2

The Key Principles of Economics

Chapter Summary

Chapter 2 introduces the key principles that are central to all economic theory:

- The *principle of opportunity cost* states that the opportunity cost of something is what you sacrifice to get it. Opportunity costs in production are generally increasing, and thus, the production possibilities curve is bowed outward.
- The *marginal principle* states that any activity should be increased as long as the marginal benefits of the additional activity exceed the marginal costs.
- The *principle of voluntary exchange* states that a voluntary exchange between two people makes both people better off.
- The *principle of diminishing returns* states that, in the short run, if use of one input is increased while all others are held constant, production will eventually increase at a decreasing rate.
- The *real-nominal principle* states that what matters to people is the real value or purchasing power of money or income, not its face or nominal value.

Learning Objectives:

1. The Principle of Opportunity Cost: Apply the principle of opportunity cost.
2. The Marginal Principle: Apply the marginal principle.
3. The Principle of Voluntary Exchange: Apply the principle of voluntary exchange.
4. The Principle of Diminishing Returns: Apply the principle of diminishing returns.

5. The Real-Nominal Principle: Apply the real-nominal principle.

Approaching the Material

Continue the approach you developed in the first chapter, reaching students where they are. The decision to go to college is a great illustration of opportunity costs because students forgo earnings that they would have received from a full-time job. Apply the concept of diminishing returns to hours studying: If a student studies for five hours, will studying one additional hour really benefit him or her? Most of the students will have had jobs, so use the price of a gallon of gas or a burger per hour worked to explain real wages. Most students will have trouble with the marginal principle, so have plenty of examples ready. A seat on a bus or train that is not full is a good example. An extra passenger in a car for a road trip or another person watching a movie will also work.

Chapter Outline

2.1 The Principle of Opportunity Cost

A. Definition
   1. The **opportunity cost** of something is what you sacrifice to get it.
   2. What you sacrifice is the *next best* alternative.
   3. For example, if you choose to buy a cup of coffee, you are giving up the money it costs to buy it. What else would you have used the $2.00 for? The opportunity cost of the coffee is the one thing (or next best alternative) that you would buy if not the coffee.

Teaching Tip

Ask the students what they would be doing if they weren't in class. Answers will range from sleeping, working, watching TV, studying, etc. You can make the point that the alternatives are infinite and computing the cost of them all is impossible. However, since they could only be doing one thing (not all of them) if they were not in class, determining the opportunity cost requires only knowing the one thing they would be doing.

B. The Cost of College
   1. The classic example of opportunity cost is the costs of going to college. Be sure to illu strate the implicit opportunity cost of forgone income as well as tuition, books, etc.

Teaching Tip

It's also helpful to have a discussion about whether room and board should be considered a cost of college. If the person has to pay the same amount for room and board whether he/she goes to college or works, it should not be considered a cost of college.

C. The Cost of Military Spending
D. Opportunity Cost and the Production Possibilities Curve
   1. The **production possibilities curve**: A curve that shows the possible combinations of products that an economy can produce, given that its productive resources are fully employed and efficiently used.
   2. Discussion of relevant points on the production possibilities graph
      a. Points on the curve are efficient and indicate an economy is utilizing all resources.
      b. Points inside the curve are inefficient and indicate an economy is not utilizing all resources or resources are not used in the least-cost manner.
      c. Points outside the curve are not feasible given current technologies and resources.
   3. Shifts in the Production Possibilities Curve. Show how points outside the PPC are feasible in the future if it shifts out due to increases in resources or technological innovation. It is also useful to discuss what might make the PPC shift in: a natural disaster, the Y2K bug, etc.
      a. Increased resources
      b. Technological innovation

Teaching Tip

Use something students are familiar with to construct their first production possibilities curve. Pick two classes, such as Economics and Marketing. Tell them they are going to allocate study time to produce grades in the classes. The choice involves how much study time to allocate for each class. You can start with an all-or-nothing scenario producing an A|F outcome and make adjustments from there. Once they are comfortable, remind them that everything else was held constant. Ask them what would happen to the curve if the professors were better teachers, if students had better study skills, smaller classes, better textbooks, upgraded computers, or more time to study.

Review this key question and the related application:

Question 1: What is the opportunity cost of running a business?

APPLICATION 1: DON'T FORGET THE COSTS OF TIME AND INVESTED FUNDS

This Application gives an example of a business to explain how we can use the principle of opportunity cost to compute a business's costs. In a business, the total costs are affected by the costs of raw materials, the opportunity costs of funds invested, and the opportunity costs of time. This Application shows that we must include not just the costs of materials but also the opportunity cost of funds invested, as well as the opportunity costs of time in computing the true cost of running a business.

2.2 The Marginal Principle

A. Definition
   1. **Marginal benefit** is the additional benefit resulting from a small increase in some activity.
   2. **Marginal cost** is the additional cost resulting from a small increase in some activity.
   3. Choose a level of the activity such that marginal benefit of the last unit equals the marginal cost of the last unit.

B. Using the Marginal Principle: Movie Sequels, Renting College Facilities, Automobile Emissions Standards, Driving Speed and Safety

Teaching Tip

There are several easy-to-understand examples of the Marginal Principle in the world of college students. An easy way to start is with examples where the marginal cost is zero: The amount of food consumed at a particular meal in the cafeteria; Internet minutes in the computer lab; cell phone weekend minutes with some plans. Given that the marginal costs are zero, the student's decision to consume is based on positive marginal benefits. You can then introduce situations where there are positive marginal costs, such as fast food that needs to be paid for.

Review this key question and the related application:

Question 2: How do people think at the margin?

