FIFTH EDITION

ECONOMICS for Healthcare Managers

Robert H. Lee

ECONOMICS *for* HEALTHCARE MANAGERS

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ROBERT H. LEE

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PREFACE

A fifth edition of *Economics for Healthcare Managers* was needed for five main reasons. First, dramatic shifts in health insurance continue to reshape healthcare. The implementation of the Affordable Care Act of 2010 and the increasing ability of insurers and sponsors to identify efficient forms of care are driving change. Where these shifts will lead is not clear, but managers must be prepared to innovate and react.

Second, the COVID-19 pandemic has changed how we think about healthcare and how we deliver healthcare. Again, the long-term impact of the pandemic and the direction it will take us remain uncertain, but economics offers an important set of tools for managing in turbulent times.

Third, improving the health of populations has grown increasingly important. Insurers and employers—including healthcare employers—are beginning to address the challenges of improving the health of populations. This is unfamiliar territory for many healthcare managers.

Fourth, this new edition further expands the opportunities for active learning. New cases, new questions, and new activities allow for more topical and challenging opportunities for discussion and learning.

Finally, research has exploded in the last five years. Although classic citations remain vital, the fifth edition shares some of this new work with students in an accessible way.

Instructor Resources

This book's Instructor Resources include a test bank, PowerPoint slides for each chapter, answers to the study questions, guides to the case studies, and a transition guide to the new edition. For the most up-to-date information about this book and its Instructor Resources, visit ache.org/HAP/Lee5E.

This book's Instructor Resources are available to instructors who adopt this book for use in their course. For access information, please email hapbooks@ache.org.

CHAPTER

1

WHY HEALTH ECONOMICS?

Learning Objectives

After reading this chapter, students will be able to

- describe the value of economics for managers,
- identify major challenges for healthcare managers,
- find current information about health outcomes, and
- distinguish between positive and normative economics.

Key Concepts

- Economics helps managers focus on key issues.
- Economics helps managers understand goal-oriented decision-making.
- Economics helps managers understand strategic decision-making.
- Economics gives managers a framework for understanding costs.
- Economics gives managers a framework for understanding market demand.
- Economics gives managers a framework for assessing profitability.
- Economics helps managers understand risk and uncertainty.
- Economics helps managers understand insurance.
- Economics helps managers understand asymmetric information.
- Economics helps managers deal with rapid change.

1.1 Why Health Economics?

Why should working healthcare managers study economics? This simple question is really two questions: Why is economics valuable for managers? What special challenges do healthcare managers face? These questions motivate this book.

Why is economics valuable for managers? There are six reasons. We will briefly explore them here to highlight themes that we will develop in later chapters.

1. Economics helps managers focus on key issues. Economics helps managers wade through the deluge of information they confront and identify the data they need.
2. Economics outlines strategies for realizing goals given the available resources. A primary task of economics is to carefully examine the implications of rational decision-making.
3. Economics gives managers ground rules for strategic decision-making. When rivals are not only competing against them but also watching what they do, managers must be prepared to think strategically.
4. Economics gives managers a framework for making sense of **costs**. Managers need to understand costs because they are likely to make poor decisions without this knowledge.
5. Economics gives managers a framework for thinking about value. Successful organizations provide goods and services to customers that are worth more than the costs of producing them. So, good decisions demand an understanding of how customers perceive value.
6. Most important, economics sensitizes managers to fundamental ideas that affect the operations of every organization. Effective management begins with the recognition that consumers are sensitive to price differences, that organizations compete to advance the interests of their stakeholders, and that success comes from providing value to customers.

cost
The value of a resource in its next best use.

1.2 Economics as a Map for Decision-Making

Economics provides a map for decision-making. Maps do two things: they highlight key features and suppress unimportant features. For example, to drive from Des Moines, Iowa, to Dallas, Texas, you need to know how the major highways connect. You do not want to know the name and location of each street in each town you pass through. Of course, what is important and what is unimportant depend on the task at hand. If you want to drive from West 116th Street and Ridgeview Road in Olathe, Kansas, to the Truman homestead in Independence, Missouri, a map that describes only the interstate highway system will be of limited value to you. You need to know which map is the right tool for your situation.

Using a map takes knowledge and skill. You need to know what information you need, or you may choose the wrong map and be swamped in extraneous data or lost without key facts. Having the right map is no guarantee that you can use it, however. You need to practice to be able to use a map quickly and effectively. In the same sense, economics is a map for decision-making.

Like a map, economics highlights some issues and suppresses others. For example, economics helps managers focus on **marginal** or **incremental costs**, which makes understanding and managing costs much simpler. (A **marginal** or **incremental change** is a small change.) However, economics has little to say about the belief systems that motivate consumer behavior. If you are seeking to make therapeutic regimens easier to adhere to by making them more consistent with consumers' belief systems, economics is not a helpful map. If, on the other hand, you want to decide whether setting up an urgent care clinic is financially feasible, economics helps you focus on how your project will change revenues and costs.

marginal or **incremental cost** The cost of producing an additional unit of output.

marginal change A small change.

incremental change A small change.

Economics also gives managers a framework for understanding **rational decision-making**. Rational decision-making means making choices that further one's goals given the resources available. Whether those goals include maximizing profits, securing the health of indigent patients, or other objectives, the framework is much the same. It entails looking at benefits and costs to realize the largest net benefit. (We will explore this question further in section 1.5.)

rational decision-making Choosing the course of action that offers the best outcome, given the existing constraints.

Managers must understand costs and be able to explain costs to others. Confusion about costs is common, so confusion in decision-making is also common. Confusion about benefits is even more widespread than confusion about costs. As a result, management decisions in healthcare often leave much to be desired.

Economists typically speak about economics at a theoretical level, using "perfectly competitive markets" (which are, for the most part, mythical social structures) as a model, which makes the application of economics difficult for managers competing in real-world markets. Yet, economics offers concrete guidance about pricing, contracting, and other quandaries that managers face. Economics also offers a framework for evaluating the strategic choices that managers must make. Many healthcare organizations have rivals, so good decisions must take into account what the competition is doing. Will being the first to enter a market give your organization an advantage, or will it give your rivals a low-cost way of seeing what works and what does not? Will buying primary care practices bring you increased market share or buyer's remorse? Knowing economics will not make these choices easy, but it can give managers a plan for sorting through the issues.

1.3 Special Challenges for Healthcare Managers

What special challenges do healthcare managers face? Healthcare managers face five issues that are particular to their position:

1. The central roles of risk and uncertainty
2. The complexities created by insurance

3. The perils produced by asymmetric information
4. The special challenges posed by not-for-profit organizations
5. The rapid and confusing course of technical and institutional change

Let's look at each of these challenges in more depth.

1.3.1 Risk and Uncertainty

Risk and uncertainty are defining features of healthcare markets and healthcare organizations. Both the incidence of illness and the effectiveness of medical care should be described in terms of probabilities. For example, the right therapy, provided the right way, usually carries some risk of failure. A proportion of patients will experience harmful side effects, and a proportion of patients will not benefit from the therapy. As a result, management of costs and quality presents difficult challenges. Did a provider produce bad outcomes because they were unlucky and had to treat an extremely sick panel of patients, or because they encountered a panel of patients for whom standard therapies were ineffective? Did their colleagues let them down? Or was the provider sloppy, or lazy? The reason is not always evident.

1.3.2 Insurance

Because risk and uncertainty are inherent in healthcare, most consumers have health insurance, and healthcare organizations have to contend with the management problems that insurance presents. First, insurance creates confusion about who the customer is. Customers use the products, but insurance plans often pay most of the bill. Moreover, most people with private medical insurance receive coverage through their employer (largely because of tax breaks). Although economists generally agree that employees ultimately pay for insurance through wage reductions, most employees do not know the costs of insurance alternatives (and unless they are changing jobs, they have limited interest in finding out). As a result of the employer plan default, employees remain unaware of the true costs of care, and they are not eager to balance cost and value. If insurance is footing the bill, most patients will choose the best, most expensive treatment—a choice they might not make if they were paying the full cost.

In addition, insurance makes even simple transactions complex. Most transactions involve at least three parties—the patient, the insurer, and the provider—and many involve more. To add to the confusion, most providers deal with a wide array of insurance plans and face a blizzard of disparate claim forms and payment systems. Increasing numbers of insurance plans have negotiated individual payment systems and rates, so many healthcare providers look wistfully at industries that simply bill customers to obtain revenues. The complexity of insurance transactions also increases opportunity for error and fraud. In fact, both are fairly common.

Despite the bewildering array of insurance plans, many providers still rely on a few plans for their revenue (a circumstance most managers seek to avoid). For example, most hospitals receive at least a third of their revenue from Medicare. As a result, changes in Medicare regulations or payment methods can profoundly alter a healthcare organization's financial prospects. Overnight, changes to reimbursement terms may transform a market that is profitable for everyone into one in which only the strongest, best-led, best-positioned organizations can survive.

1.3.3 Asymmetric Information

Information asymmetries are common in healthcare markets and create a number of problems. **Asymmetric information** occurs when one party in a transaction has less information than the other party. In this situation, the party with more information has an opportunity to take advantage of the party with less information. Recognizing that they are at a disadvantage, the party with less information may become skeptical of the other party's motivation and decline a recommendation that would have been beneficial to them. For example, physicians and other healthcare providers usually understand patients' medical options better than patients do. Unaware of their choices, patients may accept recommendations for therapies that are not cost-effective, or, recognizing their vulnerability to physicians' self-serving advice, they may resist recommendations made in their best interest.

asymmetric information
A situation in which one party in a transaction has less information than the other party.

From a manager's perspective, asymmetric information means that providers have a great deal of autonomy in recommending therapies. Because providers' recommendations largely define the operations of insurance plans, hospitals, and group practices, managers need to ensure that providers do not have incentives to use their superior information to their advantage. Conversely, in certain situations, patients have the upper hand and are likely to forecast their healthcare use more accurately than insurers. Patients know whether they want to start a family, whether they will seek medical attention whenever they feel ill, or whether they have symptoms that indicate a potential condition. As a result, health plans are vulnerable to **adverse selection**.

adverse selection
A situation that occurs when buyers have better information than sellers. For example, high-risk consumers are willing to pay more for insurance than low-risk consumers are. (Organizations that have difficulty distinguishing high-risk from low-risk consumers are unlikely to be profitable.)

1.3.4 Not-for-Profit Organizations

Most not-for-profit organizations have worthy goals that their managers take seriously, but these organizations can create problems for healthcare managers as well. For example, not-for-profit organizations usually have multiple stakeholders. Multiple stakeholders mean multiple goals, so organizations become much harder to manage, and managers' performance becomes harder to assess. The potential for managers to put their own needs before their stakeholders' needs exists in all organizations, but it is more difficult to detect in not-for-profit organizations because they do not have a simple bottom line. In addition, not-for-profit organizations may be harder to run well.

They operate amid a web of regulations designed to prevent them from being used as tax-avoidance schemes. These regulations make setting up incentive-based compensation systems for managers, employees, and contractors (the most important of whom are physicians) more difficult. Further, when a project is not successful, not-for-profit organizations have greater difficulty putting the resources invested in the failed idea to other uses. For example, the trustees of a not-for-profit organization may have to get approval from a court to sell or repurpose its assets. Because of these special circumstances, managers of not-for-profit organizations can always claim that substandard performance reflects their more complex environment.

1.3.5 Technological and Institutional Change

This fifth challenge makes the others pale in comparison. The healthcare system is in a state of flux. Virtually every part of the healthcare sector is reinventing itself, and no one seems to know where the healthcare system is headed. Leadership is difficult to provide if you do not know where you are going. Because change presents a pervasive test for healthcare managers, we will examine it in greater detail.

1.4 Flux in the Healthcare System

Why is there so much change in the US healthcare system? One explanation is common to the entire developed world: rapid technical change. The pace of medical research and development is breathtaking, and the public's desire for better therapies is manifest. These demands challenge healthcare managers to regularly lead their organizations into unmapped territory. To make matters more complicated, changes in technology or changes in insurance can quickly affect healthcare markets. In healthcare, as in every other sector of the economy, policy changes can create winners and losers. For example, during the COVID-19 pandemic, Medicare and other insurers started routinely paying for telehealth visits, and the number of such visits skyrocketed (Levey 2021). Products or services that appear unprofitable today may be profitable tomorrow if technology, competition, rates, or regulations change.

The Affordable Care Act (ACA) resulted in a wave of innovations by providers, insurers, employers, and governments. (See chapter 6 for more detail.) Which of these innovations will succeed still remains unclear. In addition, some healthcare organizations have thrived in the new environment, and some have failed. The passage of the ACA appears to have been transformative, but the innovations it spurred may already have become part of the status quo.

1.4.1 The Pressure to Reduce Costs

The economics of high healthcare costs are far simpler than the politics. To reduce costs, managers must reallocate resources from low-productivity uses to high-productivity uses, increase productivity wherever feasible, and reduce prices paid to suppliers and sectors that have excess supply. They also must recognize that cost cutting is politically difficult. Reallocating resources and increasing productivity will cost some people their jobs. Reducing prices will lower some people's incomes. These steps are difficult for any government to take, and many of those who will be affected (physicians, nurses, and hospital employees) are politically well organized.

Case 1.1 Why Is the Pressure to Reduce Healthcare Costs So Strong?

The United States spends far more than other wealthy industrialized countries, but it has poorer health outcomes. Healthcare spending per person in the United States is more than double that in Canada, France, Japan, and the United Kingdom (see exhibit 1.1). Differences of this magnitude should be reflected in the outcomes of care.

EXHIBIT 1.1 Healthcare Spending per Person

Country	2011	2018
Canada	$4,248	$5,287
France	$4,031	$5,154
Germany	$4,588	$6,224
Switzerland	$6,048	$7,280
United Kingdom	$3,084	$4,290
United States	$8,145	$10,637

Source: Data from OECD (2021).
Note: Spending has been converted into US dollars.

As you can see in exhibit 1.2, of the six countries listed, the United States has the shortest life expectancy at birth. In part, this is because the United States invests relatively little in improving the **social determinants of health** and reducing inequality. Sanchez-Romero, Lee,

(continued)

social determinants of health Factors that affect health independently of healthcare, such as education and housing.

Case 1.1 *(continued)*

and Prskawetz (2020) note that the life expectancy of 50-year-old men at the bottom of the income distribution is 12.7 years shorter than for men at the top of the income distribution. Greater spending should not produce these results.

EXHIBIT 1.2 Life Expectancy at Birth, 2018

Country	Males	Females
Canada	79.9 years	84.1 years
France	79.7 years	85.9 years
Germany	78.6 years	83.3 years
Switzerland	81.9 years	85.7 years
United Kingdom	79.5 years	83.1 years
United States	76.2 years	81.2 years

Source: Data from OECD (2021).

Discussion Questions

- Why is spending so much more on healthcare than other countries a problem?
- What can Americans not buy because of high spending on healthcare?
- What factors other than healthcare affect a population's health?
- Does this evidence suggest that the American healthcare system is not efficient?
- What are social determinants of health?

1.4.2 The Fragmentation of Healthcare Payments

The fragmented payment system compounds the political problem. Most Americans see only a fraction of their total healthcare spending. Typically, Americans pay for their care through a mixture of direct payments to providers; payroll deductions for insurance premiums; lower wages; higher prices for goods and services; and higher federal, state, and local taxes. Because so much of the payment system is hidden, few can track healthcare costs. Those

that can—notably, employers that write checks for the entire cost of insurance policies and the trustees of the Medicare system—understand the need to reduce costs.

1.5 What Does Economics Study?

What does economics study? Economics analyzes the allocation of **scarce resources**. Although this answer appears straightforward, several definitions are needed to make this sentence understandable. Resources include anything that is useful in consumption or production. From the perspective of a manager, resources include the flow of services from supplies or equipment that the organization owns and the flow of services from employees, buildings, or other entities the organization hires. A resource is scarce if it has alternative uses, which might include another use within the organization or use by another person or organization. Most issues that managers deal with involve scarce resources, so economics can be useful for nearly all of them.

scarce resources Anything useful in consumption or production that has alternative uses.

Economics focuses on rational behavior—that is, individuals' efforts to best realize their goals given the resources that are available. Because time and energy spent collecting and analyzing information are scarce resources (i.e., time and energy have other uses), complete rationality is irrational. Everyone uses shortcuts and rules to make certain choices, and doing so is rational, even though better decisions are theoretically possible.

Much of economics is positive. **Positive economics** uses objective analysis and evidence to answer questions about individuals, organizations, and societies. Positive economics might describe the state of healthcare in terms of hospital occupancy rates over a certain period. Positive economics also proposes hypotheses and assesses how consistent the evidence is with them. For example, one might examine whether the evidence supports the hypothesis that reductions in direct consumer payments for medical care (measured as a share of spending) have been a major contributor to the rapid growth of healthcare spending per person. Although values do not directly enter the realm of positive economics, they do shape the questions that economists ask (or do not ask) and how they interpret the evidence.

positive economics The use of objective analysis and evidence to answer questions about individuals, organizations, and societies.

Normative economics often addresses public policy issues, but not always. A manager of a healthcare organization who can identify additional services or features that customers are willing to pay for is demonstrating normative economics. Likewise, a manager who can identify services or features that customers do not value is also demonstrating normative economics.

normative economics The use of values to identify the best options.

Case 1.2 Prices

The United States spends about 17 percent of its national income on medical care. This figure is nearly double the 9 percent spent by other countries belonging to the Organisation for Economic Co-operation and Development (OECD 2021). (The OECD is a group of high-income, market-oriented countries.) Although healthcare spending in the United States rose from 16.3 percent of national income in 2010 (largely because of increases in insurance coverage resulting from the ACA), rates of inpatient and outpatient service use remained low compared with peer countries (OECD 2021). In short, the United States spends more to buy less care.

What explains this? Higher prices in the United States explain much of the difference. For example, the private price for a normal delivery of a baby in a hospital is more than double the median in seven wealthy countries, and prices are much higher in the United States for drugs, tests, and procedures (Hargraves and Bloschichak 2019). In addition, incentives to use more expensive forms of care (e.g., specialists instead of generalists, inpatient rather than outpatient care) may explain some of the remaining difference, but good comparative data are not available.

Why are prices higher in the United States? One reason is higher prices of inputs. For example, hospital nurses earn 50 to 70 percent more in the United States than the OECD median (OECD 2021). In addition, administrative costs for insurers, hospitals, and physicians are four times higher in the United States than in Canada (Himmelstein, Campbell, and Woolhandler 2020). Still another reason is the weak bargaining position of many purchasers of care. Insurers that cover a small share of the population in a local area usually pay much higher prices than insurers that cover a larger share of the population (Cooper et al. 2019). And health systems that provide a large share of the care in a local area usually get paid higher prices.

Chernew, Hicks, and Shah (2020) note that the prices paid by commercial insurers are considerably higher than those paid by Medicare and Medicaid (which are somewhat higher than the prices in other countries). The authors explore what would happen if everyone paid Medicare prices, and they conclude that average hospital revenues would fall by about 30 percent. They do not forecast what would

(continued)

Case 1.2 *(continued)*

happen to hospital and physician administrative costs, although fewer resources would be needed to manage relationships with private insurers.

Discussion Questions

- Why is healthcare spending measured as a share of national income?
- Is it a problem that the United States spends so much on medical care? Why or why not?
- How could the United States reduce prices for drugs, tests, and procedures? Should it?
- How would lower prices for drugs, tests, and procedures affect you professionally?
- How would reductions in administrative costs affect you professionally?
- How would a 30 percent drop in hospital revenue affect you professionally?

Normative economics can take two forms. In the first, citizens use the tools of economics to answer public policy questions. Usually these questions involve ethical and value judgments (which economics cannot supply) as well as factual judgments (which economics can support or refute). A question such as "Should Medicare eliminate deductibles?" involves balancing benefits and harms. Economic analysis can help assess the facts that underlie the benefits and harms but cannot provide an answer. The second form of normative economics is the basis for this book's content. This form tells us how to analyze what we *should* do, given the circumstances we face. In this type of normative analysis, market transactions indicate value. For example, we may believe that a drug is overpriced, but we must treat that price as a part of the environment and react appropriately if no one will sell it for less. Most managers find themselves in such an environment.

To best realize our goals within the constraints we face, we can use the explicit guidance that economics gives us:

1. First, identify plausible alternatives. Breakthroughs usually occur when someone realizes there is an alternative to the way things have always been done.
2. Second, consider modifying the standard choice (e.g., charging a slightly higher price or using a little more of a nurse practitioner's time).

3. Next, pick the best choice by determining the level at which its *marginal benefit* equals its *marginal cost.* (We will explain these terms shortly.)
4. Finally, examine whether the total benefits of this activity exceed the total cost.

Skilled managers routinely perform this sort of analysis. For example, a profit-seeking organization might conclude that a clinic's profits would be as large as possible if it hired three physicians and two nurse practitioners, but the clinic's profits would be unacceptably low if it did. Profits would fall even further if it increased or decreased the number of physicians and nurse practitioners, so the profit-seeking organization would choose to close the clinic.

Let's back up and define some terms to make this discussion clearer. *Cost*, as noted at the beginning of this chapter, is the value of a resource in its next best use. For example, the cost of a plot of land for a medical office would be the most another user would pay for it, not what it sold for 20 years ago. The next best use of that land might be for housing, for a park, for a store, or for some other use. Usually the next best use of a resource is someone else's use of it, so a resource's cost is the price we would be paid when we sell it or the price we have to pay to buy it. If 30 Lipitor tablets are worth $80 to another consumer, that will be our cost for the drug.

Benefit is the value we place on a desired outcome. We describe this value in terms of our willingness to trade one desired outcome for another. Often, but not always, our willingness to pay for an outcome is a convenient measure of value.

A marginal or incremental amount is the increased cost we incur from using more of a resource or the increased benefit we realize from a greater outcome. So, if a 16-ounce iced tea costs $1.49 and a 24-ounce iced tea costs $2.29, the incremental cost of the larger size is ($2.29 – $1.49) ÷ (24 – 16), or 10 cents per ounce. A rational consumer might conclude that

1. the incremental benefit of the larger soda exceeds its incremental cost and buy the larger size;
2. the incremental cost of the larger soda exceeds its incremental benefit and buy the smaller size; or
3. the total benefit of both sizes was less than their total cost and buy neither.

Remember, however, that rational decisions are defined by the goals that underpin them. A consumer with a train to catch might buy an expensive small drink at the station to save time.

1.6 Conclusion

Why should healthcare managers study economics? In short, to be better managers. Economics offers a framework that can simplify and improve managers' decisions. This is valuable for all managers. It is especially valuable for clinicians who assume leadership roles in healthcare organizations.

Managers are routinely overwhelmed with information, yet they lack the key facts that they need to make good decisions. Economics offers a map that makes focusing on essential information easier.

Exercises

1.1 Why is the idea that value depends on consumers' preferences radical?

1.2 Mechanics usually have better information about how to fix automobiles than their customers do. What problems does this advantage create? Do mechanics or their customers do anything to limit these problems?

1.3 A mandatory health insurance plan costs $4,000. One worker earns $24,500 in employment income and $500 in investment income. Another worker earns $48,000 in employment income and $2,000 in investment income. A third worker earns $68,000 in employment income and $7,000 in investment income. A premium-based system would cost each worker $4,000. A wage tax–based system would cost each worker 8.5 percent of wages. An income tax–based system would cost each worker 8 percent of income. For each worker, calculate the cost of the insurance as a share of total income.

	Worker 1	Worker 2	Worker 3
E = Employment income	$24,500	$48,000	$68,000
I = Investment income	$500	$2,000	$7,000
P = Premium cost of insurance	$4,000	$4,000	$4,000

Premium as a percentage of income **= P/(E + I)**

W = Wage tax cost of insurance **= 0.085 × E**

Wage tax cost as a percentage of income **= W/(E + I)**

T = Income tax cost of insurance **= 0.080 × (E + I)**

Income tax cost as a percentage of income **= T/(E + I)**

1.4 Which of the plans in exercise 1.3 would impose the largest burden on those with incomes under $25,000: a mandatory insurance plan financed through premiums, through the income tax, or through a payroll tax?

1.5 Which of the plans in exercise 1.3 would be the fairest?

1.6 Which of the preceding questions can you answer using positive economics? For which of the preceding questions must you use normative economics?

1.7 The following table shows data for Australia, the United Kingdom, and the United States.

a. How did female life expectancy at birth change between 2010 and 2018?

b. How did expenditure per person change between 2010 and 2018?

c. What conclusions do you draw from these data?

d. If you were the "manager" of the healthcare system in the United States, what would be a sensible response to these data?

	Life Expectancy (Years)		Expenditure per Person	
	2010	2018	2010	2018
Australia	81.8	82.8	$3,893	$4,965
United Kingdom	80.6	81.3	$3,281	$4,290
United States	78.6	78.7	$8,559	$10,637

Source: Data from OECD (2021).

Note: Expenditure per person has been translated into US dollars and adjusted for inflation.

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CHAPTER

2

AN OVERVIEW OF THE US HEALTHCARE SYSTEM

Learning Objectives

After reading this chapter, students will be able to

- apply marginal analysis to a simple economic problem,
- articulate the input and output views of healthcare products,
- find current national and international information about healthcare,
- compare the US healthcare system to those in other countries, and
- identify major trends in healthcare.

Key Concepts

- Healthcare products are both inputs into health and outputs of the healthcare sector.
- The usefulness of healthcare products varies widely.
- Marginal analysis helps managers focus on the right questions.
- Life expectancies increased in the United States before the COVID-19 pandemic.
- Other wealthy countries have seen larger health gains with smaller cost increases.
- The pandemic erased the health gains of recent years, with larger impacts for Blacks and Hispanics.
- The healthcare sector may change radically in response to technology and policy changes.

2.1 Input and Output Views of Healthcare

This chapter describes the healthcare system of the United States from an economic point of view and introduces tools of economic analysis. It looks at the system from two perspectives. The first perspective, called the *input view*, emphasizes healthcare's contribution to the public's well-being. The second

perspective, called the *output view*, emphasizes the goods and services the healthcare sector produces. In the language of economics, an **input** is a good or service used in the production of another good or service, and an **output** is the good or service that emerges from a production process. Products (goods and services are considered products) are commonly both inputs and outputs. For example, a surgical tool is an input into a surgery and an output of a surgical tool company. Similarly, the surgery itself can be considered an output of the surgical team or an input into the health of the patient.

input
A good or service used in production.

output
A good or service produced by an organization.

2.1.1 The Input View

The input view of the healthcare system stresses the usefulness of healthcare products. From this perspective, healthcare products are neither good nor bad; they are simply tools used to improve and maintain health. The input view is important because it focuses our attention on alternative ways of achieving our goals. Healthcare products are only one of many inputs into health. Others, such as exercise, diet, and rest, are alternative ways to improve or maintain health. From this perspective, the decision to switch from medical therapies for high blood pressure to meditation or exercise would be based on the following question: which is the least expensive way to get the result I want? This apparently simple question can be very difficult to answer.

The input view stresses that the usefulness of any resource depends on the problem at hand and other available resources. Whether the health of a particular patient or population will improve as a result of using more healthcare products depends on a number of factors, including the quality and quantity of healthcare products already being used, the quality and quantity of other health inputs, and the general well-being of the patient or population. For example, the effect of a drug on an otherwise healthy 30-year-old is likely to be different from its effect on an 85-year-old who is taking 11 other medications. Likewise, increasing access to medical care is not likely to be the best way to reduce infant mortality in a population that is malnourished and lacks access to safe drinking water, given the powerful effects of better food and water on health outcomes. What is the best way to use our resources, given that most preventable mortality is a result of risky behavior? Sometimes, more medical care is not the answer. All of these examples illustrate that the usefulness of resources varies with the situation.

marginal analysis
The analysis of small changes in a decision variable (e.g., price, volume of output) on outcomes (e.g., costs, profits, probability of recovery).

The economic perspective of **marginal analysis** challenges us to examine the effects of changes on what we do. Marginal analysis proposes questions such as these: How much healthier would this patient or population be if we increased use of this resource? How much unhealthier would this patient or population be if we reduced use of this resource? Most management decisions are made on the basis of marginal analysis, although the questions used to arrive at the decisions are often more concrete. For example, what costs would we incur if we increased the chicken pox immunization rate

among three-year-olds from 78 to 85 percent, and how much would increasing immunization reduce the incidence of chicken pox among preschoolers?

Reasonable answers to these questions tell us the cost per case of chicken pox avoided, and we can decide whether we want to use our resources for this proposition. Managers who focus on healthcare products as outputs of their organizations ask the same types of questions, although they frame them differently: How much will profits rise if we increase the number of skilled nursing beds from 12 to 18? What costs would we incur if we added a nurse midwife to the practice, and how would this addition change patient outcomes and revenues? In any setting, marginal analysis helps managers focus on the right questions.

Exhibit 2.1 illustrates how variable the effects of medical interventions can be. The data indicate that spending $1 million on a tetanus vaccine would save thousands of **life years**, whereas spending $1 million on individual financial awards for smoking cessation would save less than one life year. Exhibit 2.1 also reminds us that effectiveness does not always determine which services are offered. Interventions to reduce childhood obesity are not common, but many companies have experimented with smoking cessation programs.

life year
One additional year of life. A life year can equal one added year of life for an individual or an average of 1/*n*th of a year of life for *n* people. (For example, the addition of one life year would increase life expectancy by 1/100 for 100 people.)

We have to make some choices. A financial incentive to reduce smoking saves only a few life years. However, this screening may allow children multiple happy years with a parent or grandparent. We cannot avoid a making decision about whether the benefits of this intervention are large enough to

EXHIBIT 2.1
How Many Life Years Will $1 Million Save?

Intervention	Life Years Saved	Source
Maternal and neonatal tetanus vaccine in low-income countries	22,222	Laing et al. (2020)
Intervention to reduce childhood obesity	1,292	Sharifi et al. (2017)
Multidisciplinary management for heart failure	995	Dang et al. (2017)
Fecal immunochemical testing	126	Crosby, Mamaril, and Collins (2021)
Multidisciplinary heart failure management plus exercise	28	Dang et al. (2017)
Individual deposits for smoking cessation	4	Russell et al. (2021)
Individual rewards for smoking cessation	>1	Russell et al. (2021)

justify its substantial costs. Furthermore, many interventions improve quality of life without extending it, so a life year gain is an imperfect measure of value.

The input view also stresses that changes in technology or prices may affect the mix or amount of healthcare products that citizens want to use. For example, lower surgery costs might increase the number of people who choose vision correction surgery rather than eyeglasses. Conversely, advances in pharmaceutical therapy for coronary artery disease might reduce the rate of bypass graft surgeries (and reduce the number of attendant hospital stays).

In the past, healthcare managers did not spend much time on the input view. They were charged with running healthcare organizations well, so products that their organizations did not produce were of little interest. This perception is changing. Our collective rethinking of the role of health insurance makes the input view practical. For example, if offering instruction on meditation reduces healthcare use enough, the chief executive of an insurance plan, the medical director of a capitated healthcare organization (one in which payments are made per person, regardless of the services provided), or the benefits manager of a self-insured employer will find it an attractive option. Increasingly, healthcare managers must be prepared to evaluate a wide range of options.

2.1.2 The Output View

New ways of thinking do not always invalidate former perspectives. The output view of the healthcare sector is more relevant than ever. The importance of producing goods and services efficiently has increased. Those struggling with the rising cost of healthcare are increasingly purchasing care from lower-cost producers. At present, third parties (i.e., insurers, governments, and employers) have difficulty distinguishing between care that is inexpensive because it is of inferior quality and care that is inexpensive because it is produced efficiently, but their ability to make this distinction is improving.

To succeed, managers must lead their organizations to become efficient producers that attract customers. In many organizations, this task will be formidable.

2.2 Health Outcomes

Americans often celebrate their healthcare system as "the best in the world." While parts of the system are superb, the system as a whole needs improvement. As indicated in chapter 1, the American healthcare system incurs high costs and produces mediocre outcomes. Although the United States spends far more on healthcare per person than any other large developed country, American life expectancy at birth ranks twenty-seventh among the 34 members of the group of industrialized nations called the Organisation for

Economic Co-operation and Development (OECD). Only Latvia, Poland, Estonia, the Slovak Republic, Hungary, Turkey, and Mexico trail the United States (OECD 2021).

Given the political decision to subsidize healthcare resources for the elderly, life expectancy at age 65 might represent a fairer comparison. On this measure, the United States ranked twenty-fifth in 2018. The health of the American public is not the best in the world.

This caustic appraisal should not hide the fact that the health of Americans has improved dramatically. Between 2000 and 2018, life expectancy at birth rose from 76.7 years to 78.7 years, an increase of 2.0 years (OECD 2021). Note, however, that this figure does not reflect the effects of the COVID-19 pandemic, which cut life expectancy. In many other countries, life expectancy improved during this period.

From one perspective, this increase in life expectancy reflects impressive performance. From another, it does not compare well with the performance of other industrialized countries. For example, in France, life expectancy at birth rose from 79.2 years in 2000 to 82.8 years in 2018. Making the comparison even less favorable, costs increased less than half as much in France as in the United States (OECD 2021).

This conclusion rests on a simple marginal analysis in which we compare the change in spending to the change in life expectancy. What appears to be higher spending, however, might just be the effects of inflation. To avoid inaccuracies resulting from changes in the value of money, economists use two strategies. The simplest and most reliable strategy to report spending uses shares of national income, or *gross domestic product* (GDP). Focusing on shares removes the effects of overall inflation (see exhibit 2.2).

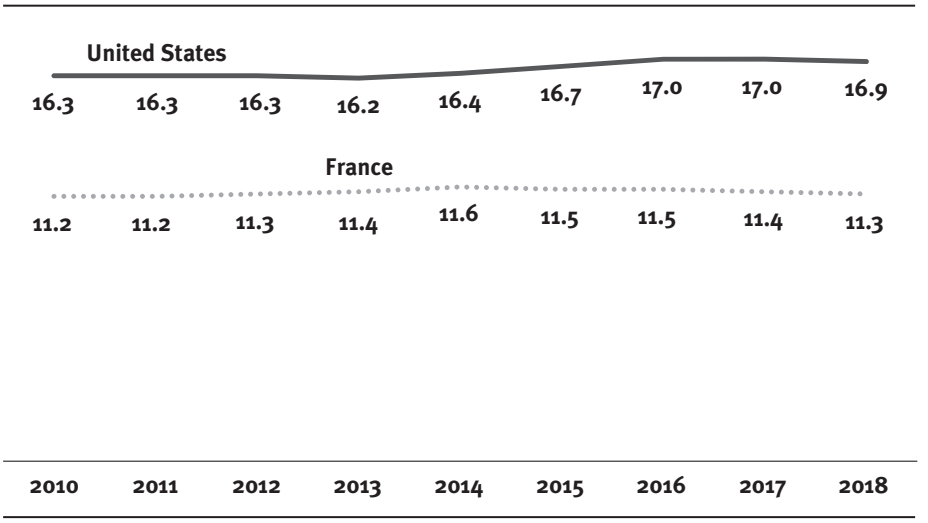

EXHIBIT 2.2 Health Expenditures as a Share of Gross Domestic Product, United States and France

Source: Data from OECD (2021).

2.3 Outputs of the Healthcare System

In 2019, Americans spent $3.8 trillion on healthcare, meaning that the expenditure averaged $11,582 per person, or 17.7 percent of the nation's output (CMS 2021). This represented a modest change from 2018's 17.6 percent. Higher spending and substantial reductions in economic output during the pandemic will surely change these numbers significantly.

Exhibit 2.2 compares the French and American shares of national income using OECD data (which employs somewhat different definitions of spending). In 2018, the French spent $4,530 per person or 11.3 percent of national income. In both countries, the share of national income spent on healthcare has risen, but the increase has been much larger in the United States. Why is how much we spend interesting? Is there anything wrong with spending that much? Why has spending been rising around the world? Why has it been rising faster in the United States?

2.3.1 Why Is How Much We Spend on Healthcare Interesting?

How much we spend on healthcare matters for two reasons. First, although healthcare claims an increasing share of national income worldwide, other industrialized countries have realized larger health gains while spending less than the United States. Second, the rising share of national income claimed by healthcare has prompted most governments and employers to question whether the benefits of this increased spending warrant it. If not, there is something wrong with healthcare spending. If the benefits of healthcare spending are smaller than the benefits of using our resources in other ways, a shift would be in order. For example, would we be better off if we had spent less on educating new physicians and more on educating new teachers? The **opportunity cost** of producing a product consists of the other goods and services we cannot make instead. Stating that the benefits of healthcare are less than its costs does not imply that it is bad or worthless, only that it is worth less than some other use of our resources.

opportunity cost
The value of what you cannot do as a result of making a choice.

2.3.2 Why Is Healthcare Spending Rising More Slowly than Anticipated?

Between 2010 and 2019, healthcare spending grew more slowly than forecast. Spending covered by private insurance, by Medicare, by Medicaid, and by other insurers came in below estimates. Higher healthcare spending is driven by changes in prices and quantities. Here, we explore both.

Prices for services covered by private insurance are set through negotiation and have historically risen much faster than other prices. That remains the general pattern, although the rates are highly variable (see exhibit 2.3).

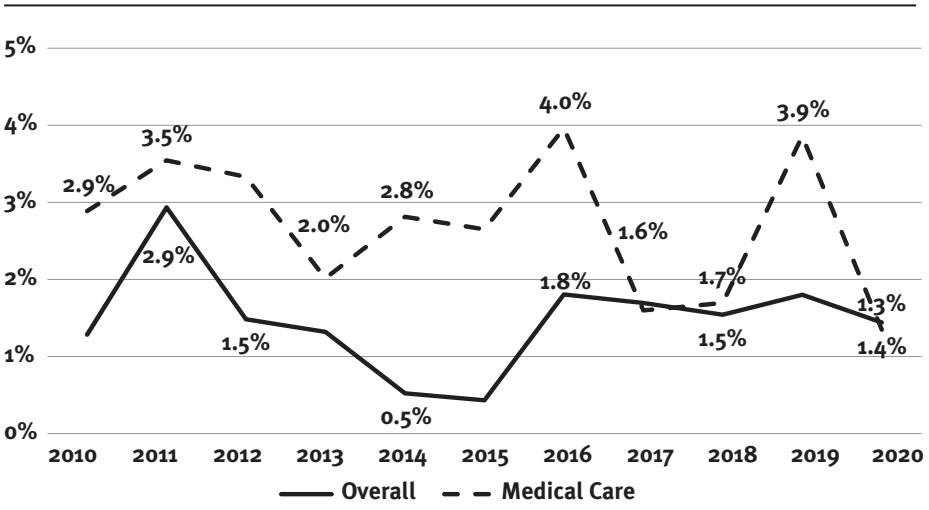

EXHIBIT 2.3 Medical and Overall Inflation in the United States

Source: Data from Bureau of Labor Statistics (2021).

