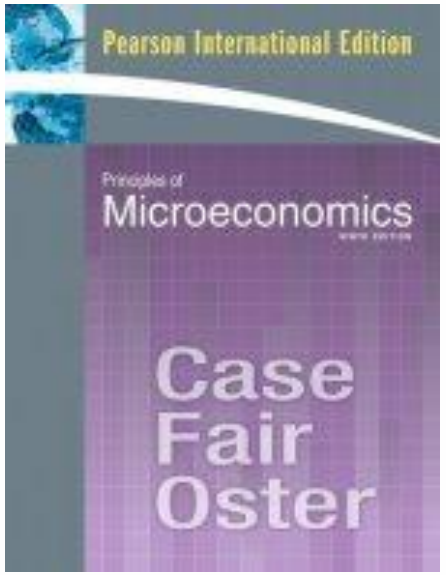
CHAPTER 10

Organizing Production



After studying this chapter you will be able to

- Explain what a firm is and describe the economic problems that *all* firms face
- Distinguish between technological efficiency and economic efficiency
- Define and explain the principal-agent problem and describe how different types of business organizations cope with this problem
- Describe and distinguish between different types of markets in which firms operate
- Explain why markets coordinate some economic activities and firms coordinate others

The invention of the World Wide Web has paved the way for the creation of thousands of profitable businesses, such as Google, Inc.

How do Google and the other 20 million firms in the United States make their business decisions?

Most of the firms don't make things; they buy and sell things. For example, Apple doesn't make the iPod. Toshiba makes the iPod's hard drive and display module and Inventec assembles the iPod.

Why doesn't Apple make its iPod?

How do firms decide what to make themselves and what to buy from other firms?

The Firm and Its Economic Problem

A firm is an institution that hires factors of production and organizes them to produce and sell goods and services.

The Firm's Goal

A firm's goal is to maximize profit.

If the firm fails to maximize its profit, the firm is either eliminated or bought out by other firms seeking to maximize profit.

The Firm and Its Economic Problem

Accounting Profit

Accountants measure a firm's profit to ensure that the firm pays the correct amount of tax and to show it investors how their funds are being used.

π=TR-TC=Profit equals total revenue minus total cost

Accountants use Internal Revenue Service rules based on standards established by the Financial Accounting Standards Board to calculate a firm's depreciation cost.

The Firm and Its Economic Problem

Economic Profit

Economists measure a firm's profit to enable them to predict the firm's decisions, and the goal of these decisions in to maximize economic profit.

Economic profit is equal to total revenue minus total cost, with total cost measured as the opportunity cost of production.

The Firm and Its Economic Problem

A Firm's Opportunity Cost of Production

A firm's opportunity cost of production is the value of the best alternative use of the resources that a firm uses in production.

A firm's opportunity cost of production is the sum of the cost of using resources

- **Bought in the market**
- **Owned by the firm**
- **Supplied by the firm's owner**

The Firm and Its Economic Problem

Resources Bought in the Market

The amount spent by a firm on resources bought in the market is an opportunity cost of production because the firm could have bought different resources to produce some other good or service.

The Firm and Its Economic Problem

Resources Owned by the Firm

If the firm owns capital and uses it to produce its output, then the firm incur an opportunity cost.

The firm incurs an opportunity cost of production because it could have sold the capital and rented capital from another firm.

The firm implicitly rent the capital from itself.

The firm's opportunity cost of using the capital it owns is called the implicit rental rate of capital.

The Firm and Its Economic Problem

The implicit rental rate of capital is made up of

1. Economic depreciation

2. Interest forgone

Economic depreciation is the change in the *market value* of capital over a given period.

Interest forgone is the return on the funds used to acquire the capital.

The Firm and Its Economic Problem

Resources Supplied by the Firm's Owner

The owner might supply both entrepreneurship and labor.

The return to entrepreneurship is profit.

The profit that an entrepreneur can expect to receive *on average* is called normal profit.

Normal profit is the cost of entrepreneurship and is a cost of production.