APPLICATION 2: HOW FAST TO SAIL?

This Application explains the factors that go into the decision regarding how fast to sail an ocean cargo ship. We can use the marginal principle to see that the increase in a ship's speed depends on the marginal benefit of delivering more cargo compared to the cost of additional fuel. If the marginal benefit (the increase in revenue from delivered cargo) is greater than the marginal cost (the increase in fuel cost), the ship operator will increase the ship's speed.

2.3 The Principle of Voluntary Exchange

A. The assumption is that people act in their own self-interest**.** A voluntary exchange between two people makes both better off. Markets work because they are based on the principle of voluntary exchange.

Teaching Tip

College students easily understand the principle of voluntary exchange because they are constantly engaged in voluntary exchanges. Work and consumption are two examples from their world. If they are employed, they voluntarily exchange their time and effort for the money they earn. Nobody kidnaps them and forces them to work. Their employer pays them voluntarily as well. Both the student and employer are better off. Any time individuals purchase anything, they exchange money for a product or a service, making both the buyer and the seller better off. Ask students what they purchased yesterday or today: Coffee or soda? Candy? Newspaper? Why did they purchase it?

B. Exchange and Markets
   1. A market is an institution or arrangement that allows buyers and sellers to exchange goods and services.

Teaching Tip

Create a market in the classroom. Do the experiment described in the book or in MyEconLab.

C. Online Games and Market Exchange
   1. Online games such as EverQuest illustrate how markets and exchange develop on their own because of the desire to trade.

Review this key question and the related application:

Question 3: What is the rationale for specialization and exchange?

APPLICATION 3: RORY MCILROY AND WEED-WHACKING

Rory McIlroy is one of the best golfers in the world as well as a skillful weed whacker. He can whack down all the weeds on his property in one hour, making him 20 times more productive than the best gardener. Rory should still hire the less productive gardener because of the lower opportunity cost. If he earns $1,000 per hour playing golf, by paying the gardener only $200 ($10 an hour × 20), he would end up saving $800. This shows how the principles of voluntary exchange and specialization are beneficial.

2.4 The Principle of Diminishing Returns

A. **Principle of Diminishing Returns**: Suppose that output is produced with two or more inputs, and we increase one input while holding the others constant. Eventually, output will begin to increase at a decreasing rate.

Teaching Tip

Have the students picture the front end of a fast-food franchise, such as McDonald's, Burger King, Wendy's, or another franchise near you. Ask them what would happen if you kept on adding more and more workers at McDonald's. All the equipment is fixed. The number of workers is the variable input. Ask students what would happen to the number of hamburgers served as you increased the number of workers from 1 to 3 to 5 to 50. Eventually the restaurant would be so crowded that none of the workers would be able to move or serve any hamburgers. (Make sure to point out that this is well beyond the point of diminishing returns.)

B. Diminishing Returns from Sharing a Production Facility
   1. A good example of diminishing returns is when a company tries to add workers to an existing production facility. Eventually, the facility will become overcrowded, and the additional output resulting from additional workers will fall.

Review this key question and the related application:

Question 4: Do farmers experience diminishing returns?

APPLICATION 4: FERTILIZER AND CROP YIELDS

This Application illustrates how the notion of diminishing returns applies to all inputs to the production process. For a farmer, continuously increasing the amount of fertilizer applied to a fixed amount of land eventually reduces the increases in output. The farmer will experience diminishing return because, while even though the amount of fertilizer was not fixed, the other inputs to the production process are fixed.

Teaching Tip

A classroom full of urban or suburban students might not relate very well to this example. You can use watering the lawn instead. An excessive amount of water will not help the lawn grow faster.

2.5 The Real-Nominal Principle

A. Definition
   1. What matters to people is the real value or purchasing power of money or income, not its face value.
   2. The **nominal value** of an amount of money is its face value. The **real value** is the value of an amount of money in terms of what it can buy.
B. The Design of Public Programs
C. The Value of the Minimum Wage

When the government publishes statistics about the economy, it takes into account the real-nominal principle. For example, the value of "real wages" shows what has happened to the purchasing power of workers over time. The nominal wage shows what has happened to the sum on the worker's paycheck, but it cannot show what has happened to purchasing power.

Teaching Tip

Ask the students how many of them would be happy to earn $500,000 per year. Most will say yes. Then tell them that a case of soda pop costs $100, a CD costs $250, and a new car costs $500,000. Are they still happy? You can now proceed to explain the difference between nominal and real variables.

Review this key question and the related application:

Question 5: How does inflation affect lenders and borrowers?

APPLICATION 5: REPAYING STUDENT LOANS

This Application shows how inflation can impact the value of money paid back over time. Using changes in annual salaries, the Application demonstrates the work time it takes someone to pay back the loan under various inflation assumptions.

Teaching Tip

Another way to illustrate this concept is to ask students if they know their parents' monthly mortgage payments and when they purchased their homes. Inflation in home prices affects the amount that people will have to borrow. An older home usually will have a smaller nominal mortgage payment. However, your students' parents' salaries have presumably risen partly due to inflation. Therefore, inflation has helped those who have been debtors.

Additional Applications to Use in Class

Question: Has fish production reached the point of diminishing returns?

ADDITIONAL APPLICATION: SO LONG SEAFOOD? EXPERTS WARN OF DISASTER

MSNBC Staff and News Service Reports
"So Long Seafood? Experts Warn of Disaster"
Posted on MSNBC.com
Financial Times
http://www.msnbc.msn.com/id/15532333/
Posted 11/03/2006

Summary: Key Points in the Article

According to some experts, overfishing and pollution will virtually wipe out all the world's fisheries by the year 2050. A team of economists and ecologists arrived at that conclusion by extrapolating current trends. The team warned that unless fisheries management practices radically change, we were in the "last century of wild seafood."