Case 2.1 Comparing Health Outcomes in Adjoining Counties

Johnson County and Wyandotte County are adjacent counties in the Kansas City metropolitan area. Despite having made significant progress in recent years, the rate of premature death in Wyandotte County remains more than double the rate in Johnson County (University of Wisconsin Population Health Institute 2021). What might cause such a large difference? Causes might include weaknesses in the primary care system, disparities in household resources, or differences in health behaviors. Risk factors for premature death include smoking, obesity, poverty, and exposure to environmental hazards such as reduced air quality (America's Health Rankings 2020). Wyandotte County fared much worse on all these risk factors. Home to a major railroad terminal, multiple trucking companies, and many manufacturing plants, Wyandotte County has a 19 percent higher air particulate burden than Johnson County, and six times as many Wyandotte County children live in poverty (University of Wisconsin Population Health Institute 2021).

How do these two counties compare otherwise? Even though the University of Kansas Health System is based there, Wyandotte County has far fewer primary care physicians and dentists per resident than

(continued)

Case 2.1 *(continued)*

the Kansas average. Johnson County has far more primary care physicians and dentists per resident than average. Residents of Wyandotte County are much more likely to be obese and physically inactive. Residents of Wyandotte County are much more likely to smoke but less likely to drink excessively (University of Wisconsin Population Health Institute 2021).

Before labeling these factors as lifestyle differences, note that the economic circumstances are very different in the two counties. Median household income is 90 percent lower in Wyandotte County (reflecting lower earnings and a higher proportion of single-parent households). The share of the population without health insurance is 58 percent higher, and the share with a high school diploma is 22 percent lower. In addition, 23 percent of Wyandotte residents are African American and 30 percent are Hispanic, making it a much more diverse county (US Census Bureau 2021).

The government of Wyandotte County has launched a number of projects to improve the health of its citizens since 2009 (Healthy Communities Wyandotte 2021). Its 20-20-20 Movement built 20 new miles of trails, 20 miles of bikeways, and 20 miles of sidewalks. The Tobacco Free Wyandotte Action Team enhanced resources for quitting tobacco, preventing young people from starting to use tobacco, and protecting residents from secondhand smoke. The Food Systems Action Team promoted urban agriculture, farmers' markets, community gardens, school-based gardens, summer meals for students, and nutrition education. The Community Health Council of Wyandotte County (2021) emphasizes three strategies: Community Health Workers are local residents who seek to assist their peers with a wide range of health concerns. Cradle KC works with partner organizations—Advent Health, the University of Kansas Medical Center, and Vibrant Health, which is a collection of community clinics—to reduce infant mortality. And the Kansas Assistance Network seeks to connect residents with community and insurance networks.

Not surprisingly, Johnson County fared much better during the COVID-19 pandemic than Wyandotte County. Even though both counties have large, sophisticated health departments, infection rates in Wyandotte County were 25 percent higher and death rates were 36 percent higher (*New York Times* 2022).

(continued)

Case 2.1 *(continued)*

Discussion Questions

- What are the main inputs to health mentioned in this case?
- Are there important inputs to health that the case does not mention?
- Which health behaviors should be prioritized?
- Is there evidence that reducing smoking improves health?
- Is there evidence that reducing obesity improves health?
- Does income play any role in improving health?
- How important is health insurance in improving health?
- Why did Wyandotte County fare so poorly during the pandemic?
- Wyandotte County has relatively few primary care physicians. Should increasing that number be a priority?
- Can you find any evidence that improving primary care improves health?
- What role, if any, should private foundations play in improving health?
- What role, if any, should state government play in improving health?
- What role, if any, should the federal government play in improving health?
- What would you recommend that Wyandotte County should do to improve health?
- Which of these questions are examples of positive economics? Normative economics?

2.4 The Shifting Pattern of Healthcare Spending

With total revenues of nearly $1.2 billion, hospitals claim over a third of total spending. What hospitals produce is changing, however. Hospitals' reliance on outpatient revenues continues to increase, and there is no end in sight. Changes in technology, new payment models, and patient preferences for getting care in clinics or at home drive this (Deloitte 2021). The pandemic saw non-COVID-related admissions decline significantly while telemedicine visits increased sharply. The inpatient revenue share has been trending downward for years, and managers must be prepared to lead organizations into a very different world.

As exhibit 2.4 shows, spending for physicians' services claims over a fifth of total spending. This share has fallen since 2000 as a result of consolidation into systems and increasing spending on pharmaceuticals.

Spending on pharmaceuticals (which does not include pharmaceuticals administered in hospitals and nursing homes) has risen sharply since 2000. This increase reflects the expected effects of public policy and some unexpected effects. Medicare Part D, a voluntary outpatient prescription drug benefit for people on Medicare, went into effect in 2006 and now provides coverage for more than 46 million people. The Affordable Care Act (ACA) of 2010 expanded Medicaid and established marketplace insurance plans. Both provided coverage for pharmaceuticals and were designed to increase the use of pharmaceuticals. What was not expected—but should have been—was that prices increased rapidly as well. As chapter 7 will show, increasing insurance coverage results in increased sales and higher prices.

EXHIBIT 2.4 Spending by Sector (millions of dollars)

	Amount	Percent
Total hospital expenditures	$1,191,978	33.2%
Total physician and clinical expenditures	$772,115	21.5%
Total prescription drug expenditures	$369,687	10.3%
Total administration plus net cost of health insurance	$288,888	8.0%
Total nursing care and continuing care retirement facilities	$172,655	4.8%
Total other health, residential, and personal care expenditures	$193,633	5.4%
Total dental services expenditures	$143,191	4.0%
Total structures and equipment	$108,018	3.4%
Total home health care expenditures	$113,510	3.2%
Total other professional services expenditures	$87,715	2.7%
Public health activity	$97,805	2.7%
Other nondurable medical product expenditures	$59,030	1.8%
Total durable medical equipment expenditures	$48,458	1.5%
Research	$46,714	1.5%

Source: Data from CMS (2021).

It may come as a surprise, but the overhead costs of health insurance represent the fourth-largest component of spending—and this figure is likely to be an understatement. The American approach to health insurance, which emphasizes subsidies for private coverage, essentially ensures high costs of managing insurance. Having multiple small plans with distinct patterns of coverage guarantees high overhead rates. It should be stressed that this represents only part of the cost of running American health insurance. Hospitals, physician practices, and other organizations incur substantial costs for billing and contract compliance.

2.5 Disruptive Change in the Healthcare System

For many years, six trends have been evident in the US healthcare system:

- Rapid technological change
- The shrinking share of direct consumer payment
- The inadequacies of the nation's public health infrastructure
- The nation's poor infant and maternal health outcomes
- Significant health disparities linked to income and ethnicity
- The gradual increase in the share of insured Americans

Most of these trends have been identified for years, but the COVID-19 pandemic brought them to the fore.

2.5.1 Rapid Technological Change

Technological change is pervasive in healthcare. Technological change makes transformation of the healthcare system possible, and policy changes are apt to make transformation desirable. Only luck will rescue management decisions that ignore technological change.

Monitoring of implantable cardioverter defibrillators illustrates the interaction of technological and policy change. Patients with an implantable cardioverter defibrillator—a small device used to treat irregular heartbeats—require regular follow-up visits to monitor their health and to ensure that their device is working properly. The stakes are high, as untreated arrhythmia may be life-threatening. More than 2 percent of the US population experience some arrhythmia.

Although little scientific evidence exists, the professional consensus is that these patients should be seen two to four times per year even if no difficulties are evident. A recent evaluation of a home monitoring system concluded that it offered better quality at lower cost (Parahuleva et al. 2017). In volume-based payment environments, in which revenues depend on the

number of visits, providers may not find remote home monitoring attractive. However, in value-based environments, in which reducing the number of visits reduces workload without reducing revenue, providers, patients, and insurers may have a common interest in expanding remote monitoring. For reasons that will be discussed more fully in chapter 6, public and private insurers are trying to move quickly to value-based models.

Other innovations could prove even more disruptive. For example, pharmacogenomics—the science of predicting differing responses to drugs based on genetic variations—could have profound effects. Even after adjusting for individual factors such as age, weight, race, sex, diet, and other medications, patients can respond very differently to a drug. One patient may have the desired relief of symptoms, another may have no apparent response, and a third may have a life-threatening reaction. Obviously, this difference matters a great deal to patients and practitioners. It also matters to managers. An adverse drug reaction is the fourth leading cause of death in the United States, and genetic testing to ensure that patients get safe, effective pharmaceuticals could reduce hospitalization rates by up to 30 percent (Nicholson et al. 2021).

Like every sector of society, healthcare struggles to take advantage of the information revolution and illustrates the paradox of technological change. The essence of the information revolution is that the cost of performing a single calculation has dropped precipitously. As a result, many more calculations are possible, and spending on some types of information processing (e.g., computer games) has increased sharply as spending on other types of information processing (e.g., inventory management) has plummeted. Technological advances almost always make a process less expensive, yet spending may rise because volume increases dramatically.

The challenges of the information revolution are even greater in healthcare than in most sectors. Data constitutes much of the output of the healthcare sector, yet relatively few healthcare workers are highly skilled users of such information. In addition, healthcare organizations have lagged behind other service organizations in investing in computer hardware, software, and personnel.

The rapid pace of change in other areas further intensifies these challenges. Healthcare's diagnostic and therapeutic outputs are changing even faster than the organizational structure of the sector, which itself is changing rapidly. In some areas (most notably, imaging and laboratory services), technological change is tightly linked to the information processing revolution. In other areas, the links are much looser. For example, advances in information processing speed the development and assessment of new drugs, yet because pharmaceutical innovations can be extremely profitable, a powerful incentive for pharmaceutical innovation exists regardless of these advances.

2.5.2 The Shrinking Share of Direct Consumer Payments

Understandable complaints about higher deductibles and copays obscure the gradual decline in direct consumer payments. Most wealthy countries cap out-of-pocket payments based on income. The United States does not.

Exhibit 2.5 depicts the steady decline in the share of direct consumer payments for healthcare. Broader and more complete insurance coverage explains this trend. While consumers ultimately pay all healthcare bills, increasingly, they pay indirectly through taxes and premiums.

2.5.3 Inadequacies of the Nation's Public Health Infrastructure

More than 40,000 jobs were eliminated at state and local public health agencies between 2008 and 2020. State spending on public health fell by over 20 percent, and federal spending fell in inflation-adjusted terms (Ollove and Vestal 2021). There will be another pandemic, and many of the factors affecting the health of the population are at least partly public health issues.

2.5.4 The Nation's Poor Infant and Maternal Health Outcomes

The United States ranks last in infant mortality among wealthy countries (OECD 2021). Its infant death rate of 5.7 per 1,000 live births is more than double the rate in many countries. The United States also ranks last in maternal mortality, with rates that are more than double those in Canada (which is far from an exemplar of care after delivery). Strikingly, the poor outcomes in the United States represent a failure to adopt the successful innovations of other countries, compounded by policy decisions. The United States is the

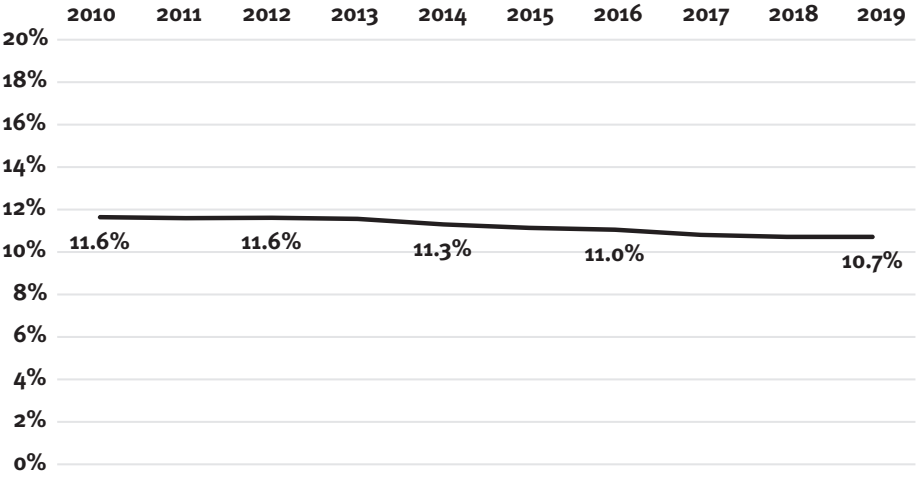

EXHIBIT 2.5 Direct Payments by Consumers as a Share of National Health Spending

Source: Data from CMS (2021).

only wealthy country that does not guarantee a post-birth visit by a healthcare professional (usually a nurse or midwife) or paid maternity leave, and infant and maternal death rates after delivery make the United States an outlier.

2.5.5 Significant Health Disparities Linked to Income and Ethnicity

Infant mortality rates for Blacks and Native Americans are nearly double those of whites (National Center for Health Statistics 2021). This is true even though rates for whites are much higher than those in other wealthy countries. Maternal mortality rates for Blacks are more than triple those of whites. In addition, life expectancies for low-income individuals (those in the bottom fifth of the income distribution) are much shorter than for high-income individuals (those in the top fifth). Furthermore, this gap has been getting wider (Sanchez-Romero, Lee, and Prskawetz 2020).

This pattern was reemphasized during the pandemic: COVID-19 infections and deaths were much higher in counties with higher poverty levels (Jung, Manley, and Shrestha 2021).

2.5.6 The Gradual Increase in the Share of Insured Americans

The share of the US population with health insurance coverage rose from 82 percent in 2010 to 89 percent in 2018 (National Center for Health Statistics 2021). Most of this increase is attributable to the ACA, a primary aim of which was to expand coverage.

By creating new insurance options, the ACA facilitated large gains in coverage between 2010 and 2018. Most of the new options made it easier for those with low or moderate incomes to afford health insurance. Especially after the full implementation of the ACA in 2014, Black and Hispanic people realized large gains in coverage, although whites remained more likely to have coverage (Artiga et al. 2021).

2.5.7 The Transformation of the Health Insurance Industry

The health insurance industry looks very different than it did just a few years ago. To begin with, its revenues have grown. Analysts forecast that industry revenues will double by 2025, with most of the growth coming from Medicare Advantage, Medicaid, and ACA marketplace plans (Becker et al. 2020).

Second, the industry's customers look different. Until recently, most purchases were made by firms or governments. Americans had coverage through work, Medicare, or Medicaid. Typically, just one plan was offered. Increasingly, though, individuals are making their own choices. Millions of Americans have chosen Medicare Advantage plans already, and millions more have chosen marketplace plans. Both options seem likely to grow, and insurers plan to roll out private exchanges so that employees can choose their plans as well.

Third, the basis for competition seems likely to change. The ACA has made avoiding risk more difficult, and, with other regulations, it has made pricing and quality easier for consumers to discern. Starting in 2007, individuals seeking Medicare Advantage plans could use summary ratings based on clinical quality, the experience of patients, and customer service. Customers are using these ratings to choose plans, and ratings systems seem likely to spread.

Fourth, the structure of the industry has changed. The industry has already consolidated, and this process is likely to continue. If, as many predict, profit margins drop, additional mergers and acquisitions seem likely. Indeed, one rationale for the merger of CVS and Aetna was that providing more care in MinuteClinics (part of CVS) would allow the merged firm to offer insurance with lower premiums (Japson 2021).

Fifth, the health insurance industry is increasingly using data to measure cost and quality. More and more, insurers use data to identify high-risk beneficiaries, estimate the cost of an entire episode of care, provide feedback to providers, and make judgments about which providers offer good value. Underlying insurers' increasing willingness to create narrow networks and designate preferred providers of care is the conclusion that cost and quality are not highly correlated, so steering patients to low-cost providers can be a winning strategy (Liebman and Panhans 2021).

deductible The amount a consumer must pay before insurance covers any healthcare costs.

Sixth, benefit designs have changed. The average **deductible** for an employment-based plan rose from $343 in 2007 to $1,644 in 2020 (Kaiser Family Foundation 2020). In addition, caps on **out-of-pocket spending** and employee wellness programs have become nearly universal.

out-of-pocket spending Direct spending for care by a consumer.

In short, there have been so many changes in health insurance that they are hard to track. Chapters 3 and 6 will explore them more fully.

Case 2.2 Quiet Changes in the Healthcare System

As of July 2019, 1,368 Federally Qualified Health Centers (FQHCs) were in operation in the United States, serving nearly 30 million patients (HRSA 2020). Together with similar health centers that do not receive federal grant funding, there are more than 14,000 sites serving patients across the United States. (In 2009, only 1,007 FQHCs were in operation.) FQHCs offer behavioral health care, dental care, and medical care to a variety of underserved areas. About 79 percent of FQHCs

(continued)

Case 2.2 *(continued)*

are organized as patient-centered medical homes (PCMHs).

A PCMH provides comprehensive primary care that is coordinated with other providers and focuses on treating the whole person. PCMHs offer shorter waits for urgent needs, expanded hours, and around-the-clock virtual access to a member of the care team. In 2019, more than 9,000 practices were certified as having PCMH status (New York State Department of Health 2019). In 2009, fewer than 100 practices were certified. Implementation of the PCMH strategy has exploded (Sinaiko et al. 2017). Note that the capabilities and designs of PCMH and non-PCMH practices vary considerably, so comparing their performance can be challenging.

An analysis by a team of RAND researchers (Kahn et al. 2017) compared FQHCs that were identified as PCMHs to those that were not. (The non-PCMH practices were chosen to be as similar to the PCMH practices as possible.) PCMH patients had lower overall spending and were less likely to have an emergency department visit, to be admitted to a hospital, or experience a readmission. The researchers found, in short, that PCMH patients appeared to be healthier, even though they were more likely to identify themselves as Asian, Black, or Hispanic.

PCMHs typically employ primary care nurse practitioners (and encourage other staff to work at the top of their licenses). In 2019, more than 290,000 nurse practitioners were licensed in the United States, with over 70 percent providing primary care (AANP 2020). Since 2009, the number of nurse practitioners has more than tripled.

Taken together, the growth of FQHCs, PCMHs, and nurse practitioners has profoundly changed primary care in the United States.

Discussion Questions

- Why do you think FQHCs have been promoted by both Democratic and Republican administrations?
- Should state Medicaid programs promote FQHCs? Why?
- Why have PCMHs grown so rapidly?
- What are the advantages of PCMHs for insurers? For patients?
- Are there advantages of the PCMH model for primary care practices?

(continued)

Case 2.2 *(continued)*

- Are reduced emergency department visits, hospitalizations, and rehospitalizations desirable?
- Is there evidence that the growth of primary care has been beneficial?
- Some states' licensure regulations restrict the role of nurse practitioners. What are the advantages and disadvantages of doing so?
- Why would states restrict the role of nurse practitioners?

2.6 Conclusion

A consensus has emerged that the US healthcare system needs to be redirected despite its many triumphs. Underlying this consensus is the recognition that costs are the highest in the world even though outcomes are not the best in the world.

How the healthcare system should change is much less clear. Managing under such circumstances is stressful, but an awareness of the trends presented in this chapter should identify a number of strategies (such as striving to be the low-cost producer) that make sense in almost any environment. These low-risk strategies, and ways to deal with risk and uncertainty, will be discussed in the next chapters.

Exercises

2.1 Identify a product that is one organization's output and another organization's input.

2.2 Can you think of any initiatives that reflect the input view of healthcare?

2.3 What is wrong with spending 17.2 percent of GDP on healthcare?

2.4 Americans spend more on smartphones than the citizens of other countries do, yet this type of spending is seldom described as a problem. Why is spending more on healthcare different?

2.5 Should reducing overhead costs associated with insurance be a priority?

2.6 US national health expenditure was $7,892 per person in 2008 and $10,364 in 2016. The Consumer Price Index had a value of 210.228 in 2008 and a value of 241.432 in 2016. In 2016 dollars, how much was spending in 2008?

To answer this question, multiply spending in 2008 by the Consumer Price Index for 2016 and divide by its value for 2008. The answer is $9,063 = $7,892 × 241.432/210.228.

2.7 Spending on pharmaceuticals rose from $253,080 in 2010 to $369,687 in 2019. Use the Consumer Price Index for 2010 (219.179) and 2019 (256.974), then calculate 2010 spending in 2019 terms.

2.8 How did the state and local government share of national health expenditures change between 2010 and 2019? What accounts for this change? Go to the website of the Centers for Medicare & Medicaid Services (www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical) to get data.

2.9 When was the last year that GDP grew faster than national health expenditure? Go to the website of the Centers for Medicare & Medicaid Services (www.cms.gov/Research-Statistics-Data-and-Systems/Research-Statistics-Data-and-Systems.html) to get data.

2.10 Your accountants tell you that it will cost $400 to set up an immunization program at a preschool and immunize one child against polio. It will cost $460 more to immunize 20 more children. What is the cost per child for the first child? What is the cost per child for the additional 20 children? What is the average cost per child? What concepts do these calculations illustrate?

These calculations illustrate the ideas of average and incremental (marginal) values. The incremental cost for the first child is $400. The incremental cost for the next 20 is $23 = $460/20. Average cost for the 21 children is $43 = (400 + 460)/21.

2.11 Starting a mobile clinic costs $300,000. The additional cost of serving the first patient is $40. What is the average cost of serving the first patient? The 20th patient?

2.12 Setting up nurse practitioner clinics to serve 20,000 newborns in Georgia would cost $6 million. This program would increase life expectancy at birth from 75.1 years to 75.3 years. How many life years would be gained? What is the cost per life year? Should this program be started?

The added cost is $2,000,000. The increase in life years is 3.2 × 1,000 = 3,200. So, the cost per life year is $625 = $2,000,000/3,200. The decision to start the program is a judgment call, but this is a very low cost per life year.

2.13 A new treatment for cystic fibrosis costs $2 million. The life expectancy of 1,000 patients who were randomly assigned to the new treatment increased by 3.2 years. What is the cost per life year of the new treatment? Is this a good investment?

2.14 Why has the share of healthcare output produced by hospitals risen? Will this trend continue? Can you think of a policy or technology change that would reduce hospital use? Can you think of a policy or technology change that would increase hospital use? What implications do these changes have for the careers of healthcare managers?

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CHAPTER

3

AN OVERVIEW OF THE HEALTHCARE FINANCING SYSTEM

Learning Objectives

After reading this chapter, students will be able to

- explain why health insurance is common,
- use standard health insurance terminology,
- identify major trends in health insurance,
- describe the major problems faced by the current insurance system, and
- find current information about health insurance.

Key Concepts

- Insurance pools the risks of high costs.
- Moral hazard and adverse selection complicate risk pooling.
- About 91 percent of the US population has medical insurance.
- Consumers pay for most medical care indirectly, through taxes and insurance premiums.
- Most consumers obtain coverage through an employer- or government-sponsored plan.
- Managed care has largely replaced traditional insurance.
- Managed care plans differ widely.

3.1 Introduction

3.1.1 Paying for Medical Care

Consumers pay for most medical care indirectly, through insurance. In 2019, insurance paid for 77 percent of healthcare spending (CMS 2020). Healthcare managers therefore must understand the structure of private and public insurance programs because much of their organizations' revenues will be shaped by insurance.

Managers must also be aware that consumers ultimately pay for healthcare products, a key fact that is obscured by the complex structure of the US healthcare financing system. A prudent manager will anticipate a reaction when healthcare spending invokes higher premiums or taxes, thereby forcing consumers to spend less on other goods and services. Some consumers may drop coverage, some employers may reduce benefits, and some plans may reduce payments. This reaction need not occur if a consensus has emerged in support of increased spending, but even then, managers should be wary of the profound effects that changes to insurance plans can mean for them. Finally, managers must consider more than insurance payments. Even though the bulk of healthcare firms' revenue comes from insurers, consumers do pay directly for some products. Consumers directly spent more than $400 billion on healthcare products in 2019 (CMS 2020). No firm should ignore this huge market.

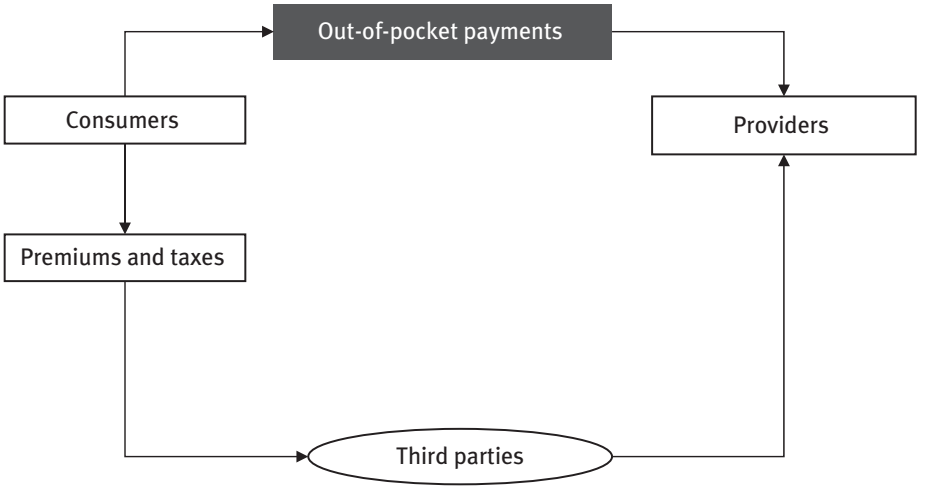
3.1.2 Direct Spending

coinsurance
A form of cost sharing in which a patient pays a share of the bill, not a set fee.

copayment
A fee the patient must pay in addition to the amount paid by insurance.

Although the amount of direct consumer spending is high, it accounts for only a fraction of total healthcare spending. Exhibit 3.1 depicts a healthcare market in general terms—consumers directly pay the full cost of some services and part of the costs of other services. These direct payments are often called *out-of-pocket* payments. For example, a consumer's payment for the full cost of a pharmaceutical product, a 20 percent **coinsurance** payment to a dentist, and a $25 **copayment** to a child's pediatrician are all considered out-of-pocket payments. Insurance beneficiaries make some out-of-pocket payments for services that are not covered, for services in excess of a policy's

EXHIBIT 3.1 The Flow of Funds in Healthcare Markets



coverage limits, or for **deductibles** (amounts that consumers are required to spend before their plan pays anything). Another term for out-of-pocket payments is **cost sharing**. Economics teaches us that a well-designed insurance plan usually incorporates some cost sharing. We will explore this concept in detail in the discussion of demand in chapter 7.

deductible The amount that a consumer must pay before insurance covers any healthcare costs.

cost sharing The general term for direct payments to providers by insurance beneficiaries. (Deductibles, copayments, and coinsurance are forms of cost sharing.)

Insurance payments are the largest source of revenue for most healthcare providers. In 2019, they represented 87 percent of payments to hospitals, 80 percent of payments to physicians, and 65 percent of payments to nursing homes (CMS 2020). Because insurance affects most healthcare purchases, its structure has a profound influence on the healthcare system and healthcare organizations.

The extent of insurance in the healthcare market distinguishes it from most other markets. Insurance has three important effects on patients:

- It protects them against high healthcare expenses, which is the main goal.
- It encourages them to use more healthcare services, which is a side effect.
- It limits their autonomy in healthcare decision-making, which is not a goal.

Nonetheless, the advantages of insurance exceed its disadvantages. As discussed in chapter 2, the share of direct payments for healthcare has fallen steadily over the past 50 years.

3.1.3 Sources of Insurance

Nearly 325 million Americans had some health insurance coverage in 2019 (Keisler-Starkey and Bunch 2021). Only 1 percent of those older than 65 lacked coverage; only 5 percent of those younger than 18 lacked coverage; and 12 percent of those aged 18 to 64 lacked coverage. Although 27 percent of those older than 65 had employment-based insurance, 93 percent had **Medicare** coverage (meaning that many had duplicate coverage). Employment-based insurance was the most common form of coverage for those younger than 65. Fifty-six percent of children had employment-based insurance, and 39 percent had **Medicaid**. Sixty-three percent of those aged 18 to 64 had employment-based insurance (and only 15 percent had Medicaid). In section 3.2, we will explore why employment-based insurance is so prevalent.

Medicare An insurance program for older and disabled Americans that is administered by the Centers for Medicare & Medicaid Services.

Medicaid A collection of state-run insurance programs that meet standards set by the Centers for Medicare & Medicaid Services and serve those with incomes low enough to qualify for their state's program. Medicaid enrollment has increased by more than 20 percent as a result of state expansions under the Affordable Care Act.

3.1.4 The Uninsured

For many years, the share of the population without medical insurance rose steadily, even as insurance payments rose as a share of total spending. Since the enactment of the Affordable Care Act (ACA) in 2010, the percentage of the population without health insurance has fallen sharply. The share of those

under age 65 without insurance was 18.2 percent in 2010. By 2016, it was 8.0 percent (Keisler-Starkey and Bunch 2021).

Uninsured consumers enter healthcare markets with three significant disadvantages. First, they must finance spending from their own resources or the resources of family, friends, and well-wishers. If these funds are not adequate, they must do without care or rely on charity care. The uninsured do not have access to the vast resources of modern insurance companies when large healthcare bills arrive. Second, unlike most insured customers, uninsured customers may be expected to pay list prices for services. The majority of insured consumers are covered by plans that have secured discounts from providers. For example, none of the major government insurance plans and few private insurance plans pay list prices for care. Although, in principle, uninsured patients could negotiate discounts, this practice is not routine. Third, the uninsured tend to have low incomes. In 2019, 15.9 percent of Americans with incomes below the federal poverty level did not have health insurance, compared with only 3.0 percent of those with annual household incomes four times the poverty level and higher (Keisler-Starkey and Bunch 2021).

The combination of low income and no insurance often creates barriers to accessing care. For example, in 2019, 32 percent of uninsured adults reported going without care when they had a medical problem (Tolbert, Orgera, and Damico 2020). This rate was more than five times that for well-insured adults. Delaying or forgoing care can lead to worse health outcomes.

3.2 What Is Insurance, and Why Is It So Prevalent?

3.2.1 What Insurance Does

Insurance pools the risks of healthcare costs, which have a skewed distribution. Most consumers have modest healthcare costs, but a few incur crushing sums. For example, in 2014, 1 percent of the noninstitutionalized population spent 23 percent of the total, averaging more than $107,000 (Berk and Fang 2017). Insurance addresses this problem. Suppose that one person in a hundred has the misfortune to run up $100,000 in healthcare bills and no one else spends anything. Consumers cannot predict whether they will be lucky or unlucky, so they may buy insurance. If a private firm offers insurance for an annual premium of $1,040, many consumers would gladly buy insurance to eliminate a 1 percent chance of a $100,000 bill. (The insurer gets $4,000 per 100 people to cover its selling costs, claims processing costs, and profits.)

3.2.2 Adverse Selection and Moral Hazard

Alas, the world is more complex than the preceding scenario, and such a simple plan probably would not work. To begin with, insurance tends to change

the purchasing decisions of consumers. Insured consumers are more likely to use healthcare services, and providers no longer feel compelled to limit their diagnosis and treatment recommendations to amounts that individual consumers can afford. The increase in spending that occurs as a result of insurance coverage is known as **moral hazard**. Moral hazard can be substantially reduced if consumers face cost-sharing requirements; most contemporary plans have this provision.

moral hazard The incentive to use additional care that having insurance creates.

Another less tractable problem remains. Some consumers, notably older people with chronic illnesses, are much more likely than average to face large bills. Such consumers would be especially eager to buy insurance. On the other hand, some consumers, especially younger people with healthy ancestors and no chronic illnesses, are much less likely than average to face large bills. Such consumers would not be especially eager to buy insurance. This situation illustrates adverse selection: people with high risk are apt to be eager to buy insurance, but people with low risk may not be. Wary of this phenomenon, insurance firms have tried to assess the risks that individual consumers pose and base their premiums on those risks, a process known as **underwriting**. Of course, underwriting drives up costs, making coverage more expensive, which further reduces the share of consumers who are willing to pay for insurance. In the worst case, no private firm would be willing to offer insurance to the general public.

underwriting The process of assessing the risks associated with an insurance policy and setting the premium accordingly.

In the United States, three mechanisms reduce the effects of adverse selection: employment-sponsored medical insurance, government-sponsored medical insurance, and health insurance subsidies. In 2020, 91 percent of the population had health insurance. About 34 percent had government-sponsored medical insurance, and 68 percent had employer-sponsored insurance (Keisler-Starkey and Bunch 2021). Ninety-four percent of Americans aged 65 and older have coverage through Medicare or Medicaid. Ninety percent of those younger than age 65 have coverage, with 63 percent having employer-sponsored coverage and 27 percent having government-sponsored coverage. (Ten percent of younger Americans bought their insurance themselves, but for some, this will be in addition to other insurance).

Why is the link between employment and medical insurance so strong? First, insurers are able to offer lower prices on employment-based insurance because they reduce sales costs and adverse selection risks by selling to groups. Selling a policy to a group of 1,000 people costs only a little more than selling a policy to an individual; thus, the sales cost is much lower. Since few people take jobs or stay in them only because of the medical insurance benefits, adverse selection rarely occurs (i.e., most employees get insurance, whether or not they think they will need it soon). Second, insurance also benefits employers. If coverage improves the health of employees or their dependents, workers will be more productive, thereby improving profits for

Understanding Health Risks and Insurance

Adverse selection is one reason for governments to intervene in health insurance markets. A persistent fear is that people with low risks will not buy insurance, pushing up premiums for people with higher risks. Once premiums go up, additional people with low risks will drop out. This sequence is called a "death spiral" because it ultimately results in no one buying insurance. To prevent this outcome, governments subsidize insurance or mandate that it be bought.

There is little evidence that people understand health risks or insurance very well. Yet to make a good choice, consumers must compare many products with different attributes and forecast what their risks will be. Not surprisingly, many find insurance choices difficult. In fact, a recent survey of Americans who were considering seeking insurance through the ACA marketplace found that many struggled with such basic concepts as premiums, provider networks, and covered services (Kettlewell 2020).

the company. Companies also benefit because workers with employment-based medical insurance are less likely to quit. The costs of hiring and training employees are high, so firms do not want to lose employees unnecessarily. Third, employers' contributions to insurance premiums are excluded from their employees' Social Security taxes, Medicare taxes, federal income taxes, and most state and local income taxes. Earning $5,000 in cash instead of a $5,000 medical insurance benefit could easily increase an employee's tax bill by $2,500.

This system is clearly advantageous from the perspective of insurers, employers, and employees. From the perspective of society as a whole, however, its desirability is less clear. The subsidies built into the tax code tend to force tax rates higher, may encourage the use of insurance for costs such as eyeglasses and routine dental checkups, and give employees an unrealistic sense of how much insurance costs.

3.2.3 Medicare as an Example of Complexity

The health insurance system in the United States is so complex that only specialists understand it. Exhibit 3.2 illustrates the complexity of healthcare financing by examining the flow of funds in traditional Medicare. Many Medicare beneficiaries pay for supplemental policies that cover deductibles, coinsurance, and other expenses that Medicare does not cover. Like many

insurers, Medicare requires beneficiaries to pay a deductible. In 2022, the **Medicare Part A** deductible was $1,556 per year and the **Medicare Part B** deductible was $233. The most common coinsurance payments spring from the 20 percent of allowed fees that Medicare beneficiaries must pay for most Part B services. To keep exhibit 3.2 simple, we focus on supplemental policies that reimburse beneficiaries rather than pay providers directly. Beneficiaries with these sorts of policies (and many without supplemental coverage) must make required out-of-pocket payments directly to providers. Beneficiaries must also pay the Part B premiums that fund 25 percent of this Medicare component. Like other taxpayers, beneficiaries must also pay income taxes that cover the other 75 percent of Part B costs.

Medicare Part A Coverage for inpatient hospital, skilled nursing, hospice, and home health services.

Medicare Part B Coverage for outpatient services and medical equipment.

Employers and employees pay taxes to fund the Medicare system. The most visible of these taxes is the Medicare payroll tax, which is levied on wages to fund Part A (which covers hospital, home health, skilled nursing, and hospice services). In addition, corporation and individual income taxes help fund the 75 percent of Part B costs that premiums do not cover. The Centers for Medicare & Medicaid Services, the federal agency that operates Medicare, combines these tax and premium funds to pay providers. Not surprisingly, few taxpayers, beneficiaries, or public officials understand how Medicare is financed.

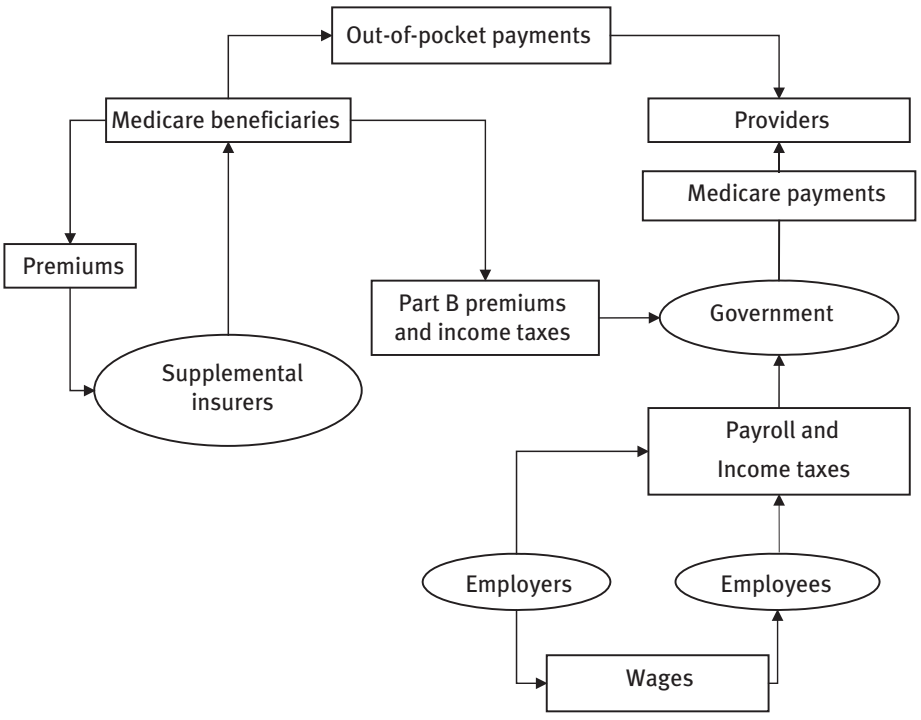


EXHIBIT 3.2 The Flow of Funds in Medicare

3.3 The Changing Nature of Health Insurance

fee-for-service (FFS)
An insurance plan that pays providers on the basis of their charges for services.

managed care
A loosely defined term that includes all plans except open-ended fee-for-service. It is sometimes used to describe the techniques that insurance companies employ.

accountable care organization
A network of providers that have financial incentives to reduce spending and improve outcomes.

global, risk-adjusted budget
Payment of a fixed amount per person to the organization that is responsible for providing care to a population. Risk adjustment means that the amount per person is higher for people with higher risk of expensive illnesses.

community health workers
Local, nonclinical workers who help patients live healthier lives and help providers understand patients' needs.

