After studying this chapter, you will be able to:

- Explain what a firm is and describe the economic problem 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 why firms coordinate others

10 ORGANIZING PRODUCTION

In the fall of 1990, a British scientist named Tim Berners-Lee invented the World Wide Web. This remarkable idea paved the way for the creation of thousands of profitable businesses that include Facebook and Twitter, Apple, Microsoft, Google, and Yahoo!.

Some of these successful dot.com firms sell goods and others sell services. But many firms, especially those that you can name, don't *make* the things they sell: They *buy* them from other firms. For example, Apple doesn't make the iPhone. Intel makes its memory chip and Foxconn, a firm in Taiwan, assembles its components. Why doesn't Apple make the iPhone? How do firms decide what to make themselves and what to buy from other firms?

How do Facebook, Twitter, Apple, Microsoft, Google, Intel, Foxconn, and the millions of other firms make their business decisions?

In this chapter, you are going to learn about firms and the choices they make. In *Reading Between the Lines* at the end of the chapter, we'll apply some of what you've learned and look at some of the choices made by Facebook and Yahoo in the Internet advertising game.

The Firm and Its Economic Problem

The 20 million firms in the United States differ in size and in the scope of what they do, but they all perform the same basic economic functions. Each **firm** is an institution that hires factors of production and organizes those factors to produce and sell goods and services. Our goal is to predict firms' behavior. To do so, we need to know a firm's goal and the constraints it faces. We start with the goal.

The Firm's Goal

When economists ask entrepreneurs what they are trying to achieve, they get many different answers. Some talk about making a high-quality product, others about business growth, others about market share, others about the job satisfaction of their workforce, and an increasing number today talk about social and environmental responsibility. All of these goals are pursued by firms, but they are not the fundamental goal: They are the means to that goal.

A firm's goal is to maximize profit. A firm that does not seek to maximize profit is either eliminated or taken over by a firm that does seek that goal.

What is the profit that a firm seeks to maximize? To answer this question, we'll look at Campus Sweaters, Inc., a small producer of knitted sweaters owned and operated by Cindy.

Accounting Profit

In 2010, Campus Sweaters received $400,000 for the sweaters it sold and paid out $80,000 for wool, $20,000 for utilities, $120,000 for wages, $5,000 for the lease of a computer, and $5,000 in interest on a bank loan. These expenses total $230,000, so the firm had a cash surplus of $170,000.

To measure the profit of Campus Sweaters, Cindy's accountant subtracted $20,000 for the depreciation of buildings and knitting machines from the $170,000 cash surplus. *Depreciation* is the fall in the value of a firm's capital. To calculate depreciation, accountants use Internal Revenue Service rules based on standards established by the Financial Accounting Standards Board. Using these rules, Cindy's accountant calculated that Campus Sweaters made a profit of $150,000 in 2010.

Economic Accounting

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

Economists measure a firm's profit to enable them to predict the firm's decisions, and the goal of these decisions is to maximize *economic profit.* **Economic profit** is equal to total revenue minus total cost, with total cost measured as the *opportunity cost of production*.

A Firm's Opportunity Cost of Production

The *opportunity cost* of any action is the highest-valued alternative forgone. The *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 value of real alternatives forgone. We express opportunity cost in money units so that we can compare and add up the value of the alternatives forgone.

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

Resources Bought in the Market A firm incurs an opportunity cost when it buys resources in the market. The amount spent on these resources is an opportunity cost of production because the firm could have bought different resources to produce some other good or service. For Campus Sweaters, the resources bought in the market are wool, utilities, labor, a leased computer, and a bank loan. The $230,000 spent on these items in 2010 could have been spent on something else, so it is an opportunity cost of producing sweaters.

Resources Owned by the Firm A firm incurs an opportunity cost when it uses its own capital. The cost of using capital owned by the firm is an opportunity cost of production because the firm could sell the capital that it owns and rent capital from another firm. When a firm uses its own capital, it implicitly rents it from itself. In this case, the firm's opportunity cost of using the capital it owns is called the **implicit rental rate** of capital. The implicit rental rate of capital has two components: economic depreciation and forgone interest.

Economic Depreciation Accountants measure *depreciation*, the fall in the value of a firm's capital, using formulas that are unrelated to the change in the market value of capital. **Economic depreciation** is the fall in the *market value* of a firm's capital over a given period. It equals the market price of the capital at the beginning of the period minus the market price of the capital at the end of the period.