The team spent four years using controlled experiments and existing data to arrive at their conclusions. However, industry professionals do not appear to share the concerns. The National Fisheries Institute issued a statement that said, "Fish stocks naturally fluctuate in population," and "By developing new technologies that capture target species more efficiently and result in less impact on other species or the environment, we are helping to ensure our industry does not adversely affect surrounding ecosystems or damage native species."

Seafood consumption is up in the United States, with the average American eating 16.6 pounds of seafood in 2004 versus 15.2 pounds in 2002. Fishing accounts for more than $80 billion in revenue worldwide.

Analyzing the News

Note that the National Fisheries Institute did not deny declining fish stocks. Instead the organization indicated the decline was part of a natural cycle. Could it be that the increasing global demand for seafood has pushed fishing to the point of diminishing returns?

Thinking Critically Questions

1. It appears that fish harvests are increasing, but overall fish stocks may be declining. What economic principle is exhibited?
2. How can we increase production?
3. At what point would we cease to add fishing boats?

Question: How can people invest in themselves?

ADDITIONAL APPLICATION: "SHORT ON CASH, SOME PUT A PRICE ON THEMSELVES"

Aleccia, JoNel
Posted 12/5/2008 on MSNBC.com

Summary: Key Points in the Article

The shrinking economy has had an impact on people's willingness to donate plasma, sperm, and fertile eggs. Hair sales are up as well. While the practice of selling most body products is illegal in the United States, there are instances where people are considered "compensated donors." For example, many plasma centers will pay $20 for donor time and travel. The sudden spike in donor applications begs the question of whether the motives are altruistic or financial.

Donating fertile eggs can be lucrative. One nursing student reported being able to graduate from college debt free due to the $28,000 she received for four cycles of fertile eggs donated since February. Viable sperm donors can earn $600 a month for a cycle of ten donations.

While the practice can earn some cash, only a small fraction of donors make it through the rigorous medical and life history screens for fertile eggs and sperm. In any case, applications to be donors are up 20 to 30 percent at most clinics with plasma donations up as much as 50 percent in some areas. The uptick appears to be consistent with the recession.

Analyzing the News

Since "price" appears fixed for these items you simply see an increase in overall quantity. However, this article begs the question of whether body parts and products should be available for sale instead of merely compensation for time and travel. What do you think?

Thinking Critically Questions

1. What is driving the increase on "donations" for certain body products?
2. How do clinics compensate donors, since it is illegal to buy plasma?
3. Should this practice be outlawed?

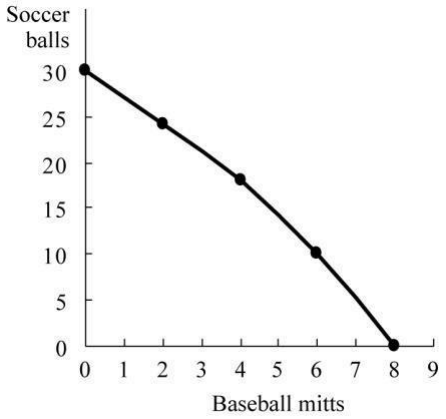
Solutions to End-of-Chapter Exercises

Chapter 2

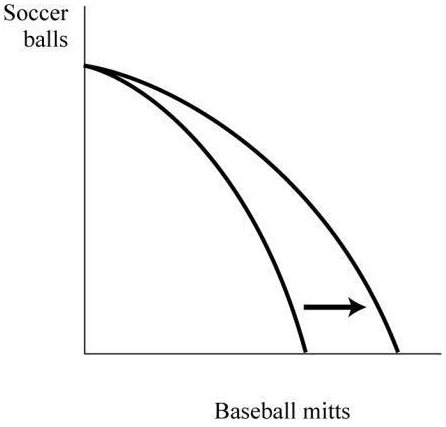
SECTION 2.1: THE PRINCIPLE OF OPPORTUNITY COST

1.1 10, 180
1.2 arrow up
1.3 arrow up
1.4 $22,000
1.5 safe drinking water for 5 million people
1.6 outbidding, $1/hectare
1.7 $86,000 per year

1.8 Scientists and engineers will be used to execute the mission, so part of the opportunity cost might be measured in science and engineering education (or any other non-mission-related scientific productivity) forgone.
1.9 The cost of holding wealth in non-interest-bearing form is higher where the interest rate is higher.
1.10 a. The loan cost me the interest I could have earned by investing the $100.
b. The opportunity cost is the current market price, not the historical price.
c. The cost of the stadium is $50 million plus the forgone earnings from renting the land or the interest that could be earned on the proceeds from sale of the land (whichever is higher).
d. The cost would also include the time difference between alternative methods of commuting
1.11 a.



b.