The Firm and Its Economic Problem

In addition **to supplying entrepreneurship, the owner might supply labor but not take as wage.**

The opportunity cost of the owner's labor is the wage income forgone by not taking the best alternative job.

Economic Accounting: A Summary

Economic profit equals a firm's total revenue minus its total opportunity cost of production.

The example in Table 10.1 on the next slide summarizes the economic accounting.

The Firm and Its Economic Problem

TABLE 10.1 Economic Accounting

Item		Amount
Total Revenue		**$400,000**
Cost of Resources Bought in Market		
Wool	$80,000	
Utilities	20,000	
Wages	120,000	
Computer lease	5,000	
Bank interest	5,000	$230,000
Cost of Resources Owned by Firm		
Economic depreciation	$25,000	
Forgone interest	15,000	$40,000
Cost of Resources Supplied by Owner		
Cindy's normal profit	$45,000	
Cindy's forgone wages	55,000	$100,000
Opportunity Cost of Production		**$370,000**
Economic Profit		**$30,000**

The Firm and Its Economic Problem

The Firm's Decisions

To maximize profit, a firm must make five basic decisions:

1. What to produce and in what quantities

2. How to produce

3. How to organize and compensate its managers and workers

4. How to market and price its products

5. What to produce itself and what to buy from other firms

The Firm and Its Economic Problem

The Firm's Constraints

The firm's profit is limited by three features of the environment:

- **Technology constraints**
- **Information constraints**
- **Market constraints**

The Firm and Its Economic Problem

Technology Constraints

Technology is any method of producing a good or service.

Technology advances over time.

Using the available technology, the firm can produce more only if it hires more resources, which will increase its costs and limit the profit of additional output.

The Firm and Its Economic Problem

Information Constraints

A firm never possesses complete information about either the present or the future.

It is constrained by limited information about the quality and effort of its work force, current and future buying plans of its customers, and the plans of its competitors.

The cost of coping with limited information limits profit.

The Firm and Its Economic Problem

Market Constraints

What a firm can sell and the price it can obtain are constrained by its customers' willingness to pay and by the prices and marketing efforts of other firms.

The resources that a firm can buy and the prices it must pay for them are limited by the willingness of people to work for and invest in the firm.

The expenditures a firm incurs to overcome these market constraints will limit the profit the firm can make.

Technology and Economic Efficiency

Technological Efficiency

Technological efficiency occurs when a firm produces a given level of output by using the least amount inputs.

There may be different combinations of inputs to use for producing a given good, but only one of them is technologically inefficient.

If it is impossible to produce a given good by decreasing any one input, holding all other inputs constant, then production is technologically efficient.

Technology and Economic Efficiency

Table 10.2 sets out the labor and capital required to produce 10 TVs a day by four methods *A*, *B*, *C*, and *D*.

Which methods are technologically efficient?

TABLE 10.2 Four Ways of Making 10 TVs a Day

	Method	Quantities of inputs	
		Labor	Capital
A	Robot production	1	1,000
B	Production line	10	10
C	Hand-tool production	1,000	1
D	Bench production	100	10

Technology and Economic Efficiency

Economic Efficiency

Economic efficiency occurs when the firm produces a given level of output at the least cost.

The economically efficient method depends on the relative costs of capital and labor.

The difference between technological and economic efficiency is that technological efficiency concerns the quantity of inputs used in production for a given level of output, whereas economic efficiency concerns the cost of the inputs used.

Technology and Economic Efficiency

An economically efficient production process also is technologically efficient.

A technologically efficient process may not be economically efficient.

Table 10.3 on the next slide illustrates how the economically efficient method depends on the relative costs of resources.

Technology and Economic Efficiency

When the wage rate is $75 a day and the rental rate is $250 a day, Method *B* is the economically efficient method.

When the wage rate is $150 a day and the rental rate is $1 a day, Method *A* is the economically efficient method.

When the wage rate is $1 a day and the rental rate is $1,000 a day, Method *C* is the economically efficient method.