Suppose that Campus Sweaters could have sold its buildings and knitting machines on January 1, 2010, for $400,000 and that it can sell the same capital on December 31, 2010, for $375,000. The firm's economic depreciation during 2010 is $25,000 ($400,000 – $375,000). This forgone $25,000 is an opportunity cost of production.

Forgone Interest The funds used to buy capital could have been used for some other purpose, and in their next best use, they would have earned interest. This forgone interest is an opportunity cost of production.

Suppose that Campus Sweaters used $300,000 of its own funds to buy capital. If the firm invested its $300,000 in bonds instead of a knitting factory (and rented the capital it needs to produce sweaters), it would have earned $15,000 a year in interest. This forgone interest is an opportunity cost of production.

Resources Supplied by the Firm's Owner A firm's owner might supply *both* entrepreneurship and labor.

Entrepreneurship The factor of production that organizes a firm and makes its decisions might be supplied by the firm's owner or by a hired entrepreneur. The return to entrepreneurship is profit, and the profit that an entrepreneur earns *on average* is called **normal profit**. Normal profit is the cost of entrepreneurship and is an opportunity cost of production.

If Cindy supplies entrepreneurial services herself, and if the normal profit she can earn on these services is $45,000 a year, this amount is an opportunity cost of production at Campus Sweaters.

Owner's Labor Services *In addition* to supplying entrepreneurship, the owner of a firm might supply labor but not take a wage. The opportunity cost of the owner's labor is the wage income forgone by not taking the best alternative job.

If Cindy supplies labor to Campus Sweaters, and if the wage she can earn on this labor at another firm is $55,000 a year, this amount of wages forgone is an opportunity cost of production at Campus Sweaters.

Economic Accounting: A Summary

Table 10.1 summarizes the economic accounting. Campus Sweaters' total revenue is $400,000; its opportunity cost of production is $370,000; and its economic profit is $30,000.

Cindy's personal income is the $30,000 of economic profit plus the $100,000 that she earns by supplying resources to Campus Sweaters.

Decisions

To achieve the objective of maximum economic profit, a firm must make five 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 buy from others

In all these decisions, a firm's actions are limited by the constraints that it faces. Your next task is to learn about these constraints.

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's Constraints

Three features of a firm's environment limit the maximum economic profit it can make. They are

- Technology constraints
- Information constraints
- Market constraints

Technology Constraints Economists define technology broadly. A **technology** is any method of producing a good or service. Technology includes the detailed designs of machines and the layout of the workplace. It includes the organization of the firm. For example, the shopping mall is one technology for producing retail services. It is a different technology from the catalog store, which in turn is different from the downtown store.

It might seem surprising that a firm's profit is limited by technology because it seems that technological advances are constantly increasing profit opportunities. Almost every day, we learn about some new technological advance that amazes us. With computers that speak and recognize our own speech and cars that can find the address we need in a city we've never visited, we can accomplish more than ever.

Technology advances over time. But at each point in time, to produce more output and gain more revenue, a firm must hire more resources and incur greater costs. The increase in profit that a firm can achieve is limited by the technology available. For example, by using its current plant and workforce, Ford can produce some maximum number of cars per day. To produce more cars per day, Ford must hire more resources, which increases its costs and limits the increase in profit that it can make by selling the additional cars.

Information Constraints We never possess all the information we would like to have to make decisions. We lack information about both the future and the present. For example, suppose you plan to buy a new computer. When should you buy it? The answer depends on how the price is going to change in the future. Where should you buy it? The answer depends on the prices at hundreds of different computer stores. To get the best deal, you must compare the quality and prices in every store. But the opportunity cost of this comparison exceeds the cost of the computer!

A firm is constrained by limited information about the quality and efforts of its workforce, the current and future buying plans of its customers, and the plans of its competitors. Workers might make too little effort, customers might switch to competing suppliers, and a competitor might enter the market and take some of the firm's business.

To address these problems, firms create incentives to boost workers' efforts even when no one is monitoring them; conduct market research to lower uncertainty about customers' buying plans, and "spy" on each other to anticipate competitive challenges. But these efforts don't eliminate incomplete information and uncertainty, which limit the economic profit that a firm can make.

Market Constraints The quantity each 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. Similarly, 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. Firms spend billions of dollars a year marketing and selling their products. Some of the most creative minds strive to find the right message that will produce a knockout television advertisement. Market constraints and the expenditures firms make to overcome them limit the profit a firm can make.