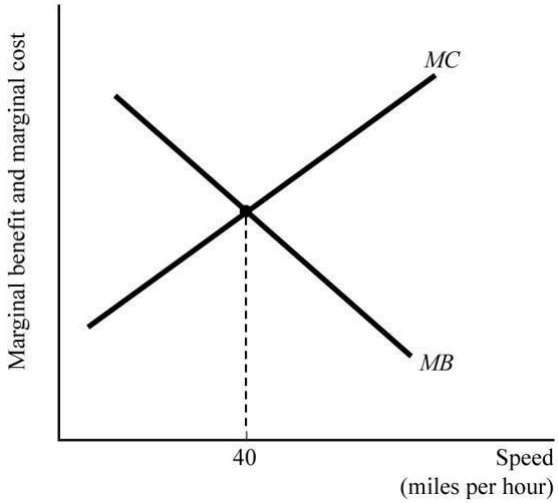


c. 6, 10
1.12 current value of the furniture, current rate of return on alternative investment(s)

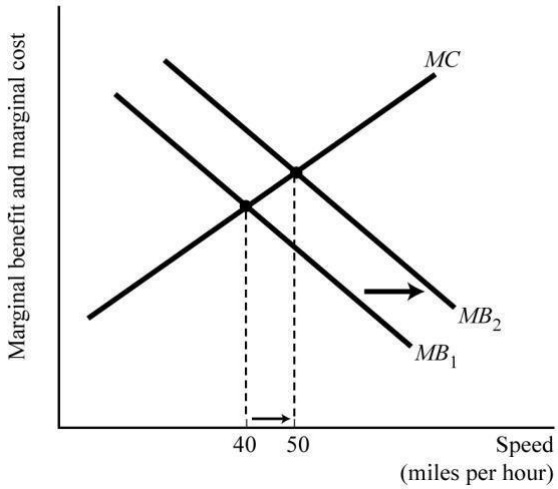
SECTION 2.2: THE MARGINAL PRINCIPLE

2.1 Yes, the marginal benefit ($300) is less than the marginal cost ($200).
2.2 Yes, the marginal benefit ($135) exceeds the marginal cost ($125).
2.3 Yes, the marginal benefit ($50 million) exceeds the marginal cost ($30 million).
2.4 marginal, marginal

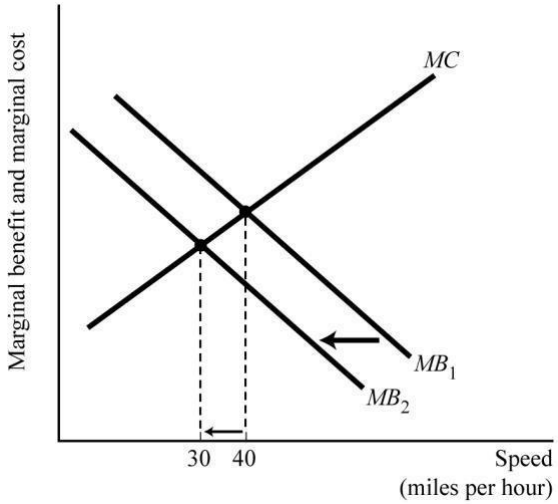
2.5 a. Draw MB and MC curves crossing at 40 mph



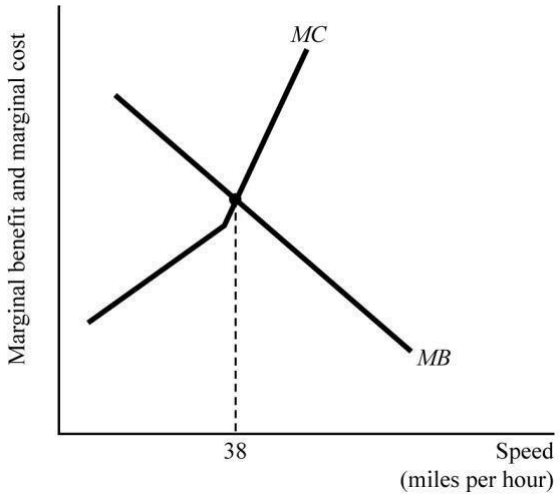
b. Shift MB to the right and show an increase in speed



c. Shift MB to the left and show a decrease in speed



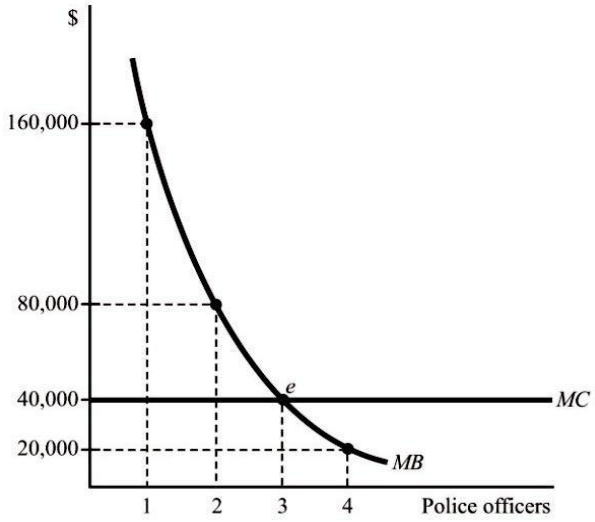
d. The MC curve should have a kink making it steeper to the right of 35mph. This lowers the speed that he drives.



2.6 a. It made sense if the marginal revenue of $3,100 was greater than the marginal costs
b. cost, less, 3,100

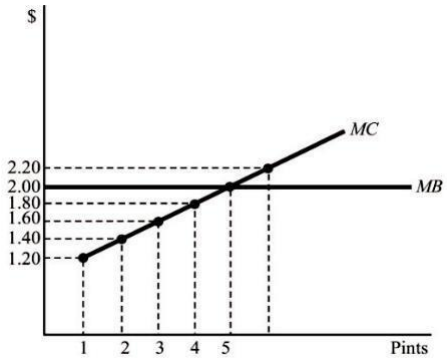
2.7 a. yes, marginal revenue 2500 > marginal cost 2000
b. no, marginal revenue 1500< marginal cost 2000

2.8 Three officers should be hired, since the marginal benefit of the third officer ($40,000) equals the constant marginal cost of $ 40,000, but the marginal benefit of the fourth officer would fall below the constant marginal cost.

