement and weights than the basketball player actually has, so it must be an unrealistic description of how basketball passes are actually made." This reaction would be wrongheaded. The fact that a good player can throw the ball accurately because of practice and skill, without making a physics calculation, doesn't mean that the physics calculation is wrong.

Similarly, from an economic point of view, someone who goes shopping for groceries every week has a great deal of practice with how to purchase the combination of goods that will provide that person with utility, even if the shopper even doesn't phrase decisions in terms of an budget constraint. In a business context, firms that consistently earn profits tend to continue operating, while firms that suffer losses eventually go out of business, regardless of whether the firm analyzes or even understands the key factors underlying profits. Government institutions may work imperfectly and slowly, but in general, a democratic form of government feels pressure from voters to make the choices that are most widely preferred by people in that society. Thus, when thinking about the economic actions of groups of people, firms, and society, it is reasonable as a first approximation to analyze them with the tools of economic analysis.

A Second Objection: People, Firms, and Society Shouldn't Do This

The economics approach portrays people as self-interested. It characterizes firms as having the goal of earning profits. For some critics of this approach, even if self-interest and profit are an accurate description of how people and firms behave, these behaviors are not moral. Instead, the critics argue that people should be taught to care more deeply about others, and businesses should be pressured to act in the "social interest" rather than in their own profit-driven interest. Economists offer several answers to these concerns.

First, economics is not a form of moral instruction. Rather, it seeks to describe economic behavior as it actually exists. Philosophers draw a distinction between **positive statements**, which describe the world as it is, and **normative statements**, which describe how the world should be. In the study of economics, positive and normative arguments often blend into each other: for example, if an economist analyzes a proposal for building a new subway system in a certain city and finds that the benefits are higher than the costs, then is this study a positive analysis that merely states what *will* happen or a normative analysis which describes what *should* happen? But even if the line between positive and normative statements isn't always crystal clear, economic analysis does try to remain rooted in the study of the actual people and firms who inhabit the actual economy. Yes, if the world were populated by saints, the economy would look different. But it isn't.

Second, self-interested behavior and profit-seeking can be labeled with other names, such as personal choice and freedom. The ability to make personal choices about buying, working, and saving is an important personal freedom. Some people may choose high-pressure, high-paying jobs so that they can earn and spend a lot of money. Others may earn a lot of money and give it to charity or spend it on their friends and family. Others may devote themselves to a career that can require a great deal of time, energy and expertise but does not offer high financial rewards, like being an elementary school teacher or a social worker. Still others may choose a job that does not take lots

positive statements:

Statements which describe the world as it is.

normative statements:

Statements which describe how the world should be.

or their time or provide a high level of income, but still leaves time for family, friends, and contemplation. Some people may prefer to work for a large company; others might want to start their own business. People's freedom to make their own economic choices has a moral value worth respecting.

Third, self-interested behavior can lead to positive social results. Businesses that strive for profits will often try to attract customers by offering good value and quality. Consumers who are looking for the best deals will encourage businesses to meet their needs. Adam Smith, writing in the *Wealth of Nations*, christened this property the "invisible hand." In describing how consumers and producers interact in a market economy, Smith wrote:

Every individual ... generally neither intends to promote the public interest, nor knows how much he is promoting it. He intends only his own security, only his own gain. And he is in this led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it.

The metaphor of the invisible hand suggests the remarkable possibility that broader social good can emerge from selfish individual actions.

Fourth, even people who focus on their own self-interest in the economic part of their life can often set aside their own narrow self-interest in other parts of life. For example, you might focus on your own self-interest when you are asking your employer for a raise or negotiating to buy a car. But then you might turn around and focus on other people when you volunteer to read stories at the local library, help a friend move to a new apartment, or donate money to a charity. Thus, self-interest can be a reasonable starting point for analyzing many economic decisions, without needing to imply that people never do anything that is not in their own immediate self-interest.

Facing Scarcity and Making Trade-offs

The study of economics is rooted in a fundamental insight about the human condition. The world we live in is a place of scarcity, whether measured in terms of time, money, natural resources, or material goods. As a result, people must face trade-offs and make choices. The main economic trade-offs for individuals are their decisions about what to consume, how much to work, and how much to save. For firms, the trade-offs involve how to earn high profits in an economy where you cannot force customers to buy your products and you must pay your workers and suppliers. For society as a whole and for government decision-makers, the task is to use scarce resources as efficiently as possible to meet people's needs. Economics delves into the questions of how individuals, firms and government will interact, and thus into the decisions that society will make about what to produce, how to produce, and for whom to produce.