TABLE 10.3 The Costs of Different Ways of Making 10 TVs a Day

(c) Wage rate $1 a day; Capital rental rate $1,000 a day

Method	Inputs: Labor	Inputs: Capital	Labor cost ($1 per day)		Capital cost ($1,000 per day)		Total cost
A	1	1,000	$1	+	$1,000,000	=	$1,000,001
B	10	10	10	+	10,000	=	10,010
C	1,000	1	1,000	+	1,000	=	2,000

TABLE 10.3 The Costs of Different Ways of Making 10 TVs a Day

(a) Wage rate $75 a day; Capital rental rate $250 a day

Method	Inputs: Labor	Inputs: Capital	Labor cost ($75 per day)		Capital cost ($250 per day)		Total cost
A	1	1,000	$75	+	$250,000	=	$250,075
B	10	10	750	+	2,500	=	3,250
C	1,000	1	75,000	+	250	=	75,250

(b) Wage rate $150 a day; Capital rental rate $1 a day

Method	Inputs: Labor	Inputs: Capital	Labor cost ($150 per day)		Capital cost ($1 per day)		Total cost
A	1	1,000	$150	+	$1,000	=	$1,150
B	10	10	1,500	+	10	=	1,510
C	1,000	1	150,000	+	1	=	150,001

(c) Wage rate $1 a day; Capital rental rate $1,000 a day

Method	Inputs: Labor	Inputs: Capital	Labor cost ($1 per day)		Capital cost ($1,000 per day)		Total cost
A	1	1,000	$1	+	$1,000,000	=	$1,000,001
B	10	10	10	+	10,000	=	10,010
C	1,000	1	1,000	+	1,000	=	2,000

Information and Organization

A firm organizes production by combining and coordinating productive resources using a mixture of two systems:

- **Command systems**
- **Incentive systems**

Information and Organization

Command Systems

A command system uses a managerial hierarchy.

Commands pass downward through the hierarchy and information (feedback) passes upward.

These systems are relatively rigid and can have many layers of specialized management.

Information and Organization

Incentive Systems

An incentive system is a method of organizing production that uses a market-like mechanism to induce workers to perform in ways that maximize the firm's profit.

Information and Organization

Mixing the Systems

Most firms use a mix of command and incentive systems to maximize profit.

They use commands when it is easy to monitor performance or when a small deviation from the ideal performance is very costly.

They use incentives whenever monitoring performance is impossible or too costly to be worth doing.

Information and Organization

The Principal–Agent Problem

The principal–agent problem is the problem of devising compensation rules that induce an agent to act in the best interests of a principal.

For example, the stockholders of a firm are the principals and the managers of the firm are their agents.

Coping with the Principal–Agent Problem

Three ways of coping with the principal–agent problem are

- **Ownership**
- **Incentive pay**
- **Long-term contracts**

Information and Organization

Ownership, often offered to managers, gives the managers an incentive to maximize the firm's profits, which is the goal of the owners, the principals.

Incentive pay links managers' or workers' pay to the firm's performance and helps align the managers' and workers' interests with those of the owners, the principals.

Long-term contracts can tie managers' or workers' long-term rewards to the long-term performance of the firm. This arrangement encourages the agents work in the best long-term interests of the firm owners, the principals.

Information and Organization

Types of Business Organization

There are three types of business organization:

- **Proprietorship**
- **Partnership**
- **Corporation**

Information and Organization

Proprietorship

A *proprietorship* is a firm with a single owner who has *unlimited liability*, or legal responsibility for all debts incurred by the firm—up to an amount equal to the entire wealth of the owner.

The proprietor also makes management decisions and receives the firm's profit.

Profits are taxed the same as the owner's other income.

Information and Organization

Partnership

A *partnership* is a firm with two or more owners who have unlimited liability.

Partners must agree on a management structure and how to divide up the profits.

Profits from partnerships are taxed as the personal income of the owners.

Information and Organization

Corporation

A *corporation* is owned by one or more stockholders with *limited liability*, which means the owners who have legal liability only for the initial value of their investment.

The personal wealth of the stockholders is not at risk if the firm goes bankrupt.

The profit of corporations is taxed twice—once as a corporate tax on firm profits, and then again as income taxes paid by stockholders receiving their after-tax profits distributed as dividends.