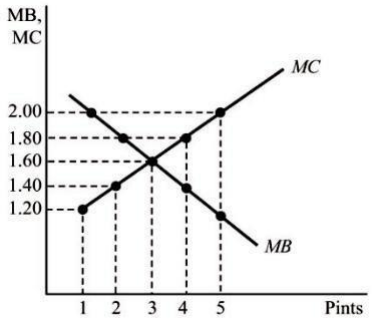


2.9 a. 26
b. yes

2.10 a. Pick 5 pints.



b. Pick 3 pints.



SECTION 2.3: THE PRINCIPLE OF VOLUNTARY EXCHANGE

3.1 False
3.2 $15, $15
3.3 Up arrow
3.4 softer
3.5 a. No, the cost of forgone surgeries exceeds the benefit of clean drains.
b. $1,150 per hour (= ($20 per minute × 60 minutes/hour) – $50 per hour)
3.6 a. 50 fish
b. Assign the tribe's least productive fishermen to build the boat. The cost of the boat decreases to 20 fish.
3.7 The tree-cutter paid the neighbor to compensate for lost shade

SECTION 2.4: THE PRINCIPLE OF DIMINISHING RETURNS

4.1 300
4.2 False. Diminishing returns means that output increases at a decreasing rate.
4.3 less than, at least
4.4 inflexible, flexible
4.5 arrow up, arrow down
4.6 This is true, so long as there are no limitations on availability of resources other than soil.
4.7 a. Yes, because employment of some resources is inflexible within a week.
b. Possibly not, because employment of all resources used in production of memory chips is likely to be flexible over a period of two years.
4.8 a. No, because of the principle of diminishing returns
b. Yes

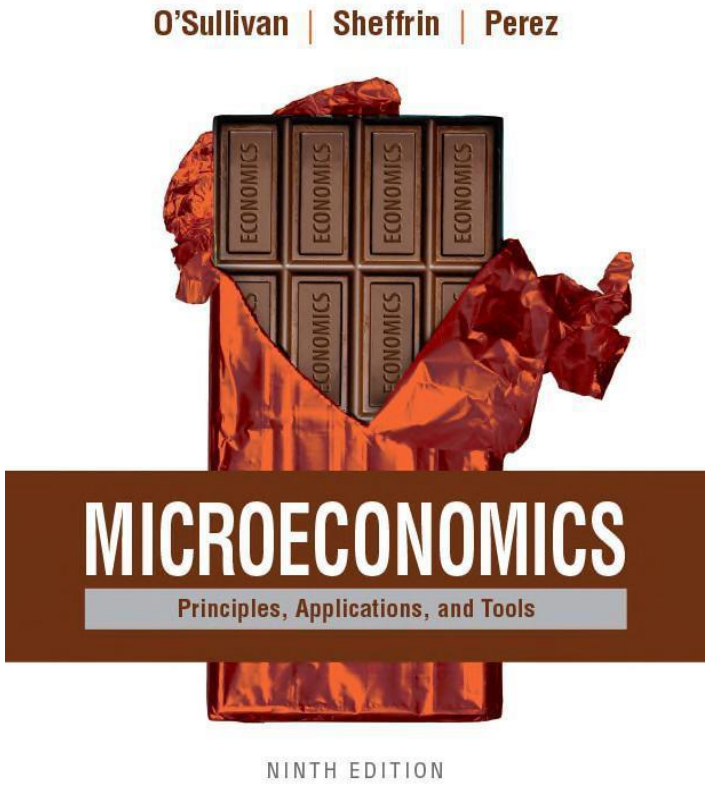
4.9 2, 154, 48, 11
3, 172, 36, 11
4, 184, 24, 11
5, 190, 12, 11
6, 193, 6, 11
Ted should work five hours, since MB < MC for the sixth hour of work.

SECTION 2.5: THE REAL-NOMINAL PRINCIPLE

5.1 $1 in purchasing power
5.2 negative $20 in purchasing power
5.3 down arrow, 3%
5.4 $65,000
5.5 No
5.6 Inflation, since it lowers the real cost of the debt repayment.
5.7 Number of baskets per week: 4.10, 3.05
So the real value of welfare payments decreased
5.8 a. 130.488%, 117.287%, 136.497%, 122.469%, 120.753%
b. Wage increases lagged consumer price increase in three of four groups.
c. Real wages fell in every sector except professional services.
5.9 a. —, 5 months
$5,000, 4 months
$2,000, 10 months
b. Inflation
5.10 a. 55 tunes, $55, 10%
b. 55 tunes, 66 dollars, 32%

Microeconomics: Principles, Applications, and Tools

NINTH EDITION



Chapter 2

The Key Principles of Economics

Pearson

Learning Objectives

2.1 Apply the principle of opportunity cost.

2.2 Apply the marginal principle.

2.3 Apply the principle of voluntary exchange.

2.4 Apply the principle of diminishing returns.

2.5 Apply the real-nominal principle.

2.1 THE PRINCIPLE OF OPPORTUNITY COST

(1 of 4)

PRINCIPLE OF OPPORTUNITY COST

The opportunity cost of something is what you sacrifice to get it.

- **Opportunity cost**
  What you sacrifice to get something.

The Cost of College

Opportunity cost of money spent on tuition and books	$ 40,000
Opportunity cost of college time (four years working for $20,000 per year)	80,000
Economic cost or total opportunity cost	$120,000

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2.1 THE PRINCIPLE OF OPPORTUNITY COST

(2 of 4)

PRINCIPLE OF OPPORTUNITY COST

The opportunity cost of something is what you sacrifice to get it.