Traditional, open-ended **fee-for-service (FFS)** plans (of which pre-1984 Medicare was a classic example) have three basic problems. First, they encourage providers and consumers to use covered services as long as the direct cost to consumers is less than the direct benefit. Because the actual cost of care is much greater than the amount that consumers pay, some consumers may use services that are worth less than they actually cost. In addition, open-ended FFS plans discourage consumers from using services that are not covered, even highly effective ones. Finally, much of the system is unplanned, in that the prices paid by consumers and the prices received by providers do not reflect actual provider costs or consumer valuations.

Given the origins of traditional medical insurance, this inattention to efficiency makes sense. Medical insurance was started by providers, largely in response to consumers' inability to afford expensive services and the unwillingness of some consumers to pay their bills once services had been rendered. The goal was to cover the costs of services, not to provide care in the most efficient manner possible or to improve the health of the covered population.

Managed care is a varied collection of insurance plans with only one common denominator: they are different from FFS insurance plans. Traditionally, FFS plans covered all services if they were included in the contract and if a provider, typically a physician, was willing to certify that they were medically necessary. No FFS features tried to influence the decisions of patients or physicians (aside from the effects of subsidizing higher spending).

Case 3.1 Oregon's Coordinated Care Organizations

In 2012, Oregon launched an ambitious redesign of its Medicaid program. It created a statewide network of coordinated care organizations, which are similar in some respects to **accountable care organizations**, but coordinated care organizations have **global, risk-adjusted budgets** set by the state, are responsible for a broad range of services (behavioral, dental, and physical), and are governed by a broad range of local stakeholders. These coordinated care organizations implemented a number of innovations:

- Colocating behavioral health specialists in primary care
- Using **community health workers**

(continued)

Case 3.1 *(continued)*

- Using emergency department navigators to connect patients with primary care
- Emphasizing identification and brief treatment of patients with substance abuse disorders

Was this program successful? Per-member per-month spending for hospital care decreased sharply, while spending on primary care increased. Most of the quality measures with incentives attached improved; most without incentives did not.

Oregon recently launched a new initiative to improve the social determinants of health for Medicaid beneficiaries (Kaye 2021). One of the first priorities was safe housing for recently discharged patients.

Discussion Questions

- Why should a state provide Medicaid to its citizens?
- Who is eligible for Medicaid in Oregon?
- How does this differ from eligibility in your state?
- How is Oregon's Medicaid program different from your health insurance? From Medicare?
- What type of insurance is Oregon Medicaid?
- Why might community health workers improve outcomes and save money?
- Why does Medicare not pay for community health workers?
- How might linking behavioral health and primary care improve outcomes and save money?
- How might connecting patients with primary care improve outcomes and save money?
- Is there evidence that good primary care improves outcomes and saves money?
- How might increasing treatment of substance abusers improve outcomes and save money?
- Is reducing the hospitalization rate a good thing?
- Is reducing the use of emergency departments a good thing?
- Are social determinants important to health status?

At present, insurance takes five basic forms: FFS plans, **PPOs (preferred provider organizations)**, **HMOs (health maintenance organizations)**, **point-of-service (POS) plans**, and **high-deductible** plans. We will briefly describe each of the alternatives to FFS plans.

PPOs are the most common form of managed care organization. All PPOs negotiate discounts with a panel of hospitals, physicians, and other

PPO (preferred provider organization) A plan that contracts with a network of providers. (Network providers may be chosen for a variety of reasons, but a willingness to discount fees is usually required.)

HMO (health maintenance organization) A plan that provides comprehensive benefits to enrollees in exchange for a premium. (Originally, HMOs were distinct from other insurance firms because providers were not paid on a fee-for-service basis and because enrollees faced no cost-sharing requirements.)

point-of-service (POS) plan A plan that allows members to see any physician but increases cost sharing for physicians outside the plan's network. (This arrangement has become so common that POS plans may not be labeled as such.)

high-deductible plan A plan that has a deductible of at least $1,000 and may be combined with a health savings account.

providers, but their similarities end there. Some PPOs have small panels; others have large panels. Some PPOs require that care be approved by a primary care physician; some do not.

group model HMO A plan that contracts with a physician group to provide services.

staff model HMO A plan that employs staff physicians to provide services.

capitation Payment per person. (The payment does not depend on the services provided.)

IPA (independent practice association) HMO A plan that contracts with independent practice associations, which, in turn, contract with physician groups.

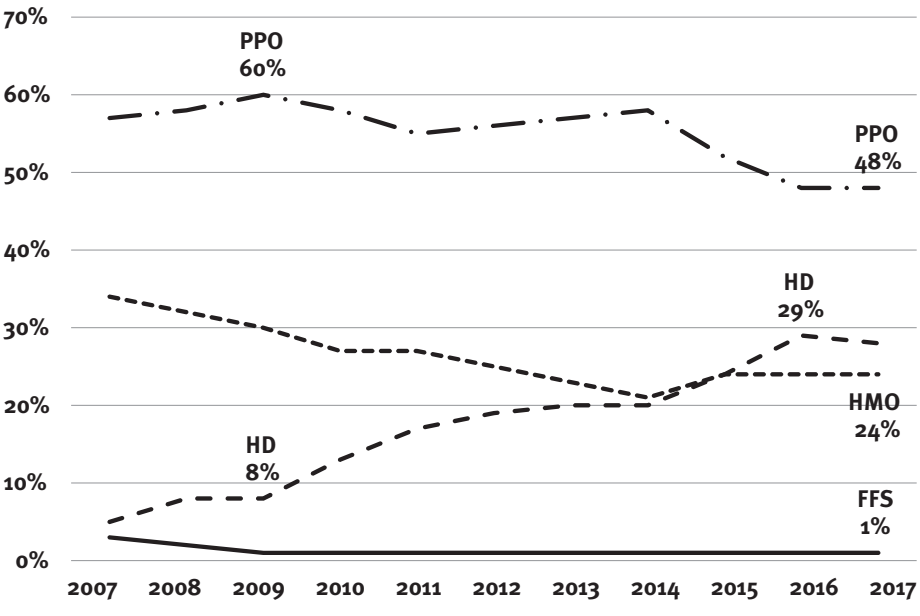
HMOs are more diverse than PPOs. Some HMOs are structured around large medical group practices and are called **group model HMOs**. Group model HMOs typically make a flat payment per consumer enrolled in the group. This practice is called **capitation**. Other HMOs, called **staff model HMOs**, employ physicians directly and pay them salaries. Both staff and group model HMOs still exist, but they are expensive to set up and make sense only for large numbers of enrollees (because small HMOs cannot negotiate favorable prices with hospitals).

The expansion of HMOs has been fueled largely by the growth of **IPA (independent practice association) HMOs**. These plans contract with large groups of physicians, small groups of physicians, and solo practice physicians. These contracts assume many forms. Physicians may be paid per service (as PPOs usually operate) or per enrollee (as group model HMOs usually operate). IPAs also pay hospitals and other providers in varied ways.

POS plans are another form of HMO. These plans are a combination of PPO and IPA plans. Unlike an IPA, they cover nonemergency services provided by non-network providers, but copayments are higher. Unlike a PPO, they pay some providers using methods other than discounted fee-for-service.

Health insurance continues to evolve in a disorderly fashion. Where this development will lead is not clear. The belief that managed care is in retreat is widespread, and exhibit 3.3 seems to confirm this. From 2007 to

EXHIBIT 3.3 Enrollment Patterns in Employer-Sponsored Insurance



Source: Data from Kaiser Family Foundation (2020).

2017, FFS plans all but disappeared, and the market share of PPO plans fell from 57 percent to 48 percent. HMO plans (which include POS plans in exhibit 3.4) fell from 34 percent of the employer-based market to 24 percent. High-deductible plans rose from 5 percent of the market in 2007 to 28 percent.

The pattern in the employer-based market is quite different from that in other sectors. More than 60 percent of Medicare Advantage beneficiaries are in HMOs. Likewise, more than 70 percent of Medicaid beneficiaries are in HMOs, and about half of those buying ACA plans are as well.

Complicating this already complex picture are recent changes in Medicare, Medicaid, ACA marketplace plans, and employment-based plans. These innovations could have widespread effects, although there is only preliminary evidence for most of them. We will explore these changes in detail in chapter 6.

Case 3.2 Geisinger's Transformation

The conflicting incentives of FFS and capitation present significant problems for integrated health systems such as Geisinger Health System of central Pennsylvania. Indeed, after the collapse of its merger with Penn State Health, many were concerned about its viability. Geisinger faced losses in its hospitals and physician group, and its health plan was not doing well either (Goldsmith 2017).

Geisinger's turnaround involved two strategies: increasing the share of physician compensation in the form of FFS payments and implementation of a robust network of patient-centered medical homes to limit **low-value care**. The change in physician compensation allowed the creation of a broader network and rewarded higher volumes. In essence, Geisinger became a **network HMO**.

Geisinger also had two major advantages. Its Medicare Advantage plan was very profitable, and its strong market position allowed it to negotiate very good rates with local insurance plans. Those high rates gave it the resources it needed to transform its primary care practices by turning them into patient-centered medical homes.

In 2021, Geisinger Health Plan and Medacta, a Swiss orthopedics company, announced that they would offer a two-year guarantee for total hip, knee, and shoulder replacement surgeries (Condon 2021).

(continued)

low-value care Care that has been scientifically evaluated and found to be of little or no clinical value or to have potential harms greater than its benefits.

network HMO A plan that offers a variety of contracts with physician groups, IPAs, and individual physicians. A network HMO may also own some of its hospitals and employ some of its physicians.

Case 3.2 *(continued)*

Discussion Questions

- Why would it make sense to become a network model HMO?
- Did it make sense for Geisinger to support the patient-centered medical home transition?
- Could an independent practice afford to become a patient-centered medical home?
- Why is Medicare sponsoring patient-centered medical home demonstrations?
- Why might private insurers support patient-centered medical homes? Do they?
- How would a six percent reduction in hospitalization rates affect hospitals?
- What is an example of low-value care?
- How is the Geisinger health plan faring now?
- How could Geisinger and Medacta offer a guarantee for joint replacement surgery?
- Would such a guarantee affect the decisions of you or a loved one?

3.4 Payment Systems

In the past, most healthcare providers were paid based on volume. Today, insurers are experimenting with alternative payment models. These alternative payment models can alter providers' incentives, which, in turn, can change patterns of care. The power of changing incentives should not be underestimated, and managers need to be wary of getting what they pay for rather than getting what they want. In contracting with insurers or providers, managers need to recognize the strengths and weaknesses of different systems. The four basic payment methods—salary, volume-based, value-based, and capitation—can be modified by the addition of incentive payments, increasing the number of possible payment methods.

salary
Fixed compensation per period.

A **salary** is fixed compensation paid per defined period. As such, it is not directly linked to output. Typically, physicians are paid a salary when their productivity is difficult to measure (e.g., in the case of academic physicians) or when the incentives created by per-service payments are seen as undesirable (e.g., an incentive to overtreat that increases costs). As noted earlier, most physicians in the United States have traditionally been paid on the basis of volume, meaning providing more services increases revenue.

Volume-based payments can take a number of forms. **Per-service payments** entail a payment for each separate service. For example, a physician visit that involves 10 minutes talking to the doctor, an X-ray, and a laboratory test would result in a bill for three services. **Case-based payments** make single payments for all covered services associated with an episode of care. Medicare's **diagnosis-related group (DRG)** system is a case-based system for hospital care, although it does not include physicians' services or posthospital care. In essence, case-based payments are volume-based payments for a bundle of services rather than separate payments for individual services. **Value-based payments** add a quality bonus or penalty to volume-based payments. For example, Medicare reduces DRG payments to hospitals with above-average 30-day readmission rates for pneumonia patients. Finally, capitation is compensation paid per beneficiary enrolled with a physician or an organization. Capitation is similar to a salary but varies according to the number of customers.

volume-based payment Payment that increases as a provider delivers more services.

per-service payment Payment for each billable service. Providing an additional service increases the bill.

case-based payment A single payment for an episode of care. (The payment does not change if fewer services or more services are provided.)

diagnosis-related group (DRG) The basis of Medicare's case-based payment system for hospitals.

value-based payment Payment that adjusts the amount paid based on measures of quality.

Each of the four basic payment methods has advantages and disadvantages. Salaries are straightforward and incorporate no incentives to provide more care than necessary, but they do not encourage efficiency or exemplary service. In addition, salaries give providers incentives to use resources other than their time and effort to meet their customers' needs. In the absence of incentives not to refer patients to other providers, salaried providers may refer substantial numbers of patients to specialists, urgent care clinics, or other sources of care.

Capitation incorporates many of the same incentives as a salary, with two important differences. First, capitated payments drop if customers leave the practice, so physicians have more incentive to serve patients well. Second, capitation creates incentives to undertreat patients. Providing a service increases costs but does not increase revenue. So, profits rise if service levels drop.

Volume-based payment incorporates incentives to be productive and efficient, but may create incentives to over-treat (especially for services with prices that are much higher than production costs). Services that offer limited benefits to patients can be profitable in volume-based payment systems, as long as the benefits exceed the consumer's out-of-pocket cost. On the other hand, incentives to under-treat can emerge if services are unprofitable. Getting prices right is vital in volume-based payment.

Case-based payment combines features of payment per service and capitation. It is a form of volume-based payment, so it rewards being productive and efficient. However, case-based payment may create incentives for physicians to treat patients with highly profitable cases who should not be treated, or it may create incentives not to treat patients who should be treated. As with capitation, there can be incentives to skimp on care. Costs can be reduced by improving efficiency, shifting responsibility for therapy to

"free" sources (such as the health department), avoiding complex patients, and narrowing the definition of a case. The challenge is to keep providers focused on improving efficiency, not on gaming the system.

Any of these four basic methods can be modified by including bonuses and penalties, which is what value-based payment does. A base salary plus a bonus for reducing inpatient days in selected cases is not a straight salary contract. Similarly, a capitation plan with bonuses or penalties for exceeding or not meeting customer service standards (e.g., a bonus for returning more than 75 percent of after-hours calls within 15 minutes) would not generate the same incentives a plain capitation plan would. Most insurers are moving away from volume-based payments toward value-based payments. However, insurers are trying a variety of approaches, as the best way to implement value-based payment is not yet clear.

Capitation was previously expected to become the dominant method of payment. However, experience with capitation suggests that few providers (or insurers, for that matter) have the administrative skills or data that capitation demands. In addition, the financial risks of capitation can be substantial. Few providers have enough capitated patients for variations in average costs to cease being worrisome, and capitated payments are seldom risk adjusted (i.e., increased when spending is expected to be higher than average). These considerations have dampened most providers' enthusiasm for capitation. Insurers have also realized that capitation is not a panacea, recognizing that providers have ways other than becoming more efficient to reduce their costs. Volume-based payments remain the norm, but most major insurers are seeking to switch to value-based payments (which include careful monitoring of quality). What compensation arrangements will look like even ten years from now remains to be seen.

3.5 Conclusion

Health insurance is common because of the risks of unexpected healthcare costs, but the days of traditional, open-ended insurance plans are over. Despite the ubiquity of managed care and much discussion of value-based payment systems, most consumers are enrolled in plans that are minimally managed, such as PPO, POS, or high-deductible plans with volume-based payments. But nearly 80 percent of CEOs who responded to a 2021 survey expected to be implementing value-based care shortly (KPMG 2021). Medicare, Medicaid, and most private insurers have already begun to change the way they pay providers. Changes in payment systems substantially increase the risks that managers must face. The next chapter will introduce strategies for managing these risks.

The central challenge of cost remains. Healthcare spending continues to rise as a share of income, and many families simply cannot afford it (Chalise 2020).

Exercises

3.1 Why is health insurance necessary?

3.2 Explain how adverse selection and moral hazard differ and give an example of each.

3.3 Some consumers are *overinsured*, yet some are clearly *underinsured*. Of course, millions are *uninsured*. What do you think these concepts mean?

3.4 Should health insurance continue to be employment based for most Americans?

3.5 A radiology firm charges $2,000 per exam. Uninsured patients are expected to pay list price. How much do they pay?

3.6 A radiology firm charges $2,000 per exam. An insurer's allowed fee is 80 percent of charges. Its beneficiaries pay 25 percent of the allowed fee. How much does the insurer pay? How much does the beneficiary pay?

3.7 If the radiology firm raised its charge to $3,000, how much would the insurer pay? How much would the beneficiary pay?

3.8 A surgeon charges $2,400 for hernia surgery. He contracts with an insurer that allows a fee of $800. Patients pay 20 percent of the allowed fee. How much does the insurer pay? How much does the patient pay?

3.9 You have incurred a medical bill of $10,000. Your plan has a deductible of $1,000 and coinsurance of 20 percent. How much of this bill will you have to pay directly?

3.10 Why do employers provide health insurance coverage to their employees?

3.11 Your practice offers only a PPO with a large deductible, high coinsurance, and a limited network. You pay $400 per month for single coverage. Some of your employees have been urging you to offer a more generous plan. Who would you expect to choose the more generous plan and pay any extra premium?

3.12 What are the fundamental differences between HMO and PPO plans?

3.13 Suppose that your employer offered you $4,000 in cash instead of health insurance coverage. Health insurance is excluded from

state income taxes and federal income taxes. (To keep the problem simple, we will ignore Social Security and Medicare taxes.) The cash would be subject to state income taxes (8 percent) and federal income taxes (28 percent). How much would your after-tax income go up if you took the cash rather than the insurance?

3.14 How different would this calculation look for a worker who earned $500,000 and lived in Vermont? This worker would face a state income tax rate of 9.5 percent and a federal income tax rate of 35 percent.

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CHAPTER

4

DESCRIBING, EVALUATING, AND MANAGING RISK

Learning Objectives

After reading this chapter, students will be able to

- explain how risk and uncertainty differ,
- describe the key features of a risky choice,
- construct and use a decision tree to frame a choice,
- calculate an expected value and standard deviation, and
- discuss common approaches to managing risk and uncertainty.

Key Concepts

- Clinical and managerial decisions typically entail risk and uncertainty.
- Decision makers often have imprecise estimates of the probabilities of various outcomes.
- Contingency planning is often the only way to manage uncertainty.
- Decision makers must describe, evaluate, and manage risk.
- Insurance, other types of risk sharing, and diversification are ways to manage risk.

4.1 Introduction

Clinical and managerial decisions typically entail risk or uncertainty. Important information is often incomplete or missing when the time to decide arrives. At best, managers know the potential outcomes and the probability that each will occur. At worst, managers have little or no information about outcomes and their probabilities. Either way, managers must identify risks that are worth analyzing, risks that are worth taking, and the best strategies for dealing with them.

Because uncertainty is central to many areas of healthcare, the same techniques (e.g., contingency planning, monitoring uncertain situations aggressively) are recommended for describing and evaluating potential outcomes regarding real investments (e.g., buildings, equipment, training), financial investments (e.g., stocks, bonds, insurance), and clinical decisions (e.g., testing, therapy).

4.2 Risk and Uncertainty

Risk and uncertainty are related, but they differ. Risk can be measured (although imperfectly). Uncertainty cannot be measured. Here are some examples. The National Oceanographic and Atmospheric Administration predicts how many hurricanes will occur each season. This estimate could be presented as a probability, hence as a risk. No one claims to be able to forecast the probability that Tampa, Florida, will be hit by a Category 4 or 5 hurricane. So, Tampa General Hospital must treat this as an uncertainty. Another example is the risk of stroke. According to Yahya and colleagues (2020), the risk of stroke for adults aged 20 to 44 years is 0.03 percent, meaning that the risk is very low. But, will you have a stroke before age 45? Will it be treated quickly and effectively? Will you become disabled as a result? That is an example of uncertainty, as the probabilities of these outcomes cannot be calculated. A final example is the effects of ransomware. Managers must assume their facility will be attacked, but there is considerable uncertainty about what the effects will be. For example, on August 4, 2021, Eskenazi Health of Indianapolis faced a ransomware attack that froze access to electronic medical records and forced ambulances to divert from the city's safety net hospital (Barrett 2021). The attack slowed care and put patients at risk.

4.3 Dealing with Uncertainty

contingency planning
A form of planning that designs a response to a worst-case scenario.

Uncertainties require **contingency planning**. Contingency planning designs a response to a worst-case scenario. For example, Tampa General Hospital strengthened its structure to withstand high winds (so patients need not be evacuated during a hurricane), built a new, elevated emergency department (so it would not need to close due to storm surges), and built in the potential to expand bed capacity in an emergency (Gresham Smith 2021). Eskenazi Health did not really have a contingency plan for computer security, but now it does. It has enhanced surveillance of its computer networks and increased computer security training. Note that contingency planning usually increases costs, which is one reason why some managers avoid it.

Contingency planning is a common part of construction. Volume forecasts are often wrong. Constructing a building that is too small reduces revenue, and expansion usually costs more than building the same capacity at the start. Building too large a facility also increases costs. A common contingency planning approach is to build a bigger building but not equip part of it (thus delaying or avoiding the substantial costs of equipment.)

4.4 Describing Potential Outcomes

Risk management can include contingency planning. It can also involve insurance, other forms of risk sharing, and diversification. First, though, we will examine how to describe risk.

The first step in any decision is to describe what could happen, including the probabilities and value of possible outcomes, and calculate descriptive statistics about the possible outcomes.

Description begins with an assessment of the probabilities of the possible outcomes. Ideally, the assessment should generate an **objective probability**—an estimate based on evidence about the frequencies of different outcomes. For example, if 250 of 1,000 patients reported nausea after taking a medication, a good estimate of the probability of nausea would be 0.25 (250 divided by 1,000). More often, though, description assesses the **subjective probability**—the decision maker's perception of how likely an outcome is to occur.

objective probability
An estimate based on frequencies.

subjective probability
An estimate based on judgment.

In some cases, decision makers have incomplete data. In other cases, the data do not fit the situation. For example, if a careful study of a drug in a population of young men finds that the probability of nausea is 0.25, what value should we use for a sample of women older than 65 years? In still other cases, individuals may feel that population frequencies do not apply to them. Someone who claims to have a cast-iron stomach may believe that their probability of nausea is much less than 0.25. The decision maker with a cast-iron stomach may be correct in thinking that the population frequency does not apply to them, or they may just be overly optimistic.

In practice, decision makers predominantly use subjective probabilities. Unfortunately, these subjective probabilities are often inaccurate, even when the estimates are made by highly trained clinicians or experienced managers. Studies have found that physicians overestimate the probabilities of skull fractures, cancer, pneumonia, and streptococcal infections, and managers are notorious for being overenthusiastic in their forecasts of how well new projects will fare (Segelod 2017).

For a variety of reasons, humans routinely misestimate probabilities, so examining data about population frequencies can significantly improve

decision makers' choices. For example, even if you believe that your hospital is less likely than average to lose money on the primary care practices it has just purchased, knowing that the majority of hospitals lose money tells you that your hospital is still prone to loss. Moreover, in many cases, an honest assessment of the probabilities results in broad generalizations, not a point estimate of probabilities. Managers may be able to say only that they think one scenario is more likely than another. This information is still useful; general impressions can often clarify the situation and help managers make the best decision.

Case 4.1 Managing Risk in Medicare Advantage

Medicare Advantage (private insurance for Medicare beneficiaries) presents major risks for insurers. First, the Centers for Medicare & Medicaid Services (CMS) annually compiles performance data and assigns every plan a rating from one to five stars. These star ratings have two effects: higher-rated plans get higher payments and more customers. Since star ratings depend on the customer and clinical service offered by providers who are usually independent contractors, profitability depends on factors that insurers control imperfectly.

Second, profitability in Medicare Advantage depends on Medicare spending levels, and no one can really forecast how payment innovations will change Medicare spending. For example, Medicare's bundled payment for joint replacement reduced costs by 20 percent in some markets (Navathe et al. 2017). Changes that large could matter. Third, no one knows what will happen to Medicare Advantage enrollment if Medicare's benefits or payment systems change. Most insurers have profited from Medicare Advantage, benefiting from the enrollment of younger retirees, more efficient use of care, and more favorable contracts with providers. But there are conspicuous examples of insurers that have posted large losses, such as Catholic Health Initiatives or Clover Health (Barkholz 2017).

Risk is intrinsic to the health insurance business. Insurers take on risk by selling coverage for consumers' variable medical expenditures. When you average risk over the spending patterns of tens of thousands of consumers, however, the risk becomes less uncertain—in most cases. But in Medicare Advantage the insured populations are

(continued)

Case 4.1 *(continued)*

often quite small and costs may be driven by a handful of beneficiaries.

But the main perils do not come from the operational issues mentioned previously. The real risks spring from strategic decisions that could go wrong if an insurer misjudges the market.

Discussion Questions

- What has happened to Medicare Advantage enrollment during the past year?
- Have any insurers pulled out of Medicare Advantage during the past year?
- Have any Medicare Advantage plans lost money during the past year?
- Is Medicare Advantage riskier than other forms of private health insurance?
- What other healthcare firms also face to risks due to changes in government policy?
- What are the advantages of having private insurers manage Medicare? Disadvantages?

4.5 Evaluating Outcomes

The next step is to evaluate possible outcomes. This chapter focuses on financial outcomes, typically profits. While financial outcomes are easier to forecast than many other outcomes, they are difficult to predict. Skilled analysts commonly arrive at different answers when asked to forecast costs and revenues for well-established products, and predictions are much less accurate for new products. A famous quote, apparently of Danish origin, holds that "Prediction is very difficult, especially if it's about the future."

The problems mount when no simple measurement system, such as profits, exists. How valuable is a new surgical procedure that reduces the chance of abdominal scarring from 0.12 to 0.08 but reduces the chance that the operation will succeed from 0.68 to 0.66? Any time a scenario involves opposing probabilities, evaluation becomes a challenge. Even though scholars have made progress in evaluating complex outcomes, considerable uncertainty remains. Chapter 14 will tackle this problem in more detail.

4.5.1 Expected Values

expected value The sum of the value of each possible outcome weighted by its probability.

Calculating descriptive statistics is the final step in the process of evaluating outcomes. The most common statistic (although not always the most useful one) is the **expected value**. To calculate an expected value, multiply the value of each outcome by its probability of occurrence and then add the resulting products. For example, suppose that you pay $1 if you flip a coin and it lands heads and get paid $2 if it lands tails. Since the chance of landing heads is 0.5, the expected value is $0.5 = (0.5 \times \$2) - (0.5 \times \$1)$. Note that you will never actually get 50 cents, even though that's the expected value.

return on investment Annual profit divided by the initial investment.

Management applications of this calculation are only a little more complicated. For example, suppose that your organization is contemplating buying a skilled nursing facility that currently has profits of $20,000. The price of the nursing home is $1 million, meaning that the **return on investment** would be only 2 percent, which is too low from your organization's point of view. One of your managers, however, has identified several operational improvements that are forecast to boost profits to $120,000. Although this manager's improvements are reasonable, a consultant points out that, in their experience, ambitious proposals to increase profits fail about 40 percent of the time. So, the consultant estimates that the expected profit is $\$80,000 = (0.6 \times \$120,000) + (0.4 \times \$20,000)$.

This level of precision (e.g., "about 40 percent of the time") is representative of the reliability of managerial forecasts—they are inexact at best. Despite imprecise forecasts, managers must make a choice. In many cases, calculating the expected profit and then conducting **sensitivity** and **scenario analyses** will help managers avoid bad decisions.

sensitivity analysis Varying the assumptions of an analysis to see how outcomes change.

scenario analysis Evaluating outcomes under different assumptions.

An expected value equals $P_1X_1 + P_2X_2 + \ldots + P_nX_n$, where P_i represents the probability that an outcome will occur and X_i represents the value of that outcome. An expected value differs from an average because the probabilities of some outcomes will be higher than the probabilities of others, so they get more weight. For example, the average of $120,000 and $20,000—the two estimates from our example above—is $70,000. But the expected value is $80,000 because the probability of earning $120,000 is larger than the probability of earning $20,000.

Does buying the skilled nursing home make sense? It might. The expected return on investment is 8 percent. Given that the worst-case scenario is a 2 percent return on investment, this gamble would seem reasonable to many firms, depending on the alternative investments it is considering.

Good decisions usually require more information than just an expected value because typically the expected value is not the outcome that occurs. Most decision makers value a list of the best and worst outcomes. A list of the most likely outcomes can also be useful. Graphs, too, can help decision makers understand their choices. Many people find a well-designed

graph more valuable than a calculation. Finally, remember that estimates are estimates; writing them down does not make them more reliable. The less mathematically sophisticated your target audience is, the more you need to emphasize that forecasts are imprecise.

This simple example can be illustrated with a **decision tree**, which is a way of presenting information about a choice. A decision tree visually links a decision maker's choices with the outcomes that are likely to result. It is called a tree because the possible outcomes branch from a choice. For analysts, much of the value lies in the process of constructing the decision tree because it highlights their perception of what will happen and where the information is weakest. In addition, many people find that examining a decision tree helps them understand the issues involved because it lays out their best estimates of the cost or payoff and the probability associated with each possible outcome. As you can see in exhibit 4.1, the worst-case forecast is a profit of $20,000, which is less than ideal but not a catastrophe. Similarly, the best-case forecast is a profit of $120,000, which is good but not superb. As is usually the case, laying out the decision tree helps clarify the situation by making the probability and profit estimates explicit. It does not tell managers what decision to make. Alternatives have not yet been laid out, so a sensible decision cannot be made.

decision tree
A chart that depicts the values and probabilities of the outcomes of a choice.

Calculating the expected values of alternatives is sometimes called *rolling back* a decision tree. Rolling back a decision tree means calculating its expected value. In exhibit 4.1, the expected profit is $68,000.

Examples as simple as this do not really require decision trees, but slightly more complex examples may require one (see exhibit 4.2). Suppose there is one chance in four that the state will reduce nursing home payments. With lower payments, profits will be $100,000 if the improvements succeed

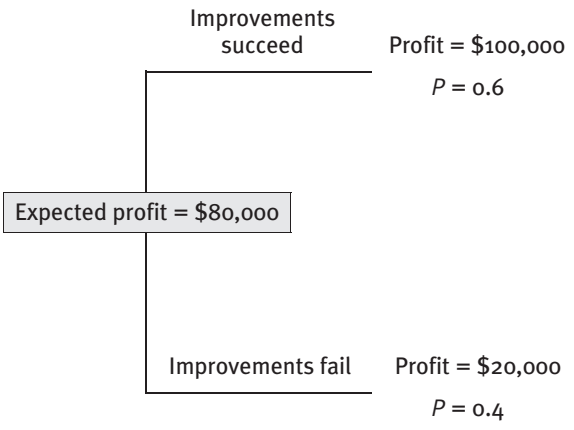
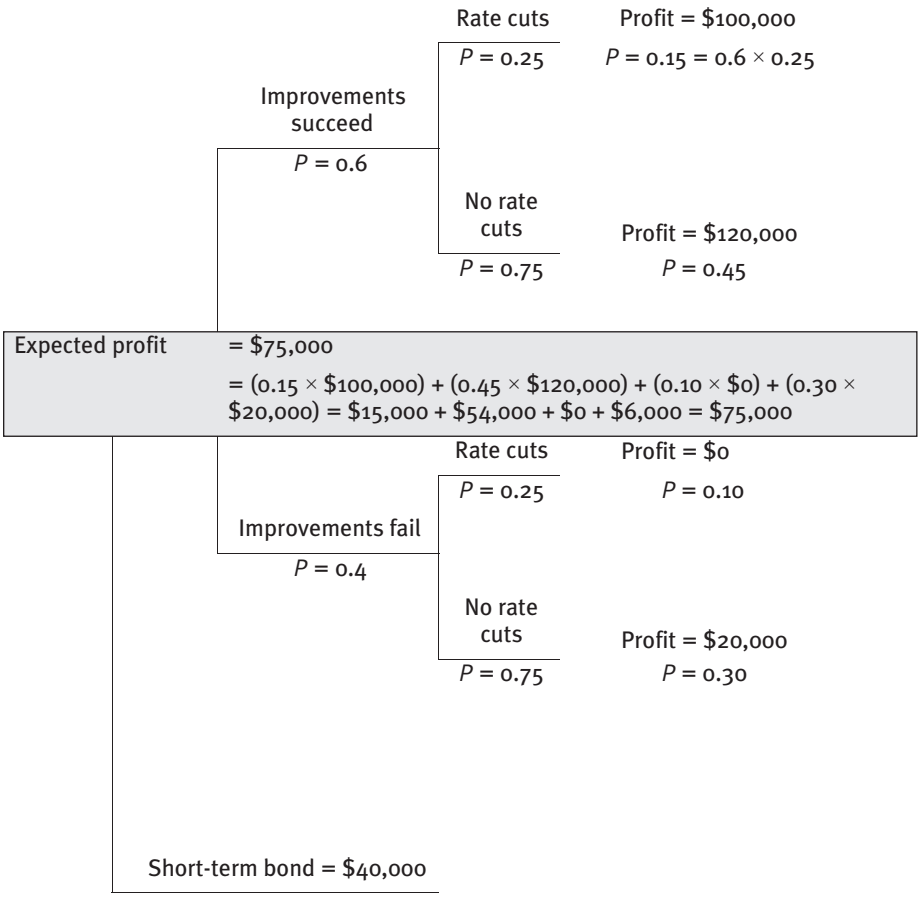


EXHIBIT 4.1
A Nursing Home Decision Tree

EXHIBIT 4.2
A Nursing Home Decision Tree with the Possibility of Rate Cuts



range
The difference between the largest and smallest values.

standard deviation
The square root of a variance.

variance
The squared deviation of a random variable from its expected value. (If a variable takes the value 3 with a probability of 0.2, the value 6 with a probability of 0.3, and the value 9 with a probability of 0.5, its expected value is 6.9. Its variance is 5.49, which is $0.2 \times [3 - 6.9]^2 + 0.3 \times [6 - 6.9]^2 + 0.5 \times [9 - 6.9]^2$.)

or $0 if they fail, so expected profits fall to $75,000. The updated decision tree also displays the profit available from an alternative investment—in this case, a short-term bond that returns $40,000. Most profit-oriented decision makers would prefer to invest in the nursing home because its expected profit is higher and the risks are modest.

To make sure that you understand exhibit 4.2, answer the following questions: Why does the probability that the improvements fail and rates are cut equal 0.10? Why is expected profit less in exhibit 4.2 than in exhibit 4.1?

4.5.2 Outcome Variation

Managers can use estimates of variability to make comparisons. Variability is typically measured by listing the **range** of possible values or by listing the **standard deviation** (which is the square root of the **variance**). If you are not comparing outcomes, the standard deviation is not helpful. In contrast, the range can convey useful information even if you are not

comparing outcomes. The range helps you see the best- and worst-case scenarios. To know whether a risk is worth taking, you need to know the size of the risk and the potential payoff. Few people will want to take a risk if the best possible payoff is small or if the worst payoff is disastrous. On the other hand, if the best payoff is large, some people will be willing to accept significant risks.

To calculate variance, multiply the squared difference between the value of each outcome and the expected value by its probability of occurrence and then add the resulting products. (Find the appropriate probability of occurrence by multiplying the probability on the "branch" of the outcome by the probability on the preceding branch.) So, in our example, the variance equals $0.15 \times (\$100{,}000 - \$75{,}000)^2 + 0.45 \times (\$120{,}000 - \$75{,}000)^2 + 0.10 \times (\$0 - \$75{,}000)^2 + 0.3 \times (\$20{,}000 - \$75{,}000)^2$, or $2,475,000,000. The standard deviation is the square root of $2,475,000,000, which is $49,749.

A standard deviation or variance has meaning only when you are comparing options. If two choices have similar expected values, the one with the higher standard deviation carries a higher risk because a larger standard deviation means that the bad outcomes are either more likely or much worse. For example, a project that has an 85 percent chance of earning $0 and a 15 percent chance of earning $500,000 has an expected profit of $75,000. The standard deviation for this project is $178,536, confirming its higher risk.

Remember, though, the point of these calculations is to improve your analysis. The analysis should include an understanding of the size of the risk, how likely it is to occur, and whether it is worth taking. If your target audience, which might include members of the board or nonfinancial managers, is puzzled by your analysis and does not really understand the issues, you have failed to present it effectively. Your audience will not be able to offer useful feedback, and the decision to take or not take the risk will be all yours. Managers *could* be terminated for taking risks that the board and other managers understood and approved. Managers *will* be terminated for taking risks that the board and other managers did not understand.

