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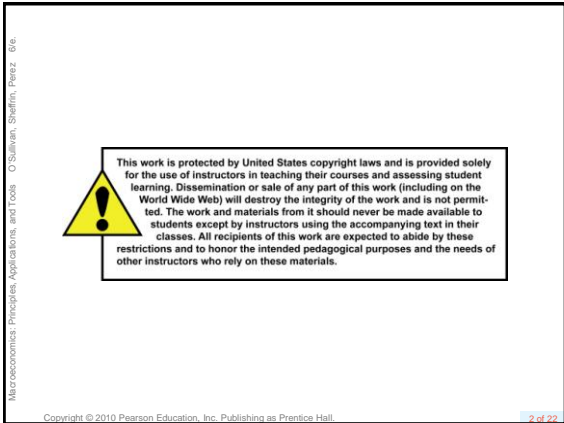
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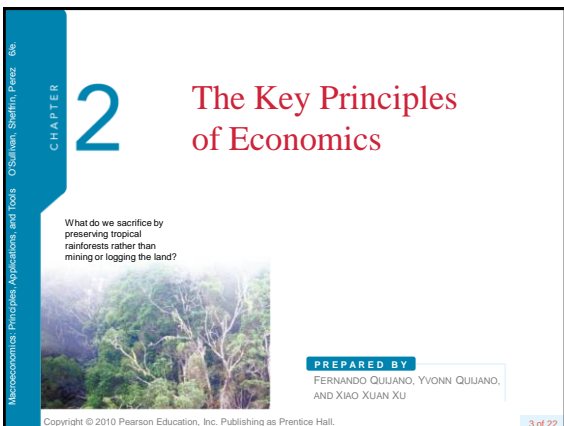
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**CHAPTER 2**  
The Key Principles of Economics

**APPLYING THE CONCEPTS**

- 1 What is the opportunity cost of running a business?  
*Don't Forget the Costs of Time and Invested Funds*
- 2 What are society's trade-offs between different goods?  
*The Opportunity Cost of Military Spending*
- 3 How do people think at the margin?  
*The Marginal Benefit and Marginal Cost of Speed*
- 4 What is the rationale for specialization and exchange?  
*Tiger Woods and Weeds*
- 5 Do farmers experience diminishing returns?  
*Fertilizer and Crop Yields*
- 6 How does inflation affect the real minimum wage?  
*The Declining Real Minimum Wage*
- 7 How does inflation affect lenders and borrowers?  
*Repaying Student Loans*



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**CHAPTER 2**  
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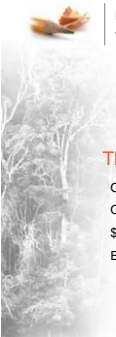
**2.1 | THE PRINCIPLE OF OPPORTUNITY COST**

**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
<b>Economic cost or total opportunity cost</b>	<b>\$120,000</b>



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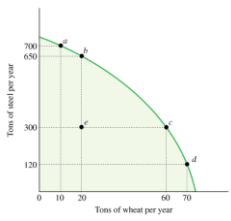
**CHAPTER 2**  
The Key Principles of Economics

**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.

**FIGURE 2.1**  
Scarcity and the Production Possibilities Curve  
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.



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**CHAPTER 2**  
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**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?**

Betty has a degree in fine arts, and makes a unique product—decorative bottle-cap pins. She has asked you to compute the annual cost of her business. She uses machines and tools that have a current market value of \$10,000. The annual cost of her raw materials (bottle caps, paint, pins) is \$2,000. She could be earning \$30,000 in another job. We can use the principle of opportunity cost to compute Betty's costs. In addition to the \$2,000 cost of raw materials, we must include two other sorts of costs:

- **Opportunity cost of funds invested.** Betty could have invested the \$10,000 in a bank account. If the interest rate on a bank account is 8 percent, the annual cost of her capital (machines and tools) is the \$800 she could have earned in a bank account during the year.
- **Opportunity cost of her time.** The opportunity cost of Betty's time is the \$30,000 salary she sacrifices by being her own boss.

Adding the \$800 cost of funds and the \$30,000 cost of her time to the \$2,000 materials cost, we find Betty's cost of doing business is \$32,800 per year.