REVIEW QUIZ

1. What is a firm's fundamental goal and what happens if the firm doesn't pursue this goal?
2. Why do accountants and economists calculate a firm's cost and profit in different ways?
3. What are the items that make opportunity cost differ from the accountant's measure of cost?
4. Why is normal profit an opportunity cost?
5. What are the constraints that a firm faces? How does each constraint limit the firm's profit?

You can work these questions in Study Plan 10.1 and get instant feedback. myeconlab

In the rest of this chapter and in Chapters 11 through 14, we study the choices that firms make. You're going to learn how we can predict a firm's decisions as those that maximize profit given the constraints the firm faces. We begin by taking a closer look at a firm's technology constraints.

Technological and Economic Efficiency

Microsoft employs a large workforce, and most Microsoft workers possess a large amount of human capital. But the firm uses a small amount of physical capital. In contrast, a coal-mining company employs a huge amount of mining equipment (physical capital) and almost no labor. Why? The answer lies in the concept of efficiency. There are two concepts of production efficiency: technological efficiency and economic efficiency. **Technological efficiency** occurs when the firm produces a given output by using the least amount of inputs. **Economic efficiency** occurs when the firm produces a given output at the least cost. Let's explore the two concepts of efficiency by studying an example.

Suppose that there are four alternative techniques for making TVs:

A. *Robot production.* One person monitors the entire computer-driven process.
B. *Production line*. Workers specialize in a small part of the job as the emerging TV passes them on a production line.
C. *Hand-tool production*. A single worker uses a few hand tools to make a TV.
D. *Bench production.* Workers specialize in a small part of the job but walk from bench to bench to perform their tasks.

Table 10.2 sets out the amounts of labor and capital required by each of these four methods to make 10 TVs a day.

Which of these alternative methods are technologically efficient?

Technological Efficiency

Recall that *technological efficiency* occurs when the firm produces a given output by using the least amount of inputs. Look at the numbers in the table and notice that method *A* uses the most capital and the least labor. Method *C* uses the most labor and the least capital. Method *B* and method *D* lie between the two extremes. They use less capital and more labor than method *A* and less labor but more capital than method *C*.

Compare methods *B* and *D*. Method *D* requires 100 workers and 10 units of capital to produce 10 TVs. Those same 10 TVs can be produced by method *B* with 10 workers and the same 10 units of capital. Because method *D* uses the same amount of capital and more labor than method *B*, method *D* is not technologically efficient.

Are any of the other methods not technologically efficient? The answer is no. Each of the other methods is technologically efficient. Method *A* uses more capital but less labor than method *B*, and method *C* uses more labor but less capital than method *B*.

Which of the methods are economically 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

Economic Efficiency

Recall that *economic efficiency* occurs when the firm produces a given output at the least cost.

Method *D*, which is technologically inefficient, is also economically inefficient. It uses the same amount of capital as method *B* but 10 times as much labor, so it costs more. A technologically inefficient method is never economically efficient.

One of the three technologically efficient methods is economically efficient. The other two are economically inefficient. But which method is economically efficient depends on factor prices.

In Table 10.3(a), the wage rate is $75 per day and the rental rate of capital is $250 per day. By studying Table 10.3(a), you can see that method *B* has the lowest cost and is the economically efficient method.

In Table 10.3(b), the wage rate is $150 a day and the rental rate of capital is $1 a day. Looking at Table 10.3(b), you can see that method *A* has the lowest cost and is the economically efficient method. In this case, capital is so cheap relative to labor that the

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

(a) Wage rate $75 per day; Capital rental rate $250 per 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 per day; Capital rental rate $1 per 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 per day; Capital rental rate $1,000 per 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**

method that uses the most capital is the economically efficient method.

In Table 10.3(c), the wage rate is $1 a day and the rental rate of capital is $1,000 a day. You can see that method *C* has the lowest cost and is the economically efficient method. In this case, labor is so cheap relative to capital that the method that uses the most labor is the economically efficient method.

Economic efficiency depends on the relative costs of resources. The economically efficient method is the one that uses a smaller amount of the more expensive resource and a larger amount of the less expensive resource.

A firm that is not economically efficient does not maximize profit. Natural selection favors efficient firms and inefficient firms disappear. Inefficient firms go out of business or are taken over by firms that produce at lower costs.