4.5.3 Risk Preferences

Risk preferences may influence choices. A **risk seeker** prefers more variability. Someone who gambles in a casino must be **risk seeking** because the expected payoff from a dollar bet will always be less than a dollar because of taxes and the casino's take. Likewise, a patient who can expect to live 18 months if they undergo standard therapy may be a risk seeker. The patient may prefer a therapy that offers an expected life span of only 13 months if it increases the chances of significant recovery. The manager of a nearly bankrupt business is likely also a risk seeker. Taking chances, even ones with low expected payoffs, may be the only way to survive.

risk seeker
A person who prefers more risk to less. (A risk seeker would prefer a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10 to getting $5 for sure.)

risk seeking
Willingness to accept a lower payoff in order to increase risk.

risk neutral
Not caring about risk. (A risk-neutral person would think that getting $5 for sure is as good as a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10.)

risk averse
Preferring a smaller, less risky payoff to a larger payoff with more variability. (A risk-averse person would choose getting $5 for sure to a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10.)

risk aversion
Willingness to accept a lower payoff to reduce risk.

A **risk-neutral** person does not care about variability and will always choose the outcome with the highest expected value. Large organizations with substantial reserves can afford to be risk neutral. For example, a firm with $400 million in cash reserves will probably not buy fire insurance for a $200,000 clinic. If the expected loss is $4,000 per year (a 2 percent chance of a $200,000 loss), the organization's fire insurance will cost at least $4,400 because of processing costs and insurer profits. On average, the firm will have higher profits if it does not insure this risk, and it can afford not to. Spending $200,000 for a new clinic will not put much of a dent in the organization's reserves.

A **risk-averse** person avoids variability and will sometimes choose strategies with smaller expected values to avoid risk. An individual who buys health insurance is likely to demonstrate **risk aversion** because the expected value of their covered expenses will usually be less than the premium. Insurance premiums must cover the insurer's expected payout, its cost of operation, and some return on invested capital. Unless a beneficiary's expected benefits (the insurer's expected payouts) have been incorrectly estimated, the insurer's costs and profits will push insurance premiums above expected losses. By definition, someone who will pay an insurance premium is risk averse.

4.5.4 Decision Analysis

Decision analysis has three steps, and only one of them is difficult. The steps are setting up a decision tree, identifying the alternative with the largest expected value, and using sensitivity analysis to assess the robustness of the analysis. Setting up a decision tree is the hardest and most important part of decision analysis. Managers gain the most insights, but also make the most mistakes, in this step. Setting up a decision tree requires six actions:

1. Carefully defining the problem. Often, this task is harder than it sounds.
2. Finding alternative courses of action. Serious mistakes are often made here.
3. Identifying the outcomes associated with each alternative.
4. Identifying the sequence that leads to final outcomes, including choice and chance events.
5. Calculating the probability of each outcome.
6. Calculating the value of each outcome.

Each of these activities is more difficult than it sounds, so deciding whether to do a decision analysis at all should be the first step.

4.5.5 Sensitivity Analysis

Any time setting up and solving a decision tree is worthwhile, performing a sensitivity analysis is equally worthwhile. A sensitivity analysis substitutes different, but plausible, values for the values in a decision tree. Gauging the effects of minor data changes on the results is always helpful. The data are never perfect, and using them as if they were does not make sense.

The decision tree for the nursing home purchase tells us that the key issue is whether the manager can realize the operational improvements and product line changes under consideration. If so, the return on equity will be no less than 8.3 percent, no matter what Medicare does. A sensitivity analysis tells us that if the manager can realize about 70 percent of the projected gains, the return on equity will be 7 percent, no matter what Medicare does. What could the manager do to increase the odds of full improvement? The sensitivity analysis indicates that we can fall somewhat short of the manager's prediction and still hit the target rate of return.

4.5.6 Scenario Analysis

Just focusing on the expected value of a risky choice is not a very satisfactory way to make a decision. The expected value may not be a possible outcome, and the best possible and worst possible outcomes matter. One solution is to model several scenarios. Typically these include a worst-case scenario, a most likely scenario, and a best-case scenario. The process of setting up a decision tree helps identify these scenarios.

In exhibit 4.2, the worst case, which is relatively unlikely, yields a profit of zero. The best case, which is the most likely scenario, yields a profit of $120,000. Thus, buying the nursing home has the potential to be profitable and appears to be low risk. The scenario analysis reinforces the conclusion that succeeding in making improvements is vital.

4.6 Managing Risk

Contingency planning, insurance, other forms of risk sharing, and diversification are strategies for managing risk. Buying an insurance policy is the obvious way to share risk, although joint ventures or options can serve the same function. For insurance, consumers pay a fee to induce another organization to share risks; joint ventures or options share costs and profits with partners.

Diversification can take a number of forms. Horizontal integration (creating an organization that can offer the full spectrum of healthcare services) is one diversification strategy because some products are likely to be profitable no matter what the environment. All of these strategies limit potential losses, but they also limit potential profitability.

4.6.1 Contingency Planning

A contingency plan is a strategy for dealing with a potentially disruptive situation. For example, what is your organization's plan for dealing with a tornado, a flood, or a cyberattack? The process is simple. First, do a thorough risk assessment. Second, develop a plan to mitigate the risk. Third, keep the plan up to date.

4.6.2 Insurance

Most firms buy insurance. Malpractice insurance may seem the most obvious, but coverage for losses due to fire, staff injuries, business interruption, and other problems is common. From a firm's perspective, these are uncertain events. From an insurer's perspective, these are risks to be underwritten.

4.6.3 Risk Sharing

Joint ventures and options are common risk-sharing methods in the biotechnology and pharmaceutical fields. For example, CRISPR Therapeutics has launched a number of joint ventures to develop new drugs using CRISPR, a technique that edits DNA and mRNA very precisely (CRISPR Therapeutics 2021). Its partners include Bayer, CureVac, Vertex, and other firms. An example of a provider joint venture is the partnership of VCU (Virginia Commonwealth University) Health and BAYADA Home Health Care. The new company will provide home-based and hospice care (Vidya 2021). BAYADA will manage the day-to-day operations of the company, while VCU Health will offer its expertise on overall quality and safety.

Biotechnology entails significant risk. Few interventions that pass toxicity tests get approved for public marketing, so reducing the costs of research and development represents another motive for joint ventures (ideally with a low-cost partner). For example, Amgen reports that it has multiple joint ventures, partnerships, collaborators, and acquisitions (Amgen 2021). Its partners include investment firms (e.g., venBio), multinational pharmaceutical firms (e.g., Novartis or Dr. Reddy's Laboratories), small biotechnology companies (e.g., Xencor), equipment manufacturers (e.g., Illumina), and academic partners (e.g., University of California, Los Angeles). Such partnerships allow Amgen to diversify its portfolio of potential products and reduce its fixed costs. Both strategies reduce risk.

In a very different type of joint venture, two physicians and Eastern Long Island Hospital agreed to construct a jointly owned ambulatory surgery center (Dyrda 2017). The motives for each side were straightforward: physicians hoped to negotiate higher rates because of the hospital's ownership, and the hospital hoped to have a low-cost site for routine surgeries (which are increasingly valuable as value-based payments become more common).

Boston Children's Hospital and Google are producing software to identify areas with low rates of COVID-19 vaccination (Bartlett 2021). This example illustrates another facet of risk sharing. Often, the cost that an organization seeks to share is the enormous cost of acquiring a key competency. Working with a knowledgeable partner allows the organization to gain experience. A lot of time and money is needed to build expertise, and joint ventures can reduce the risk of expending these resources needlessly. Of course, the organization must also assess what the gains are for the partner, such as expertise and profits.

4.6.4 Diversification

Diversification creates a portfolio of projects or therapies that are not highly positively correlated. Exhibit 4.3 compares investing in a clinic, investing in an emergency department, and investing in a portfolio of 50 percent shares of each. Forecasts of return on investment for the projects depend on whether the growth of the accountable care organization (ACO) is rapid, moderate, or slow. The clinic is a better investment than the trauma unit (higher expected profits and lower standard deviation of profits). The portfolio is also a better investment than the trauma unit (higher expected profits and lower standard deviation of profits). The portfolio might be a better investment than the clinic for a risk-averse investor (lower expected profits but a lower standard deviation of profits).

Joint ventures can make diversification less risky, as case 4.2 illustrates. But acquisitions and mergers typically increase risk.

EXHIBIT 4.3 Diversification and Risk Reduction

	ACO Growth				
	Rapid	**Moderate**	**Slow**		
Growth probabilities	0.160	0.700	0.140		
Profits				**Expected**[a]	**Standard Deviation**
Clinic	10.0%	4.0%	–1.0%	4.3%	3.0%
Emergency department	–3.0%	2.0%	13.0%	2.7%	4.5%
Portfolio[b]	3.5%	3.0%	6.0%	3.5%	1.0%

[a] Expected profits = $(P_{Rapid} \times Profit_{Rapid}) + (P_{Moderate} \times Profit_{Moderate}) + (P_{Slow} \times Profit_{Slow})$.

[b] Portfolio profits = 50 percent of the clinic and the emergency department profits.

Case 4.2 Diversification by Joint Venture and Acquisition

The University of Pittsburgh Medical Center (UPMC) has international operations in multiple countries (Rau 2021). It operates cancer centers and a full-service hospital in Ireland; transplantation, radiotherapy, and biotechnology centers in Italy; information technology and cancer centers in the United Kingdom; cancer center consulting in Kazakhstan; and transplantation and pathology consulting in China. Most of these operations represent joint ventures with local partners.

UPMC is headquartered in Pittsburgh, where it has a commanding presence. The largest nongovernmental employer in Pennsylvania, with more than 90,000 employees and nearly $23 billion in revenue, UPMC owns more than 30 hospitals, 600 outpatient sites, a large insurance plan, and several other healthcare ventures (UPMC 2021).

Moody's Investors Services (2017) greeted UPMC's most recent diversification with a debt downgrade. Rather than a joint venture, this was an acquisition. In the summer of 2017, UPMC bought Pinnacle Health System, a seven-hospital system based in Harrisburg, Pennsylvania. This meant that UPMC had acquired, built, or otherwise gained access to nine hospitals in 2017, allowing it to sell its health insurance products outside its core western Pennsylvania market. Moody's noted that the purchases added integration and execution risk; enabled entry into a competitive and rapidly consolidating market; put pressure on profit margins; and increased the ratio of debt to equity.

Discussion Questions

- Why is expansion outside the United States an attractive form of diversification?
- What are the potential pitfalls of international expansion?
- What are the potential pitfalls of other diversification efforts?
- Why do small profit margins and a high ratio of debt to equity increase risk?
- What are the main risks that UPMC faces in its Pittsburgh operations?
- Why is buying additional hospitals in Pennsylvania risky?
- Should a tax-exempt organization engage in activities solely for profit?
- How would "Medicare for all" affect UPMC?

4.7 Conclusion

The goal of describing, evaluating, and managing risk is to improve choices, not to identify perfect choices. No one can make perfect choices. Even when managers have good evidence and make good decisions, bad outcomes can result. More often, though, medical and managerial decisions are made with inadequate information. For example, managers often must make investment decisions long before they know how well technology will work, what volumes will be, and what rivals will do. Even when managers have access to good information (which will never be the case with innovative choices), the possible consequences of their choices remain uncertain.

Good management, however, can reduce risk and reduce the consequences of risk. Managers will mitigate some risks using contingency planning. Managers will avoid some risks because of inadequate payoffs. Managers will share some risks via joint ventures or insurance. Managers will hedge some risks via diversification. A balanced portfolio of projects and lines of business can be profitable in any market environment. Reducing cost variations or reducing fixed costs can cut risk sharply. Finally, there is nothing like a high margin to reduce risk. If possible outcomes are a 15 percent return on equity or an 11 percent return on equity, most managers will sleep well.

Exercises

4.1 What are other examples of contingency planning in healthcare?

4.2 Your firm expects profits of \$0 (a 40 percent chance), \$1,000,000 (a 45 percent chance), or \$1,000 (a 15 percent chance). What is the range? What are expected profits? What is the variance of the payoff?

The range is \$1,000,000 – \$1,000 = \$999,000. Expected profits equal \$450,150 = (0.40 × \$0) + (0.45 × \$1,000,000) + (0.15 × \$1,000). The variance is 247,365,127,500 = [0.40 × (0 – 450,150)^2] + [0.45 × (1,000,000 – 450,150)^2] + [0.15 × (1,000 – 450,150)^2]. Without a basis for comparison, the variance conveys no information.

4.3 Five of ten people earn \$0, four earn \$100, and one loses \$100. What is the range? What is the expected payoff? What is the variance of the payoff?

4.4 There is a 50 percent chance of making $0, a 40 percent chance of making $100, and a 10 percent chance of losing $100. Calculate the expected value and variance of the payoff. How does your estimate compare to the previous problem?

In this case, your expected spending is $3,200, which is equal to (0.01 × $100,000) + (0.19 × $10,000) + (0.60 × $500) + (0.20 × $0).

4.5 There is a 1 percent chance that you will have healthcare bills of $100,000, a 19 percent chance that you will have healthcare bills of $10,000, a 60 percent chance that you will have healthcare bills of $500, and a 20 percent chance that you will have healthcare bills of $0. What is your expected spending?

4.6 There is a 2 percent chance that you will have healthcare bills of $100,000, a 20 percent chance that you will have healthcare bills of $10,000, a 60 percent chance that you will have healthcare bills of $500, and an 18 percent chance that you will have healthcare bills of $0. What is your expected healthcare spending? How does this number compare with the answer in exercise 4.5?

4.7 There is a 1 percent chance that you will have healthcare bills of $100,000, a 19 percent chance that you will have healthcare bills of $10,000, a 60 percent chance that you will have healthcare bills of $500, and a 20 percent chance that you will have healthcare bills of $0. What is your expected spending? Would you be willing to buy complete insurance coverage if it cost $3,712? Explain.

4.8 Instead of complete insurance, as in exercise 4.4, you have a policy with a $5,000 deductible. What is your expected out-of-pocket spending? What are your expected insurance benefits? Assuming that the premium equals 116 percent of expected insurance benefits, do you prefer the policy with a $5,000 deductible or complete coverage? Explain.

4.9 Your firm, which operates a nationwide system of cancer clinics, has annual profits of $800 million and cash reserves of $500 million. Your clinics have a replacement value of $200 million, and fire insurance for them would cost $5 million per year. Actuarial data show that your expected losses due to fire are $4 million. Should you buy insurance?

4.10 Your firm rents a supply management system to hospitals. You have received a buyout offer of $5 million. You forecast a 25 percent

chance that you will have profits of $10 million, a 35 percent chance that you will have profits of $6 million, and a 40 percent chance that you will have profits of $2 million. Should you accept the offer? Explain.

4.11 You were given a lottery ticket. The drawing will be held in five minutes. You have a 0.1 percent chance of winning $10,000. You refuse an offer of $11 for your ticket. Are you risk averse? Explain.

4.12 Your house is worth $200,000. Your risk of a catastrophic flood is 0.5 percent. Such a flood would destroy your house and would not be covered by homeowner's insurance. Although you grumble, you buy flood coverage for $1,200. Are you risk averse or risk seeking?

4.13 Your firm faces considerable revenue uncertainty because you must negotiate contracts with several customers. You forecast a 20 percent chance that your revenues will be $200,000, a 30 percent chance that your revenues will be $300,000, and a 50 percent chance that your revenues will be $500,000. Your costs are also uncertain because the prices of your supplies fluctuate considerably. You forecast a 40 percent chance that your costs will be $400,000 and a 60 percent chance that your costs will be $250,000. Use Excel to set up a decision tree for your profit forecast (it does not matter whether costs or revenues come first). How many possible profit outcomes do you have? What is your expected profit?

4.14 Your firm has been sued for $3 million by a supplier for breach of contract. Your lawyers believe that there are three possible outcomes if the suit goes to trial. One, which the lawyers term highly improbable, is that your supplier will win the lawsuit and be awarded $3 million. Another, which the lawyers term unlikely, is that your supplier will win the lawsuit and be awarded $500,000. The third, which the lawyers term likely, is that your supplier will lose the lawsuit and be awarded $0. You have to decide whether to try to settle the case. To do so you need to assign probabilities to "highly improbable," "unlikely," and "likely." What probabilities correspond to these statements? Going to trial will cost you $100,000 in legal fees. One of your lawyers believes that your supplier will settle for $100,000 (and you will have legal fees of $25,000). Should you settle?

4.15 Why does reducing cost variation reduce risk? Why does reducing fixed cost reduce risk?

4.16 In a week, a clinic sees the following number of flu cases per day: 1, 2, 2, 4, 6. What is the average for this sample? What is the standard deviation for this sample?

Cases	D	D^2	
1	−2	4	D = the number of cases minus the average.
2	−1	1	D^2 = D squared (D × D)
2	−1	1	
4	1	1	
6	3	9	
3	= the average = average(A2:A6), an Excel function		
	4		= the sum of D^2 divided by 4 = $n - 1$
	2		= the square root of 4 = sample standard deviation
2	= stdev.s(A2:A6).		
	Here stdev.s is Excel's sample standard deviation function.		

A resource for reviewing how to calculate a sample standard can be found at www.thoughtco.com/calculate-a-sample-standard-deviation-3126345.

4.17 The following data describe the costs for two pediatric clinics with the same revenue. Calculate the average and sample standard deviation of weekly costs. Which clinic is riskier?

Week	Clinic 1	Clinic 2
1	$21,616	$23,041
2	$21,462	$19,382
3	$20,812	$22,156
4	$19,308	$15,757
5	$20,544	$21,145
6	$19,712	$17,867
7	$18,682	$17,767
8	$19,994	$16,514
9	$19,359	$18,553
10	$19,334	$20,330
11	$20,034	$20,166
12	$20,283	$20,131

(continued)

Week	Clinic 1	Clinic 2
13	$19,435	$16,275
14	$21,746	$16,200
15	$18,419	$15,171
16	$19,359	$24,460
17	$19,140	$21,365
18	$18,721	$22,551
19	$18,036	$21,534
20	$19,392	$24,215
21	$21,155	$20,933
22	$21,005	$23,774
23	$21,419	$22,121
24	$19,131	$20,901
25	$20,162	$22,200
26	$21,607	$15,182
27	$21,030	$24,725
28	$19,426	$16,239
29	$21,785	$20,137
30	$18,258	$22,673
31	$18,644	$15,545

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CHAPTER

5

UNDERSTANDING COSTS

Learning Objectives

After reading this chapter, students will be able to

- calculate average and marginal costs,
- articulate why increasing efficiency is important,
- identify opportunity costs, and
- forecast how changes in technology and prices will change costs.

Key Concepts

- Costs can be hard to measure and depend on perspective.
- Incremental cost equals the change in cost resulting from a change in output.
- Average cost equals the total cost of a process divided by the total output of a process.
- Large firms have a cost advantage if there are economies of scale.
- Multiproduct firms have a cost advantage if there are economies of scope.
- Costs depend on outputs, technology, input prices, and efficiency.
- Opportunity cost is the value of a resource in its best alternative use.
- Sunk costs, which are costs you cannot change, should be ignored.

5.1 Understanding Costs

Understanding and managing costs are core managerial tasks. Whatever the mission of the organization, cost control must be a priority. An organization with costs that are too high, given the quality of its product, will be hard-pressed to succeed.

An **efficient** producer of a good or service has a **competitive advantage**. For example, a pharmacy that can accurately dispense a product more cheaply than its competitors has an advantage. The efficient producer can win more contracts, enjoy higher profit margins, and more easily weather

efficient
Producing the most valuable output possible, given the inputs used. (Viewed differently, an efficient organization uses the least expensive inputs possible, given the quantity and quality of output it produces.)

competitive advantage
The ability to outperform rivals (e.g., profitably offering products at lower cost, at the same cost and higher quality, or offering products that customers are willing to pay more for.)

a slump. In healthcare, the bar has been raised as increased attention to the outcomes of care challenges us to think about health, not just medical care. Healthcare organizations are being challenged to work with customers to produce health efficiently, not just to produce goods and services efficiently.

The pressure to become more efficient has grown. As chapter 6 details, public and private insurers have taken steps to steer patients toward providers with lower costs. If your organization is a high-cost producer, there may not be much time to become more efficient.

This chapter focuses on what is necessary to turn an organization into an efficient producer. The starting point is to understand costs, which have two components. First, the goods or services that an organization uses to produce its outputs are called inputs. Second, opportunity cost equals the value of an input in its best alternative use. From this production-oriented perspective, costs equal the opportunity cost per unit of input multiplied by the volume of inputs. Reducing the cost per unit that the organization pays for inputs reduces total costs, but real savings result from reducing the volume of inputs the organization uses. To reduce input volume, managers must improve efficiency or outsource the production of goods and services.

5.2 Cost Perspectives

Costs are complex because they may be difficult to measure and depend on the perspective of the beholder. For example, consumers will characterize the cost of a prescription in terms of their out-of-pocket spending and ancillary costs, such as the value of time spent filling a prescription. Pharmacists will focus on the spending required to obtain, store, and dispense the drug. Insurers will focus on their payments to the pharmacist for the prescription and their spending on claim management. Each of these perspectives on costs is valid. Exhibit 5.1 illustrates what costs look like from three perspectives.

EXHIBIT 5.1 Prescription Costs Without Insurance from Three Perspectives

	Pharmacy	Consumer	Society
Wholesale price	$10	$0	$10
Travel	$0	$4	$4
Processing	$5	$0	$5
Capital	$1	$0	$1
Retail price	($16)	$16	$0
Total	$0	$20	$20

In exhibit 5.1, a pharmacist acquires a drug for $10 and incurs $5 in processing, storing, and billing costs. The pharmacist should recognize that reasonable returns on their time and investment in the pharmacy represent opportunity costs because both could be used in other ways. The consumer is uninterested in the pharmacist's costs. What matters are their out-of-pocket costs and the $4 in travel expense incurred driving to the pharmacy. When the consumer does not have insurance, as shown in exhibit 5.1, their perspective mirrors society's perspective. Both will say that the drug costs $20, although the two calculations are different. The consumer will focus on the price paid and the travel costs. Society will ignore the price the consumer pays and focus on the underlying resource use by the pharmacist and the consumer. The payment is an accounting entry, not a real use of resources (because it equals the amount the pharmacist receives).

Exhibit 5.1 illustrates two important concepts. First, what one party views as a cost, the other views as revenue. So, reducing costs sounds wonderful from the perspective of the buyer, but not from the perspective of the seller. Second, it is often convenient to use the price of a product as a proxy for the cost of producing it.

Exhibit 5.2 lists the cost perspectives when the prescription is covered by insurance. Although the cost looks the same from the pharmacist's perspective, three things change as a result of coverage. First, the additional perspective of the insurer must be considered. Second, the insurer incurs expense by processing the claim. Third, the consumer's perspective on costs now differs from society's.

The insurer focuses on its share of the retail price and its cost of paying the bill. Again, the insurer should factor in the opportunity cost of using its investment to provide pharmacy insurance benefits, but it will probably express this figure in terms of a required return on investment. From the perspective of the insurer, covering the prescription adds $21 in costs. From the perspective of the consumer, insurance coverage reduces costs by $11.

	Pharmacy	Consumer	Insurance	Society
Wholesale price	$10	$0	$0	$10
Travel	$0	$4	$0	$4
Processing	$5	$0	$9	$14
Capital	$1	$0	$1	$2
Retail price	($16)	$5	$11	$0
Total	$0	$9	$21	$30

EXHIBIT 5.2 Cost Perspectives with Insurance

Society's perspective on costs also differs from the perspective of any of the participants when insurance plays a role. Society adds the processing and asset costs that the insurer incurs, making the total $30.

The concept of cost cannot be fully understood without stating a cost perspective. The part of cost that matters depends on your point of view. Your revenues are someone else's costs, and your costs are someone else's revenues.

Most people want to focus on costs from the perspective of the organization in which they work, but shifting costs to customers or suppliers seldom represents a good business strategy. Long-term business success rests on selling products that offer your customers excellent value and offer your suppliers adequate profits.

As stated earlier, the difficulty of measuring cost components also complicates the concept of costs. For example, opportunity costs are sometimes hard to measure. Managers sometimes become confused when calculating the opportunity cost of resources that have changed in value. For example, land that your organization bought a few years ago may be more valuable if rents in the area have risen or less valuable if rents have fallen. In most cases, though, an input's opportunity cost is simply its market price.

Linking the use of a resource to the organization's output also poses problems. A focus on incremental costs (i.e., the cost of the additional resources you use when you increase output by a small amount) often simplifies this task. "How much more of a hospital's information system does its intensive care unit use when it cares for an additional patient?" is an example of a way to reframe the relationship between resource use and output and facilitate its measurement.

Case 5.1 Cost Reductions at Baptist Health System

Baptist Health System, a clinically integrated network of five hospitals in Texas, has taken part in Medicare's knee replacement **bundled payment** programs since 2008. Medicare began bundled payments in the hope that its costs (the amount it pays doctors, hospitals, nursing homes, and rehabilitation centers) would go down. Baptist Health System also sought to improve quality and reduce costs, thereby gaining a competitive advantage.

(continued)

bundled payment Payment of a fixed amount for an episode of care. The payment might cover just hospital care, or it might include physician, hospital, and rehabilitation.

Case 5.1 *(continued)*

It seems that both parties got what they wanted. Average Medicare payments per knee replacement without complications declined by 21 percent between 2008 and 2015 (Navathe et al. 2017). However, Baptist Health System's cost per case declined by 25 percent, primarily because of reductions in implant and rehabilitation costs (Navathe et al. 2017). In addition, outcomes appeared to improve. Episodes with readmissions decreased from 6.4 percent to 5.0 percent, episodes with emergency department visits decreased from 7.4 percent to 6.5 percent, and episodes with prolonged stays decreased from 22.4 percent to 7.3 percent (Navathe et al. 2017). Overall, Medicare spent less, Baptist earned a higher profit margin, and patients got better care.

Discussion Questions

- This case includes two perspectives on costs. Which is correct?
- How did participating in the bundled payment change Baptist's perspective on costs?
- Did Baptist reduce both marginal and average costs?
- Did Baptist gain a competitive advantage as a result of these changes?
- Baptist reduced implant costs by 29 percent. How could it do this?
- Baptist reduced rehabilitation costs by 27 percent. How could it do this?
- Was Baptist Health System efficient in 2007?
- Whose revenues fell as a result of the changes that Baptist made?

5.3 Vocabulary

To talk sensibly about costs, we need a clear vocabulary. At the core of that vocabulary are the concepts of average cost and incremental cost. **Average cost** equals the total cost of a process divided by the total output of a process. In exhibit 5.3, when total cost equals \$10,500 and output equals 300, average cost equals \$35. **Incremental cost**, also called **marginal cost**, equals the change in a process's total cost that is associated with a change in the process's total output. In exhibit 5.3, total cost rises from \$8,000 to \$10,500 as output rises from 200 to 300, so incremental cost equals (\$10,500 – \$8,000) ÷ (300 – 200), or \$25 per unit of output.

average cost Total cost divided by total output. It is sometimes abbreviated as AC.

marginal or **incremental cost** The cost of producing an additional unit of output. It is sometimes abbreviated as MC.

In exhibit 5.3, average cost is significantly larger than incremental cost. This difference is common because many processes require resources (e.g.,

EXHIBIT 5.3 Total, Average, and Incremental Costs

Output	Total Cost	Average Cost	Incremental Cost
0	$3,000		
100	$5,500	$55	$25
200	$8,000	$40	$25
300	$10,500	$10,500/300 = $35	($10,500 – $8,000)/(300 – 200) = $25

fixed costs Costs that do not vary when output changes.

variable costs Costs that change when output changes.

equipment, key personnel) that do not change as output varies. For example, to open a pharmacy, a pharmacist must rent a building. If sales fall short of expectations, the rent will not change. Rent is an example of a **fixed cost**, a component of total cost. In contrast, some labor costs and the cost of restocking the pharmacy will vary with sales. Average cost includes fixed and **variable costs**, but incremental cost includes only variable costs. The fact that average cost often exceeds incremental cost is important because management decisions often hinge on knowing how much increasing or decreasing production of a good or service will cost. Your willingness to negotiate with an insurer that offers $300 per service is likely to depend on whether you believe an additional service will cost you $440 (the average cost) or $120 (the incremental cost).

Most management decisions concern incremental changes. Should we increase hours in the pediatric clinic? Should we reduce evening pharmacy staff? Should we accept patients needing skilled nursing care? These decisions demand data on incremental costs.

In addition to being the most relevant concept for managers, incremental costs are easier to calculate than average cost. Average cost calculations always involve difficult questions (e.g., How much of the cost incurred by the chief financial officer should we allocate to the pediatrics department?). In contrast, incremental cost calculations involve more straightforward questions and can be performed by most clinicians and frontline managers (e.g., What additional resources will we need to keep the pediatric clinic open on Wednesday evenings, and what are the opportunity costs of those resources?). To decide whether to start or stop a service, a manager needs to compare average revenue and average cost. For example, a telemedicine program that has average revenue of $84 and average cost of $98 is unprofitable. To decide whether to expand or contract a service, a manager needs to compare how revenue and costs will change. To make this comparison, information about incremental costs is essential. Usually confusion about cost arises because one person is talking about average cost and another is talking about incremental cost (or because one person is talking about costs to society and the other is talking about costs to the organization).

5.4 Factors That Influence Costs

Producer costs depend on what is produced (the outputs), the prices of inputs, how outputs are produced (the technology), and how efficiently inputs are used. We will explore each of these factors.

5.4.1 Outputs

Differences in outputs can profoundly affect costs. Firms that produce large volumes of a good or service may have lower costs than firms that produce small volumes. Large firms that have a cost advantage have **economies of scale**. Firms that produce several different kinds of goods or services may have lower costs than firms that produce just one. Multiproduct firms that have a cost advantage have **economies of scope**. Economies of scale and scope result from sharing resources.

economies of scale
When larger organizations have lower average costs.

economies of scope
When multiproduct organizations have lower average costs.

An example of economies of scale might be a large pharmacy's use of automated dispensing equipment. In a larger pharmacy, the fixed costs of the equipment could be shared by a larger number of prescriptions, so the cost per prescription could be lower. An example of economies of scope might be a nursing home that expands to offer skilled care as well as intermediate care. Fixed costs (such as the cost of the director of nursing) would be shared by additional patients, so average costs for intermediate care could be lower.

Differences in the quality of outputs can affect costs as well. For an efficient firm, higher-quality products cost more. For an inefficient firm, higher-quality products may not.

What is higher quality? Economists define *quality* from the perspective of consumers, not from the clinical perspective common in healthcare. In economics, a good or service is of higher quality when it is more valuable to a well-informed customer than comparable goods or services. Consumers usually find greater value in goods or services that produce better clinical outcomes, so the clinical perspective is not wrong. Economists also define quality in terms of nonclinical factors. Well-informed consumers may attribute higher quality to a product that is easier to use, a service for which the wait is shorter, an insurance plan with less confusing referral requirements, a provider who bills more accurately, or a more cordial staff.

If higher quality does not cost more, failure to provide it demonstrates inefficiency. The many opportunities available to improve quality in healthcare without increasing costs reflect how inefficient most healthcare organizations are. Once an organization has become efficient, though, higher quality (better service, improved reliability, greater accuracy, less pain, and other enhancements) will cost more to produce.

Case 5.2 Improving Performance in Primary Care

Lean is a performance improvement strategy that emphasizes reducing waste, which is defined as activity that adds less value than it costs. Examples of waste include patient waiting time (which adds no value from their perspective), staff looking for supplies, staff who are not using all of their skills, unnecessary paperwork, and so forth.

The Lean approach stresses increasing efficiency and redesigning products so that they better meet customers' goals. Does Lean reduce costs in primary care? Does it improve customer satisfaction? Does it improve staff satisfaction? Does it improve clinical quality? California's Palo Alto Medical Foundation for Health Care, Research and Education, which has more than 1,400 physicians and more than 5,000 other employees, systematically evaluated its system-wide Lean initiative to find out (Hung et al. 2017).

This initiative standardized the equipment, supplies, and education materials in exam rooms; set up shared workspaces for physicians and staff; and redesigned multiple workflows. For example, teams started convening daily morning huddles to review schedules; expanded the roles of medical assistants; and established metrics to track clinical quality, costs, patient satisfaction, staff satisfaction, and physician satisfaction. Most measures of clinical quality did not change, although diabetes care improved. Costs dropped, patient satisfaction increased, staff satisfaction increased, and physician satisfaction did not change (Hung et al. 2017).

Discussion Questions

- What are other examples of waste?
- How would standardizing equipment, supplies, and education materials increase efficiency?
- Why would expanding the roles of medical assistants increase efficiency?
- Cost per visit fell by 12.5 percent. How would this affect profits?
- How might huddles reduce costs? Increase quality?
- Would the changes described in this case reduce costs from a patient's perspective?

5.4.2 Input Costs

Higher input prices mean higher costs. Shifting to a different combination of inputs will only partially offset the effects of higher input prices. The only times this rule does not hold are when a firm is inefficient or when a perfect, lower-priced substitute for the higher-priced input is available. An inefficient firm might be able to limit the effects of a cost increase by shifting to a more efficient production process. For example, even if the wages of pharmacy technicians increase, the cost of dispensing a prescription might not increase if the pharmacy switches to the automated system it should have been using before the wage increase. A firm also can avoid higher costs by switching to a perfect substitute. For example, if an internet access provider tried to raise its monthly rates, firms could switch to rival internet access providers and costs would not go up. Unfortunately, firms are unlikely to find such a replacement.

5.4.3 Technology

Advances in technology always reduce the cost of an activity, but volumes may increase enough to increase spending. Adopting a new technology would be pointless if it increased the costs of a process (unless it increased the quality of the process). For example, installing an automated laboratory system would be absurd if it increased cost per analysis. An automated laboratory system that reduces cost per analysis, however, does not guarantee that laboratory costs will go down. Lower costs per analysis may prompt physicians to request more analyses, and the greater volume cancels the cost savings and might even drive up costs.

5.4.4 Efficiency

Increases in efficiency always reduce the cost of an activity. Production of almost every healthcare good or service can be made more efficient. Few production processes in healthcare have been examined carefully, and most healthcare workers have little or no training in process improvement. Consequently, mistakes, delays, coordination failures, unwise input choices, and excess capacity are far too common. More and more though, healthcare organizations are responding to financial and quality challenges by trying to increase efficiency (Rotter et al. 2017)

Even though greater efficiency reduces costs, not everyone is in favor of it. Greater efficiency often means that fewer workers will be needed. Workers whose jobs are in jeopardy may not want to help improve efficiency. (Commitment to a policy of no layoffs is usually one of the core terms of efficiency improvements.) Others have limited incentive to participate in efforts to improve efficiency. Physicians must help change clinical processes,

yet many physicians have little to gain from these efforts. The gains produced by the changes will accrue to the healthcare organization, but the resulting billing reductions will be problematic for physicians and other healthcare workers not employed by the organization. A major challenge lies in devising incentives that will encourage workers and contractors to help improve efficiency.

5.5 Variable and Fixed Costs

Managing costs requires an understanding of opportunity costs and triggers that change costs. As stated earlier, opportunity costs usually are easy to assess. The opportunity cost of using $220 in supplies is $220. The opportunity cost of using an hour of legal time billed at $150 per hour is $150. Other cases demand more study. For example, the opportunity cost of a vacant wing of a hospital depends on its future use. If the wing will be reopened for acute care in response to a rising hospital census, the opportunity cost of the wing will depend on its value as an acute care unit. If the wing will be reopened because the hospital needs a skilled nursing unit, the opportunity cost of the wing will be determined by its value in that role.

sunk costs
Costs that have been incurred and cannot be recouped.

Sunk costs should be ignored. A **sunk cost** is a cost you cannot change. A computer's purchase price is a sunk cost, as is money spent to train employees to operate the computer. If your current needs do not require the use of a computer, you should not fret about its initial cost. The opportunity cost of the computer will depend on its value in some other use (including its resale value).

In the long run, all costs are variable. Buildings and equipment can be changed or built. The way work is done can be changed. Additional personnel can be hired. The entire organization could shut down, and its assets could be sold. However, in the short run, some costs are fixed. An existing lease may not be negotiable, even if the building or equipment no longer suits your needs. Ignore fixed costs in the short run. They are sunk costs.

average variable costs
Variable costs divided by total volume. It is sometimes abbreviated as AVC.

average fixed costs
Fixed costs divided by total volume. It is sometimes abbreviated as AFC.

When fixed costs are substantial, average costs typically fall as output increases because the fixed costs are spread over a growing volume of output. As long as **average variable costs** are stable, this drop in **average fixed costs** will cause a reduction in average total costs. *Average total costs* equal average fixed costs plus average variable costs. As exhibit 5.4 illustrates, average fixed cost drops from $30 to $15 as output rises from 100 to 200. If variable costs rise quickly enough, average total costs may rise despite the fall in average fixed costs. In exhibit 5.4, variable costs rise by $10,000 as output increases

EXHIBIT 5.4
Fixed and Variable Costs

Output	Total Cost	Fixed Cost	Average Total Cost	Average Fixed Cost	Average Variable Cost
0	$3,000	$3,000			
100	$5,500	$3,000	$55	$30	$25
200	$8,000	$3,000	$40	$15	$25
300	$18,000	$3,000	$18,000/300 = $60	$3,000/300 = $10	$15,000/300 = $50

from 200 to 300. As a result, average total cost rises to $60 even though average fixed cost continues to fall.

Fixed and variable costs are important concepts for day-to-day management of healthcare organizations. For example, an advantage of growth is that fixed costs can be spread over a larger volume of output. The idea is that lower average fixed costs result in lower average total costs, so profit margins can be larger. As exhibit 5.4 illustrates, growth should not result in increases in average variable costs large enough to offset any reduction in average fixed costs. Otherwise, growth will be unprofitable.

Misclassifying costs can create odd incentives. For example, fixed overhead costs are often allocated on the basis of some measure of output, which can understate the profits from growth because the overhead costs allocated to a unit increase as it grows. So that unit managers are not discouraged from expanding, allocated fixed costs should not vary with output.

5.6 Conclusion

Cost management has become vital, as more efficient organizations have a competitive advantage. Increasingly, managers are challenged to reduce costs while improving clinical quality and customer service. This pressure has intensified as purchasers have realized that high costs do not guarantee high quality and that high quality may not be more expensive. Healthcare organizations are beginning to adopt cost-reducing technology, substitute low-cost production techniques for high-cost ones, purchase goods and services more conservatively, and rethink what they produce. In addition, providers and insurers are being challenged to improve the health of target populations in ways that are cost-effective—a task that is more difficult than the efficient production of healthcare products.