- **Opportunity cost**

  What you sacrifice to get something.

The Cost of Military Spending

The war in Iraq will cost $1 trillion

Each $100 billion could instead support:

- Enrolling 13 million preschool children in the Head Start program for one year.
- Hiring 1.8 million additional teachers for one year.
- Immunizing all the children in less-developed countries for the next 33 years.

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2.1 THE PRINCIPLE OF OPPORTUNITY COST

APPLICATION 1

(3 of 4)

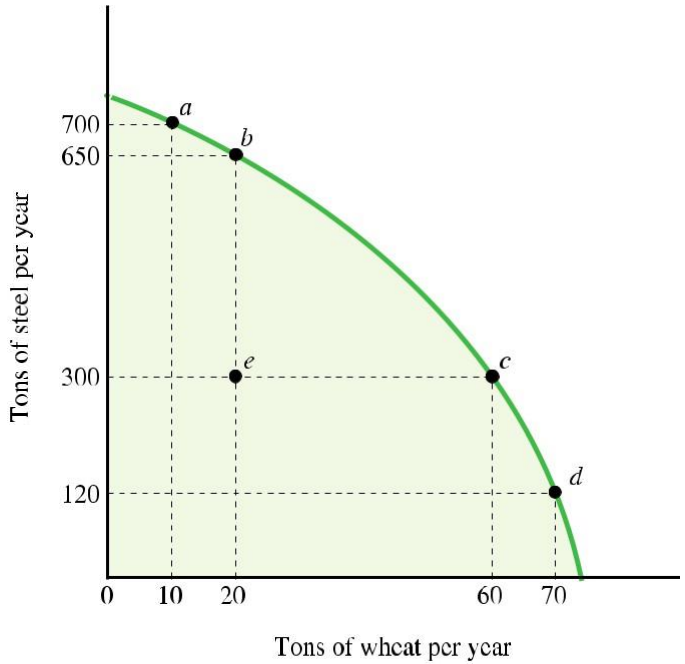
Opportunity Cost and the Production Possibilities Curve

Production possibilities curve

A curve that shows the possible combinations of products that an economy can produce, given that its productive resources are fully employed and efficiently used.

The production possibilities curve illustrates the principle of opportunity cost for an entire economy.

An economy has a fixed amount of resources. If these resources are fully employed, an increase in the production of wheat comes at the expense of steel.



▲ FIGURE 2.1 Scarcity and the Production Possibilities Curve

2.1 THE PRINCIPLE OF OPPORTUNITY COST

APPLICATION 1

DON'T FORGET THE COSTS OF TIME AND INVESTED FUNDS

APPLYING THE CONCEPTS #1: What is the opportunity cost of running a business?

Suppose you run a lawn-cutting business and use solar-powered equipment that you could sell tomorrow for $5,000. Instead of cutting lawns, you could work as a janitor for $300 a week. You have a savings account that pays a weekly interest rate of 0.20 percent (or$0.002 per dollar. What is your weekly cost of cutting lawns?

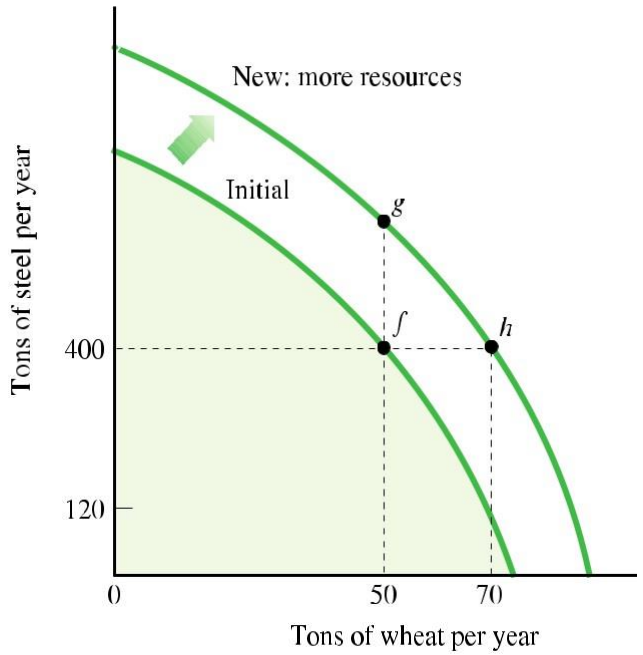
We can use the principle of opportunity cost to compute the cost of the lawn business.

- The opportunity cost of the $5,000 is $10 weekly interest.
- The opportunity cost of the time is $300 weekly income as a janitor.
- The opportunity cost of cutting lawns is $310 a week.

2.1 THE PRINCIPLE OF OPPORTUNITY COST
2.2 THE MARGINAL PRINCIPLE (4 of 4) (5 of 3)

An increase in the quantity of resources or technological innovation in an economy shifts the production possibilities curve outward.

Starting from point *f*, a nation could produce more steel (point *g*), more wheat (point *h*), or more of both goods (points between *g* and *h*).



▲ FIGURE 2.2 Shifting the Production Possibilities Curve

2.1 THE PRINCIPLE OF OPPORTUNITY COST
2.2 THE MARGINAL PRINCIPLE (6 of 3)

- **Marginal benefit**
  The additional benefit resulting from a small increase in some activity.
- **Marginal cost**
  The additional cost resulting from a small increase in some activity.

MARGINAL PRINCIPLE

Increase the level of an activity as long as its marginal benefit exceeds its marginal cost.