REVIEW QUIZ

1. Is a firm technologically efficient if it uses the latest technology? Why or why not?
2. Is a firm economically inefficient if it can cut its costs by producing less? Why or why not?
3. Explain the key distinction between technological efficiency and economic efficiency.
4. Why do some firms use large amounts of capital and small amounts of labor while others use small amounts of capital and large amounts of labor?

You can work these questions in Study Plan 10.2 and get instant feedback. myeconlab

Next we study the information constraints that firms face and the wide array of organization structures these constraints generate.

Information and Organization

Each firm organizes the production of goods and services by combining and coordinating the productive resources it hires. But there is variety across firms in how they organize production. Firms use a mixture of two systems:

- Command systems
- Incentive systems

Command Systems

A **command system** is a method of organizing production that uses a managerial hierarchy. Commands pass downward through the hierarchy, and information passes upward. Managers spend most of their time collecting and processing information about the performance of the people under their control and making decisions about what commands to issue and how best to get those commands implemented.

The military uses the purest form of command system. A commander-in-chief (in the United States, the President) makes the big decisions about strategic goals. Beneath this highest level, generals organize their military resources. Beneath the generals, successively lower ranks organize smaller and smaller units but pay attention to ever-increasing degrees of detail. At the bottom of the managerial hierarchy are the people who operate weapons systems.

Command systems in firms are not as rigid as those in the military, but they share some similar features. A chief executive officer (CEO) sits at the top of a firm's command system. Senior executives who report to and receive commands from the CEO specialize in managing production, marketing, finance, personnel, and perhaps other aspects of the firm's operations. Beneath these senior managers might be several tiers of middle management ranks that stretch downward to the managers who supervise the day-to-day operations of the business. Beneath these managers are the people who operate the firm's machines and who make and sell the firm's goods and services.

Small firms have one or two layers of managers, while large firms have several layers. As production processes have become ever more complex, management ranks have swollen. Today, more people have management jobs than ever before, even though the information revolution of the 1990s slowed the growth of management. In some industries, the information revolution reduced the number of layers of managers and brought a shakeout of middle managers.

Managers make enormous efforts to be well informed. They try hard to make good decisions and issue commands that end up using resources efficiently. But managers always have incomplete information about what is happening in the divisions of the firm for which they are responsible. For this reason, firms use incentive systems as well as command systems to organize production.

Incentive Systems

An **incentive system** is a method of organizing production that uses a market-like mechanism inside the firm. Instead of issuing commands, senior managers create compensation schemes to induce workers to perform in ways that maximize the firm's profit.

Selling organizations use incentive systems most extensively. Sales representatives who spend most of their working time alone and unsupervised are induced to work hard by being paid a small salary and a large performance-related bonus.

But incentive systems operate at all levels in a firm. The compensation plan of a CEO includes a share in the firm's profit, and factory floor workers sometimes receive compensation based on the quantity they produce.

Mixing the Systems

Firms use a mixture of commands and incentives, and they choose the mixture that maximizes profit. Firms use commands when it is easy to monitor performance or when a small deviation from an ideal performance is very costly. They use incentives when it is either not possible to monitor performance or too costly to be worth doing.

For example, PepsiCo can easily monitor the performance of workers on a production line. If one person works too slowly, the entire line slows, so a production line is organized with a command system.

In contrast, it is costly to monitor a CEO. For example, what does Steve Jobs, the CEO of Apple Inc., contribute to Apple's success? This question can't be answered with certainty, yet Apple's stockholders have to put someone in charge of the business and provide that person with an incentive to maximize stockholders' returns. The performance of Apple

illustrates a general problem, known as the principal–agent problem.

The Principal–Agent Problem

The **principal–agent problem** is the problem of devising compensation rules that induce an *agent* to act in the best interest of a *principal*. For example, the stockholders of Texaco are *principals,* and the firm's managers are *agents*. The stockholders (the principals) must induce the managers (agents) to act in the stockholders' best interest. Similarly, Steve Jobs (a principal) must induce the designers who are working on the next generation iPhone (agents) to work efficiently.

Agents, whether they are managers or workers, pursue their own goals and often impose costs on a principal. For example, the goal of stockholders of Citicorp (principals) is to maximize the firm's profit—its true profit, not some fictitious paper profit. But the firm's profit depends on the actions of its managers (agents), and they have their own goals. Perhaps a bank manager takes a customer to a ball game on the pretense that she is building customer loyalty, when in fact she is simply enjoying on-the-job leisure. This same manager is also a principal, and her tellers are agents. The manager wants the tellers to work hard and attract new customers so that she can meet her operating targets. But the workers enjoy conversations with each other and take on-the-job leisure. Nonetheless, the firm constantly strives to find ways of improving performance and increasing profits.