Exercises

5.1 Why is it important to distinguish between fixed and variable costs?

5.2 Explain how a decrease in input prices or an increase in efficiency would affect costs.

5.3 You spent $500,000 on coding training last year. Is this a sunk cost? Should it be considered in deciding whether to switch coding software?

5.4 You bought 2 acres of land for $200,000 ten years ago. Although it is zoned for commercial use, it currently holds eight small, single-family houses. A property management firm that wants to continue leasing the eight houses has offered you $400,000 for the property. A developer wants to build a 12-story apartment building on the site and has offered $600,000. What value should you assign to the property?

5.5 A clinic's cost and visit data are below. Calculate its average and marginal costs. Note that you can only calculate marginal cost as visits increase from 100 to 110.

Visits	Total Cost	Average Cost	Marginal Cost
100	$2,000		
110	$2,100		

Visits	Total Cost	Average Cost	Marginal Cost
100	$2,000	*$20*	
110	$2,100	*$19*	*$10*

Average Cost = Total Cost/Visits.
Marginal Cost = Change in Total Cost/Change in Visits.

5.6 A community health center has assembled the following data on cost and volume. Calculate its average and marginal costs for volumes ranging from 25 to 40. What patterns do you see?

Visits	Total Cost
20	$2,200
25	$2,250
30	$2,300
35	$2,350
40	$2,400

5.7 Sweetwater Nursing Home has 150 beds. Its cost and volume data are below. Calculate its average and marginal costs for volumes ranging from 100 to 140. What patterns do you see?

Residents	Costs
80	$10,000
100	$11,000
120	$12,000
140	$13,200

5.8 A phlebotomist takes 15 minutes to complete a blood draw. The supplies for each draw cost $4, and the phlebotomist earns $20 per hour. The phlebotomy lab is designed to accommodate 20,000 draws per year. Its rent is $80,000 per year. What are the average and marginal costs of a blood draw when the volume is 20,000? 10,000? What principle does your calculation illustrate?

Costs with a Wage of $20			
Volume	**Total Cost**	**Average Cost**	**Marginal Cost**
0	$80,000		
20,000	$260,000	$13.00	$9.00
10,000	$170,000	$17.00	$9.00

The average cost of a blood draw when the volume is 20,000 is $13. The average cost is $17 when the volume is 10,000. At smaller volumes, the $80,000 in fixed costs results in higher average costs, even though marginal costs are constant.

5.9 How would the average and marginal costs change if the phlebotomist's wage rose to $24 per hour? What principle does your calculation illustrate?

5.10 A new computer lets a phlebotomist complete a blood draw in 10 minutes. The supplies for each draw cost $4, and the phlebotomist earns $20 per hour. The phlebotomy lab is designed to accommodate 20,000 draws per year. Its rent is $80,000 per year. What is the marginal cost of a blood draw? What principle does your calculation illustrate?

5.11 Use the data in exercise 5.7. How would the average and marginal costs change if the rent rose to $100,000? What principle does your calculation illustrate?

5.12 A patient visits a clinic. She incurs $10 in travel costs and has a copayment of $20. The clinic's total charge is $60. The clinic spends $9 to bill the insurance company for the visit and uses resources worth $51 to produce the visit. The insurance company pays the clinic $40 and spends $11 to process the claim. Describe the cost of the visit from the perspective of the patient, the clinic, the insurer, and society.

5.13 A practice uses $40 worth of a dentist's time, $30 worth of a hygienist's time, $10 worth of supplies, and $15 worth of a billing clerk's time to produce a visit. The practice charges a patient $25 and charges her insurer $70. The insurer spends an additional $4 to process the claim. The patient incurs travel costs of $20. What are the costs of the visit from the perspective of society, the patient, the practice, and the insurer?

5.14 Kim and Pat underwrite insurance. Each underwrites 50 accounts per month. Each account takes four hours to underwrite. The value of their time is $40 per hour. Monthly costs for each are $1,500 for an office, $2,000 for a receptionist, and $2,400 for a secretary. Calculate the average and incremental cost per case for Kim and Pat.

5.15 If Kim and Pat merge their operations, they would need only one receptionist, and their rent for the joint office would be $2,800 per month. All other values stay the same. Calculate the average and incremental cost per case for the merged office. Are there economies of scale at 100 accounts per month? Should Kim and Pat merge their offices?

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CHAPTER

6

IMPROVING POPULATION HEALTH

Learning Objectives

After reading this chapter, students will be able to

- explain the concept of population health,
- propose several strategies for improving population health,
- describe some of the main challenges to improving population health,
- explain how governments can improve population health,
- debate how insurers can improve population health, and
- discuss how employers can improve the health of their patients and employees.

Key Concepts

- A population can include everyone, beneficiaries, patients, or employees.
- Ideally, improvements in population health should also improve patients' experience of care, improve providers' experience of care, and reduce per capita costs.
- Multiple public and private trials of payment innovations are underway.
- The full effects of provider and insurer innovation will not be known for years.

6.1 Introduction

Defining population health is challenging. It can represent the health (perhaps measured as life expectancy at birth) of the residents of a country, region, or area. It can represent the health of a subgroup of residents. But a population can also be defined as an insurer's beneficiaries, a provider's patients, or a firm's employees. Which definition is correct depends on the context.

The United States spends far more on healthcare than any other country, but the health of its population falls short of the standards of other wealthy countries. Several hypotheses have been proposed to explain this paradox:

- High healthcare prices explain high costs.
- Misaligned healthcare prices distort patterns of use.
- The payment system imposes very high costs on insurers and providers.
- Insurance regulations make it hard for many people to get coverage or access to care.
- Governments at every level have avoided taking responsibility for population health.

These hypotheses do not compete. All may be true.

Efforts to reduce infant mortality illustrate the interplay of these factors. The United Health Foundation (2020) recommends taking the following actions to reduce infant mortality:

- Reduce maternal obesity
- Reduce maternal smoking and alcohol consumption
- Improve access to prenatal and postnatal care
- Improve maternal preconception health
- Improve sleep practices among infants and newborns
- Increase the minimum wage

The first two recommendations entail health interventions but may not require the services of physicians or nurses. The third and fourth recommendations involve expanding insurance coverage, primarily for low-income families. The fifth recommendation reflects research on routine newborn care. The sixth recommendation represents a pure change in the social determinants of health and may be outside the purview of the healthcare system. Evidence suggests that most states reduced infant mortality between 2005 and 2020, and some states that expanded their Medicaid programs have cut rates quite significantly (CDC 2022).

Governments, insurers, and providers have proposed a variety of strategies to improve population health:

- Expansion of health insurance coverage
- Addition of new insurance benefits
- Alternative payment systems
  - Accountable care organizations (ACOs)
  - Bundled payments
  - Centers of excellence and high-performance networks

- New organizational structures
  - Patient-centered medical homes (PCMHs)
  - Health centers
- Reconfiguration of insurance plans to focus on population health
- Emphasis on changing social determinants of health in population health initiatives

This chapter will explore all these topics.

6.2 Insurance Expansion

6.2.1 Standardization of Dependent Care Coverage

One of the first effects of the Affordable Care Act (ACA) was to systematize the option to buy insurance coverage for dependents up to age 26. Many studies have found that coverage for young adults increased as a result of this provision (Glied, Collins, and Lin 2020), improving access to care and reducing out-of-pocket spending. As most young adults are healthy, the health effects of this policy are less clear. However, expanded coverage of dependents did not address disparities in insurance coverage. White non-Hispanic Americans were much more likely to have health insurance to share with their dependents than other groups (National Center for Health Statistics 2021).

6.2.2 ACA Marketplaces

The ACA also created health insurance exchanges, or marketplaces, for people who lack employer- or government-sponsored coverage. Starting in 2014, the ACA set up online marketplaces offering private nongroup insurance policies. Marketplaces policies are required to meet federal standards, and they are subsidized for citizens with incomes between 138 percent and 400 percent of the poverty level. (The American Rescue Plan Act of 2021 temporarily expanded the subsidies and eligibility for them.)

The ACA marketplaces clearly expanded coverage: in 2022, more than 14 million people enrolled in plans (CMS 2022). But did they improve the health of those covered? Because the marketplaces were implemented simultaneously nationwide, this question is difficult to answer (Soni, Wherry, and Simon 2020). Evidence indicates that the marketplaces resulted in increased coverage, improved access to care, and better self-reported health (Courtemanche et al. 2020), but the effects have been smaller compared with Medicaid expansion. The ACA marketplaces appear to have reduced (but not eliminated) some financial barriers to care (Buchmueller and Levy 2020).

6.2.3 Medicaid Expansion

More than 15 million people gained health insurance through Medicaid expansion, and enrollment surged as Americans lost jobs, incomes, and private insurance coverage during the COVID-19 pandemic (Medicaid.gov 2022). Because some states have not yet expanded Medicaid and programs vary from state to state, analysts have been able to show that Medicaid expansion substantially improved access to care, reduced medical bankruptcy, and improved health. There are far too many studies to review here, but Lee, Dodge, and Terrault (2022) link Medicaid expansion to significant reductions in all-cause mortality.

All these expansions appear to have succeeded, yet some problems remain. For example, even though maternal mortality rates have fallen since 2014, the rate for non-Hispanic Black women is more than triple the rate for other non-Hispanic women (Hoyer 2021). Given that the maternal mortality rate for white and Asian non-Hispanic women is 50 percent higher than the rate for women in other Organisation for Economic Co-operation and Development (OECD) member countries, this, too, remains a challenge.

Taking a broader view, Venkataramani, O'Brien, and Tsai (2021) note that life expectancy has been increasing at a slower rate in the United States compared with its OECD peer countries for more than 40 years. Indeed, the effects of the opioid crisis and COVID-19 caused life expectancy to fall in recent years. Much of this decline can be attributed to the widening disparity between those at the top and the bottom of the income distribution. Increasingly, healthcare managers, scholars, and policymakers are exploring strategies to improve the health of the US population.

6.3 Addition of New Insurance Benefits

6.3.1 The Oregon Experiments

On January 1, 2020, Oregon's 15 coordinated care organizations (CCOs) began the second phase of Medicaid expansion. These CCOs are regional organizations that are charged with

- improving the behavioral health system,
- increasing value and pay-for-performance,
- focusing on social determinants of health and health equity, and
- maintaining sustainable cost growth.

This is an ambitious agenda, as simply improving the behavioral health system presents significant challenges (Brawley 2021). Cottrell and colleagues (2021) show that moving away from a fee-for-service payment system

reduced visits in clinics and increased other activities such as care coordination and education. Common interventions to improve social determinants of health include partnerships with community organizations, education and training for beneficiaries, and efforts to increase food security.

Many other states have been granted waivers to test programs aimed at improving the social determinants of health. However, the effectiveness of these programs is not yet clear.

6.3.2 Medicare Enhancements

The ACA expanded coverage for preventive services in traditional fee-for-service Medicare. As a result, services such as flu shots, cholesterol and blood pressure tests, endoscopies, colon cancer screenings, clinical breast exams, mammograms, and prostate exams are now covered without a copay. Despite arguments that vision, dental, and hearing benefits are worth their additional costs, traditional Medicare does not yet cover these services.

In contrast, most Medicare Advantage plans offer vision, dental, and hearing benefits. In 2022, many plans also offered supplemental benefits for services such as home palliative care, home support services, and massage therapy.

6.3.3 Private Insurance Enhancements

Employers, which sponsor the bulk of private health insurance, have also added some additional benefits. Adding behavioral health services is a priority but remains a work in progress. Coverage for telemedicine was expanded during the pandemic, but cost-control initiatives slowed. Other common benefits are weight loss or smoking cessation programs offered by outside vendors. These services are **cost-effective** (Horstman et al. 2021; Russell et al. 2021), but they are most likely to be included in programs covering well-paid employees, so they do not address challenges faced by other employees who receive less compensation.

cost-effective Improving outcomes at a modest cost. There is no consensus as to what a modest cost is, but this is the sort of judgment that managers must make. (Ways of evaluating the costs and benefits of interventions will be discussed in chapter 17.)

6.4 Alternative Payment Systems

6.4.1 Accountable Care Organizations

ACOs can take many forms, although most continue to pay providers based on volume (e.g., per visit or per procedure) but add incentives to improve quality or reduce costs. More a prescription for health system redesign than an organizational model, Medicare ACO programs have consistently been associated with modest savings and stable measures of quality (Zhu et al. 2021).

Originally a Medicare payment model, ACO contracts have become common in private insurance and Medicaid. This is not surprising: non-Medicare

ACOs can reduce costs and improve quality by creating networks of higher-quality, lower-cost providers. (Medicare has fee schedules, not negotiated prices, and cannot exclude any eligible provider.)

6.4.2 Bundled Payments

Bundled payments pay a fixed amount for all the care related to an episode of care, such as a knee replacement. As with ACOs, bundled payments are commonly seen as Medicare innovations authorized by the ACA. In fact, bundled payments are not new. Medicare's diagnosis-related groups (DRGs) were a form of bundled payment, and Medicare tested bundled payments for coronary artery bypass grafting in 1991 (Slotkin et al. 2017). Like ACOs, bundled payments usually base payments at least partly on quality. Early results of bundled payments are promising, showing lower costs with no reduction in quality (Sullivan et al. 2017). Because Medicare patients tend to require significant postsurgical rehabilitation, bundled payments may save more for Medicare than for commercial insurance.

For example, Hollywood Presbyterian Medical Center chose to participate in seven Medicare bundled payment programs that included costs for the three days prior to the procedure plus hospital, physician, rehabilitation cost, and any additional costs for 90 days after discharge. The Medical Center reduced mortality, readmissions, and costs per episode (Haas and Chang 2021). Savings resulted from reduced readmissions and more efficient post-acute care.

Although commercial bundled payments are similar to Medicare's, important differences exist. Commercial bundles have fewer opportunities for savings, because rehabilitation and readmission costs are much smaller (Whaley et al. 2021). Commercial prices are higher than Medicare's, however, so commercial bundled payments can reduce costs for employers and their beneficiaries.

6.4.3 Reference Pricing and Centers of Excellence

In response to rising spending, employers and insurers have sought to identify benefit designs that would simultaneously reduce spending and improve the health of beneficiaries. These goals can conflict. For example, increasing deductibles appears to reduce the use of services, and therefore costs. Unfortunately, patients appear to reduce the use of both effective and ineffective services, often including preventive care that is covered in full (Agarwal, Mazurenko, and Menachemi 2017). Reducing the use of effective services can harm population health.

reference pricing A pricing design that sets a maximum amount that an insurer will pay for a product. Patients typically must pay the full difference between the product's price and the reference price.

Reference pricing is one strategy to reduce costs without harming population health. An insurer sets a reference price for a product, and the patient is responsible for the entire difference between the reference price

and the provider's price. Originally used in Europe to steer patients toward less expensive drugs, reference pricing also appears to lead firms to cut prices (Herr and Suppliet 2017). Commonly used in the United States to reduce spending on high-cost products, reference prices typically shift market share to less expensive providers and induce expensive providers to lower prices (or forgo billing patients for their shares).

Centers of excellence represent an alternative strategy for reducing costs and improving population health. From the patient's perspective, a center of excellence offers access to high-quality, high-volume providers with minimal out-of-pocket expense. From the insurer's perspective, a center of excellence offers high quality and savings that are primarily attributable to reductions in intensity of care. Most centers of excellence adhere to evidence-based guidelines and reduce volume-based compensation for practitioners, seeking to avoid invasive procedures unless they are the most appropriate treatment for the patient. Zhang, Cowling, and Facer (2017) found that reference pricing and centers of excellence both steered patients toward high-quality providers and reduced spending. However, the mechanisms differed: reference pricing reduced average prices sharply but did not reduce utilization. In contrast, centers of excellence reduced utilization sharply but did not reduce prices. However, because any organization can claim to be a center of excellence, such a claim or even accredited status may not guarantee excellence (Li et al. 2020).

center of excellence An integrated program to treat a condition (e.g., breast cancer care). Certification is possible, but structures and approaches vary. From the employer's or the insurer's perspective, a center of excellence is defined by the contract with the provider and by demonstrated high quality and efficiency.

6.4.4 Second Opinion Programs

Some health insurance plans build in second opinion programs. In such programs, patients can initiate a review of the diagnosis or treatment plan, usually at no additional out-of-pocket cost. Many medical centers offer virtual second opinion consultations, typically for orthopedic and cancer cases.

One study found significant differences between the first and second opinions (Weyerstraß et al. 2020). Patients who sought a second opinion tended to feel supported in their decision-making and generally were quite satisfied with the process.

6.4.5 Value-Based Pricing

Insurance pricing should signal to patients that a covered product is effective, and it should signal to providers that patients value the resulting health gains (Zanotto et al. 2021). Designing such a plan is demanding. It requires accurate measurement of health outcomes, their value to consumers, and total costs (not just the cost of the product). It also requires payment changes to create the proper incentives for patients and providers. (How to do so is not always obvious.) Value-based pricing was introduced to reduce waste and increase the quality of care, but it remains a work in progress.

Another approach to value-based insurance is pay-for-performance, which gives bonuses to providers for high-quality care and imposes penalties for low-quality care. Although pay-for-performance sounds plausible, there is little evidence that it works (Ramirez et al. 2022).

Yet another approach involves public reporting of cost and quality measures, which is much less obtrusive than pay-for-performance and involves potentially powerful incentives. Patients are apt to prefer providers with high ratings, meaning that poor performance can have significant financial consequences. However, since quality is a complex, multifaceted concept and the evidence is often confusing, reporting in a way that consumers and referring physicians can understand is a challenge.

Case 6.1 Centers of Excellence

It is easy to understand why JetBlue Airways would help launch the Employers Centers of Excellence Network. JetBlue and its partners shifted from paying highly variable prices for care of variable quality to paying a set price to a small set of organizations with a history of offering excellent quality. Prices are typically 10 to 15 percent lower, but the real savings occur because patients are often steered toward less invasive, less costly care. For example, local providers had recommended surgery for nearly all the 450 spine patients who went to centers of excellence, but the centers recommended surgery for only 62 percent of them (Slotkin et al. 2017). Instead, the centers proposed physical therapy, pain treatments, weight loss, and other alternatives.

It is also easy to understand why an employee would be willing to seek care from a center of excellence. Travel, lodging, and care are covered by the program, so out-of-pocket costs are typically much lower. Some patients also avoid unnecessary surgery, and the quality of care appears to be higher at centers of excellence. Claims data from Lowe's (another partner in the Employers Centers of Excellence Network) show sharply lower readmission rates, much lower use of skilled nursing facilities, and very high rates of employee satisfaction (Slotkin et al. 2017).

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Case 6.1 *(continued)*

Why limit the center of excellence to American providers? Excellent providers are available in other countries for much lower prices. For example, American private insurers paid an average of $32,500 for hospital and physician services for hip replacement. Australian insurers paid an average of $20,900, and Swiss insurers paid an average of $15,600 (International Federation of Health Plans 2019). Hip replacement costs about $12,500 in Mexico (CMQ Hospital 2021).

One alternative to a center of excellence is a high-performance network, which identifies high-quality, cost-effective providers. No explicit contract may be required. In 2021, less than one-fifth of employers offered high-performance networks. This number is expected to grow significantly. Currently, centers of excellence are much more common, but it is difficult to distinguish marketing hype from reality.

Discussion Questions

- Why do prices vary so much?
- Why does clinical quality vary so much?
- Why do patient experiences vary so much?
- What employers are participating in centers of excellence?
- What services do centers of excellence typically offer?
- Why might low-quality care be more expensive than high-quality care?
- Have you or has someone you know used a center of excellence? What was your/their experience?
- Why would risks for providers be higher for a center of excellence?
- If you ran an ACO, would you choose a center of excellence or reference pricing?
- Have centers of excellence grown as expected? Have high-performance networks?
- Would you be willing to go to a center of excellence if you needed spine surgery?
- Would you be willing to go to Cancun if you needed a hip replacement? Zurich?
- What are the alternatives to a center of excellence program?

6.5 New Organizational Structures

6.5.1 Patient-Centered Medical Homes

Like ACOs and bundled payments, PCMHs are hard to define. For example, the Patient-Centered Primary Care Collaborative (2017) defines them "as a model or philosophy of primary care that is patient-centered, comprehensive, team-based, coordinated, accessible, and focused on quality and safety." One difficulty with this definition is that some PCMHs have implemented the model more completely or more effectively than others, and some practices that are not considered medical homes may have implemented many features of a PCMH without seeking certification. In addition, good evidence about which elements of the PCMH model are most important is not available. Some research suggests that enhanced care coordination, continuity of care, access to care, and communication improve clinical quality the most, but this finding needs to be confirmed (Nelson et al. 2017).

Case 6.2

Can Patient-Centered Medical Homes Improve Population Health?

The PCMH model emphasizes a team approach to care, typically including physicians, advanced practice nurses, physician assistants, nurses, pharmacists, nutritionists, social workers, educators, and care coordinators. This team cooperates to improve access (e.g., after-hours care and same-day visits), patient engagement (e.g., teaching patients how to manage their care and contribute to decision-making), care coordination (e.g., tracking care plans among providers and improving transitions from hospitals to home), quality (e.g., improving patient satisfaction and tracking compliance with practice protocols), and safety (e.g., decision support for prescribing and tracking abnormal test results). Despite broad similarities among them, PCMHs vary in their emphases and implementation strategies. Not surprisingly, reviews find weak, variable evidence that PCMHs save money (although the evidence is stronger and less variable for high-risk patients) (Sinaiko et al. 2017). Similarly, some studies find improvements in patients' experiences in PCMH practices, while others do not (Sarinopoulos et al. 2017).

Can becoming a PCMH help practices improve health? Green and colleagues (2018) suggest that the evidence is clearer than it seems.

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Case 6.2 *(continued)*

Their analysis focused on conditions that were targeted by Blue Cross Blue Shield of Michigan and measured how many PCMH components each practice had implemented (an approach that had seldom been used before). Their analysis found that both emergency department and hospitalization costs fell for all conditions, but by much more for targeted conditions and for practices with more complete PCMH implementation.

Another study found that incorporating behavioral health services into the PCMH model appears to shift patients with behavioral health symptoms away from emergency departments and primary care providers toward behavioral health providers (Maeng et al. 2022). As with many healthcare innovations, the evidence of savings is stronger than the evidence of improved health.

Discussion Questions

- How could improving access to care reduce costs? Increase costs?
- How could improving care coordination reduce costs? Increase costs?
- Why is the evidence about effects on cost so varied?
- Why is the evidence about effects on quality so varied?
- Why is the evidence about effects on the patient experience so varied?
- How would a successful PCMH program affect patients? Hospitals? Participating practices?
- How would behavioral health integration affect patients? Hospitals? Participating practices?
- Can you share a patient's perspective on a PCMH transition? A provider's perspective?

6.5.2 Health Centers

Health centers include organizations that receive grants from the federal Bureau of Primary Health Care, called Federally Qualified Health Centers (FQHCs), and some that do not, which are often called health center look-alikes. (Look-alikes often seek to become FQHCs once they have a track record.) An FQHC is a clinic that qualifies for federal grant funding plus higher Medicare and Medicaid rates (Gregoire 2021).

Although health centers were officially established in 1965 as a part of President Lyndon B. Johnson's War on Poverty, similar organizations already existed. Now serving more than 30 million patients, health centers are significant providers of care. Health centers must provide comprehensive services (either on-site or by arrangement with another provider), including preventive health services, dental services, mental health services, substance abuse services, transportation services, hospital care, and specialty care. Many health centers are PCMHs, but they must meet several additional requirements and typically offer a broader array of services.

Health centers' grant funding, higher Medicare and Medicaid rates for primary care, comprehensive benefits, and educational loan forgiveness make them unusual. Izguttinov and colleagues (2020) report that many FQHCs are exploring value-based payments, as it is far from clear that fee-for-service prices reflect the relative values of services. Clearly, though, fee-for-service payments are expensive to manage, especially for primary care services.

6.6 Focus on Population Health

Population health focuses on health outcomes and how they vary (Zimmerman 2021). Originally meant to describe populations in geographic areas, the term *population health* now sometimes refers to clinical populations (e.g., a patient panel or registry).

Population health focuses on the distribution of outcomes and emphasizes disparities in those outcomes. For example, because the infant mortality rate for non-Hispanic Blacks is more than double the rate for non-Hispanic whites and Hispanics, reducing the infant mortality rate for non-Hispanic Blacks would improve population health and reduce disparities (National Center for Health Statistics 2021). Overall improvement would be desirable as well. Among the well-to-do countries of the world, only Chile, Mexico, and Turkey have higher infant mortality rates (OECD 2021).

Not all disparities reflect advantages to whites. Even though life expectancies at age 65 fell for all ethnic groups as a result of the COVID-19 pandemic, in 2020, Hispanics had longer life expectancies than non-Hispanic whites and much longer life expectancies than non-Hispanic Blacks (Woolf, Masters, and Aron 2021).

Disparities are relevant for managers because some disparities can be reduced by changes in the healthcare system. For example, prior to the implementation of the ACA, African Americans were less likely to be insured than whites and less likely to have had a physician visit (Buchmueller and Levy 2020). These differences narrowed, primarily as a result of the

ACA, but other health disparities can be reduced by modifying social determinants of health.

6.7 Improving Population Health

6.7.1 Social Determinants of Health

Social factors, including income, education, ethnicity, and neighborhoods, are widely understood to affect health (Green, Fernandez, and MacPhail 2021). Showing that improving social factors can cause improvements in health is harder, as both practical and ethical concerns make studying changes in social factors complex. As Kindig and Mullahy (2022) note, research on social determinants of health is complicated by multiple uncertainties:

- Which aspects of health merit primary attention?
- Which social determinants can policy affect?
- What sorts of policy changes are feasible and acceptable?
- How long will it take for policy changes to work?

The rapid rollout of the COVID-19 vaccine in 2021, which represented a major triumph for the world's scientific community, provides a good example of the complexities involved. The population health measures associated with this effort were controversial and involved interventions that were not directly health related. In the United States, more than 45 percent of the adult white population expressed concern about paying for basic household expenses during the height of the pandemic, and more than 65 percent of Black and Hispanic adults felt this way (Drake and Rudowitz 2022). As part of a population health initiative intended to prevent food and housing insecurity, the American Rescue Plan provided direct payments to lower-income people, extended federal unemployment insurance payments, and provided a child tax credit. The American Rescue Plan barely passed in the US Senate, suggesting that population health initiatives may not be universally acceptable.

Not all experiments have clear results, however. A synthesis found that many social factors experiments have been too small to detect all but the largest effects, presumably because of the costs of these experiments (Courtin, Kim et al. 2020). Among studies with statistically significant results, 49 percent of health measures improved, 44 percent showed no effect, and 7 percent worsened. Not all population health initiatives offer quick gains at low cost, but even those that do may face vigorous opposition. In addition, healthcare providers and managers generally act in their roles as citizens, rather than as professionals, in broadly defined efforts to improve population health.

6.7.2 What Are Modifiable Social Determinants of Health?

Many social determinants of health are modifiable. Some involve health systems. For example, follow-up after a missed primary care visit might identify lack of transportation as a barrier to accessing care. The health system could connect the patient with an insurance-provided transportation service or a social service agency that provides medical transportation. Alternatively, improved diet, increased physical activity, stopping smoking, and other patient-managed activities have been shown to significantly improve the health of diabetics (American Diabetes Association 2017). Especially for patients with language, financial, or cultural barriers that complicate efforts to manage their health, a health system that simply recommends changes and fails to follow up on those recommendations will have poor outcomes.

Not all changes to social determinants of health need to be financed by the health system. A local government or charity may offer a subsidy program for medical transportation. Alternatively, a health system, local government, local school, or local charity might develop user-friendly tools that simplify the process of booking a ride for patients or providers. Likewise, other community organizations may support programs to improve health self-management (or be induced to do so by encouragement from the health system).

Some modifiable social determinants may not involve health systems at all. For example, low-income children are twice as likely to have asthma than higher-income children (CDC 2021). One strategy for reducing the severity of asthma is to change a child's home environment (e.g., reducing mold or exposure to tobacco smoke), and this effort can be supervised by housing code officers, community health workers, or public health workers. Alternatively, increases in income transfers (such as Social Security or the earned income tax credit) can improve health and economic outcomes enough to yield a substantial return on investment (Sun et al. 2021). Typically, health systems play little or no role in such programs.

Case 6.3

Changing Nonmedical Determinants of Health

Many factors affect health. Most suggest indicate that medical care alters health by no more than 10 to 20 percent (Frakt, Jha, and Glied 2020). Social and economic factors, individual behaviors, the environment, and genetics account for the remaining 80 to 90 percent. How can we change these nonmedical factors? Are there interventions that

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Case 6.3 *(continued)*

are more efficient? Are there interventions that are more politically feasible?

People with higher incomes tend to be healthier, and there is some evidence that increasing income improves health. For example, the New York City Paycheck Plus demonstration program gave a random sample of single, low-income, childless, working-age adults a refundable tax credit of $2,000 (Courtin, Aloisi et al. 2020). (Members of the control group received the standard tax credit of $500.) At 32 months, those in the treatment group had modest reductions in extreme poverty and small improvements in health-related quality of life (but only for women).

The health effects of income supplementation have been small and variable (Gibson, Hearty, and Craig 2020). Providing low-income people with free or subsidized health insurance also effectively increases their incomes and reduces the cost of medical care. Borgschulte and Vogler (2020) concluded that Medicaid expansion reduced mortality by 3.6 percent. The main effects of Medicaid expansion appear to be attributable to expanded access to medical care (although reduced stress due to insurance coverage appears to have been a factor as well).

Improving housing is another strategy for improving health. Housing subsidies increase incomes and reduce the cost of better housing. (Because better apartments are often located in better neighborhoods, it is not clear whether the effects are attributable to housing or the environment.) For example, the Moving to Opportunity project gave a randomly chosen group of low-income families a restricted housing voucher that could only be used in low-poverty neighborhoods. Decades later, the children of families who had received restricted vouchers had higher incomes and better health than comparable children of families that received unrestricted vouchers (Zafari and Muennig 2020). In addition, lifetime counseling and medical costs were lower for the children whose families received restricted vouchers.

Another way to improve population health is to target behaviors that worsen health. Many smokers would like to quit, and smoking remains a leading cause of premature death (Müssener et al. 2020). Several effective programs exist, but smokers and physicians may not be aware of them.

A marketing campaign in Austin, Texas, sought to connect residents to a free, federally funded, evidence-based, smartphone-based

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Case 6.3 *(continued)*

smoking cessation program. Brown and colleagues (2020) concluded that the program had relatively low costs per life year saved.

Most adolescent smokers would also like to quit. Effective smoking cessation interventions exist, but many programs that work for adults do not work well for adolescents. In contrast, mHealth strategies that use mobile phone apps to enroll and support teenagers appear to be effective and low in cost (Müssener et al. 2020).

Discussion Questions

- Why is the contribution of medical care to improved health so modest?
- Can you reconcile this modest contribution with the evidence about Medicaid expansion?
- Is income supplementation an effective policy for improving health? Is it politically feasible?
- Has your state expanded its Medicaid program? What were the arguments for and against doing so?
- Are housing subsidies an effective policy for improving health? Are they politically feasible?
- Would you recommend that your state start a smoking cessation program for adults?
- Would you recommend that your state start a smoking cessation program for adolescents?
- Is there a national marketing campaign to link people to cessation resources?
- Do other health promotion programs work? What is the evidence?
- Is there a national marketing campaign to link people to these resources?

6.8 Conclusion

Interest in improving population health has grown, yet the evidence does not clearly tell us which interventions work or for whom. Taking the first step entails defining the issue (Barry and Saloner 2021). For example, reducing infant mortality or reducing obesity, both of which clearly improve population health, can steer policy choices. The next step is to make the problem

clear and seize opportunities to make policy changes. The third step is to make policy choices. What is effective? What is doable? What is fair? The ACA focused on expanding health insurance coverage and testing new payment systems. While some progress has been made, the gains from these choices appear to have been overwhelmed by the opioid epidemic and the COVID-19 pandemic.

The best evidence suggests that healthcare costs are high in the United States because prices are high, especially private prices. Among the initiatives discussed in this chapter, only reference pricing and (to a lesser extent) centers of excellence directly address prices. Private ACOs tend to shift care to less costly sites and may have indirect effects on price.

Medicare and Medicaid prices are lower than private prices. Their efforts to reduce spending emphasize delivering care more efficiently and more effectively (by decreasing low-value care and increasing high-value care), thus improving the health of beneficiaries. The early evidence from Medicare and Medicaid ACOs, bundled payments, and PCMHs is fairly positive. Spending seems to have grown more slowly, quality seems to have increased, and the patient experience may have improved.

One reason for the poor health of Americans may be our weak primary care system. Support for PCMHs and other health centers has enhanced the capacity of primary care—if only because it creates a model that allows nurses, nurse practitioners, and physician assistants to play a larger role. In addition, multiple insurers have initiated programs that pay primary care practices to coordinate care for patients with complex problems. This model can increase primary care revenues and capabilities, but it does not reduce payment system overhead costs.

The ACA expanded insurance coverage and changed the system of subsidies. Newly insured Medicaid and ACA marketplace enrollees received substantial subsidies. Before passage of the ACA in 2010, most subsides went to enrollees in employer-sponsored plans and Medicare. Standardization of dependent coverage and Medicaid expansion clearly improved health, but all expansions of coverage reduced the risk of medical bankruptcy. Whether viewed in this light or seen as an income supplement, coverage expansions improve population health, especially when focused on those with low incomes.

Federal, state, and local leaders have expressed renewed interest in improving population health. This concept encounters little opposition, but the specific policies proposed to improve population health are likely to face indifference or even opposition. The COVID-19 pandemic revealed a pattern of disinvestment in traditional public health initiatives (e.g., tracking infectious diseases, making water safe to drink, reducing environmental hazards). For other social determinants of health (e.g., poor housing, poor diet, unsafe

neighborhoods), new policies that are effective and politically acceptable are needed. Making healthcare safer, of higher quality, and more affordable are only a few parts of the efforts to improve health.

Exercises

6.1 Give an example of a modifiable social determinant of health.
6.2 What are some other examples of population health improvement initiatives?
6.3 What is an example of a modifiable social determinant of health that would be feasible for a health system in an ACO? For a health system not in an ACO? For an insurer?
6.4 Has your state launched any population health initiatives?
6.5 Why did hospitals have limited incentives to reduce readmissions prior to the ACA?
6.6 Where are reference prices being used? What have their effects been?
6.7 Go to the website of the Centers for Medicare & Medicaid Services Innovation Center (innovation.cms.gov) and see what ideas are being tested in a state of your choice.
6.8 Why would a healthcare system launch a medical home that reduces its revenues?
6.9 Why would a state seek to expand health centers? A county?
6.10 What are the differences between a narrow network and an ACO?
6.11 What recent evidence about ACOs can you find? Are they growing? Are they saving money? Do enrollees seem to like the care they get? Is the quality of care good?
6.12 What recent evidence about medical homes can you find? Are they growing? Are they saving money? Do enrollees like the care they get? Is the quality of care good?
6.13 What recent evidence about bundled payment programs can you find? Are they growing? Are they saving money? Do enrollees like the care they get? Is the quality of care good?
6.14 What recent evidence about Medicare Advantage HMOs can you find? Are they growing? Are they saving money? Do enrollees like the care they get? Is the quality of care good?
6.15 How much did cost per Medicare beneficiary go up last year? (The Kaiser Family Foundation publishes these data on its website at http://kff.org/state-category/medicare/).

6.16 Why would a health system want to participate in a trial of bundled payments?
6.17 What risk does a health system bear when it agrees to a bundled payment?
6.18 What risk does a health system bear when it agrees to accept capitation?
6.19 How are private insurance and Medicare subsidized?

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CHAPTER

7

THE DEMAND FOR HEALTHCARE PRODUCTS

Learning Objectives

After reading this chapter, students will be able to

- calculate sales and revenue using simple models,
- discuss the importance of demand in management decision-making,
- articulate why consumer demand is an important topic in healthcare,
- apply demand theory to anticipate the effects of a policy change,
- use standard terminology to describe the demand for healthcare products, and
- discuss the factors that influence demand.

Key Concepts

- The demand for healthcare products is complex.
- When a product's price rises, the quantity demanded usually falls.
- The amount a consumer pays directly is called the out-of-pocket price of that good or service.
- Because of insurance, the total price and the out-of-pocket price can differ markedly.
- Multiple factors can shift demand: changes in consumer income, insurance coverage, health status, prices of other goods and services, and tastes.
- Demand forecasts are essential to management.

7.1 Introduction

Demand is one of the central ideas of economics. It underpins many of the contributions of economics to public and private decision-making. Analyses of demand tell us that human wants are seldom absolute. More often they are conditioned by questions: Is it really worth it? Is its value greater than its cost? These questions are central to understanding healthcare economics.

demand
The amounts of a product that will be purchased at different prices when all other factors are held constant.

Demand forecasts are essential to management. Most managerial decisions are based on revenue projections. Revenue projections, in turn, depend on estimates of sales volume, given the prices that managers set. A volume estimate is an application of demand theory. Understanding the relationship between price and quantity must be part of every manager's toolkit. On an even more fundamental level, demand forecasts help managers decide whether to produce a certain product at all and how much to charge. For example, if you conclude that the direct costs of providing therapeutic massage are $48 and that you will need to charge at least $75 to have an attractive profit margin, will you have enough customers to make this service a sensible addition to your product line? Demand analyses are designed to answer such questions.

7.1.1 Rationing

On an abstract level, we need to ration goods and services (including medical goods and services) somehow. Human wants are infinite, or nearly so. Our capacity to satisfy those wants is finite. We must develop a system for determining which wants will be satisfied and which will not. **Market systems** use prices to ration goods and services. A price system costs relatively little to operate, is usually self-correcting (e.g., prices fall when the quantity supplied exceeds the **quantity demanded**, which tends to restore balance), and allows individuals with different wants to make different choices. These advantages are important. The problem is that markets work by limiting the choices of some consumers. As a result, even if the market *process* is fair, the market *outcome* may seem unfair. Wealthy societies typically view exclusion of some consumers from valuable medical services, perhaps because of low income or perhaps because of previous catastrophic medical expenses, as unacceptable.

market system
A system that uses prices to ration goods and services.

quantity demanded
The amount of a good or service that will be purchased at a specific price when all other factors are held constant.

