Macroeconomics: Principles, Applications, and Tools

NINTH EDITION

Chapter 2

The Key Principles of Economics

What do we sacrifice by preserving tropical rainforests rather than mining or logging the land?

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

PRINCIPLE OF OPPORTUNITY COST

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

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

2.1 THE PRINCIPLE OF OPPORTUNITY COST

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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.

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

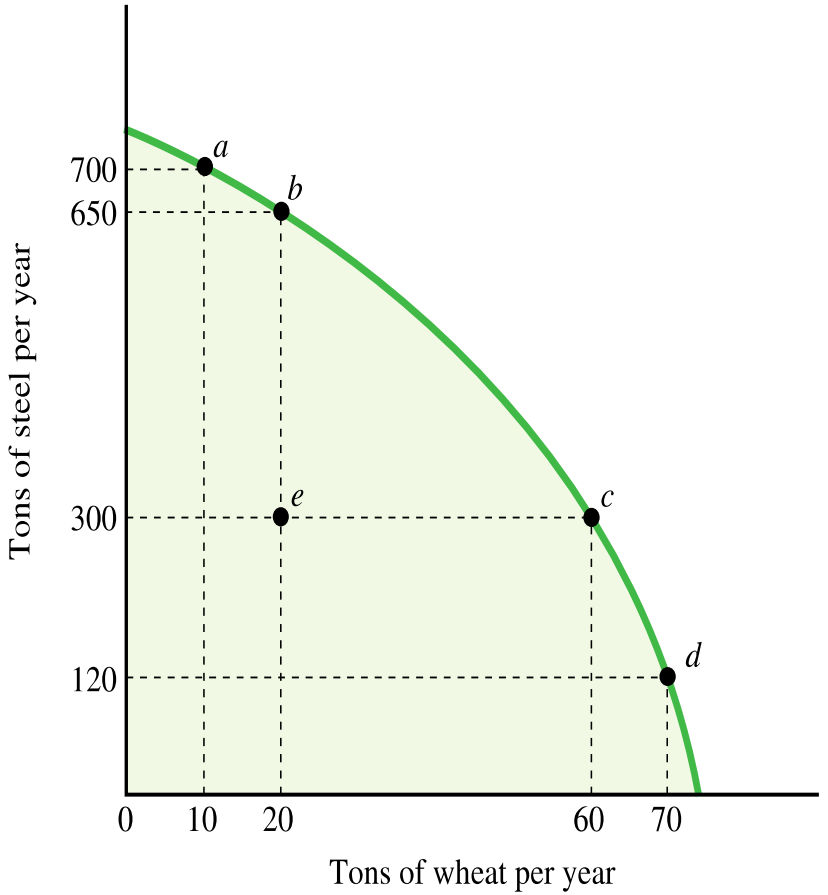
Opportunity Cost and the Production Possibilities Curve

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.

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.

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



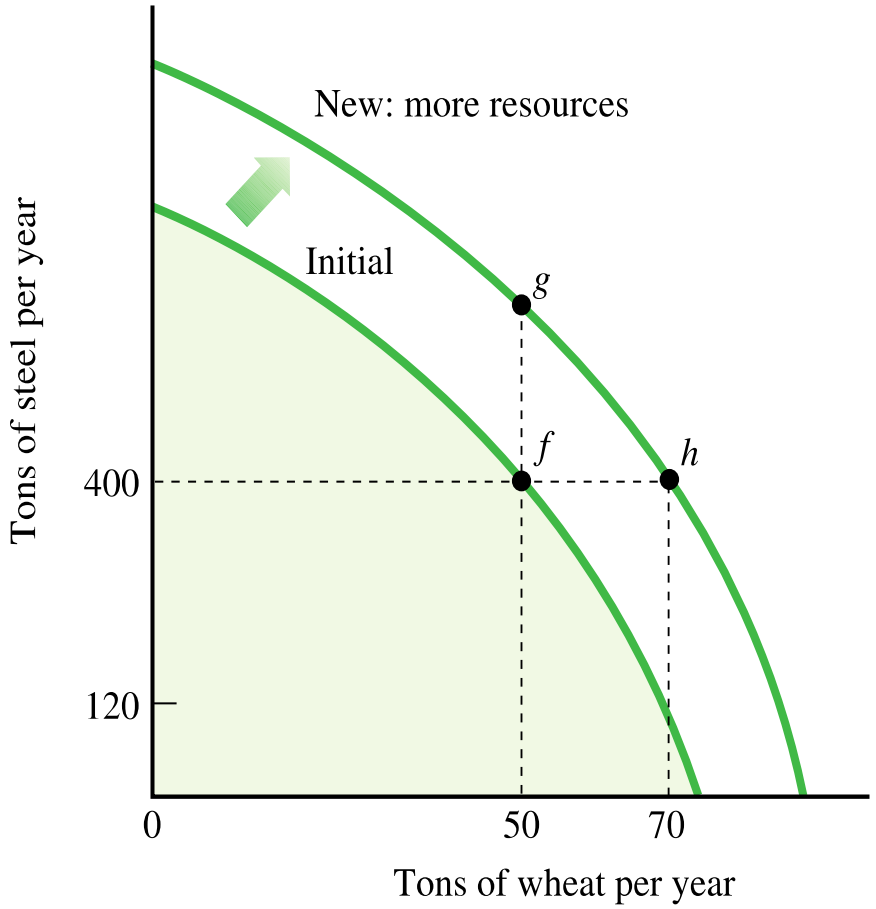
▲ FIGURE 2.1 Scarcity and the Production Possibilities Curve