Coping with the Principal–Agent Problem

Issuing commands does not address the principal–agent problem. In most firms, the shareholders can't monitor the managers and often the managers can't monitor the workers. Each principal must create incentives that induce each agent to work in the interests of the principal. Three ways of attempting to cope with the principal–agent problem are

- Ownership
- Incentive pay
- Long-term contracts

Ownership By assigning ownership (or part-ownership) of a business to managers or workers, it is sometimes possible to induce a job performance that increases a firm's profits. Part-ownership is quite common for senior managers but less common for workers. When United Airlines was running into problems a few years ago, it made most of its employees owners of the company.

Incentive Pay Incentive pay—pay related to performance—is very common. Incentives are based on a variety of performance criteria such as profits, production, or sales targets. Promoting an employee for good performance is another example of the use of incentive pay.

Long-Term Contracts Long-term contracts tie the long-term fortunes of managers and workers (agents) to the success of the principal(s)—the owner(s) of the firm. For example, a multiyear employment contract for a CEO encourages that person to take a long-term view and devise strategies that achieve maximum profit over a sustained period.

These three ways of coping with the principal–agent problem give rise to different types of business organization. Each type of business organization is a different response to the principal–agent problem. Each type uses a different combination of ownership, incentives, and long-term contracts. Let's look at the main types of business organization.

Types of Business Organization

The three main types of business organization are

- Proprietorship
- Partnership
- Corporation

Proprietorship A *proprietorship* is a firm with a single owner—a proprietor—who has unlimited liability. *Unlimited liability* is the legal responsibility for all the debts of a firm up to an amount equal to the entire wealth of the owner. If a proprietorship cannot pay its debts, those to whom the firm owes money can claim the personal property of the owner. Businesses of some farmers, computer programmers, and artists are examples of proprietorships.

The proprietor makes management decisions, receives the firm's profits, and is responsible for its losses. Profits from a proprietorship are taxed at the same rate as other sources of the proprietor's personal income.

Partnership A *partnership* is a firm with two or more owners who have unlimited liability. Partners must agree on an appropriate management structure and

on how to divide the firm's profits among themselves. The profits of a partnership are taxed as the personal income of the owners, but each partner is legally liable for all the debts of the partnership (limited only by the wealth of that individual partner). Liability for the full debts of the partnership is called *joint unlimited liability*. Most law firms are partnerships.

Corporation A *corporation* is a firm owned by one or more limited liability stockholders. *Limited liability* means that the owners have legal liability only for the value of their initial investment. This limitation of liability means that if the corporation becomes bankrupt, its owners are not required to use their personal wealth to pay the corporation's debts.

Corporations' profits are taxed independently of stockholders' incomes. Stockholders pay a capital gains tax on the profit they earn when they sell a stock for a higher price than they paid for it. Corporate stocks generate capital gains when a corporation retains some of its profit and reinvests it in profitable activities. So retained earnings are taxed twice because the capital gains they generate are taxed. Dividend payments are also taxed but at a lower rate than other sources of income.

Pros and Cons of Different Types of Firms

The different types of business organization arise from firms trying to cope with the principal–agent problem. Each type has advantages in particular situations and because of its special advantages, each type continues to exist. Each type of business organization also has disadvantages.

Table 10.4 summarizes these and other pros and cons of the 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

Economics in Action

Types of Firms in the Economy

Proprietorships, partnerships, and corporations: These are the three types of firms that operate in the United States. Which type of firm dominates? Which produces most of the output of the U.S. economy?

Proprietorships Most Common Three quarters of the firms in the United States are proprietorships and they are mainly small businesses. Almost one fifth of the firms are corporations, and only a twentieth are partnerships (see Fig. 1).

Corporations Produce Most Corporations generate almost 90 percent of business revenue. Revenue is a measure of the value of production, so corporations produce most of the output in the U.S. economy.

Variety Across Industries In agriculture, forestry, and fishing, proprietorships generate about 40 percent of the total revenue. Proprietorships also generate a significant percentage of the revenue in services, construction, and retail trades. Partnerships account for a small percentage of revenue in all sectors and feature most in agriculture, forestry, and fishing, services, and mining. Corporations dominate all sectors and have the manufacturing industries almost to themselves.