Pros and Cons of Different Types of Firms

Each type of business organization has advantages and disadvantages.

Table 10.4 summarizes the pros and cons of different types of firms.

TABLE 10.4 The Pros and Cons of Different Types of Firms

Type of Firm	Pros	Cons
Proprietorship	■ Easy to set up ■ Simple decision making ■ Profits taxed only once as owner's income	■ Bad decisions not checked; no need for consensus ■ Owner's entire wealth at risk ■ Firm dies with owner ■ Cost of capital and labor is high relative to that of a corporation
Partnership	■ Easy to set up ■ Diversified decision making ■ Can survive withdrawal of partner ■ Profits taxed only once as owners' incomes	■ Achieving consensus may be slow and expensive ■ Owners' entire wealth at risk ■ Withdrawal of partner may create capital shortage ■ Cost of capital and labor is high relative to that of a corporation
Corporation	■ Owners have limited liability ■ Large-scale, low-cost capital available ■ Professional management not restricted by ability of owners ■ Perpetual life ■ Long-term labor contracts cut labor costs	■ Complex management structure can make decisions slow and expensive ■ Retained profits taxed twice: as company profit and as stockholders' capital gains

Information and Organization

Proprietorships

- Are easy to set up
- Managerial decision making is simple
- Profits are taxed only once as owner's income
- But bad decisions made by the manager are not subject to review
- The owner's entire wealth is at stake
- The firm dies with the owner
- The cost of capital and labor can be high

Information and Organization

Partnerships

- Are easy to set up
- Employ diversified decision-making processes
- Can survive the withdrawal of a partner
- Profits are taxed only once
- But achieving a consensus about managerial decisions difficult
- Owners' entire wealth is at risk
- Capital is expensive

Information and Organization

Corporation

- Limited liability for its owners
- Large-scale and low-cost capital that is readily available
- Professional management
- Lower costs from long-term labor contracts
- But complex management structure may lead to slow and expensive
- Profits taxed twice—as corporate profit and shareholder income.

Markets and the Competitive Environment

Economists identify four market types:

1. Perfect competition

2. Monopolistic competition

3. Oligopoly

4. Monopoly

Markets and the Competitive Environment

Perfect competition is a market structure with

- **Many firms**
- **Each sells an identical product**
- **Many buyers**
- **No restrictions on entry of new firms to the industry**
- **Both firms and buyers are all well informed about the prices and products of all firms in the industry.**

Markets and the Competitive Environment

Monopolistic competition is a market structure with

- **Many firms**
- **Each firm produces similar but slightly different products—called product differentiation**
- **Each firm possesses an element of market power**
- **No restrictions on entry of new firms to the industry**

Markets and the Competitive Environment

Oligopoly is a market structure in which

- **A small number of firms compete.**
- **The firms might produce almost identical products or differentiated products.**
- **Barriers to entry limit entry into the market.**

Markets and the Competitive Environment

Monopoly is a market structure in which

- One firm produces the entire output of the industry.
- There are no close substitutes for the product.
- There are barriers to entry that protect the firm from competition by entering firms.

Markets and the Competitive Environment

Measures of Concentration

Economists use two measures of market concentration:

- **The four-firm concentration ratio**
- **The Herfindahl–Hirschman index (HHI)**

The larger the measure of market concentration, the less competition that exists in the industry.

Markets and the Competitive Environment

The Four-Firm Concentration Ratio

The four-firm concentration ratio is the percentage of the total industry sales accounted for by the four largest firms in the industry.

Table 10.5 on the next slide shows two calculations of the four-firm concentration ratio.