Pearson

2.1 THE PRINCIPLE OF OPPORTUNITY COST

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

2.2 THE MARGINAL PRINCIPLE

- **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

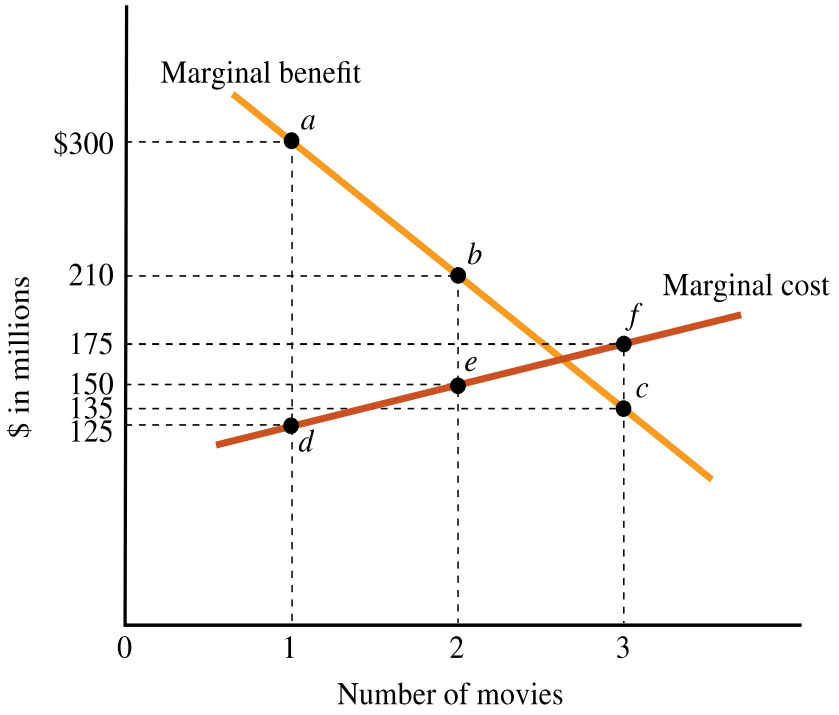
Increase the level of an activity as long as its marginal benefit exceeds its marginal cost. Choose the level at which the marginal benefit equals the marginal cost.

2.2 THE MARGINAL PRINCIPLE

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
3	135	175

2.2 THE MARGINAL PRINCIPLE

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.

New auditorium rental costs:	
Cost of building	$300
Utilities & janitorial	$100
Insurance	$ 50
	$450

Student group offers: $150

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

- 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

- 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.

APPLICATION 2

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

PRINCIPLE OF VOLUNTARY EXCHANGE

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

- 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

Exchange and Markets

- **Self-sufficiency**
  Production of everything needed or wanted by oneself
- **Specialization**
  A method of production where an individual, business, or area focuses on a limited scope of products or services
- **Market**
  An institution or arrangement that enables people to exchange goods and services

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

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.

APPLICATION 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 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.

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

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
4	147

2.5 THE REAL-NOMINAL PRINCIPLE

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

THE VALUE OF 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

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
Deflation: Salary cut in half	20,000	1 year

Learning Objectives

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KEY TERMS

Marginal benefit

Marginal cost

Opportunity cost

Production possibilities curve

Nominal value

Real value

Questions?