Why do corporations dominate the business scene? Why do the other types of businesses survive? And why are proprietorships and partnerships more prominent in some sectors? The answers lie in the pros and cons of the different types of business organization. Corporations dominate where a large amount of capital is used; proprietorships dominate where flexibility in decision making is critical.

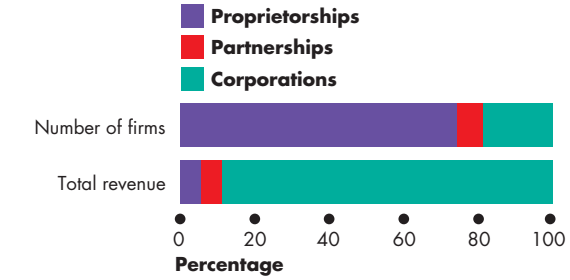


Figure 1 Number of Firms and Total Revenue

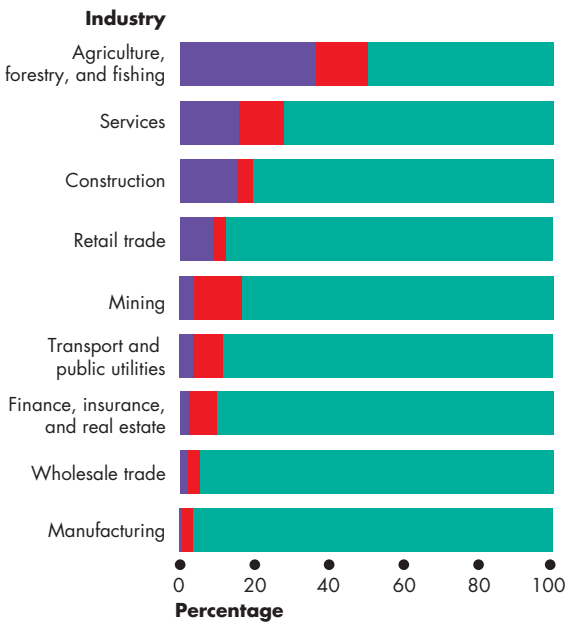


Figure 2 Total Revenue in Various Industries

Source of data: U.S. Bureau of the Census, *Statistical Abstract of the United States, 2001.*

REVIEW QUIZ

1. Explain the distinction between a command system and an incentive system.
2. What is the principal–agent problem? What are three ways in which firms try to cope with it?
3. What are the three types of firms? Explain the major advantages and disadvantages of each.
4. Why do all three types of firms survive and in which sectors is each type most prominent?

You can work these questions in Study Plan 10.3 and get instant feedback. myeconlab

You've now seen how technology constraints and information constraints influence the way firms operate. You've seen why some firms operate with a large amount of labor and human capital and a small amount of physical capital. You've also seen how firms use a mixture of command and incentive systems and employ different types of business organization to cope with the principle–agent problem.

Your next task is to look at the variety of market situations in which firms operate and classify the different market environments in which firms do business.

Markets and the Competitive Environment

The markets in which firms operate vary a great deal. Some are highly competitive, and profits in these markets are hard to come by. Some appear to be almost free from competition, and firms in these markets earn large profits. Some markets are dominated by fierce advertising campaigns in which each firm seeks to persuade buyers that it has the best products. And some markets display the character of a strategic game.

Economists identify four market types:

1. Perfect competition
2. Monopolistic competition
3. Oligopoly
4. Monopoly

Perfect competition arises when there are many firms, each selling an identical product, many buyers, and no restrictions on the entry of new firms into the industry. The many firms and buyers are all well informed about the prices of the products of each firm in the industry. The worldwide markets for corn, rice, and other grain crops are examples of perfect competition.

Monopolistic competition is a market structure in which a large number of firms compete by making similar but slightly different products. Making a product slightly different from the product of a competing firm is called **product differentiation**. Product differentiation gives a firm in monopolistic competition an element of market power. The firm is the sole producer of the particular version of the good in question. For example, in the market for pizzas, hundreds of firms make their own version of the perfect pizza. Each of these firms is the sole producer of a particular brand. Differentiated products are not necessarily different products. What matters is that consumers perceive them to be different. For example, different brands of potato chips and ketchup might be almost identical but be perceived by consumers to be different.

Oligopoly is a market structure in which a small number of firms compete. Computer software, airplane manufacture, and international air transportation are examples of oligopolistic industries. Oligopolies might produce almost identical products, such as the colas produced by Coke and Pepsi. Or they might produce differentiated products such as Boeing and Airbus aircraft.