Markets and the Competitive Environment

TABLE 10.5 Calculating the Four-Firm Concentration Ratio

Tire makers		Printers	
Firm	**Sales (millions of dollars)**	**Firm**	**Sales (millions of dollars)**
Top, Inc.	200	Fran's	2.5
ABC, Inc.	250	Ned's	2.0
Big, Inc.	150	Tom's	1.8
XYZ, Inc.	100	Jill's	1.7
Largest 4 firms	700	Largest 4 firms	8.0
Other 10 firms	175	Other 1,000 firms	1,592.0
Industry	875	Industry	1,600.0

Four-firm concentration ratios:

Tire makers: $\frac{700}{875} \times 100 = 80$ percent

Printers: $\frac{8}{1{,}600} \times 100 = 0.5$ percent

Markets and the Competitive Environment

The Herfindahl–Hirschman Index

The Herfindahl–Hirschman index (HHI) is the square of percentage market share of each firm summed over the largest 50 firms in the industry.

For example, if there are four firms in a market and the market shares are 50 percent, 25 percent, 15 percent, and 10 percent,

$$HHI = 50^2 + 25^2 + 15^2 + 10^2 = 3{,}450.$$

Markets and the Competitive Environment

Concentration Measures for the U.S. Economy

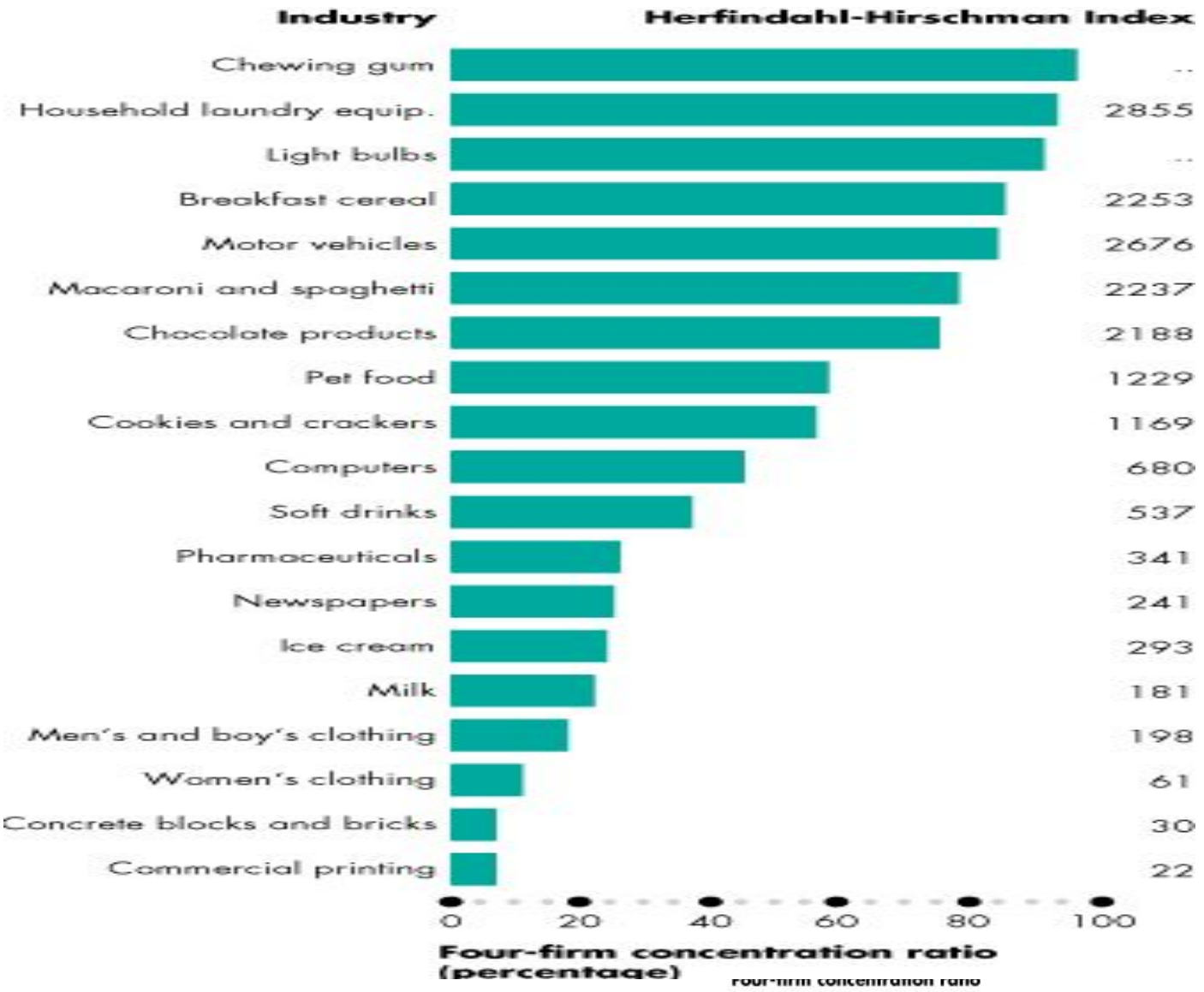
Figure 9.2 shows some concentration ratios and HHIs for the United States.