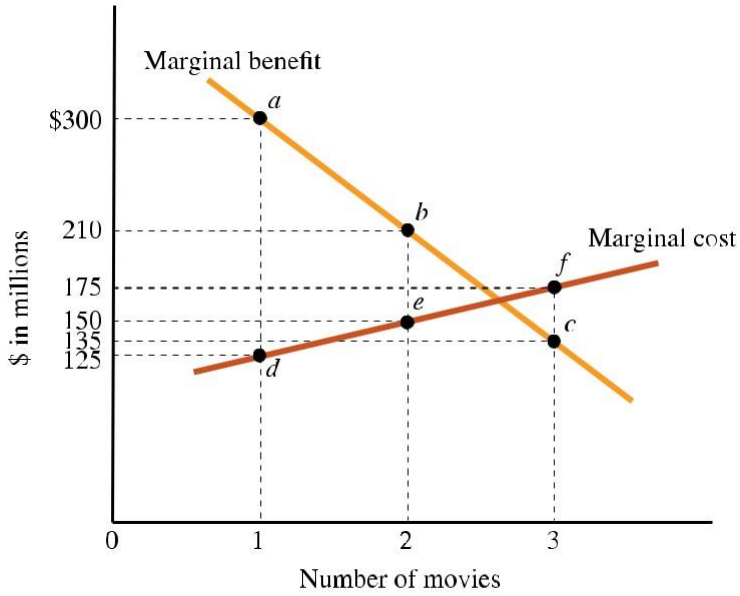
Choose the level at which the marginal benefit equals the marginal cost.

2.2 THE MARGINAL PRINCIPLE (2 of 3)

How Many Movie Sequels?

The marginal benefit of movies in a series decreases because revenue falls off with each additional movie, while the marginal cost increases because actors demand higher salaries.

The marginal benefit exceeds the marginal cost for the first two movies, so it is sensible to produce two, but not three, movies.



▲ FIGURE 2.3 The Marginal Principle and Movie Sequels

Number of Movies	Marginal Benefit ($ millions)	Marginal Cost ($ millions)
1	$300	$125
2	210	150

2.2 THE MARGINAL PRINCIPLE (2 of 3)

3	135	175

2.2 THE MARGINAL PRINCIPLE (2 of 3)

Renting College Facilities

Because many colleges include costs that aren't affected by the use of a facility, they overestimate the actual cost of renting out their facilities, missing opportunities to serve student groups and make some money at the same time.

Automobile Emissions Standards

Using the marginal principle, the government should make the emissions standard stricter as long as the marginal benefit (savings in health-care costs and work time lost) exceeds the marginal cost (the cost of additional equipment and extra fuel used).

Driving Speed and Safety (1 of 2)

- Consider the decision about how fast to drive on a highway. The marginal benefit of going one mile per hour faster is the travel time you'll save. On the cost side, an increase in speed increases your chances of colliding with another car, and also increases the severity of injuries suffered in a collision. A rational person will pick the speed at which the marginal benefit of speed equals the marginal cost.

- In the 1960s and 1970s, the federal government required automakers to include a number of safety features, including seat belts and collapsible steering columns. These new regulations had two puzzling effects. Although deaths from automobile collisions decreased, the reduction was much lower than expected. In addition, more bicyclists were hit by cars and injured or killed.

Driving Speed and Safety (1 of 2)

- We can use the marginal principle to explain why seat belts and other safety features made bicycling more hazardous. The mandated safety features decreased the marginal cost of speed: People who wear seat belts suffer less severe injuries in a collision, so every additional unit of speed is less costly. Drivers felt more secure because they were better insulated from harm in the event of a collision, and so they drove faster. As a result, the number of collisions between cars and bicycles increased, meaning that safer environment for drivers led to a more hazardous environment for bicyclists.

2.3 THE PRINCIPLE OF VOLUNTARY EXCHANGE

APPLICATION 2 (12 of 12)

HOW FAST TO SAIL?

APPLYING THE CONCEPTS #2: How do people think at the margin?

Consider the decision about how fast to sail an ocean cargo ship. As the ship's speed increases, fuel consumption increases.

For a 70,000-ton cargo ship

- 16.5 tons of fuel per day at 11 knots
- 21.4 tons at 12 knots
- 27.2 tons at 13 knots
- 33.9 tons at 14 knots

Increased speed means the ship delivers more cargo per year, but at increased fuel cost. To decide the best speed, the ship operator must find the speed at which the marginal cost (the increase in fuel cost) equals the marginal benefit (the increase in revenue from delivered cargo). An increase in fuel cost increases the marginal cost of speed causing the ship to slow down.

2.3 THE PRINCIPLE OF VOLUNTARY EXCHANGE

APPLICATION 2 (1 of 2)

PRINCIPLE OF VOLUNTARY EXCHANGE

A voluntary exchange between two people makes both people better off.

Here are some examples.

- If you voluntarily exchange money for a college education, you must expect you'll be better off with a college education. The college voluntarily provides an education in exchange for your money, so the college must be better off, too.
- If you have a job, you voluntarily exchange your time for money, and your employer exchanges money for your labor services. Both you and your employer are better off as a result.

2.3 THE PRINCIPLE OF VOLUNTARY EXCHANGE

(2 of 3)

Exchange and Markets

Adam Smith stressed the importance of voluntary exchange as a distinctly human trait. He noticed

> a propensity in human nature . . . to truck, barter, and exchange one thing for another . . . It is common to all men, and to be found in no other . . . animals . . . Nobody ever saw a dog make a fair and deliberate exchange of one bone for another with another dog.

2.3 THE PRINCIPLE OF VOLUNTARY EXCHANGE

APPLICATION 3 (3 of 3)

Online Games and Market Exchange

Consider the virtual world of online games such as World of Warcraft and EverQuest.