The implications of demand are not limited to market-oriented systems. Demand theory predicts that if care is not rationed by price, it will be rationed by other means, such as waiting times, which are often inconvenient for consumers. In addition, careful analyses of consumer use of services have convinced most analysts that medical goods and services should not be free. If care were truly costless for consumers, they would use it until it offered them no additional value. Today this understanding is reflected in most public and private insurance plans.

Care cannot really be free. Someone must pay, somehow. Modern healthcare requires the services of highly skilled professionals, complex and elaborate equipment, and specialized supplies. Even the resources for which there is no charge represent a cost to someone.

7.1.2 Indirect Payments and Insurance

Because the burden of healthcare costs falls primarily on an unfortunate few, health insurance is common. Insurance creates another use for demand

analyses. To design sensible insurance plans, we need to understand the public's valuation of services. Insurance plans seek to identify benefits the public is willing to pay for. The public may pay directly (through out-of-pocket payments) or indirectly. Indirect payments can take the form of health insurance premiums, taxes, wage reductions, or higher prices for other products. Understanding the public's valuation is especially important in the healthcare sector because indirect payments are so common. When consumers pay directly, valuation is not very important (except for making revenue forecasts). Right or wrong, a consumer who refuses to buy a $7.50 bottle of aspirin from an airport vendor because it is "too expensive" is making a clear statement about value. In contrast, a Medicare patient who thinks coronary artery bypass graft surgery is a good buy at a cost of $1,000 is not providing us with useful information. The surgery costs more than $30,000, but the patient and taxpayers pay most of the bill indirectly. Because consumers purchase so much medical care indirectly, with the assistance of public or private insurance, assessing whether the values of goods and services are as large as their costs is often difficult.

7.2 Why Demand for Healthcare Is Complex

The demand for medical care is more complex than the demand for many other goods for four reasons:

1. The price of care often depends on insurance coverage. Insurance has powerful effects on demand and makes analysis more complex.
2. Healthcare decisions are often quite challenging. The links between medical care and health outcomes are often difficult to ascertain at the population level (where the average impact of care is what matters) and stunningly complex at the individual level (where what happens to the consumer is what matters). Forced to make hard choices, consumers may make bad choices.
3. This complexity contributes to consumers' poor information about costs and benefits of care. Such "rational ignorance" is natural. Because most consumers will not have to make most healthcare choices, it makes no sense for them to be prepared to do so.
4. The net effect of complexity and consumer ignorance is that producers have significant influence on demand. Consumers naturally turn to healthcare professionals for advice. Unfortunately, because they are human, professionals' choices are likely to reflect their values and incentives as well as those of their patients.

Demand is complicated by itself. To keep things simple, we will first examine the demand for medical goods and services in cases in which insurance and professional advice play no role. The demand for over-the-counter pharmaceuticals, such as aspirin, is an example. We will then add insurance to the mix but keep professional advice out. Finally, we will add the role of professional advice.

7.3 Demand Without Insurance and Healthcare Professionals

In principle, a consumer's decision to buy a particular good or service reflects a maddening array of considerations. For example, a consumer with a headache who is considering buying a bottle of aspirin must compare its benefits, as they perceive them, to those of the other available choices. Those choices might include taking a nap, going for a walk, taking another nonprescription analgesic, or consulting a physician.

Economic models of demand radically simplify descriptions of consumer choices by stressing three key relationships that affect the amounts purchased:

1. The impact of changes in the price of a product
2. The impact of changes in the prices of related products
3. The impact of changes in consumer incomes

demand curve A graph that describes how much consumers are willing to buy at different prices.

This simplification is valuable to firms and policymakers, who cannot change much besides prices and incomes. This focus can be misleading, however, if it obscures the potential impact of public information campaigns (including advertising).

7.3.1 Changes in Price

shift in demand A shift that occurs when a factor other than the price of the product (e.g., consumer income) changes. A shift in demand changes the entire price-quantity schedule (creating a new demand curve, not a movement along an existing curve).

The fundamental prediction of demand theory is that the quantity demanded will increase when the price of a good or service falls. The quantity demanded may increase because some consumers buy more of a product (as might be the case with analgesics) or because a larger proportion of the population chooses to buy a product (as might be the case with dental prophylaxis). Exhibit 7.1 illustrates this sort of relationship. On **demand curve** D_1, a price reduction from P_1 to P_2 increases the quantity demanded from Q_1 to Q_2.

Exhibit 7.1 also illustrates a **shift in demand**. At each price, demand curve D_2 indicates a lower quantity demanded than demand curve D_1. (Alternatively, at each volume, willingness to pay will be smaller with D_2.) This shift might be due to a drop in income, a drop in the price of a

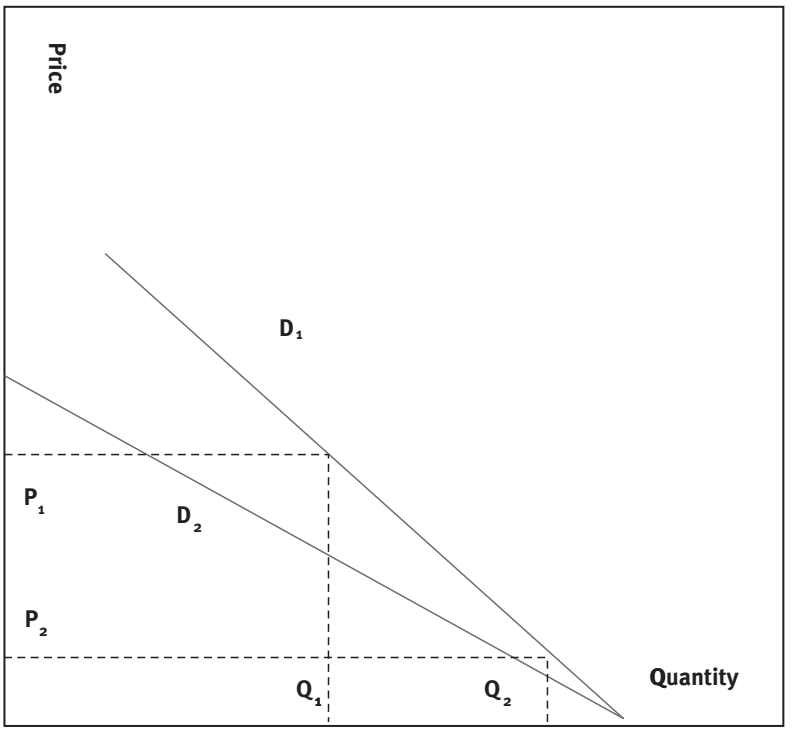

EXHIBIT 7.1
A Shift in Demand

substitute, an increase in the price of a **complement**, a change in demographics or consumer information, or other factors.

substitute
A product used instead of another product.

complement
A product used in conjunction with another product.

Demand curves can also be interpreted to mean that prices will have to be cut to increase sales. Consumers who are not willing to pay what the product now costs may enter the market at a lower price, or current consumers may use more of the product at a lower price. Demand curves are important economic tools. Analysts use statistical techniques to estimate how much the quantity demanded will change if the price of the product or other factors change.

Substitution explains why demand curves generally slope downward—that is, why consumption of a product usually falls if its price rises. Substitutes exist for most goods and services. When the price of a product is higher than that of its substitute, more people choose the substitute. Substitutes for aspirin include taking a nap, going for a walk, taking another nonprescription analgesic, and consulting a physician. If close substitutes are available, changes in a product's price could lead to large changes in consumption. If none of the alternatives are close substitutes, changes in a product's price will lead to smaller changes in consumption. Taking another nonprescription analgesic is a close substitute for taking aspirin, so we would anticipate that consumers would be sensitive to changes in the price of aspirin.

Substitution is not the only result of a change in price. When the price of a good or service falls, the consumer has more money to spend on all goods and services. Most of the time this income effect reinforces the substitution effect, so we can predict with confidence that a price reduction will cause consumers to buy more of that good. In a few cases, things get murkier. A rise in the wage rate, for example, increases the income you would forgo by reducing your work week. At first blush, you might expect that a higher wage rate would reduce your demand for time off. At the same time, though, a higher wage rate increases your income, which may mean more money for travel and leisure activities, increasing the amount of time you want off. In these cases, empirical work is necessary to predict the impact of a change in prices.

Two points about price sensitivity need to be made here. First, a general perception that use of most goods and services will fall if prices rise is a useful notion to keep tucked away. Second, managers need more precise guidance. How much will sales increase if I reduce prices by 10 percent? Will my total revenue rise or fall as a result? Answering these questions requires empirical analysis. Fleshing out general notions about price sensitivity with estimates is one of the tasks of economic analysis. We also need an agreed-upon terminology to talk about how much the quantity demanded will change in response to a change in income, the price of the product, or the prices of other products. Economists describe these relationships in terms of elasticities, which we will talk more about in chapters 8 and 9.

7.3.2 Factors Other than Price

Changes in factors other than the price of a product shift the entire demand curve. Changes in beliefs about the productivity of a good or service, preferences, the prices of related goods and services, and income can shift the demand curve.

Consumers' beliefs about the health effects of products are obviously central to discussions of demand. Few people want aspirin for its own sake. The demand for aspirin, as for most medical goods and services, depends on consumers' expectations about its effects on their health. These expectations have two dimensions. One dimension consists of consumers' beliefs about their own health. If they believe they are healthy, they are unlikely to purchase goods and services to improve their health. The other dimension consists of their perception of how much a product will improve health. If I have a headache but do not believe that aspirin will relieve it, I will not be willing to buy aspirin. Health status and beliefs about the capacity of goods and services to improve health underpin demand.

Demand is a useful construct only if consumer preferences are stable enough to allow us to predict responses to price and income changes and if price and income changes are important determinants of consumption

decisions. If on Tuesday, 14 percent of the population thinks that aspirin is something to avoid (whether it works or not), and on Friday, that percentage has risen to 24 percent, demand models will be of little use. We would need to track changes in attitude, not changes in price. Alternatively, if routine advertising campaigns could easily change consumers' opinions about aspirin, tracking data on incomes and prices would be of little use. Preferences are usually stable enough for demand studies to be useful, so managers can rely on them in making pricing and marketing decisions.

Changes in income and wealth usually result in shifts in demand. In principle, an increase in income or wealth could shift the demand curve either out (more consumption at every price) or in (less consumption at every price). Overall spending on healthcare clearly increases with income, but spending on some products falls with income. For example, as income and wealth increase, retirees reduce their use of informal home care (Rodrigues, Ilinca, and Schmidt 2018). For the most part, however, consumers with larger budgets buy more healthcare products.

Changes in the prices of related goods also shift demand curves. Related goods are substitutes (products used instead of the product in question) and complements (products used in conjunction with the product in question). A substitute need not be a perfect substitute; in some cases it is simply an alternative. For example, ibuprofen is a substitute for aspirin. A reduction in the price of a substitute usually shifts the demand curve in (reduced willingness to pay at every volume). If the price of ibuprofen fell, some consumers would be tempted to switch from aspirin to ibuprofen, and the demand for aspirin would shift in. Conversely, an increase in the price of a substitute usually shifts the demand curve out (increased willingness to pay at every volume). If the price of ibuprofen rose, some consumers would be tempted to switch from ibuprofen to aspirin, and the demand for aspirin would shift out.

7.4 Demand with Insurance

Insurance changes demand by reducing the price of covered goods and services. For example, a consumer whose dental insurance plan covers 80 percent of the cost of a routine examination will need to pay only $10 instead of the full $50. The volume of routine examinations will usually increase as a result of an increase in insurance coverage, primarily because a higher proportion of the covered population will seek this form of preventive care. The response will not typically be large, however. Most consumers will not change their decisions to seek care because prices have changed. But managers should recognize that some consumers will respond to price changes caused by insurance. (We will develop tools for describing responses to price changes and review the evidence on this score in chapter 8.)

Exhibit 7.2 depicts standard responses to increases in insurance. An increase in insurance (a higher share of the population covered or a higher share of the bill covered) rotates the demand curve from D_1 to D_2. As a result, the quantity demanded may rise, the price may rise, or both may occur. To predict the outcome more precisely we will need the tools of supply analysis that we will develop in chapter 10.

For provider organizations, an increase in insurance represents an opportunity to increase prices and margins. The rotation of D_2 has made it steeper, meaning that demand has become less sensitive to price. As demand becomes less sensitive to price, profit-maximizing firms will seek higher margins. (Higher margins mean that the cost of production will represent a smaller share of what consumers pay for a product.) Higher prices and increased quantity mean that the expansion of unmanaged insurance will result in substantial increases in spending.

cost sharing The general term for direct payments to providers by insurance beneficiaries. (Deductibles, copayments, and coinsurance are forms of cost sharing.)

Demand theory implies that having patients pay a larger share of the bill (usually termed increased **cost sharing**) should reduce consumption of care. Does it? A classic study by the RAND Corporation tells us that it does (Manning et al. 1987). The RAND Health Insurance Experiment randomly assigned consumers to different health plans and then tracked their use of care (see exhibit 7.3). Its fee-for-service sites had coinsurance rates of

EXHIBIT 7.2 The Impact of Insurance on Demand

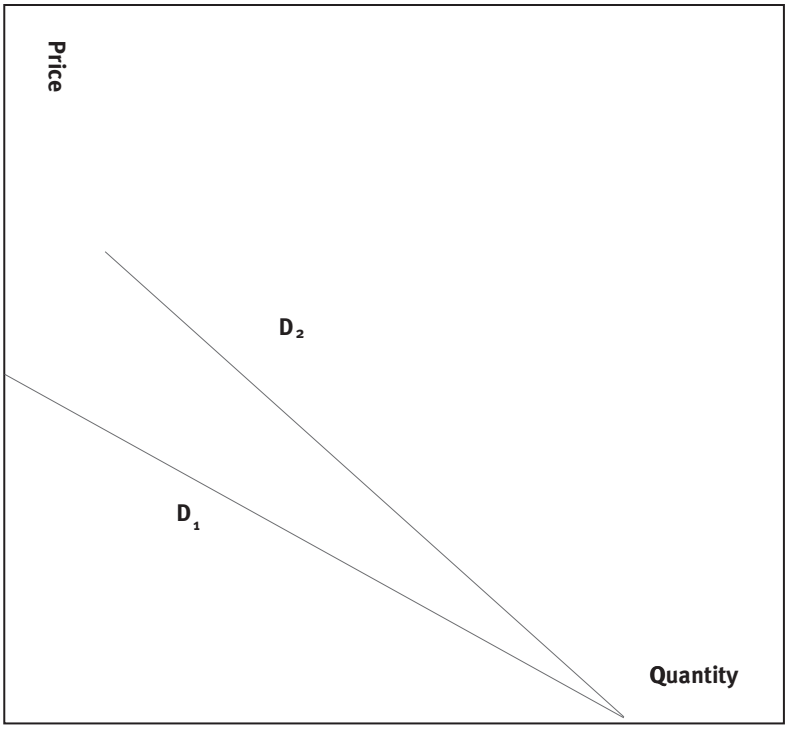

EXHIBIT 7.3 Effect of Coinsurance Rate

Coinsurance Rate	Spending	Any Use of Care	Hospital Admission
0%	$750	87%	10%
25%	$617	79%	8%
50%	$573	77%	7%
95%	$540	68%	8%

Source: Manning et al. (1987).

0 percent, 25 percent, 50 percent, and 95 percent. The health plans fully covered expenses above the **out-of-pocket maximum**, which varied from 5 percent to 15 percent of income. Spending was substantially lower for consumers who shared in the cost of their care. Increasing the coinsurance rate (the share of the bill that consumers pay) from 0 percent to 25 percent reduced total spending by nearly a fifth. This reduction had minimal effects on health.

out-of-pocket maximum A cap on the amount that the consumer has to pay out of pocket.

Costs were lower because consumers had fewer contacts with the healthcare system. The experiment went on for several years, and the suspicion that reducing use of care would increase spending later was not borne out. Based on the results of this study, virtually all insurance plans now incorporate some form of cost sharing for care initiated by patients.

CASE 7.1 CVS Health

CVS Health wants to transform the healthcare sector. The firm owns the insurer Aetna and CVS drugstores, many of which house MinuteClinics. The rationale for this arrangement is that MinuteClinics can serve some customers who might otherwise go to emergency rooms (thereby reducing costs for customers and for Aetna). In addition, CVS hopes to expand sales of other products to customers who seek care at a MinuteClinic (Tully 2021).

MinuteClinic started in 2000, and as of 2021, it had more than 1,100 locations (CVS 2021). Its clinics are staffed by nurse practitioners and physician assistants, rather than physicians. The clinics are open seven days a week, and appointments are not needed. The nurse practitioners and physician assistants diagnose, treat, and write

(continued)

Case 7.1 *(continued)*

prescriptions for a variety of common illnesses. MinuteClinics show customers the prices of care (typically less than the prices in a physician's office) and usually accept insurance. Most clinics are in CVS pharmacies, although an increasing number are in other sites and some have connections with local health systems.

Discussion Questions

- For what products is MinuteClinic a substitute?
- For what products is it a complement?
- How would continued expansion of MinuteClinics affect revenues of primary care practices?
- What attributes other than prices would make MinuteClinics attractive to patients?
- Is the supply of primary care physicians large enough to meet current levels of demand?
- Would you expect expansion of Minute Clinics to increase or decrease spending? Why?
- What are the implications of Aetna's sale to CVS?
- A common criticism is that MinuteClinics locate in well-to-do areas. Is this a concern?

7.5 Demand with Advice from Providers

Consumers are often rationally ignorant about the healthcare system and the decisions they need to make. They are ignorant because medical decisions are complex, because they are unfamiliar with their options, because they lack the skills and information they need to compare their options, and because they lack time to make a considered judgment. This ignorance is rational because consumers do not know what choices they will have to make, because the cost of acquiring skills and information is high, and because the benefits of acquiring these skills and information are unknown.

Consumers routinely deal with situations in which they are ignorant. Few consumers really know whether their car needs a new constant velocity joint, whether their roof should be replaced or repaired, or whether they should sell their stock in Cerner Corporation. Of course, consumers know they are ignorant. They often seek an **agent**, someone who is knowledgeable and can offer advice that advances the consumers' interests. Most people with medical problems choose a physician to be their agent.

agent
A person who provides services and recommendations to clients (who are called *principals*).

Using an agent reduces, but does not eliminate, the problems associated with ignorance. Agents sometimes take advantage of **principals** (the ignorant consumers they represent). Taking advantage can range from out-and-out fraud (e.g., lying to sell a worthless insurance policy) to simple shirking (e.g., failing to check the accuracy of ads for a property). If consumers can identify poor agent performance, fairly simple remedies further reduce the problems associated with ignorance. In many cases an agent's reputation is of paramount importance, so agents have a strong incentive to please principals. In other cases, simply delaying payment until a project has been successfully completed substantially reduces agency problems.

principal
The organization or individual represented by an agent.

Problems arise when consumers have difficulty distinguishing bad outcomes from bad performance on the part of an agent. This problem is common. Did your house take a long time to sell because the market weakened unexpectedly or because your agent recommended that you set the price too high? Was your baby born by cesarean section to preserve the baby's health or to preserve your physician's weekend plans? Most contracts with agents are designed to minimize these problems by aligning the interests of the principal and the agent. For example, real estate agents earn a share of a property's sale price so that both the agent and the seller profit when the property is sold quickly at a high price. In similar fashion, earnings of mutual fund managers are commonly based on the total assets they manage, so managers and investors profit when the value of the mutual fund increases.

Agency models have several implications for our understanding of demand. First, what consumers demand may depend on incentives for providers. Agency models suggest that changes in the amount paid to providers, the way providers are paid, or providers' profits may change their recommendations for consumers. For example, consumers may respond to a lower price for generic drugs only because pharmacists have financial incentives to recommend them. Second, provider incentives will affect consumption of some goods and services more than others. Provider recommendations will not affect patients' initial decisions to seek care. And where standards of care are clear and generally accepted, providers are less apt to change their recommendations when their incentives change. When a consensus about standards of care exists, providers who change their recommendations in response to financial incentives risk denial of payment, identification as a low-quality provider, or even malpractice suits. Third, patients with chronic illnesses are often quite knowledgeable about the therapies they prefer. When patients have firm preferences, agency is likely to have less effect on demand. In short, agency makes the demand for medical care more complex.

Agency is one of the most important factors that makes managed care necessary. (That insurance plans must protect consumers from virtually all the costs of some very expensive procedures, so out-of-pocket costs need to

fall to near zero, is the other main factor.) If all the parties to a healthcare transaction had all the same information, expenditures could be limited simply by changing consumer out-of-pocket payments. In many cases, though, provider incentives need to be aligned with consumer goals. (Of course, health plans also have an agency relationship with beneficiaries, and nothing guarantees that plans will be perfect agents.) Most of the features of managed care address the agency problem in one way or another. Bundled payments for services and capitation are designed to give physicians incentives to recommend no more care than is really necessary. Primary care gatekeepers are supposed to monitor recommendations for specialty services (from which they derive no financial benefit).

Case 7.2 Colonoscopy

Colonoscopy screens for colorectal cancer, which is quite common and quite treatable in its early stages (CDC 2021). Colonoscopy involves inserting a long, flexible viewing tube into the colon. Because it requires a highly skilled team, colonoscopy is expensive. It also requires that patients prepare for the procedure, and many patients find this burdensome. The preparation involves at least a day of fasting followed by a powerful laxative. Not surprisingly, many patients have not had the recommended number of colon cancer screenings, even though the Affordable Care Act required coverage by most insurers.

There are alternatives to colonoscopy, and some insurers are encouraging use of them (Span 2021). The best known is a fecal immunochemical test, which tests a stool sample for traces of blood. It is much less expensive and requires no preparation.

Discussion Questions

- How did increased insurance coverage affect the demand for colonoscopies?
- How did the COVID-19 pandemic affect the demand for colonoscopies?
- What are some of the other substitutes for colonoscopies?
- How well do colonoscopy substitutes work?
- How would an improvement in a substitute affect the demand for colonoscopies?

(continued)

Case 7.2 *(continued)*

- What are some complements for a colonoscopy?
- How would an improvement in a complement affect the demand for colonoscopies?
- Are gastroenterologists perfect agents in their colonoscopy recommendations?

7.6 Conclusion

Demand is one of the central ideas of economics, and managers need to understand the basics of demand. In most cases, sales of a product falls when its price increases, and studies of healthcare products confirm this generalization. An understanding of this relationship between price and quantity is part of effective management. Without it, managers cannot predict sales, revenues, or profits.

To make accurate forecasts, managers also must be aware of the effects of factors they do not control. Demand for their products will be higher when the price of complements is lower or the price of substitutes is higher. In most cases, demand will be higher in areas with higher incomes. We will explore how to make forecasts in more detail in chapter 8.

The demand for healthcare products is complex. Insurance and professional advice have significant effects on demand. Insurance means that three prices exist: the out-of-pocket price the consumer pays, the price the insurer pays, and the price the provider receives. The quantity demanded will usually fall when out-of-pocket prices rise, but it may not change when the other prices do. Because professional advice is important in consumers' healthcare decisions, the incentives professionals face can influence consumption of some products. How and how much professionals are paid can affect their recommendations, and recognition of this effect has helped spur the shift to managed care. To change patterns of consumption, managers may need to change incentives for patients and providers.

Exercises

7.1 Is the idea of demand useful in healthcare, given the important role of agents?

7.2 Should medical services be free? Justify your answer.

7.3 Why might a consumer be "rationally ignorant" about the proper therapy for gallstones?

7.4 Why do demand curves slope down (i.e., sales volume usually rises at lower prices)?

7.5 Why would consumers ever choose insurance plans with large deductibles?

7.6 During the last five years, average daily occupancy at Autumn Acres nursing home has slid from 125 to 95 even though Autumn Acres has cut its daily rate from $125 to $115. Do these data suggest that occupancy would have been higher if Autumn Acres had raised its rates? What changes in non-price demand factors might explain this change? (The supply, or the number of nursing home beds in the area, has not changed during this period.)

7.7 Your hospital is considering opening a satellite urgent care center about five miles from your main campus. You have been charged with gathering demographic information that might affect the demand for the center's services. What data are likely to be relevant?

7.8 How would each of the following changes affect the demand curve for acupuncture?

a. The price of an acupuncture session increases.
b. Online sessions on stretching reduce back problems.
c. Medicare reduces the copayment for acupuncture from $20 to $10.
d. The surgeon general issues a warning that back surgery is ineffective.
e. Medicare stops covering back surgery.

7.9 Your boss has asked you to describe how the demand for an over-the-counter sinus medication would change in the following situations. Assuming the price does not change, forecast whether the sales volume will go up, remain constant, or go down.

a. The local population increases.
b. A wet spring leads to a bumper crop of ragweed.
c. Factory closings lead to a drop in the area's average income.
d. A competing product with a different formula is found to be unsafe.
e. A research study showing that the medication causes severe dizziness is published.
f. The price of another sinus medication drops.

7.10 A community has four residents. The table below shows the number of dental visits each resident will have. Calculate the total quantity demanded at each price. Then graph the relationship between price and total quantity, with total quantity on the horizontal axis.

Price	Abe's Quantity	Beth's Quantity	Cal's Quantity	Don's Quantity
$40	0	0	0	1
$30	0	1	0	1
$20	0	1	0	2
$10	1	2	1	2
$0	1	2	1	3

7.11 A clinic focuses on three services: counseling for teens and young adults, smoking cessation, and counseling for young parents. An analyst has developed a forecast of the number of visits each group will make at different prices. Calculate the total quantity demanded at each price. Then graph the relationship between price and total quantity, putting total quantity on the horizontal axis.

Price	Teen Counseling	Smoking Cessation	Parent Counseling
$80	10	0	0
$60	15	1	0
$40	20	2	0
$20	40	4	6
$0	50	6	8

7.12 The price-quantity relationship has been estimated for the new prostate cancer blood test: $Q = 4{,}000 - 20 \times P$. Use a spreadsheet to calculate the quantity demanded and total spending for prices ranging from $200 to $0, using $50 increments. Calculate the quantity and revenue for each price.

Price	Quantity	Revenue
$200	0	$0
$150	1,000	$150,000
$100	2,000	$200,000
$50	3,000	$150,000
$0	4,000	$0

7.13 A physical therapy clinic faces a demand equation of $Q = 200 - 1.5 \times P$, where Q is sessions per month and P is the price per session.
   a. The clinic currently charges $80. What is its sales volume and revenue at this price?
   b. If the clinic raised its price to $90, what would happen to volume and revenue?
   c. If the clinic lowered its price to $70, what would happen to volume and revenue?

7.14 Researchers have concluded that the demand for annual preventive clinic visits by children with asthma equals $1 + 0.00004 \times \Upsilon - 0.04 \times P$. In this equation Υ represents family income and P represents price.
   a. Calculate how many visits a child with a family income of $100,000 will make at prices of $200, $150, $100, $50, and $0. If you predict that visits will be less than zero, convert your answer to zero.
   b. Now repeat your calculations for a child with a family income of $35,000.
   c. How do your predictions for the two children differ?
   d. Assume that the market price of a preventive visit is $100. Does this system seem fair? What fairness criteria are you using?
   e. Would your answer change if the surgeon general recommended that every child with asthma have at least one preventive visit each year?

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CHAPTER

8

ELASTICITIES

Learning Objectives

After reading this chapter, students will be able to

- describe economic relationships with elasticities,
- use elasticity terms appropriately, and
- apply elasticities to make simple forecasts.

Key Concepts

- Managers can use elasticities to forecast sales and revenues.
- Elasticities measure the association between the quantity demanded and related factors.
- Elasticities are ratios of percentage changes, so they are scale free.
- Income, price, and cross-price elasticities are used most often.
- Income elasticities are usually positive but quite small.
- Price elasticities are usually negative.
- Cross-price elasticities may be positive or negative.

8.1 Introduction

Elasticities are valuable tools for managers. Armed only with basic marketing data and reasonable elasticity estimates, managers can make sales, revenue, and marginal revenue forecasts. In addition, elasticities are ideal for analyzing "what if" questions. What will happen to revenues if we raise prices by 2 percent? What will happen to our sales if the price of a substitute drops by 3 percent?

Elasticities reduce confusion in descriptions. For example, suppose the price of a 500-tablet bottle of generic ibuprofen rose from $7.50 to $8.00. Someone who was seeking to downplay the size of this increase (or someone whose focus was on the cost per tablet) would say that the price rose from

1.5 cents to 1.6 cents per tablet. Describing this change in percentage terms would eliminate any confusion about price per bottle or price per tablet, but a potential source of confusion remains.

To avoid confusion in calculating percentages, economists recommend being explicit about the values used to calculate percentage changes. For example, one might say that the price increase to $8.00 represents a 6.67 percent increase from the starting value of $7.50.

income elasticity
The percentage change in the quantity demanded divided by the percentage change in income. For example, if visits were 0.04 percent higher for consumers with incomes that were 1 percent higher, the income elasticity would equal 0.04 = 0.0004/0.010.

8.2 Elasticities

An elasticity measures the association between the quantity demanded and related factors. For example, Ghosh, Simon, and Sommers (2019) used statistical techniques to estimate that the price elasticity for pharmaceuticals was –0.05. This means that a 10 percent price increase would reduce sales by less than 1 percent. As we shall see, these apparently esoteric estimates can be quite valuable to managers.

First, we need to learn a little more about elasticities. Economists routinely calculate three demand elasticities:

1. Income elasticities, which quantify the association between the quantity demanded and consumer income
2. Price elasticities, which quantify the association between the quantity demanded and the product's price
3. Cross-price elasticities, which quantify the association between the quantity demanded and the prices of a **substitute** or **complement**

substitute
A product used instead of another product (e.g., using home health services for rehabilitation rather than a rehabilitation hospital). Substitutes have positive cross-price elasticities.

complement
A product used in conjunction with another product (e.g., home health is a complement for joint replacement surgery). Complements have negative cross-price elasticities.

Elasticities are ratios of percentage changes. For example, the income elasticity of demand for visits would equal the ratio of the percentage change in visits (dQ/Q) associated with a given percentage change in income ($d\Upsilon/\Upsilon$). (The mathematical terms dQ and $d\Upsilon$ identify small changes in consumption and income.) So, the formula for an income elasticity would be $(dQ/Q)/(d\Upsilon/\Upsilon)$. The formula for a price elasticity would be $(dQ/Q)/(dP/P)$, and the formula for cross-price elasticity would be $(dQ/Q)/(dR/R)$. (A cross-price elasticity measures the response of demand to changes in the price of a substitute or complement, so R is the price of a related product.)

Assume that the estimate of the income elasticity for physician visits is 0.04. This implies that 0.04 = the percentage change in volume divided by the percentage change in income. Suppose we wanted to know how much higher than average the visits per person would be in an area where the average income is 2 percent higher than the national average. To answer this

question, we multiply both sides of the equation by 0.02 and find that visits should be 0.0008 (0.08 percent) higher in an area with income 2 percent above the national average. From the perspective of a working manager, what matters is the conclusion that visits will be only be slightly higher in the wealthier area.

8.3 Income Elasticities

Consumption of most healthcare products increases with income, but only slightly. As exhibit 8.1 shows, consumption of healthcare products appears to increase more slowly than income. As a result, healthcare spending will represent a smaller proportion of income among high-income consumers than among low-income consumers.

Variable	Estimate	Source
Total expenditures	0.81	Barati and Fariditavana (2020)
Hospital admissions	0.02 to 0.04	Newhouse and Phelps (1976)
Physician visits	0.01 to 0.04	Newhouse and Phelps (1976))

EXHIBIT 8.1 Selected Estimates of the Income Elasticity of Demand Elasticities

8.4 Price Elasticities of Demand

The **price elasticity of demand** is even more useful because prices depend on choices managers make. Estimates of the price elasticity of demand will guide pricing and contracting decisions, as chapter 9 will explore in more detail.

price elasticity of demand The ratio of the percentage change in sales volume associated with a percentage change in a product's price. For example, if prices rose by 2.5 percent and the quantity demanded fell by 7.5 percent, the price elasticity would be –3.00 = –0.075/0.025.

Managers need to be careful in using the price elasticity of demand for three reasons. First, because the price elasticity of demand is almost always negative, we need a special vocabulary to describe the responsiveness of demand to price. For example, –3.00 is a smaller number than –1.00, but –3.00 implies that demand is more responsive to changes in prices (a 1 percent rise in prices results in a 3 percent drop in sales rather than a 1 percent drop in sales). Second, changes in prices affect revenues directly and indirectly, through changes in quantity and changes in prices. Managers need to keep this fact in mind when using the price elasticity of demand. Third, there are two very different price elasticities of demand that managers need to consider: the overall price elasticity of demand and the price elasticity of demand for their firm's products.

elastic
A term that describes demand when the quantity demanded changes by a larger percentage than the price. For example, a price elasticity of –4.55 would signify elastic demand. (This term is usually applied only to price elasticities of demand.)

Economists usually speak of price elasticities of demand (but not other elasticities) as being **elastic** or **inelastic**. When a change in price results in a larger percentage change in the quantity demanded, the price elasticity of demand will be less than –1.00, and demand is said to be elastic. When price change results in a smaller percentage change in the quantity demanded, the price elasticity of demand will be between 0.00 and –1.00, and demand is said to be inelastic.

Exhibit 8.2 shows that the demand for medical care is usually inelastic. It is important to recognize that inelastic demand still responds to price changes. Suppose that, in forecasting the demand response to a 3.5 percent price cut, we use an elasticity of –0.20. Predicting that sales will rise by 0.7 percent ($0.007 = -0.035 \times -0.2$), we anticipate that this price cut will increase by a small amount.

EXHIBIT 8.2 Selected Estimates of the Price Elasticity of Demand

Variable	Estimate	Source
Total spending	–0.44	Ellis, Martins, and Zhu (2017)
Total spending	–0.20	Manning et al. (1987)
Inpatient	–0.30	Ellis, Martins, and Zhu (2017)
Outpatient	–0.29	Ellis, Martins, and Zhu (2017)
Emergency department	–0.04	Ellis, Martins, and Zhu (2017)

inelastic
A term that describes demand when the quantity demanded changes by a smaller percentage than the price. For example, a price elasticity of –0.55 would signify inelastic demand. (This term is usually applied only to price elasticities of demand.)

Case 8.1 The Curious Case of Daraprim

In August 2015, Turing Pharmaceuticals raised the price of the drug Daraprim from $13.50 a tablet to $750, an increase of more than 5,000 percent (Erdman and Gumbrecht 2020). At the time, Daraprim was the only available treatment for toxoplasmosis, a rare infection that can be deadly for patients with weakened immune systems. With the price increase, a patient's treatment could cost up to $634,000. Daraprim's patent expired in 1953, and it can be compounded for less than a dollar per tablet.

Two contradictory trends are evident. Generic drug prices have been declining in the United States since at least 2010, yet many

(continued)

Case 8.1 *(continued)*

generic drugs have risen in price (Kaplan 2021). The price increases generate far more attention than the price decreases, yet the structure of the market has not changed.

In the United States, pharmaceutical prices (indeed, most medical prices) are based on negotiations between private insurers and suppliers. The US market has two features that are uncommon in other countries. First, pharmacy benefit managers often act as intermediaries between insurers and suppliers. Second, the federal government plays a very limited role in negotiating prices. Although the US Department of Veterans Affairs negotiates drug prices for its beneficiaries, private firms negotiate for Medicare.

Discussion Questions

- Would you expect demand for Daraprim to be elastic or inelastic? Why?
- What change in the market would make demand for Daraprim more elastic? Less?
- What would the out-of-pocket cost for Daraprim be for a patient on Medicare? Medicaid?
- What would the price elasticity be after a patient exceeded her out-of-pocket maximum?
- Why did other companies not start making versions of Daraprim?
- Did Turing Pharmaceuticals violate any laws or regulations when it raised the price?
- Could a company have raised the price of a drug like this in Canada? France? Australia?
- Companies have also raised prices for other off-patent drugs. Can you explain why?
- Can you offer examples of large price increases for off-patent drugs?
- What should the United States do about cases such as Daraprim?
- Should the federal government negotiate pharmaceutical prices? Why? Why not?
- Should someone else negotiate pharmaceutical prices? Who? Why? Why not?

8.5 Other Elasticities

cross-price elasticity of demand
The ratio of the percentage change in sales volume associated with a percentage change in another product's price. For example, if prices of the other product rose by 2.0 percent and the quantity demanded fell by 5.0 percent, the cross-price price elasticity would be –0.05/0.02, which equals –2.50.

The **cross-price elasticity of demand** describes how sales change when the price of a related product changes. This might sound esoteric, but it has practical implications. For example, how does use of hospital services change when the price of primary care changes? Alternatively, how does the demand for outpatient or emergency care change if drug copays change? These are important questions for the design of health insurance plans. Unfortunately, the evidence is contradictory.

For example, among their other effects, insurance expansions reduce the out-of-pocket price for primary care. In some instances, this scenario has led to an increase in emergency department use, suggesting that primary care is a complement for emergency department care. In other cases, it has led to a reduction in emergency department use, suggesting that primary care is a substitute (Sommers and Simon 2017).

8.6 Using Elasticities

Elasticities are useful forecasting tools. With an estimate of the price elasticity of demand, a manager can quickly estimate the impact of a price cut on sales and revenues. As we noted earlier, though, managers need to use the correct elasticity. Most estimates of the overall price elasticity of demand fall between –0.10 and –0.40. For the market as a whole, demand is typically inelastic. For individual firms, in contrast, demand is usually elastic. The reason is quite simple. Most healthcare products have few close substitutes, but the products of one healthcare organization represent close substitutes for the products of another.

The price elasticity of demand that individual firms face typically depends on the overall price elasticity and the firm's market share. So, if the price elasticity of demand for hospital admissions is –0.17 and a hospital has a 12 percent share of the market, the hospital needs to anticipate that it faces a price elasticity of –0.17/0.12, or –1.42. This rule of thumb need not hold exactly, but there is good evidence that individual firms confront elastic demand. Indeed, as we will show in chapter 9, profit-maximizing firms should set prices high enough that demand for their products is elastic.