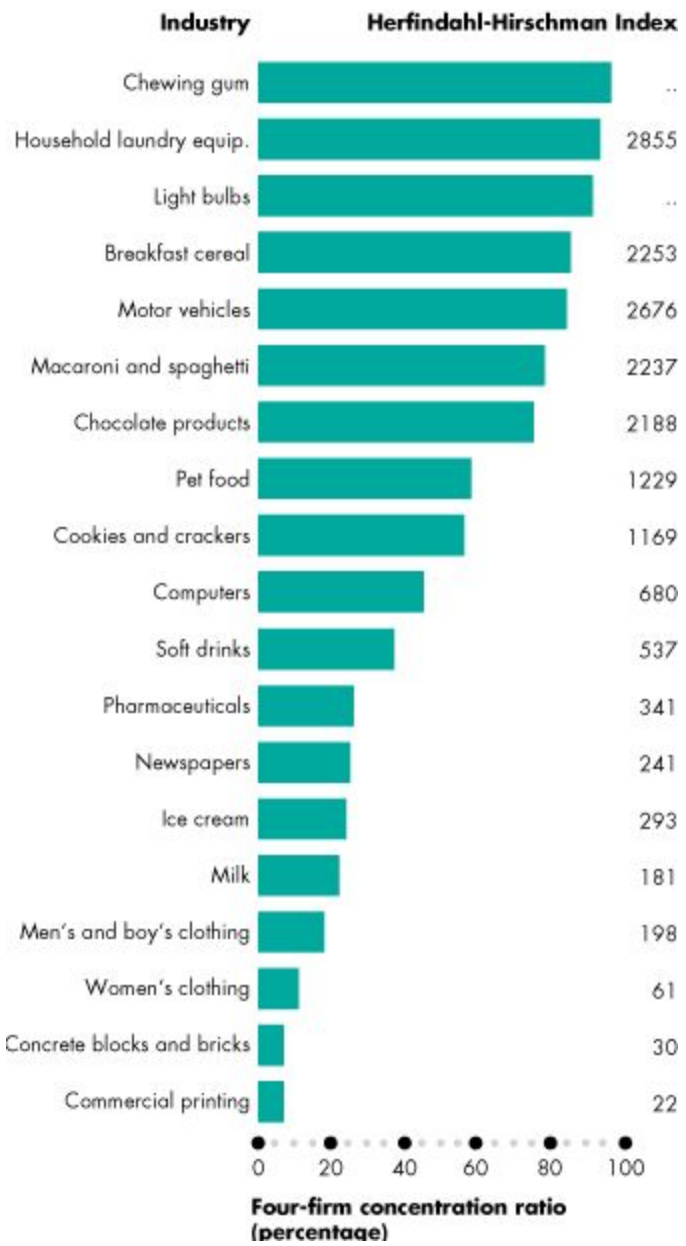
Concentration measures are a useful indicator of the degree of competition in a market.

- **A market with an HHI of less than 1,000 is regarded as being highly competitive.**
- **A market with an HHI between 1,000 and 1,800 is regarded as being moderately competitive.**
- **A market with an HHI greater than 1,800 is regarded as being uncompetitive.**

Markets and the Competitive Environment

Figure 10.2 shows the four-firm concentration ratio for various industries in the United States.