Each player constructs a character – called an avatar – by choosing some initial traits for it. Then the player navigates the avatar through the game's challenges where it acquires skills and assets, including clothing, weapons, armor, and even magic spells.

Players can use real-life auction sites, including eBay and Yahoo! Auctions, to buy products normally acquired in the game.

A player can use eBay to buy a Rubicite girdle for $50 from another, who then transfers the product in the game. You can even buy an entire avatar.

The implicit wage earned by a typical online player is $3.42 per hour.

2.3 THE PRINCIPLE OF VOLUNTARY EXCHANGE

APPLICATION 3 (4 of 3)

RORY MCILROY AND WEED-WHACKING

APPLYING THE CONCEPTS #3: What is the rationale for specialization and exchange?

Should Rory McIlroy whack his own weeds?

The swinging skills that make Rory McIlroy, one of the world's best golfers, could also make him a skilful weed-whacker. With his large estate, the best gardener would take 20 hours to take care of all of them. Rory could whack done all the weeds in just one hour.

We can use the Principle of Voluntary Exchange to explain why Rory should hire the less productive gardener.

Suppose Rory earns $1,000 per hour. His opportunity cost of whacking weeds then is $1,000. If the gardener charges $10 per hour, Rory could hire him to take care of the weeds for $200, so he is better off by $800. Rory specializes in what he does best, and then buys goods and services from other people.

2.4 THE PRINCIPLE OF **APPLICATION 4**

DIMINISHING RETURNS

PRINCIPLE OF DIMINISHING RETURNS

Suppose output is produced with two or more inputs, and we increase one input while holding the other input or inputs fixed. Beyond some point—called the *point of diminishing returns*—output will increase at a decreasing rate.

The principle of diminishing returns is relevant when we try to product more output in an existing facility by increasing the number of workers sharing the facility.

When we add a worker to the facility, each worker becomes less productive because he or she works with a smaller piece of the facility:

More workers share the same machinery, equipment, and factory space. As we pack more and more workers into the factory, total output increases, but at a decreasing rate.

It's important to emphasize that diminishing returns occurs because one of the inputs to the production process is fixed.

2.4 THE PRINCIPLE OF **APPLICATION 4**

When a firm can vary all its inputs, including the size of the production facility, the principle of diminishing returns is not relevant.

2.4 THE PRINCIPLE OF **APPLICATION 4**

FERTILIZER AND CROP YIELDS

APPLYING THE CONCEPTS #4: Do farmers experience diminishing returns?

The notion of diminishing returns applies to all inputs to the production process. For example, one of the inputs in the production of corn is nitrogen fertilizer. Suppose a farmer has a fixed amount of land (an acre) and must decide how much fertilizer to apply.

Table 2.1 shows the relationship between the amount of fertilizer and the corn output. The farmer experienced diminishing returns because the other inputs to the production process are fixed.

TABLE 2.1 Fertilizer and Corn Yield

Bags of Nitrogen Fertilizer	Bushels of Corn per Acre
0	85
1	120
2	135
3	144

2.4 THE PRINCIPLE OF **APPLICATION 4**

4	147

21.5 THE DESIGN AND IMPLEMENTATION OF PUBLIC PROGRAMS

REAL-NOMINAL PRINCIPLE

What matters to people is the real value of money or income—its purchasing power—not its "face" value.

- **Nominal value**

  The face value of an amount of money.

- **Real value**

  The value of an amount of money in terms of what it can buy.

THE DESIGN OF PUBLIC PROGRAMS

Government officials use the real-nominal principle when they design public programs.

- Social Security payments indexed to inflation
- Published statistics are adjusted for inflation

APPLYING THE REAL-NOMINAL PRINCIPLE TO THE MINIMUM WAGE

Between 1974 and 2011, the federal minimum wage increased from $2.00 to

$7.25. Was the typical minimum-wage worker better or worse off in 2011?

We can apply the real-nominal principle to see what's happened over time to the real value of the federal minimum wage.

TABLE 2.2 The Real Value of the Minimum Wage, 1974–2011

	1974	2015
Minimum wage per hour	$ 2.00	$ 7.25
Weekly income from minimum wage	80	290
Cost of a standard basket of goods	47	236
Number of baskets per week	1.70	1.23

Because prices increased faster than the nominal wage, the real value of the minimum wage actually decreased over this period.

APPLICATION 5 THE MINIMUM WAGE

REPAYING STUDENT LOANS

APPLYING THE CONCEPTS #6: How does inflation affect lenders and borrowers?

Suppose you finish college with $20,000 in student loans and start a job that pays a salary of $40,000 in the first year. In 10 years, you must repay your college loans. Which would you prefer, stable prices, rising prices, or falling prices?

In this case, your nominal salary in 10 years is $40,000, and the real cost of repaying your loan is the half year of work you must do to earn the $20,000 you owe.
However, if all prices double over the 10-year period, your nominal salary will double to $80,000, and, it will take you only a quarter of a year to earn $20,000 to repay the loan.
In other words, a general increase in prices lowers the real cost of your loan.

TABLE 2.3 Effect of Inflation and Deflation on Loan Repayment

Change in Prices and Wages	Annual Salary	Years of Work to Repay $20,000 Loan
Stable	$40,000	1/2 year
Inflation: Salary doubles	80,000	1/4 year

APPLICATION OF THE MINIMUM WAGE

Deflation: Salary cut in half	20,000	1 year

KEY TERMS

Marginal benefit

Marginal cost

Opportunity cost

Production possibilities curve

Nominal value

Real value