Key Concepts and Summary

1. The real world is one of scarcity: that is, a world in which people's desires exceed what is possible. As a result, economic behavior involves trade-offs in which individuals, firms, government and society must give up one thing that they desire to obtain things that they desire more.

2. Individuals face three main categories of trade-offs: the consumption choice of what quantities of goods to consume, the labor-leisure choice of what quantity of hours to work, and the intertemporal choices that involve costs in the present and benefits in the future, or benefits in the present and costs in the future.
3. The **budget constraint**, sometimes called the **opportunity set**, illustrates the range of choices available. The slope of the budget constraint is determined by the relative price of the choices. Choices beyond the budget constraint are impossible. Choices inside the budget constraint are wasteful.
4. People will choose along their budget constraints in a way that maximizes their satisfaction or **utility**, which is based on their own distinctive personal preferences.
5. An interest rate has three components: the **risk premium** to cover the risk of not being repaid, the rate of expected **inflation**, and the **time value of money**. The formula for how **compound interest** accumulates over time is:

$$(\text{Amount at present}) * (1 + \text{Interest rate})^{\text{number of years}} = \text{Amount at future time}$$

6. **Opportunity cost** measures cost by what is given up in exchange. Sometimes opportunity cost can be measured in money, but it is often useful to consider whether time should be included as well, or to measure it in terms of the actual resources that must be given up.
7. Most economic decisions and trade-offs are not all-or-nothing. Instead, they are about **marginal analysis** involving a little more or a little less.
8. The **law of diminishing marginal utility** points out that as a person receives more of something—whether it is a specific good or another resource—the additional marginal gains tend to become smaller.
9. Because **sunk costs** occurred in the past and cannot be recovered, they should be disregarded in making current decisions.
10. Firms seek to make a **profit**, which is defined as **total revenues** minus **total costs**. However, firms are constrained by their competitors and by their customers in deciding what to charge for their products and what they must pay for labor and other inputs.
11. A **production possibilities frontier** defines a set of choices faced by society as a whole. The shape of the PPF is typically curved outward, rather than straight. Choices outside the PPF are unattainable and choices inside the PPF are wasteful. Over time, a growing economy will tend to shift the PPF outwards.
12. The **law of diminishing returns** holds that as increments of additional resources are devoted to producing something, the marginal increase in output will become smaller and smaller.
13. All choices along a production possibilities frontier display **productive efficiency**; that is, it is impossible to use society's resources to produce more of one good without decreasing production of the other good. The specific choice along a production possibilities frontier that reflects the mix of goods that society prefers is the choice with **allocative efficiency**.

14. **Positive statements** describe the world as it is, while **normative statements** describe how the world should be. Even when economics analyzes the gains and losses from various events or policies, and thus draws normative conclusions about how the world should be, the analysis of economics is rooted in a positive analysis of how people, firms and government actually behave, not how they should behave.

Review Questions

1. Explain why scarcity leads to trade-offs.
2. Name the three main categories of economic trade-offs that individuals face.
3. What determines the slope of the consumption choice budget constraint? The labor-leisure budget constraint? The intertemporal budget constraint?
4. Explain why individuals make choices that are directly on the budget constraint, rather than inside the budget constraint or outside it.
5. Does the economic approach specify what choices people should make? Why or why not?
6. What does it mean to “maximize utility”?
7. What are the three components of the interest rate?
8. What is the formula for how compound interest accumulates over time?
9. What is opportunity cost?
10. What is the law of diminishing marginal utility?
11. What are sunk costs?
12. What is the basic definition of how a firm’s profits are calculated?
13. Why can’t firms just make higher profits by continually raising the price of their products?
14. What does a production possibilities frontier illustrate?
15. Why is a production possibilities frontier typically drawn as a curve, rather than a straight line?
16. Explain why societies cannot make a choice above their production possibilities frontier and should not make a choice below it.
17. What are diminishing marginal returns?
18. What is productive efficiency? Allocative efficiency?
19. What’s the difference between a positive and a normative statement?
20. Is the economic model of decision-making intended as a literal description of how individuals, firms, and the government actually make decisions?