Industry
Herfindahl-Hirschman Index
Chewing gum
..
Household laundry equip.
2855
Light bulbs
..
Breakfast cereal
2253
Motor vehicles
2676
Macaroni and spaghetti
2237
Chocolate products
2188
Pet food
1229
Cookies and crackers
1169
Computers
680
Soft drinks
537
Pharmaceuticals
341
Newspapers
241
Ice cream
293
Milk
181
Men's and boy's clothing
198
Women's clothing
61
Concrete blocks and bricks
30
Commercial printing
22
0
20
40
60
80
100
Four-firm concentration ratio (percentage)

Markets and the Competitive Environment

Limitations of Concentration Measures

The main limitations of only using concentration measure as determinants of market structure are

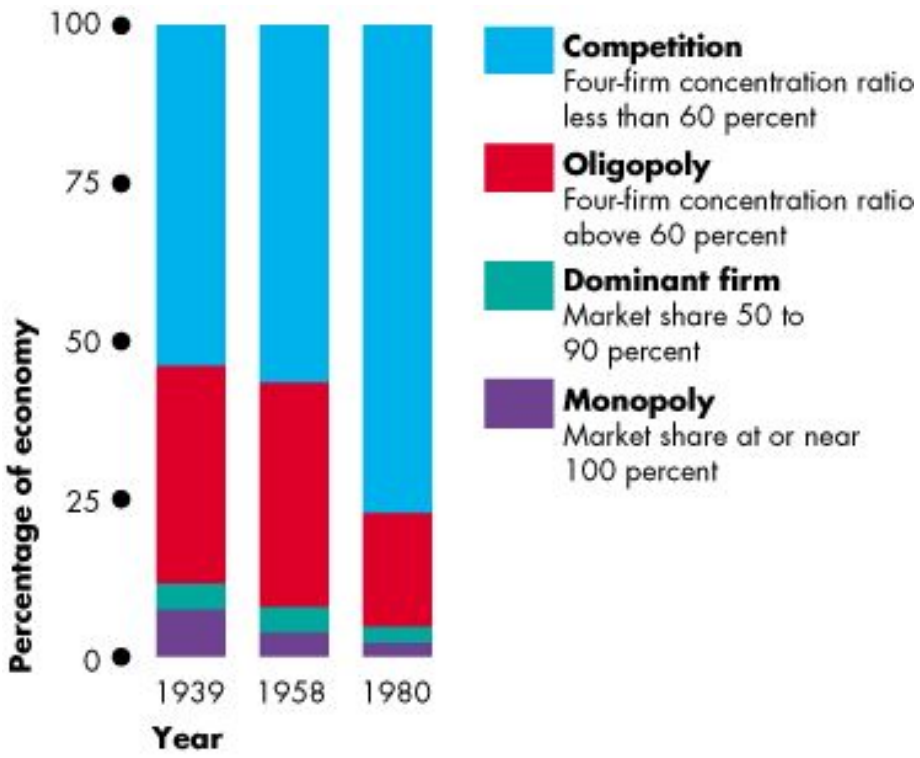
- **The geographical scope of the market**
- **Barriers to entry and firm turnover**
- **The correspondence between a market and an industry**