Monopoly arises when there is one firm, which produces a good or service that has no close substitutes and in which the firm is protected by a barrier preventing the entry of new firms. In some places, the phone, gas, electricity, cable television, and water suppliers are local monopolies—monopolies restricted to a given location. Microsoft Corporation, the software developer that created Windows and Vista, is an example of a global monopoly.

Perfect competition is the most extreme form of competition. Monopoly is the most extreme absence of competition. The other two market types fall between these extremes.

Many factors must be taken into account to determine which market structure describes a particular real-world market. One of these factors is the extent to which a small number of firms dominates the market. To measure this feature of markets, economists use indexes called measures of concentration. Let's look at these measures.

Measures of Concentration

Economists use two measures of concentration:

- The four-firm concentration ratio
- The Herfindahl-Hirschman Index

The Four-Firm Concentration Ratio The **four-firm concentration ratio** is the percentage of the value of sales accounted for by the four largest firms in an industry. The range of the concentration ratio is from almost zero for perfect competition to 100 percent for monopoly. This ratio is the main measure used to assess market structure.

Table 10.5 shows two calculations of the four-firm concentration ratio: one for tire makers and one for printers. In this example, 14 firms produce tires. The largest four have 80 percent of the sales, so the four-firm concentration ratio is 80 percent. In the printing industry, with 1,004 firms, the largest four firms have only 0.5 percent of the sales, so the four-firm concentration ratio is 0.5 percent.

A low concentration ratio indicates a high degree of competition, and a high concentration ratio indicates an absence of competition. A monopoly has a concentration ratio of 100 percent—the largest (and only) firm has 100 percent of the sales. A four-firm concentration ratio that exceeds 60 percent is regarded as an indication of a market that is highly concentrated and dominated by a few firms in an oligopoly. A ratio of less than 60 percent is regarded as an indication of a competitive market.

The Herfindahl-Hirschman Index The **Herfindahl-Hirschman Index**—also called the HHI—is the square of the percentage market share of each firm summed over the largest 50 firms (or summed over all the firms if there are fewer than 50) in a market. For example, if there are four firms in a market and the market shares of the firms are 50 percent, 25 percent, 15 percent, and 10 percent, the Herfindahl-Hirschman Index is

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

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

Economics in Action

Concentration in the U.S. Economy

The U.S. Department of Commerce calculates and publishes data showing concentration ratios and the HHI for each industry in the United States. The bars in the figure show the four-firm concentration ratio and the number at the end of each bar is the HHI.

Chewing gum is one of the most concentrated industries. William Wrigley Jr. Company of Chicago employs 16,000 people and sells $5 billion worth of gum a year. It does have some competitors but they have a very small market share.

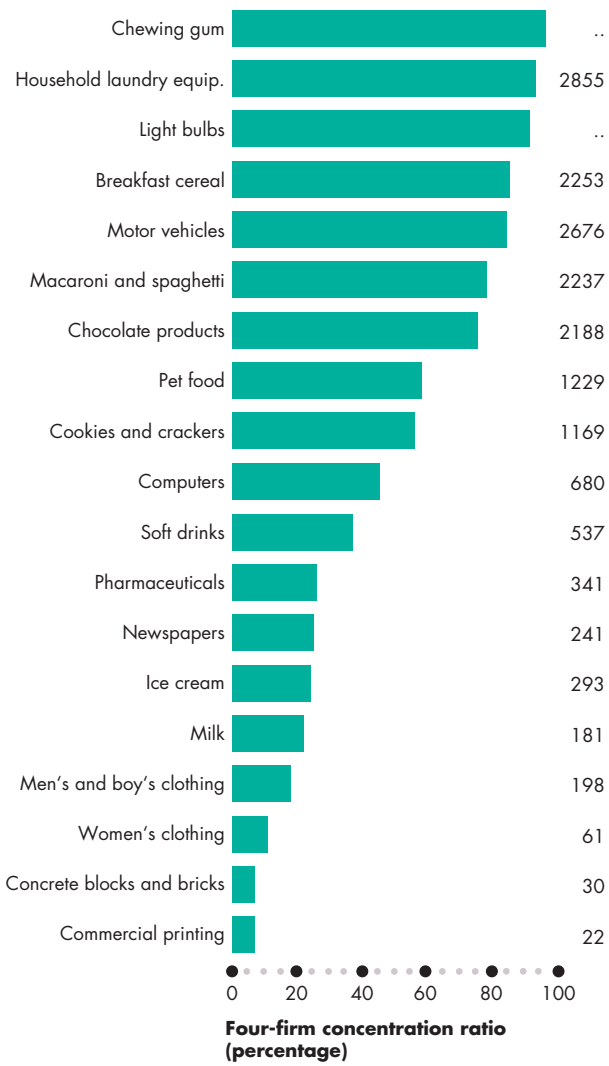
Household laundry equipment, light bulbs, breakfast cereal, and motor vehicles are highly concentrated industries. They are oligopolies.