Armed with a reasonable estimate of the price elasticity of demand, we will now predict the impact of a 5 percent price cut on volume. If the price elasticity faced by a physician firm were –2.80, a 5 percent price cut should increase the number of visits by 14 percent, which is the product of –0.05 and –2.80. (Prudent managers will recognize that their best guess about the

price elasticity will not be exactly right and repeat the calculations with other values. For example, if the price elasticity is really –1.40, volume will increase by 7 percent. If the price elasticity is really –4.20, volume will increase by 21 percent.)

How much will revenues change if we cut prices by 5 percent and the price elasticity is –2.80? Obviously, revenues will rise by less than volume does because we have reduced prices. A rough, easily calculated estimate of the change in revenues is the percentage change in prices plus the percentage change in volume. Prices will fall by 5 percent and quantity will rise by 7 to 21 percent, so revenues should rise by approximately 2 to 16 percent. Our baseline estimate is that revenues will rise by 9 percent. If costs rise by less than this percentage, profits will rise.

Case 8.2 Should Sodas Be Taxed?

One in five adults is obese in wealthy countries around the world. Unfortunately, in the United States, the rate is about two in five (OECD 2021). Major causes appear to be sweet drinks and added sugars in other products. According to the Centers for Disease Control and Prevention, frequently consuming sweetened beverages is associated with obesity, heart disease, kidney diseases, cavities, and a variety of other diseases (CDC 2021).

Despite the obesity epidemic, subsidies for crops that can be refined into sugar—corn, wheat, rice, sorghum, and others—continue. The subsidies reduce the prices of products containing sugars. These products include sodas, sweetened teas, and other products.

A few local governments have enacted taxes on sweetened beverages, but no taxes have passed at the state or federal level. In 2014, Mexico implemented a tax of one peso per liter of sugar-sweetened beverage. An analysis concluded that the Mexican tax would prevent 239,000 cases of obesity and more than 60,000 cases of diabetes, and it would save more than 55,000 life years (Basto-Abreu et al. 2019). Implementation of such a tax in the United States should be relatively simple and effective. However, a proposal to enact such a tax in the United States did not make it out of committee in the House of Representatives. Paarlberg, Mozaffarian, and Micha (2017) argue that a

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Case 8.2 *(continued)*

17 percent tax on sweetened beverages would reduce consumption by 15 percent.

Discussion Questions

- What price elasticity does Paarlberg, Mozaffarian, and Micha's estimate imply?
- Can you find another estimate of the price elasticity of demand for sweetened drinks?
- Is the demand for sweetened drinks elastic or inelastic?
- If the price of soda rose by 5 percent, how much would sales drop?
- What are substitutes for sweetened drinks?
- Can you find an estimate of the cross-price elasticity of demand for sweetened drinks?
- Is water a substitute or complement for soda?
- Based on your answer to the previous question, should the cross-price elasticity be positive?
- Do you favor a tax on sweetened drinks? Why? Why not?
- Do you favor a tax on added sugars? Why? Why not?
- How could a health system reduce sugar consumption? Should it try?

8.7 Conclusion

An elasticity is the percentage change in one variable that is associated with a 1 percent change in another variable. Elasticities are simple, valuable tools that managers can use to forecast sales and revenues. Elasticities allow managers to apply the results of sophisticated economic studies to their organizations.

Three elasticities are common: income elasticities, price elasticities, and cross-price elasticities. Income elasticities measure how much demand varies with income; price elasticities measure how much demand varies with the price of the product itself; and cross-price elasticities measure how much demand varies with the prices of complements and substitutes. Of these, price elasticity is the most important, because it guides pricing and contracting decisions.

Virtually all price elasticities of demand for healthcare products are negative, reflecting that higher prices generally reduce the quantity demanded. Overall, demand is generally inelastic, meaning a price increase will result in a smaller percentage reduction in sales. In most cases, though, the demand for an individual organization's products will be elastic, meaning

that a price increase will result in a larger percentage reduction in sales. This difference is based on ease of substitution. There are few good substitutes available for broadly defined healthcare products, so demand is inelastic. In contrast, the products of other healthcare providers are usually good substitutes for the products of a particular provider, so demand is elastic. When making decisions, managers must consider that their organization's products face elastic demands.

Exercises

8.1 Why are elasticities useful for managers?

8.2 Why are price elasticities called "elastic" or "inelastic" when other elasticities are not?

8.3 Why is the demand for healthcare products usually inelastic?

8.4 Why is the demand for an individual firm's healthcare products usually elastic?

8.5 Per capita income in the county was $40,000 and physician visits averaged 4.00 per person per year. Per capita income has risen to $42,000 and physician visits have risen to 4.02 per person per year. What is the percentage change in visits? What is the percentage change in income? What is the income elasticity of demand for visits?

Percentage change in visits = income elasticity × percentage change in income.

8.6 The average number of visits per week equal 640 when the copayment is $40, but the copayment may rise to $45. You believe that the price elasticity of demand is –0.25. Forecast the percentage change in visits.

Percentage change in visits = price elasticity × percentage change in price.

If you are right, prices may rise by 12.5% = 5/40. So, your forecast is that visits will drop by 3.125%, a decline of 20.

8.7 Sales were 4,000 at a price of $200, but your practice might increase its price to $220. Since other practices are unlikely to increase their prices, you anticipate that the price elasticity of demand will be –2.00. Forecast the percentage change in sales.

8.8 Per capita income in the county was $45,000 and physician visits averaged 3.4 per person per year. Per capita income has risen to $50,000 and physician visits have risen to 3.5 per person per year. What is the income elasticity of demand for visits?

8.9 The price elasticity of demand is –1.2. Is demand elastic or inelastic?

8.10 The price elasticity of demand is –0.12. Is demand elastic or inelastic?

8.11 If the income elasticity of demand is 0.2, how would the volume of services change if income rose by 10 percent?

8.12 You are a manager for in a regional health system. Using an estimate of the price elasticity of demand of –0.25, calculate how much ambulatory visits will change if you raise prices by 5 percent.

8.13 If the cross-price elasticity of clinic visits with respect to pharmaceutical prices is –0.18, how much will ambulatory visits change if pharmacy prices rise by 5 percent? Are pharmaceuticals substitutes for or complements to clinic visits?

8.14 If the cross-price elasticity of clinic visits with respect to emergency department prices is 0.21, how much will ambulatory visits change if emergency department prices rise by 5 percent? Are emergency department visits substitutes for or complements to clinic visits?

8.15 If the income elasticity of demand is 0.03, how much will ambulatory visits change if incomes rise by 4 percent?

8.16 A study estimates that the price elasticity of demand for Lipitor was –1.05, but the price elasticity of demand for statins as a whole was –0.13. Why is demand for Lipitor more elastic than for statins as a whole? What would happen to revenues if the makers of Lipitor raised prices by 10 percent? What would happen to industry revenues if all manufacturers raised prices by 10 percent? Why are the answers so different? Does this difference make sense?

8.17 The price elasticity of demand for the services of Kim Jones, MD, is –4.0. The price elasticity of demand for physicians' services overall is –0.1.

a. Why is demand so much more elastic for the services of Dr. Jones than for the services of physicians in general?

b. If Dr. Jones cut prices by 10 percent, how much would volume and revenue change?

c. If all local physicians cut prices by 10 percent, how much would total visits and revenue change?

d. Why does it make sense that are your answers to questions b and c are so different?

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CHAPTER

9

FORECASTING

Learning Objectives

After reading this chapter, students will be able to

- articulate the importance of a good sales forecast,
- describe the attributes of a good sales forecast,
- apply demand theory to forecasts, and
- use simple forecasting tools appropriately.

Key Concepts

- Making and interpreting forecasts are important jobs for managers.
- Forecasts are planning tools, not rigid goals.
- Sales and revenue forecasts are applications of demand theory.
- Changes in demand conditions usually change forecasts.
- Good forecasts should be easy to understand, easy to modify, accurate, transparent, and precise.
- Forecasts combine history and judgment.
- Assessing external factors is vital to forecasting.

9.1 Introduction

Making and interpreting forecasts are important jobs for managers. Sales forecasts are especially important because many decisions hinge on what the organization expects to sell. Pricing decisions, staffing decisions, product launch decisions, and other crucial decisions are based on the organization's revenue and sales forecasts.

Inaccurate or misunderstood forecasts can hurt businesses. The organization can hire too many workers or too few. It can set prices too high or too low. It can add too much equipment or too little. At best, these sorts of forecasting problems will cut into profits; at worst, they may drive an organization out of business.

The consequences of bad or misapplied forecasts are particularly serious in healthcare. For example, underestimating the level of demand in the short term may result in stock shortages at a pharmacy or too few nurses on duty at a hospital. In both cases, the healthcare organization will suffer financially and, more important, put patients at risk. It will suffer because the costs of meeting unexpected demand are high and because the long-term consequences of failing to meet patients' needs are significant. The best outcome in this case will be unhappy patients; the worst outcome will be that physicians stop referring patients to the organization.

Overestimating sales can also have serious long-term effects. A hospital may add too many beds because its census forecast was too high. This surplus will depress profits for some time because the facility will have hired staff and added equipment to meet its overestimated forecast, and the costs of hiring and paying new employees and buying new equipment will substantially exceed actual sales profits. In extreme cases, bad forecasts may drive a firm out of business. A facility that borrows heavily in anticipation of higher sales that do not materialize may be unable to repay those debts. Bankruptcy may be the only option.

Sales and revenue forecasts are applications of demand theory. The factors that change sales and revenues also change demand. The most important influences on demand are the price of the product, rivals' prices for the product, prices for complements and substitutes, and demographics. Recognizing these influences can simplify forecasting considerably, because it focuses our attention on tracking what has changed.

9.2 What Is a Sales Forecast?

A sales forecast is a projection of the number of units (e.g., bed days, visits, doses) an organization expects to sell. The forecast must specify the time frame, marketing plan, and expected market conditions for which it is valid.

A forecast is a planning tool, not a rigid goal. Conditions may change. If they do, the organization's plan needs to be reassessed. Good management usually involves responding effectively to changes in the environment, not forging ahead as though nothing has shifted. In addition, fixed sales goals create incentives to behave opportunistically (that is, for employees to try to meet their goals instead of the organization's goals). For example, sales staff may harm the organization by making overblown claims of a product's effectiveness to meet their sales goals, even though their actions will harm the company in the long run. Alternatively, sales managers may bid on unprofitable managed care contracts just to meet goals.

Whenever possible, a sales forecast should estimate the number of units expected to be sold, not revenues. The number of units to be sold determines staffing, materials, working capital, and other needs. In addition,

costs often vary unevenly with volume. A small reduction in volume may save an entire shift's worth of wages (thereby avoiding considerable cost), or an increase in sales may incur a small cost increase if it requires no additional staff or equipment.

The dollar volume of sales can vary in response to factors that do not affect the resources needed to produce, market, or service sales. Discounts and price increases are examples of such factors. Revenues can vary even though neither volume nor costs change. Finally, managers can easily forecast revenue given a volume forecast. In general, managers should build their revenue estimates on sales volume estimates.

Good forecasts have five attributes. They should be

1. easy to understand,
2. easy to modify,
3. accurate (i.e., they contain the most probable actual values),
4. transparent about how variable they are, and
5. precise (i.e., they give the analyst as little wiggle room as possible).

These attributes often conflict. Managers may need to underplay how imprecise simple forecasts are because their audience is not prepared to consider variation. As Oehmen et al. (2020) point out, forecasts are often quite wrong. Disruptive events are fairly common, whether they be a pandemic, a war, or a disruptive innovation. Nonetheless, many decision makers are more comfortable working with a single, very precise estimate, even though it may be inaccurate. Precision and accuracy always conflict because a more precise forecast (80 to 85 visits per day) will always be less accurate than a less precise forecast (70 to 95 visits per day). Offering decision makers several precise scenarios is usually a good compromise. For example, busy decision makers generally can use a forecast like this: "Our baseline forecast is 82 visits per day for the next three months; our low forecast is 75 visits per day, and our high forecast is 89 visits per day."

Case 9.1 Forecasting Supply Use

More and more healthcare institutions are seeking to reduce costs while increasing the quality of care. Accurately forecasting the use of medical supplies is an important element of this effort, as overordering supplies drives up costs and underordering supplies can also drive up costs and compromise care.

(continued)

Case 9.1
(continued)

The stakes can be quite high. BJC HealthCare is a large organization serving the greater St. Louis, Missouri, area. A pilot program in a small number of services reduced inventory by 23 percent, cut the expiration rate to less than 1 percent, and realized savings of more than $3 million (Cardinal Health 2021). The pilot used RFID (radiofrequency identification) technology to track holdings and monitor use.

Cardinal Health, a major distributor of pharmaceuticals, laboratory, and medical products, and Zipline announced a joint effort to offer on-demand autonomous aircraft delivery to retail pharmacies. The collaboration aims to reduce the risk of inventory stock-outs, thus allowing pharmacies to hold smaller drug inventories.

Many hospitals have expanded their use of just-in-time inventory management (Kutty 2020). This strategy reduces, but does not eliminate, the need for forecasting accuracy. Some supplies are highly specialized and used intermittently, so they must be ordered well in advance. The savings can be substantial, as the hospital needs less supply space and reduces overordering of supplies. The COVID-19 pandemic, however, revealed that just-in-time inventory management can break down when supply chains are disrupted. As a result of this breakdown, hospitals faced shortages of personal protective equipment, which put staff and patients at risk. So, just-in-time inventory management requires a good forecast and a contingency plan to deal with unexpected disruptions. Unfortunately, as the pandemic has taught us, the past often offers a poor guide to the future.

Discussion Questions

- What share of hospital costs do supplies represent?
- Why would overordering supplies drive up costs?
- Why would underordering supplies drive up costs?
- What inventory management problems did the pandemic expose?
- Can you offer examples of Lean inventory management? Does it work well?
- Can you offer examples of just-in-time inventory management? Does it work well?
- Can you offer examples of supplies that have to be available at all times?
- What are the main challenges to making accurate forecasts of supply use in hospitals?

(continued)

Case 9.1 *(continued)*

- How would you forecast supply use in the emergency department? Why?
- How would you forecast supply use in hospital clinics? Why?
- Would you use judgment in making these forecasts? Why?
- Would you use statistical models in making these forecasts? Why?
- How are supply chain forecasts different for hospitals than for retail? For manufacturing?

9.3 Forecasting

All forecasts combine history and judgment. History is the only real source of data. For example, sales can be forecast only on the basis of data on past sales of a product, past sales of similar products, past sales by rivals, or past sales in other markets. History is an imperfect guide to the future, but it is an essential starting point.

Judgment is also essential. It provides a basis for deciding what data to use, how to use the data, and what statistical techniques, if any, to use. In many cases (such as introductions of new products or new competitive situations), managers who have insufficient data will have to base their forecasts mainly on judgment.

As mentioned in section 9.2, a forecast must specify the time frame, marketing plan, and expected market conditions for which it is valid. Changes in any of these factors will change the forecast.

A forecast applies to a given period. Extrapolating to a longer or shorter period is risky; conditions may change. The time frame varies according to the forecast's use. For example, a staffing plan may need a forecast for only the next few weeks. Additional staff can be hired over a longer time horizon. In contrast, budget plans usually need a forecast for the coming year. Organizations usually set their budgets a year in advance on the basis of projected sales. Strategic plans usually need a forecast for the next several years. Longer forecasts are generally less detailed and less reliable, but managers know to take these factors into account when they develop and use them.

Forecasts should be as short term as possible. A forecast for next month's sales will usually be more accurate than forecasts for the distant future, which are likely to be less accurate because important facts will have changed. Your competitors today are likely to be your competitors in a month. Your competitors in two years are likely to be different from your competitors today, so a forecast based on current market conditions will be poor.

Marketing plan changes will influence the forecast. A clinic that increases its advertising expects visits to increase. A forecast that does not consider this increase will usually be inaccurate. Increasing discounts to pharmacy benefits managers should result in increased sales for a pharmaceutical firm. Again, a forecast that does not account for additional discounts will usually be deficient. Any major changes in an organization's marketing efforts should change forecasts. If they do not, the organization should reassess the usefulness of its marketing initiatives.

percentage adjustment
An increase or decrease in the average of the past *n* periods. (The adjustment is essentially a best guess of what is expected to happen in the next year.)

Changes in market conditions also influence forecasts. For example, a major plant closing would probably reduce a local plastic surgeon's volume. Plant employees who had intended to undergo plastic surgery may opt to delay this elective procedure, and prospective patients who work for similar plants may defer discretionary spending in fear that they too may lose their jobs. Alternatively, a hospital closure will probably cause a competing hospital to forecast more inpatient days. Historical data have limited value in projecting such an effect if a similar closure has not occurred in the past. Approval of a new drug by the US Food and Drug Administration should cause a pharmaceutical firm to forecast a decrease in sales for its competing product. This sort of change in market conditions is familiar, and the firm's marketing staff will probably draw on experience to predict the loss.

moving average
The unweighted mean of the previous *n* data points.

seasonalized regression analysis
A least squares regression that includes variables that identify subperiods (e.g., weeks) that historically have had above- or below-trend sales.

Analysts routinely use three forecasting methods: **percentage adjustment**, **moving averages**, and **seasonalized regression analysis**. If the data are adequate and the market has not changed too much, seasonalized regression analysis is the preferred method. However, whether the data are adequate and whether the market has changed too much are judgment calls.

Percentage adjustment increases or decreases the last period's sales volume by a percentage that the analyst deems sensible. For example, if a hospital had an average daily census of 100 the previous quarter, and an analyst expects the census to fall an average of 1 percent per quarter, a reasonable forecast would be a census of 99. Because of its simplicity, managers often use percentage adjustment; however, this simplicity is also a shortcoming. In principle, a manager can use any percentage adjustment. Without some requirement that percentage adjustments be well justified, this approach may not yield very accurate forecasts. For example, a manager might justify a request for a new position based on a forecast that average daily census will increase by 5 percent, even though the average daily census has been falling for the last 14 quarters. In addition, percentage adjustment does not allow for seasonal effects. (Seasonal effects are systematic tendencies for particular days, weeks, months, or quarters to have above- or below-average volume.)

Demand theory can be used to add rigor to percentage adjustment. For example, if the price of a product has changed, an estimate of the percentage change in sales can be calculated by multiplying the percentage change in

price by the price elasticity of demand. So, if an organization chooses to raise prices by 3 percent and faces a price elasticity of demand of –4, sales will drop by 12 percent. Similar calculations can be used if the price of a substitute, the price of a complement, or consumer income changes.

The moving average method uses the average of data from recent periods to forecast sales. This method works well for short-term forecasts, although it tends to hide emerging trends and seasonal effects. Exhibit 9.1 shows census data and a one-year moving average for a sample hospital.

EXHIBIT 9.1 Census Data for a Sample Hospital

Quarter	Census	Moving Average	First Quarter	Second Quarter	Third Quarter	Trend
1	99		1	0	0	1
2	109		0	1	0	2
3	101		0	0	1	3
4	107		0	0	0	4
5	104	104.0	1	0	0	5
6	116	105.3	0	1	0	6
7	100	107.0	0	0	1	7
8	106	106.8	0	0	0	8
9	103	106.5	1	0	0	9
10	107	106.3	0	1	0	10
11	90	104.0	0	0	1	11
12	105	101.5	0	0	0	12
13	102	101.3	1	0	0	13
14	94	101.0	0	1	0	14
15	98	97.8	0	0	1	15
16	104	99.8	0	0	0	16
17	99	99.5	1	0	0	17
18	105	98.8	0	1	0	18
19	94	101.5	0	0	1	19
20	102	100.5	0	0	0	20
21	100	100.0	1	0	0	21
22		100.3				

EXHIBIT 9.1 Census Data for a Sample Hospital (continued)

Seasonalized Regression Model			
	Coefficient	***t*-statistic**	
Intercept	108.811	40.90	$R^2 = 0.55$
First quarter	−3.968	−1.53	$F(4,20) = 4.98$
Second quarter	0.732	0.27	$p = 0.01$
Third quarter	−8.534	−3.16	
Trend	−0.334	−2.16	

Exhibit 9.1 also illustrates the calculation of a seasonalized regression format. Microsoft Excel was used to estimate a regression model with a trend (a variable that increases in value as time passes) and three quarter indicators. The variable Q1 has a value of 1 if the data are from the first quarter; otherwise, its value is 0. Q2 equals 1 if the data are from the second quarter, and Q3 equals 1 if the data are from the third quarter. For technical reasons, the average response in the fourth quarter is represented by the constant. A negative regression coefficient for trend indicates that the census is trending downward. The results also show that the typical third-quarter census is smaller than average because the coefficient for Q3 is large, negative, and statistically significant.

The forecast based on seasonalized regression analysis is calculated as follows: 108.811 + (−0.334 × 22) + 0.732. Here, 108.811 is the estimate of the constant, −0.334 is the estimate of the trend coefficient, 22 is the quarter to which the forecast applies, and 0.732 is the estimate of the Q2 coefficient. Therefore, the seasonalized forecast is 102.2, slightly higher than the forecast based on the moving average. Overall the seasonalized forecast is a little more accurate than the one-year moving average. The **mean absolute deviation** for the regression is 2.3 for periods 5 through 21, and the mean absolute deviation for the moving average is 4.0.

mean absolute deviation The average absolute difference between a forecast and the actual value. (It is absolute because it converts both 9 and −9 to 9.) The Excel function = ABS() performs this conversion.

Exhibit 9.2 shows an overview of the forecasting process. The main message of this exhibit is that a forecast is one part of the overall product management process. In addition, the forecast will change as managers' assessments of relevant internal factors (e.g., cost and quality), external factors (e.g., the competitive environment and payment levels), and the marketing plan change.

A naive forecast uses the value for the last period as the forecast for the next period— in other words, a 0 percent adjustment forecast. Exhibit 9.3 shows an example of a naive forecast. A moving-average forecast uses the average of the last *n* values, where *n* is the number of preceding values used in the forecast. For example, the first entry in the Two-Period Moving-Average column in Exhibit 9.3 equals (189 + 217) ÷ 2, or = 203.

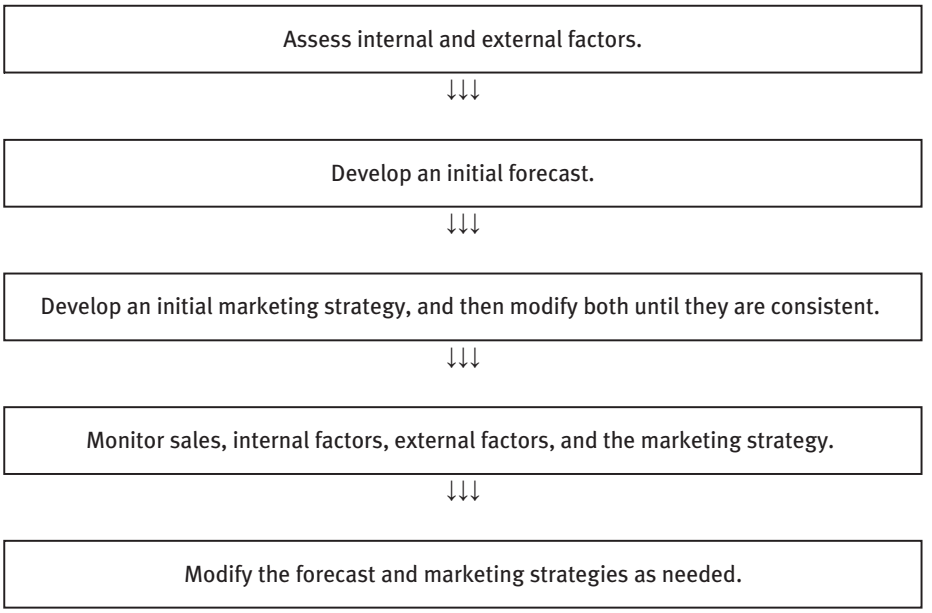

EXHIBIT 9.2 An Overview of the Forecasting Process

Month	Sales	Naïve Forecast	Two-Period Moving-Average Forecast
February	189		
March	217	189	
April	211	217	203
May	239	211	214
June	234	239	225
July	243	234	236.5

EXHIBIT 9.3 Simple Forecasting Techniques: Naive and Moving-Average Forecasts

To compare forecasting techniques, analysts sometimes use the mean absolute deviation, which is the average of the forecast's absolute deviations from the actual value. (When using the absolute deviation, it does not matter whether a value is higher or lower than the actual value; all the deviations are positive numbers.) For April through July, the naive forecast has a mean absolute deviation of 12.0, and the two-period moving-average forecast has a mean absolute deviation of 12.1. From this perspective, the naive forecast performs a little better.

These (and other) mechanistic forecasting methods do not allow managers to explore how changes in the environment are likely to affect sales.

How would changes in insurance coverage change sales? Naive forecasts and moving-average forecasts are little help in such situations.

9.4 What Matters?

Assessment of external factors (i.e., factors beyond the organization's control) is vital to forecasting. General economic conditions are a prime example. Expected inflation and interest rates are good indicators of the state of the economy. Local market conditions, such as business rents and local wages, also play an important role.

Government actions also can have a major impact on healthcare firms. For example, changes in Medicare rates affect most healthcare firms. Alternatively, regulations can have a significant effect on costs. Expansion of Medicaid eligibility can have major effects on some hospitals and minor effects on others. Keep in mind that these sorts of changes will also affect most of your competitors, but forecasters would be ill-advised to ignore changes in government policy.

The plans of key competitors must also be considered. Closure of a competing clinic or hospital can increase volume significantly and quickly. Introduction of a generic drug can have a dramatic effect on a pharmaceutical manufacturer. Changes in competitors' pricing policies can have a major impact on sales.

Technological change is always an important issue. If a rival gains a technological advantage, your sales can drop sharply. For example, if a rival introduces minimally invasive coronary artery bypass graft surgery, admissions to your cardiac unit will probably drop significantly until you adopt similar technology. In other cases, your own advances may affect sales of substitute products. For example, introduction of highly reliable MRI may sharply reduce the demand for conventional colonoscopy. Keep in mind, however, that if you do not introduce technologies that add value for your customers, someone else will. A decision not to introduce an attractive product because it will cannibalize sales is usually a mistake.

Finally, although markets usually change slowly, differences in general market characteristics (e.g., median income and percentage with insurance coverage) may be important in forecasting sales of a new product.

Assessment of internal factors (i.e., factors within an organization's control) is also vital to forecasting. For example, existing production may limit sales, or it may have limited sales in the past. If so, changes in capacity or productivity need to be considered. Changes in the availability of resources and personnel can also have a powerful effect on sales. For many healthcare organizations, the entry or exit of a key physician can dramatically shape

volume. In addition, changes in the size, support, composition, and organization of the sales staff can affect sales dramatically. For instance, a small drug firm may experience a large increase in sales if one of its products is marketed by a larger firm's sales staff.

Failures or improvements in key systems can also have dramatic effects on sales. Breakdowns in a clinic's phone or scheduling system may drive away a clinic's potential customers. Fixing the phone system, in contrast, might be the most effective marketing campaign the clinic ever launched.

Case 9.2 Mistakes to Avoid When Making Forecasts

Business plans require a sales forecast. However, forecasts tend to be overly optimistic and overly precise (Castle, Clements, and Hendry 2019). The participants in the forecasting process tend to be enthusiastic managers who do not appreciate how reliant on recent history forecasts are. Tim Berry (2021), a writer for Bplans, sees three common mistakes in business plans:

- They forecast "hockey stick" revenue growth.
- They forecast smoothly rising trend lines.
- They lack convincing evidence of market size.

"Hockey stick" revenue growth means limited revenues initially followed by explosive growth. This type of growth may be appealing to executives and investors, because it suggests that the business opportunity might be extremely valuable.

Smoothly rising trend lines do not seem plausible from an economic standpoint. The number of customers and their consumption of any product are typically finite. Furthermore, any true blockbuster product will attract competition.

Every new product faces a complex environment: features and benefits, competitive environment, regulatory conditions, payment models, distribution, pricing, market positioning, and so forth. A genuinely new product will have multiple unknowns in its market. If there are not unknowns, it is not really a new product. A convincing forecast demands market research, an honest recognition of what is not known, and a strategy for resolving some of the unknowns.

(continued)

Case 9.2 *(continued)*

Discussion Questions

- Why are many sales forecasts overly optimistic?
- What's the downside of an overly optimistic forecast?
- What's problematic about a "hockey stick" forecast?
- Can you find an example of a product that displayed "hockey stick" revenue growth?
- What is problematic about a smoothly rising trend line forecast?
- Can you find an example of a product that displayed smoothly rising revenue growth?
- From an economic point of view, what is implausible about smoothly rising trend lines?
- Can you find an example of a product that wildly underperformed early forecasts?
- Can you find an example of a product that wildly overperformed early forecasts?
- What external factors might cause below-forecast sales? Above-forecast sales?
- What internal factors might cause below-forecast revenues? Above-forecast revenues?
- What are examples of new products with uncertain prospects in healthcare?

9.5 Conclusion

Making and interpreting forecasts are important tasks for healthcare managers. Not only are most crucial decisions based on sales forecasts, but also the consequences of overestimating or underestimating demand can be catastrophic. Overestimating demand can put the financial future of an organization at risk, whereas underestimating demand can compromise the care of patients and harm the organization's reputation.

Analysts should apply demand theory to their sales forecasts to better recognize changes. Demand theory limits what analysts need to consider: the price of the product, the price of substitutes, and the price of complements. The key idea of demand theory is that the out-of-pocket price is what drives most consumer demand. The amount the consumer has to pay depends largely on the terms of his or her insurance contract. Is the product covered? What is the required copayment? Changes in the answers to these two questions can shift sales sharply. The same concerns affect the prices of substitutes.

The most important substitutes are similar products offered by rivals, but other products that meet some of the same needs should also be considered.

Demographic factors are important. Population size, income per capita, the age distribution of the population, the ethnic makeup of the population, and the insurance coverage of the population are some examples. Although vital, demographic factors tend to be stable in the short term. Demographics are much more important in long-range forecasts.

An old saying notes that "Forecasting is hard, especially when it involves the future." This reveals a core truth about forecasting: you often will be wrong. Knowing that, a shrewd manager will make decisions that can be modified as conditions change. The shrewd manager will also know which data are likely to be the most problematic or most variable and will monitor those data carefully.

Management decisions require sales forecasts. Off-the-cuff forecasts often fail to consider key factors and can lead to risky decisions. Imperfect forecasts can be used to make decisions as long as you recognize that your predictions will sometimes be wrong and you structure your decisions accordingly.

Exercises

9.1 The table below lists visits for each of the four clinics operated by your health system. You anticipate that volumes will increase by 4 percent next year. Forecast the number of visits for each clinic, and explain what assumptions underlie your forecasts. For example, are you sure that all the clinics can serve additional clients?

Period	Clinic 1	Clinic 2	Clinic 3	Clinic 4	Total
This year	16,640	41,600	24,960	33,280	116,480
Next year	?	?	?	?	121,139

9.2 New data for the clinics in exercise 9.1 suggest that clinic 2 is operating at capacity and is highly efficient. Its output is unlikely to increase. Furthermore, clinic 4 has unused capacity but is unlikely to attract additional patients. How would these facts change your answer to exercise 9.1? Continue to assume that overall volume will rise to 121,139.

9.3 You estimate that the price elasticity of demand for clinic visits is –0.25. You anticipate that a major insurer will increase the copayment from $20 to $25. This insurer covers 40,000 of your

patients, and those patients average 2.5 visits per year. What is your forecast of the change in the number of visits?

9.4 A major employer has just added health insurance coverage for its employees. Consequently, 5,000 of your patients will pay a $30 copayment rather than the list price of $100 per visit. These patients average 2.2 visits per year. You believe the price elasticity of demand is between –0.15 and –0.35. What is your forecast of the change in the number of visits?

9.5 The table below shows data on asthma-related visits. Is there evidence that these visits vary by quarter? Can you detect a trend? A powerful test would be to run a multiple regression in Microsoft Excel. (To do this, you will need the free Analysis ToolPak for your version of Excel. In Excel for Microsoft 365, if the function is already loaded, you will find it under Data > Data Analysis > Regression. If it is not loaded, go to File > Options > Add-ins to load it.) To test for quarterly differences, create a variable called Q1 that equals 1 if the data are for the first quarter and 0 otherwise, a variable called Q2 that equals 1 if the data are for the second quarter and 0 otherwise, and a variable called Q4 that equals 1 if the data are for the fourth quarter and 0 otherwise. (Because you will accept the default, which is to have a constant term in your regression equation, do not include an indicator variable for quarter three.) Also create a variable called Trend that increases by 1 each quarter.

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
2014			1,513	1,060
2015	1,431	1,123	994	679
2016	1,485	886	1,256	975
2017	1,256	1,156	1,163	1,062
2018	1,200	1,072	1,563	531
2019	1,022	1,169		

9.6 Your marketing department estimates that Medicare urology visits equal $5 - (1.0 \times C) + (-6.5 \times TO) + (5 \times TR) + (0.01 \times \Upsilon)$. Here, C denotes the Medicare copayment (now $20); TO is waiting time in your clinic (now 30 minutes), TR is waiting time in your competitor's clinic (now 40 minutes), and Υ is per capita income (now $40,000).

a. How many visits do you anticipate?
b. Medicare's allowed fee is $120. What revenue do you anticipate?
c. What might change your forecast of visits and revenue?

9.7 Because of fluctuations in insurance coverage, the average price paid out of pocket (P) by patients of an urgent care center varied, as the table shows. The number of visits per month (Q) also varied, and an analyst believes the two are related. The analyst also thinks the data show a trend. Run a regression of Q on P and *Period* to test these hypotheses. Then use the estimated parameters a, b, and c and the values of *Month* and P to predict Q (number of visits). The prediction equation is: $Q = a + (b \times Month) + (c \times P)$.

Month	1	2	3	4	5	6	7	8	9	10	11	12
P	$21	$18	$15	$24	$18	$21	$18	$15	$20	$19	$24	$20
Q	193	197	256	179	231	214	247	273	223	225	198	211

9.8 Use the data in exercise 9.7 to answer these questions:
a. Calculate the naive estimator, which is $Q_t = Q_{t-1}$.
b. Calculate the two-period moving-average forecast.
c. Calculate the mean absolute deviation for the regression forecast, the naive forecast, and the two-period moving-average forecast.
d. Which forecast seems to perform the best? Why?

9.9 Sales data are displayed in the tables.

Month	Sales
February	224
March	217
April	211
May	239
June	234
July	243
August	238
September	243
October	251
November	259
December	270

Month	Sales
January	260
February	284
March	280
April	271
May	302
June	286
July	297
August	301
September	309
October	314

a. Calculate the naive estimator, which is $Sales_t = Sales_{t-1}$.
b. Calculate the two-period and three-period moving averages.
c. Calculate the mean absolute deviation for each of the forecasting methods.

9.10 A pharmaceutical company produces a sinus medicine. Monthly sales (in thousands of doses) for the past three years are shown in the table.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
6,788	8,020	1,848	410	586	2,260	2,232	8,018	9,384	6,916	5,698	6,940
9,136	7,420	3,350	1,998	1,972	3,572	4,506	10,474	13,358	8,232	8,218	10,248
9,628	7,826	3,528	2,126	2,070	3,762	4,754	11,010	14,040	8,646	8,634	10,782

a. Develop a regression model that allows for trend and seasonal components. Obtain the Excel output for this model.
b. Calculate a two-period moving-average forecast.
c. Compare the mean absolute deviations for these approaches.
d. Use one of these models to forecast sales for each month of year 3.

9.11 Why are sales forecasts important?

9.12 Why are sales forecasts often wrong?

9.13 Can an incorrect forecast be useful?

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CHAPTER

10

SUPPLY AND DEMAND ANALYSIS

Learning Objectives

After reading this chapter, students will be able to

- define demand and supply curves,
- interpret demand and supply curves,
- use demand and supply analysis to make simple forecasts, and
- identify factors that shift demand and supply curves.

Key Concepts

- A supply curve describes how much producers are willing to sell at different prices.
- A demand curve describes how much consumers are willing to buy at different prices.
- At the equilibrium price, producers want to sell the amount that consumers want to buy.
- Markets generally move toward equilibrium outcomes.
- Expansion of insurance usually makes the equilibrium price and quantity rise.
- Regulation and technology influence the supply of medical goods and services.
- Demand and supply curves shift when a factor other than the product price changes.

10.1 Introduction

Markets are in a constant state of flux. Prices rise and fall. Volumes rise and fall. New products succeed at first and then fall by the wayside. Familiar products falter and revive. Economics teaches us that underneath the seemingly random fluctuations of healthcare markets, systematic patterns can be detected. Understanding these patterns requires an understanding of supply

and demand. Even though healthcare managers need to focus on the details of day-to-day operations, they also need an appreciation of the overview that supply and demand analysis can give them.

The basics of supply and demand illustrate the usefulness of economics. Even with little data, managers can forecast the effects of changes in policy or demographics using a supply and demand analysis. For example, the impact of added taxes on hospitals' prices, the impact of increased insurance coverage on the output mix of physicians, and the impact of higher electricity prices on pharmacies' prices can be analyzed. Supply and demand analysis is a powerful tool that managers can use to make broad strategic decisions or detailed pricing decisions.

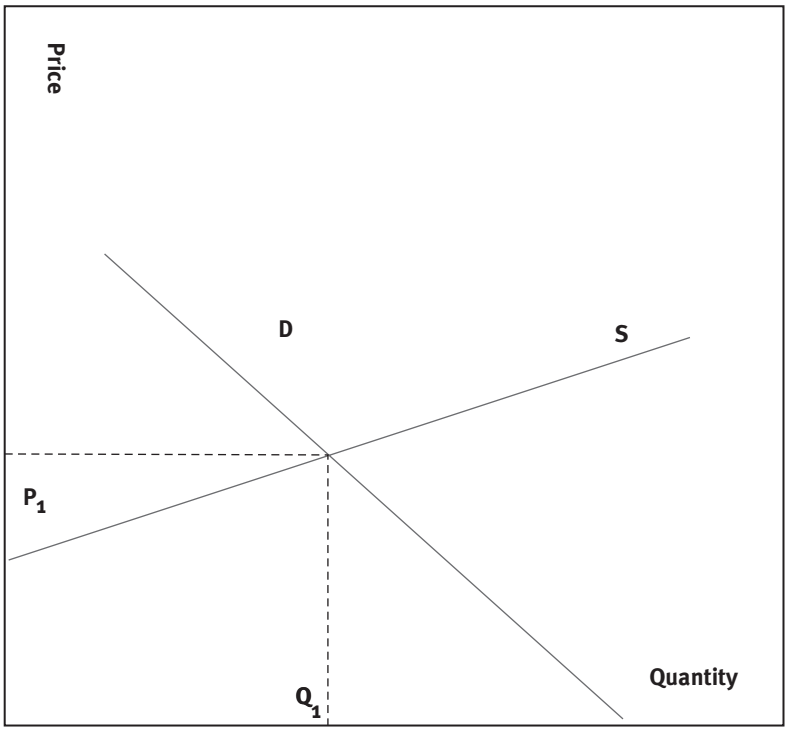
10.1.1 Supply Curves

Exhibit 10.1 is a basic supply and demand diagram. The vertical axis shows the price of the good or service. In this simple case, the price sellers receive is the same price buyers pay. (Insurance and taxes complicate matters, because the price the buyer pays is different from the price the seller receives.) The horizontal axis shows the quantity customers bought and producers sold.

supply curve
A graph that depicts how much producers are willing to sell at different prices.