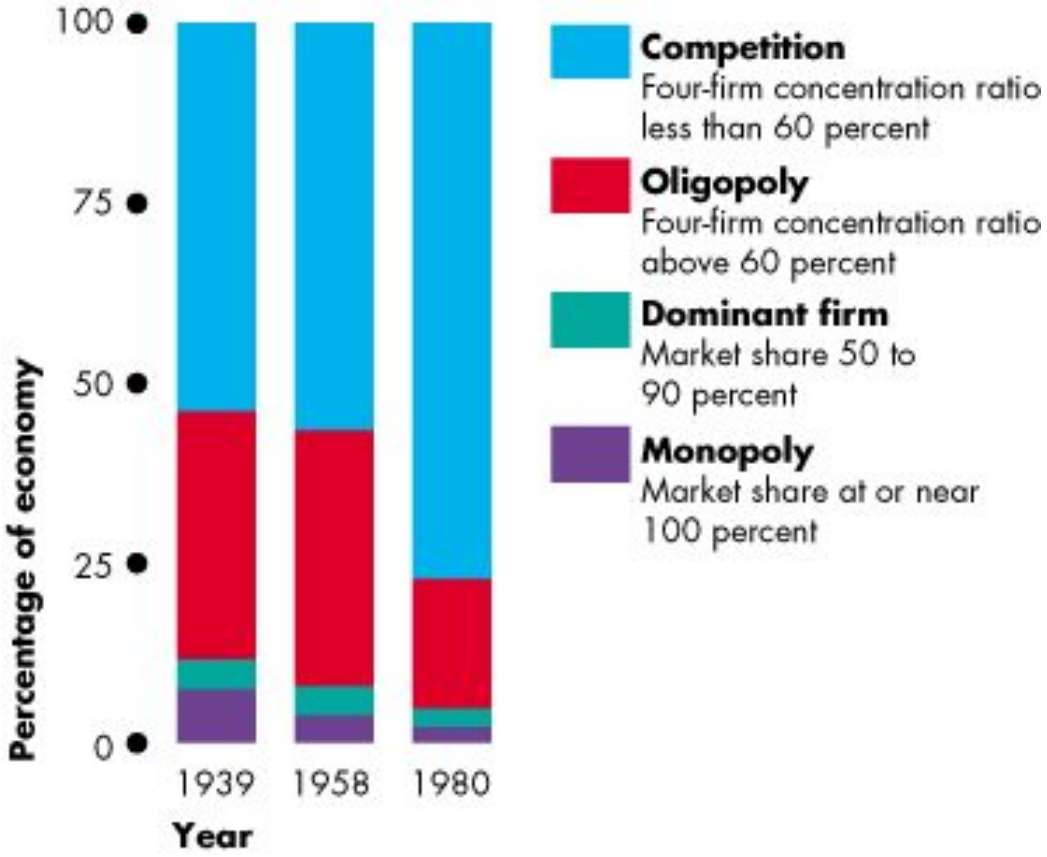
Markets and the Competitive Environment

Market Structures in the U.S. Economy

Figure 9.3 shows the distribution of market structures in the North American economy.

The economy is mainly competitive.




100
75
50
25
0
Percentage of economy
1939
1958
1980
Year
Competition
Four-firm concentration ratio less than 60 percent
Oligopoly
Four-firm concentration ratio above 60 percent
Dominant firm
Market share 50 to 90 percent
Monopoly
Market share at or near 100 percent

Markets and Firms

Market Coordination

Markets both coordinate production.

Chapter 3 explains how demand and supply coordinate the plans of buyers and sellers.

Outsourcing—buying parts or products from other firms—is an example of market coordination of production.

But firms coordinate more production than do markets.

Why?

Markets and Firms

Why Firms?

Firms coordinate production when they can do so more efficiently than a market.

Four key reasons might make firms more efficient.

Firms can achieve

- **Lower transactions costs**
- **Economies of scale**
- **Economies of scope**
- **Economies of team production**

Markets and Firms

Transactions costs are the costs arising from finding someone with whom to do business, reaching agreement on the price and other aspects of the exchange, and ensuring that the terms of the agreement are fulfilled.

Economies of scale occur when the cost of producing a unit of a good falls as its output rate increases.

Economies of scope arise when a firm can use specialized inputs to produce a range of different goods at a lower cost than otherwise.

Firms can engage in team production, in which the individuals specialize in mutually supporting tasks.

Terms Along the Way

firm

corporation

stock

bond

profit (economic profit)

total revenue

total cost

explicit cost

implicit opportunity cost (implicit cost)

normal profit

excess profit

loss

breakeven

principal – agent problem

Test Yourself

1.Which is *not* a legal form of business?

Sole proprietorship.

Partnership.

Corporation.

Limited liability.

Test Yourself

2. The stock exchanges are an example of a

primary market.

secondary market.

sole proprietorship.

mutual fund.

Test Yourself

3. Explicit cost are

wages and profits.

cost brought on by negative returns in production.

cost that accountants can measure.

cost associated with wasted resources.