Pet food, cookies and crackers, computers, and soft drinks are moderately concentrated industries. They are examples of monopolistic competition.

Ice cream, milk, clothing, concrete blocks and bricks, and commercial printing industries have low concentration measures and are highly competitive.

Concentration measures are useful indicators of the degree of competition in a market, but they must be supplemented by other information to determine the structure of the market.

Newspapers and automobiles are examples of how the concentration measures give a misleading reading of the degree of competition. Most newspapers are local. They serve a single city or even smaller area. So despite the low concentration measure, newspapers are concentrated in their own local areas. Automobiles are traded internationally and foreign cars are freely imported into the United States. Despite the high U.S. concentration measure, the automobile industry is competitive.



Concentration Measures in the United States

Source of data: *Concentration Ratios in Manufacturing*, (Washington, D.C.: U.S. Department of Commerce, 1996).

In perfect competition, the HHI is small. For example, if each of the largest 50 firms in an industry has a market share of 0.1 percent, then the HHI is $0.1^2 \times 50 = 0.5$. In a monopoly, the HHI is 10,000. The firm has 100 percent of the market: $100^2 = 10{,}000$.

The HHI became a popular measure of the degree of competition during the 1980s, when the Justice Department used it to classify markets. A market in which the HHI is less than 1,000 is regarded as being competitive. A market in which the HHI lies between 1,000 and 1,800 is regarded as being moderately competitive. But a market in which the HHI exceeds 1,800 is regarded as being uncompetitive. The Justice Department scrutinizes any merger of firms in a market in which the HHI exceeds 1,000 and is likely to challenge a merger if the HHI exceeds 1,800.

TABLE 10.6 Market Structure

Characteristics	Perfect competition	Monopolistic competition	Oligopoly	Monopoly
Number of firms in industry	Many	Many	Few	One
Product	Identical	Differentiated	Either identical or differentiated	No close substitutes
Barriers to entry	None	None	Moderate	High
Firm's control over price	None	Some	Considerable	Considerable or regulated
Concentration ratio	0	Low	High	100
HHI (approx. ranges)	Less than 100	101 to 999	More than 1,000	10,000
Examples	Wheat, corn	Food, clothing	Computer chips	Local water supply

Limitations of a Concentration Measure

The three main limitations of using only concentration measures as determinants of market structure are their failure to take proper account of

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

Geographical Scope of Market Concentration measures take a national view of the market. Many goods are sold in a *national* market, but some are sold in a *regional* market and some in a *global* one. The concentration measures for newspapers are low, indicating competition, but in most cities the newspaper industry is highly concentrated. The concentration measures for automobiles is high, indicating little competition, but the biggest three U.S. car makers compete with foreign car makers in a highly competitive global market.

Barriers to Entry and Firm Turnover Some markets are highly concentrated but entry is easy and the turnover of firms is large. For example, small towns have few restaurants, but no restrictions hinder a new restaurant from opening and many attempt to do so.

Also, a market with only a few firms might be competitive because of *potential entry*. The few firms in a market face competition from the many potential firms that will enter the market if economic profit opportunities arise.

Market and Industry Correspondence To calculate concentration ratios, the Department of Commerce classifies each firm as being in a particular industry. But markets do not always correspond closely to industries for three reasons.

First, markets are often narrower than industries. For example, the pharmaceutical industry, which has a low concentration ratio, operates in many separate markets for individual products—for example, measles vaccine and AIDS-fighting drugs. These drugs do not compete with each other, so this industry, which looks competitive, includes firms that are monopolies (or near monopolies) in markets for individual drugs.

Second, most firms make several products. For example, Westinghouse makes electrical equipment and, among other things, gas-fired incinerators and plywood. So this one firm operates in at least three separate markets, but the Department of Commerce classifies Westinghouse as being in the electrical goods and equipment industry. The fact that Westinghouse competes with other producers of plywood does not