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**CHAPTER 2**  
The Key Principles of Economics

**2.1 | THE PRINCIPLE OF OPPORTUNITY COST**

**FIGURE 2.2**  
Shifting the Production Possibilities Curve

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*).

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**CHAPTER 2**  
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**APPLICATION 2**

**THE OPPORTUNITY COST OF MILITARY SPENDING**

**APPLYING THE CONCEPTS #2: What are society's trade-offs between different goods?**

We can use the principle of opportunity cost to explore the cost of military spending. Economists estimate the cost of the Iraq War to be at least \$1 trillion. Each \$100 billion spent on the war could instead support one of the following programs:

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

In terms of domestic security (i.e., securing ports/cargo facilities, more police, airline screening improvement and more), the cost of implementation would be about \$31 billion – a fraction of the cost of the war.

Do the benefits from the war exceed its opportunity cost? Would money spent on domestic security be more beneficial than the money spent on war?

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## 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.



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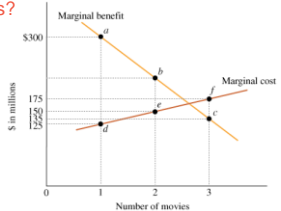
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**CHAPTER 2**  
The Key Principles of Economics

## 2.2 | THE MARGINAL PRINCIPLE

### How Many Movie Sequels?

**FIGURE 2.3**  
The Marginal Principle and 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.



Number of Movies	Marginal Benefit (\$ millions)	Marginal Cost (\$ millions)
1	300	125
2	210	150
3	135	175

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## 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.

### 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).

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**APPLICATION 3**

**THE MARGINAL BENEFIT AND MARGINAL COST OF SPEED**

**APPLYING THE CONCEPTS #3: How do people think at the margin?**



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.

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.

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**2.3 | THE PRINCIPLE OF VOLUNTARY EXCHANGE**

**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.

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**CHAPTER 2**  
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**2.3 | THE PRINCIPLE OF VOLUNTARY EXCHANGE**

**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.

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**APPLICATION 4**  
TIGER WOODS AND WEEDS

**APPLYING THE CONCEPTS #4: What is the rationale for specialization and exchange?**

Should Tiger Woods whack his own weeds? The swinging skills that make Tiger Woods one of the world's best golfers also make him a skillful weed whacker. His large estate has a lot of weeds, and it would take the best gardener 20 hours to take care of all of them. With his powerful and precise swing, Tiger could whack down all the weeds in just one hour. Since Tiger is 20 times more productive than the best gardener, should he take care of his own weeds?

We can use the principle of voluntary exchange to explain why Tiger should hire the less productive gardener. Suppose Tiger earns \$1,000 per hour playing golf—either playing in tournaments or giving lessons. For Tiger, the opportunity cost of weed whacking is \$1,000—the income he sacrifices by spending an hour cutting weeds rather than playing golf. If the gardener charges \$10 per hour, Tiger could hire him to take care of the weeds for only \$200. By switching one hour of his time from weed whacking to golf, Tiger earns \$1,000 and incurs a cost of only \$200, so he is better off by \$800. Tiger Woods specializes in what he does best, and then buys goods and services from other people.



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**CHAPTER 2**  
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**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.



**Diminishing Returns from Sharing a Production 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.

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**APPLICATION 5**  
FERTILIZER AND CROP YIELDS

**APPLYING THE CONCEPTS #5: 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.

Bags of Nitrogen Fertilizer	Bushels of Corn Per Acre
0	85
1	120
2	135
3	144
4	147

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## 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.

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**CHAPTER 2**  
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### APPLICATION 6

#### THE DECLINING REAL MINIMUM WAGE

**APPLYING THE CONCEPTS #6: How does inflation affect the real minimum wage?**

Between 1974 and 2007, the federal minimum wage increased from \$2.00 to \$5.85.

Was the typical minimum-wage worker better or worse off in 2007?

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

	1974	2007
Minimum wage per hour	\$2.00	\$5.85
Weekly income from minimum wage	80.00	234.00
Cost of a standard basket of goods	47	202
Number of baskets per week	1.70	1.16

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

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**CHAPTER 2**  
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### APPLICATION 7

#### REPAYING STUDENT LOANS

**APPLYING THE CONCEPTS #7: 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.

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

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**KEY TERMS**

- marginal benefit
- opportunity cost
- marginal cost
- production possibilities curve
- nominal value
- real value



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