The **supply curve** (labeled S) describes how much producers are willing to sell at different prices. From another perspective, it describes what the

EXHIBIT 10.1
Equilibrium



price must be to induce producers to be willing to sell different quantities. The supply curve in exhibit 10.1 slopes upward, as do most supply curves. This upward slope means that, when the price is higher, producers are willing to sell more of a good or service or more producers are willing to sell a good or service. When the price is higher, producers are more willing to add workers, equipment, and other resources to sell more. In addition, higher prices allow firms to enter a market they could not enter at lower prices. When prices are low, only the most efficient firms can profitably participate in a market. When prices are higher, firms with higher costs can also earn acceptable profits.

10.1.2 Demand Curves

The demand curve (labeled D) describes how much consumers are willing to buy at different prices. From another perspective, it describes how much the marginal consumer (the one who would not make a purchase at a higher price) is willing to pay at different levels of output. The demand curve in exhibit 10.1 slopes downward, meaning that for producers to sell more of a product, its price must be cut. Such a sales increase might be the result of an increase in the share of the population that buys a good or service, an increase in consumption per purchaser, or some mix of the two.

10.1.3 Equilibrium

The demand and supply curves intersect at the **equilibrium price** and quantity. At the equilibrium price, the amount producers want to sell equals the amount consumers want to buy. In exhibit 10.1, consumers want to buy 60 units and producers want to sell 60 units when the price is $100.

equilibrium price
The price at which the quantity demanded equals the quantity supplied. (There is no shortage or surplus.)

Markets tend to move toward equilibrium points. If the price is above the equilibrium price, producers' sales forecasts will not be met. Sometimes producers cut prices to sell more. Sometimes producers cut production. Either strategy tends to equate supply and demand. Alternatively, if the price is below the equilibrium price, consumers will quickly buy up the available stock. To meet this **shortage**, producers may raise prices or produce more. Either strategy tends to equate supply and demand.

shortage
A situation that occurs when the quantity demanded at the prevailing price exceeds the quantity supplied. (The best indication of a shortage is that prices are rising.)

Markets will not always be in equilibrium, especially if conditions change quickly, but the incentive to move toward equilibrium is strong. Producers typically can change prices faster than they can increase or decrease production. A high price today does not mean a high price tomorrow. Prices are likely to fall as additional capacity becomes available. Likewise, a low price today does not mean a low price tomorrow. Prices are likely to rise as capacity decreases. We will explore this concept in more detail in our examination of the effects of changes in insurance on the incomes of primary care physicians.

10.1.4 Professional Advice and Imperfect Competition

Two notes of caution are warranted. Healthcare markets are complex. The influence of professional advice on consumer choices is a complication of particular concern. The assumption that changes in supply will not affect consumers' choices (i.e., demand) can be misleading. If changes in factors that ought not to affect consumers' choices (such as providers' financial arrangements with insurers) influence providers' recommendations, a supply and demand analysis that does not take this effect into account could be equally misleading. Even more important, few healthcare markets fit the model of a competitive market (i.e., a market with many competitors who perceive they have little influence on the market price). We must condition any analysis on the judgment that healthcare markets are competitive enough that conventional supply curves are useful guides. In markets that are not competitive enough, producers' responses to changes in market conditions are likely to be more complex than supply curves suggest. This text focuses on applications of demand and supply analysis in which neither providers' influence on demand nor imperfect competition is likely to be a problem.

10.2 Demand and Supply Shifts

A movement along a demand curve is called a change in the quantity demanded. In other words, a movement along a demand curve traces the link between the price consumers are willing to pay and the quantity they demand. Demand and supply analysis is most useful to healthcare managers, however, in understanding how the equilibrium price and quantity will change in response to shifts in demand or supply. This application helps managers the most. With limited information, a working manager can sketch the impact of a change in policy on the markets of most concern.

What factors might cause the demand curve to shift to the right (greater demand at every price or higher prices for every quantity)? We need detailed empirical work to verify the responses of demand to market conditions, but the standard list of responses is short. Typically, a shift to the right results from an increase in income, an increase in the price of a substitute (a good or service used instead of the product in question), a decrease in the price of a complement (a good or service used along with the product in question), or a change in tastes.

Economists often use mathematical notation to describe demand. $Q = D(P,Y)$ is an example of this notation. It says that the quantity demanded varies with prices (represented by P) and income (represented by Y), which means that quantity, the relevant prices, and income are systematically related. A demand curve traces this relationship when income and all prices other than the price of the product itself do not change.

What factors might cause the supply curve to shift to the right (greater supply at every price or lower prices at every quantity)? Typically, a shift to the right results from a reduction in the price of an input, an improvement in technology, or an easing of regulations. In mathematical notation, we can describe supply as $Q = S(P,W)$. Here, W represents the prices of inputs (factors such as such as labor, land, equipment, buildings, and supplies that a business uses to produce its product). Unless technology or regulations are the focus of an analysis, we do not make their role explicit.

Case 10.1 Worrying About Demand Shifts

More than 12 million Americans rely on long-term services and supports in home, community, or institutional settings. This number may more than double by 2050 (Favreault and Johnson 2021). Only a small share of these people get services in nursing homes, and the trend is toward lower rates of nursing home care.

Pillemer and colleagues (2020) note that multiple factors influence how and where Americans get these services. First, Medicaid is a major funder of long-term services and supports, so any changes in Medicaid policy can have major effects. Second, rates of disability have been

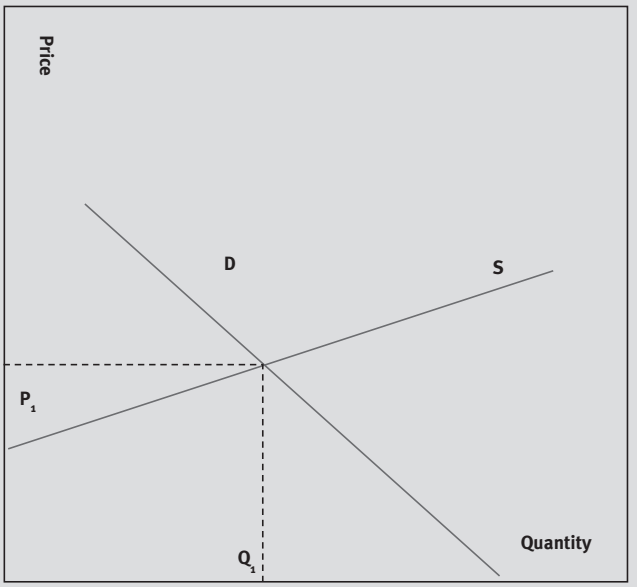


EXHIBIT 10.2 The Demand and Supply of Nursing Home Care

(continued)

Case 10.1 *(continued)*

trending down for a number of years, but there is no guarantee that this will continue. Third, use of long-term services and supports varies widely among major ethnic groups, so changes in the composition of the population might have major effects on demand. Fourth, as Americans live longer, the ability of family members to provide informal care may change.

Technology represents a wild card in efforts to predict the volume and nature of long-term services and supports. For example, the development of smart homes and devices might well increase the share of the population getting these services in their homes.

Discussion Questions

- What sorts of policy changes seem likely to shift the demand for nursing home care?
- How would exhibit 10.2 change given the scenario you outline?
- What sorts of demographic changes seem likely to shift the demand for nursing home care?
- How would exhibit 10.2 change given the scenario you outline?
- What sorts of technology changes seem likely to shift the demand for nursing home care?
- How would exhibit 10.2 change given the scenario you outline?
- What sorts of health changes seem likely to shift the demand for nursing home care?
- How would exhibit 10.2 change given the scenario you outline?

10.2.1 A Shift in Demand

We begin our demand and supply analyses by looking at a classic problem in health economics: what will happen to the equilibrium price and quantity of a product used by consumers if insurance expands? Insurance expands when the insurance plan agrees to pay a larger share of the bill or the proportion of the population with insurance increases. This sort of change in insurance causes a **shift in demand** (or demand shift). As shown in exhibit 10.3, the entire demand curve rotates. As a result of this insurance expansion, the equilibrium price rises from P_1 to P_2 and the equilibrium quantity rises from Q_1 to Q_2. For example, as coverage for pharmaceuticals has become a part of more Americans' insurance, the prices and sales of prescription pharmaceuticals have risen.

shift in demand A shift that occurs when a factor other than the price of the product (e.g., consumer incomes) changes.

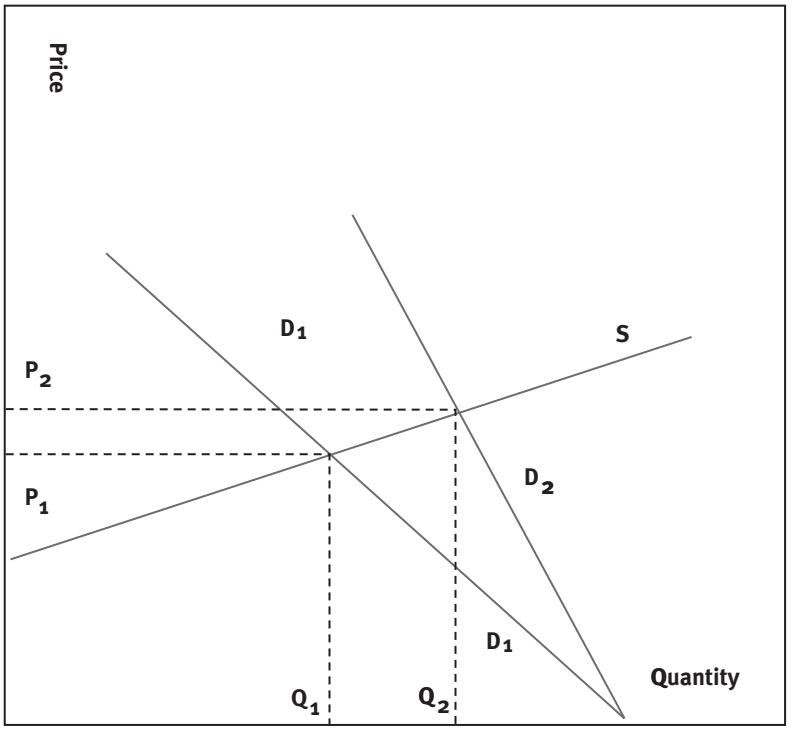


EXHIBIT 10.3
An Expansion of Insurance

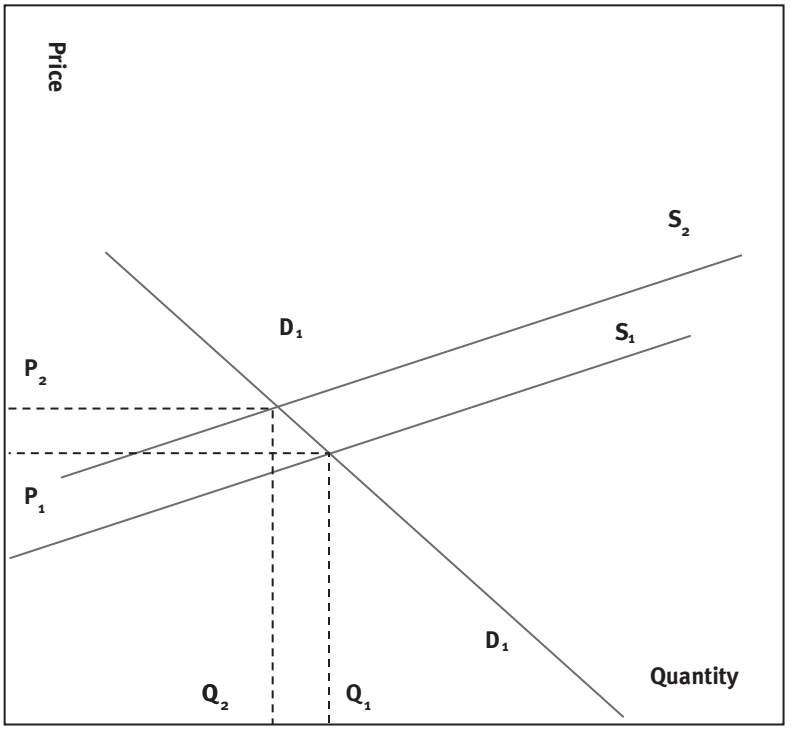
10.2.2 A Shift in Supply

Exhibit 10.4 depicts a **shift in supply**. The supply curve has contracted from S_1 to S_2. This shift means that at every price, producers want to supply a smaller volume. Alternatively, it means that to produce each volume, producers require a higher price. A change in regulations might result in a shift like the one from S_1 to S_2. For example, suppose that state regulations mandated improved care planning and record keeping for nursing homes. Some nursing homes might close down, but the majority would raise prices for private-pay patients to cover the increased cost of care. The net effect would be an increase in the equilibrium price from P_1 to P_2 and a reduction in the equilibrium quantity from Q_1 to Q_2. A manager should be able to forecast this effect with no information other than the realization that the demand for nursing home care is relatively inelastic (meaning that the slope of the demand curve is steep) and that the regulation would shift the supply curve inward.

shift in supply
A shift that occurs when a factor (e.g., an input price) other than the price of the product changes.

Responses to changing market conditions depend on how much time passes. A change in technology, such as the development of a new surgical technique, initially will have little effect on supply. Over time, however, as more surgeons become familiar with the technique, its impact on supply will

EXHIBIT 10.4
A Shift in Supply



grow. Short-term supply and demand curves generally look different from long-term supply and demand curves. The more time consumers and producers have to respond, the more their behavior changes.

10.3 Shortage and Surplus

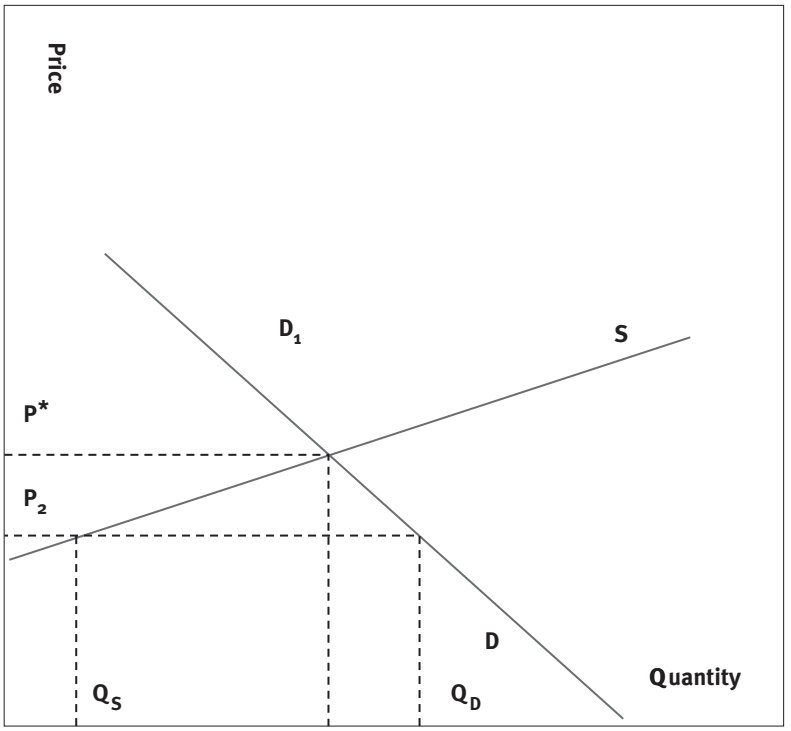
A shortage exists when the quantity demanded at the prevailing price exceeds the quantity supplied. In markets that are free to adjust, the price should rise so that equilibrium is restored. At a higher price, less will be demanded, leaving a greater supply.

surplus
A situation that occurs when the quantity supplied, at the prevailing price, exceeds the quantity demanded. (The best indication of a surplus is that prices are falling.)

In some markets, though, prices cannot adjust, often because a public or private insurer sets prices too low and consumers demand more than producers are willing to supply. Exhibit 10.5 depicts a shortage situation. The equilibrium price is P* and the equilibrium quantity is Q*, but the insurer has set a price of P_2, so consumers demand Q_D and producers supply Q_S. Because the price cannot adjust, there is a shortage equal to $Q_D - Q_S$.

A **surplus** exists when the quantity supplied at the prevailing price exceeds the quantity demanded. In markets that are free to adjust, the price

EXHIBIT 10.5
A Shortage



should fall so that equilibrium is restored. In some markets, prices are free to fall but do so slowly. For example, in the 1990s, many hospitals had unfilled hospital beds because the combination of managed care and new technology reduced the demand for inpatient care. Over time, insurance companies used this excess capacity to secure much lower rates (even though Medicare and Medicaid rates remained unchanged), and enough hospitals closed or downsized to eliminate the excess capacity.

Case 10.2 How Large Will the Shortage of Primary Care Physicians Be?

The Affordable Care Act (ACA) has increased the share of the population with health insurance. Most of those newly insured are young and reasonably healthy. As a result, the ACA primarily affects the demand for primary care services. Many anticipate a shortage of primary care physicians (AAMC 2021).

(continued)

Case 10.2 *(continued)*

But other observers suggest this concern is overblown. The production of primary care is changing in ways that shift its supply. One change is the rapid expansion of patient-centered medical homes, which emphasize a greater role for technology, nurses, physician assistants, and nurse practitioners. Another change is the growth of nurse-managed clinics (of which MinuteClinic, discussed in case 7.1, is an example). A third change is a rapid increase in the number of nurse practitioners (Davis 2021). All these innovations reduce the number of physicians needed to provide primary care for a population.

Discussion Questions

- If there were a shortage of primary care physicians, what would happen to their incomes?
- Set up a model of the demand and supply for primary care physicians. (It should have *Salary* on the vertical axis and *Number of Primary Care Physicians* on the horizontal axis.) Assuming that the production of primary care does not change (i.e., the supply curve does not shift), how do you expect the market equilibrium to change?
- How have the incomes of primary care physicians changed in the last few years? Are these changes consistent with your prediction? (You can get income data from Medscape Physician Compensation Reports.)
- Do the changes in the incomes of primary care physicians suggest there is a shortage?
- If retail clinics and patient-centered medical homes continue to expand, how will they affect the market equilibrium? Which curve would shift as a result, demand or supply?
- Deductibles have been rising quickly in recent years. How would that affect the incomes of primary care physicians?
- Patient-centered medical homes typically expand the roles of registered nurses. How would this affect the demand for primary care physicians?
- The ACA increased some payments for primary care. How would this affect the demand for primary care physicians? For advanced practice nurses?

10.4 Analyses of Multiple Markets

Demand and supply models can also be helpful in forecasting the effects of shifts in one market on the equilibrium in another. Such forecasts can be made only if the markets are related—that is, the products need to be complements or substitutes.

Parente and colleagues (2017) provide an example of this effect. They argue that the ACA's subsidies for health insurance will shift the demand for registered nurses from D_1 to D_2 (see exhibit 10.6). As a result, employment will rise from Q_1 to Q_2 and wages will rise from W_1 to W_2.

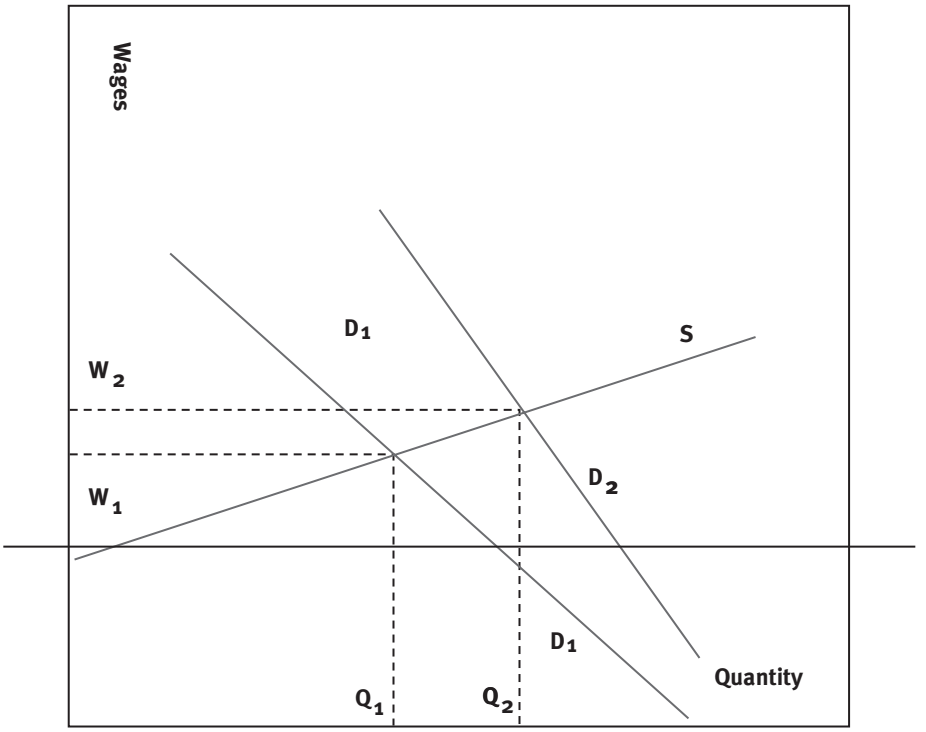


EXHIBIT 10.6 Insurance Subsidies Shift Demand for Registered Nurses

10.5 Conclusion

Supply and demand analysis can help managers anticipate the effects of changes in policy, technology, or prices. Supply and demand analysis is most valuable as a tool that managers can use to quickly anticipate the effects of shifts in demand or supply curves. Short-term shifts in demand are likely to

result from one of two factors: changes in insurance or shifts in the prices or characteristics of substitutes or complements. Short-term shifts in supply are likely to result from one of three factors: changes in regulations, shifts in the prices or characteristics of inputs, or changes in technology.

Make sure you understand the basic shapes of demand and supply curves. Most demand curves slope downward, which means that consumers will buy more if prices are lower. It also means that consumers who are willing to purchase a product only at a low price do not place a high value on it. In contrast, most supply curves slope upward, which means that higher prices will motivate producers to sell additional output (or motivate more producers to sell the same output).

Exercises

10.1 Physicians' offices supply some urgent care services (i.e., services patients seek for prompt attention but not for preservation of life or limb).

a. Name three other providers of urgent care services.

Urgent care centers, health centers, or emergency departments.

b. What sort of shift in supply or demand would result in a market equilibrium with higher prices and sales volume?

The simplest answer would be a shift out in demand, as a higher equilibrium price and quantity imply that you are moving along the supply curve. Refer to exhibit 10.3.

c. What might cause such a shift?

An increase in insurance coverage, an increase in population, reduced insurance coverage for emergency department services, or an increase in income.

d. What sort of shift in supply or demand would result in a market equilibrium with higher prices but lower sales volume?

A shift up in supply could cause this. Refer to exhibit 10.4.

e. What might cause such a shift?

Higher wages for workers, other higher input prices, or higher regulatory standards might.

10.2 Suppose the market equilibrium price for immunizations is $40 and the volume is 25,000.

a. Identify three providers of immunization services.
b. What sort of shift in supply or demand would reduce both prices and sales volume?
c. What might cause such a shift?
d. What sort of shift in supply or demand would result in a market equilibrium with a price above $40 and a volume below 25,000?
e. What might cause such a shift?

10.3 The table reports the number of antihistamine doses sold per month in a small town.

Price	Demand	Supply
$10	185	208
$9	187	205
$8	188	202
$7	190	199
$6	191	196
$5	193	193
$4	194	190
$3	196	187
$2	197	184
$1	199	181

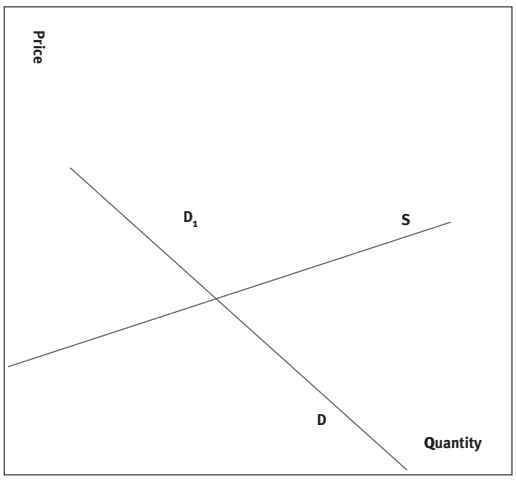
a. To sell 196 doses to customers, what will the price need to be?
b. For stores to be willing to sell 196 doses, what will the price need to be?
c. How many doses will customers want to buy if the price is $2?
d. How many doses will suppliers want to sell if the price is $2?
e. Is there excess supply or excess demand at $2?
f. What is the equilibrium price? How can you tell?

10.4 The table contains demand and supply data for eyeglasses in a local market.

Price	Demand	Supply
$300	7,400	8,320
$290	7,480	8,200
$280	7,520	8,080
$270	7,600	7,960
$260	7,640	7,840
$250	7,720	7,720
$240	7,760	7,600
$230	7,840	7,480
$220	7,880	7,360

a. At $280, how many pairs will consumers want to buy?
b. How many pairs will consumers want to buy if the price is $290?
c. How many pairs will stores want to sell at $290?
d. Is $290 the equilibrium price?
e. Is there excess supply or excess demand at $290?
f. What is the equilibrium price? How can you tell?

10.5 The exhibit shows a basic demand and supply graph for home care services. Identify the equilibrium price and quantity. Label them P* and Q*.



a. Retirements drive up the wages of home care workers. How would the graph change? How would P* and Q* change?
b. Improved technology lets home care workers monitor use of medications without going to clients' homes. How would the graph change? How would P* and Q* change?
c. The number of people needing home care services increases. How would the graph change? How would P* and Q* change?
d. A change in Medicare rules expands coverage for home care services. How would the graph change? How would P* and Q* change?

10.6 The demand function is $Q = 600 - P$, with P being the price paid by consumers. Put a list of prices ranging from \$400 to \$0 in a column labeled *P*. (Refer to the completed table below and use intervals of \$50.)

a. Consumers have insurance with 40 percent coinsurance. For each price, calculate the amount that consumers pay. (Put this figure in a column labeled P_{Net}.)
b. Calculate the quantity demanded when there is insurance. (Put this figure in a column labeled *D*.)
c. Plot the demand curve by hand, putting P (not P_{Net}) on the vertical axis.
d. The quantity supplied equals $2 \times P$. Put these values in a column labeled *S*.
e. What is the equilibrium price?

It is \$250, as $S = D = 500$.

f. How much do consumers spend?

Consumers spend \$50,000 = \$100 × 500.

g. How much does the insurer spend?

The insurer spends \$75,000 = (\$250 – \$100) × 500.

P	P_{Net}	D	S
$400	$160	400	800
$350	$140	460	700
$300	$120	480	600
$250	$100	500	500
$200	$80	520	400
$150	$60	540	300
$100	$40	560	200
$50	$20	580	100
$0	$0	600	0

10.7 The demand function is $Q = 1{,}000 - (0.5 \times P)$. P is the price paid by consumers. Uninsured consumers pay the list price. Insured consumers pay P_{Net}, which is 20 percent of the list price. Calculate the quantity demanded when there is no insurance. (Put these values in column D_U of the table below.) The table calculates D_U, P_{Net}, and D_I for a list price of $880. It also uses the supply function in the next question to estimate the quantity supplied at this list price.

List Price	D_U	P_{Net}	D_I	S
$1,000				
$960				
$920				
$880	560	$176	912	952
$840				
$800				
$760				
$720				
$680				
$640				
$600				
$560				

a. The state mandates coverage with 20 percent coinsurance, meaning that the demand function becomes $1{,}000 - (0.5 \times 0.2 \times P)$.
b. For each price, calculate what insured consumers pay. (Put this in column P_{Net}.)
c. Calculate the quantity demanded with insurance. (Put this in column D_I.)
d. Plot the two demand curves by hand, putting P (not P_{Net}) on the vertical axis.
e. How do D_U and D_I differ? Which is more elastic?

10.8 The supply function for the product in exercise 10.7 is $160 + (0.9 \times P)$. P is the price received by the seller. At the equilibrium price, the quantity demanded will equal the quantity supplied.
a. What was the equilibrium price before coverage? After?
b. After coverage begins, how much will the product cost insurers?
c. How much will the product cost patients?
d. How much did patients pay for the product before coverage started?

10.9 Consumers who can buy health insurance through their employer get a tax subsidy.
a. How does this subsidy work?
b. Use demand and supply analysis to assess how it affects subsidized consumers.
c. How does it affect consumers who cannot buy insurance through an employer?
d. Is the subsidy fair?

10.10 Why are price controls unlikely to make consumers better off if a market is reasonably competitive?

10.11 Make the business case that healthcare providers should advocate for expansion of insurance coverage for the poor.

10.12 Which of the following events would shift the supply of vaccines? Demand?
a. Approval of a second vaccine for children.
b. Allowing pharmacists to administer a vaccine without a prescription.
c. Ending a subsidy for the vaccine.
d. Requiring vaccination for entry into elementary school.
e. Development of a vaccine that does not require refrigeration.

f. Development of a nasal vaccine, meaning that no shot is required.
g. Ending a vaccination requirement for nurses.

10.13 During the pandemic were there any examples of shortages? Of surpluses?

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CHAPTER

11

MAXIMIZING PROFITS

Learning Objectives

After reading this chapter, students will be able to

- define measures of profitability,
- describe two strategies for increasing profits,
- explain how to respond if marginal revenue exceeds marginal cost,
- identify the profit-maximizing level of output, and
- discuss differences between for-profit and not-for-profit providers.

Key Concepts

- All healthcare managers need to understand how to maximize profits.
- Most healthcare organizations are inefficient, so cost reductions can increase profits.
- To maximize profits, firms should expand if marginal revenue exceeds marginal cost.
- Marginal cost is the change in total cost associated with a change in output.
- Marginal revenue is the change in total revenue associated with a change in output.
- Managers need to distinguish incremental cost from average cost.
- An agency problem arises because the goals of stakeholders may not coincide.

11.1 Introduction

Substantial numbers of healthcare managers serve firms that seek to maximize **profits**. For example, for-profit hospitals, most insurance firms, most physician groups, and a broad range of other organizations explicitly seek

profits
Total revenue minus total cost.

maximum profits. In addition, recognizing that "with no margin, there is no mission," many not-for-profit healthcare organizations act like profit-maximizing firms. Even organizations that are not exclusively focused on the bottom line must balance financial and other goals. Bankrupt organizations accomplish nothing. As a result, even healthcare managers with objectives other than maximizing profits need to understand how to maximize profits. A manager who does not understand the opportunity cost (in terms of forgone profits) of a strategic decision cannot lead effectively. All healthcare managers need to understand how to maximize profits. Finally, as markets become more competitive, the differences between for-profit and not-for-profit firms are likely to narrow.

Profits are the difference between total revenue and total cost. To maximize profits, you must identify the strategy that makes this difference the largest. In other words, identify the product price (or quantity) and characteristics that maximize profits.

11.2 Cutting Costs to Increase Profits

An obvious way to increase profits is to cut costs. Most healthcare organizations are inefficient, meaning that they could produce the same output at less cost or produce higher-quality output (that sells for a higher price) for the same cost. The inference that healthcare organizations are inefficient is based on two types of evidence. First, studies by quality management and reengineering teams have identified that costs can be cut by increasing the quality of care. For example, a transportation project at CareMore Health System (that used Lyft) reduced wait times, reduced cost, and increased patient satisfaction (Eapen and Jain 2017). Evidence from statistical studies generally confirms that most healthcare organizations are inefficient, and many organizations have embarked on efforts to improve quality while reducing costs. Some improvement has been made in recent years, but inefficiency remains substantial (Knowles et al. 2021).

As exhibit 11.1 illustrates, the payoff from cost reductions can be substantial. The organization in the exhibit earns $40,000 on revenue of $2.4 million. This operating margin (profits divided by revenue) of 1.7 percent suggests that the organization is not very profitable. Reducing costs by only 2 percent changes this picture entirely. If the cost cuts represent more efficient operations (not cuts in quality or customer service), all the cost reductions will increase profits, in this case by 118 percent.

	Status Quo	2% Cost Reduction
Quantity	24,000	24,000
Revenue	$2,400,000	$2,400,000
Cost	$2,360,000	$2,312,800
Profit	$40,000	$87,200

EXHIBIT 11.1 The Effects of Cost Reductions on Profits

11.2.1 Cost Reduction Through Improved Clinical Management

Cost reductions often require improvements in clinical management because differences in costs are primarily driven by differences in resource use, not differences in the cost per unit of resource. (An organization cannot maximize profits if it overpays for the resources it uses.) In turn, differences in resource use are driven by differences in how clinical plans are designed and executed. Improvements in clinical management require physician cooperation and, more typically, physician involvement. Even though many healthcare professionals make clinical decisions, in most settings physicians have a primary role.

Recognizing the importance of physicians in increasing efficiency, managers need to ask whether the interests of the organization and its physicians are aligned. In other words, will changes that benefit the organization also benefit its physicians? If not, physicians cannot be expected to be enthusiastic participants in these activities, especially if the advantages for patients are not clear.

Managers are responsible for ensuring that the interests of individual physicians are aligned with the organization or with the changing environment. For example, physicians usually benefit from changes in clinical processes that improve the quality of care or make care more attractive to patients. If managers present the change proposal in this fashion, physicians may understand how they will benefit. In other cases, however, physicians cannot be expected to participate in quality improvement activities without compensation. For independent physicians, explicit payments for participation may be required. The same may be true for employee physicians, or participation may be a part of their contractual obligations. In both cases, managers must be aware of the high opportunity cost of time spent away from clinical practice.

Where feasible, physicians' compensation can incorporate bonuses based on how well they meet or exceed clinical expectations. This system helps align the incentives of the organization and its physicians and provides a continual reminder to improve clinical management.

Case 11.1 Profiting from Clinical Improvement

Surgical complications reduce patients' quality of life and survival. Surgical complications also increase hospital length of stay, readmission rates, and costs. Such complications can significantly reduce profitability, especially in bundled payment, capitated, or other value-based payment environments. Haddad and colleagues (2021) show that postsurgical complications can double costs, and this estimate does not attempt to value the associated increase in mortality or the loss of business attributable to higher than expected complication rates.

Hospitals may be paid more when patients have complications or are readmitted (although Medicare has ended reimbursements for some clinical shortcomings). Because incremental revenues are highly visible and incremental costs are not, hospital managers may think that complications and readmissions do not erode margins. But Geskey and colleagues (2020) found that arranging for postdischarge home visits for some recently discharged patients increased profits.

Poor quality reduces hospital profits, even if it substantially increases payments by insurers. And poor quality is a terrible strategy in both the short run and the long run. For example, Kuklinski, Vogel, and Geissler (2021) conclude that patients respond to measures of service quality. Some degree of quality competition seems to be present, although patterns of physicians' referrals may be driving this.

Poor quality leads to market share losses, and this effect is likely to become larger as insurers increasingly use cost and quality data to try to steer patients to efficient, effective, safe providers (Avalere Health 2017).

Discussion Questions

- Is there other evidence that providers profit from improving quality?
- What is Medicare currently doing to measure quality? Safety? Efficiency?
- What are private health plans currently doing to measure quality? Safety? Efficiency?
- What are Medicaid plans currently doing to measure quality? Safety? Efficiency?

(continued)

Case 11.1 *(continued)*

- How large are the potential effects on hospital profits of Medicare's value-based payments?
- How large are the potential effects on physician profits of Medicare's value-based payments?
- How will value-based payments from private insurers affect profits?
- How could better quality not cost more?
- What is inefficiency in healthcare? How common is it?

11.2.2 Reengineering

Reengineering and quality improvement initiatives can increase profits, but that does not mean they will or will do so easily. Nothing guarantees that costs will fall, and nothing guarantees that revenues will not fall faster than costs. Especially in hospitals, improvement initiatives often coincide with downsizing efforts, making the staff wary (and sometimes causing the organization to lose the employees it most wants to keep).

Skilled leadership does not guarantee success, but it is essential to improvement initiatives. Many projects fail, but alignment of the board, management, and clinicians appears to increase the odds of success (Smith et al. 2020). Reengineering and quality management initiatives demand the time and attention of everyone in the organization, meaning that other things are left undone or done less well. If not done skillfully, reengineering and quality management initiatives can make things worse.

11.3 Maximizing Profits

Organizations can also increase profits by expanding or contracting output. The basic rules of profit maximization are to expand if **marginal revenue** (or **incremental revenue**) exceeds **marginal cost** (or **incremental cost**), to contract if marginal cost exceeds marginal revenue, and to shut down if the return on investment is not adequate. If increasing output increases revenue more than costs, profits rise. If reducing output reduces costs more than it reduces revenue, profits rise.

marginal or **incremental revenue** The revenue from selling an additional unit of output.

marginal or **incremental cost** The cost of producing an additional unit of output.

Marginal cost (or incremental cost) is the change in total cost associated with a change in output. Marginal revenue (or incremental revenue) is the change in total revenue associated with a change in output. The challenges lie in forecasting revenues and estimating costs.

As shown in exhibit 11.2, increasing output from 100 to 120 increases profits because the marginal revenue is greater than the marginal cost.

Revenue increases from $2,000 to $2,400 as sales increase from 100 to 120 units, so marginal revenue equals $20 ($400 ÷ 20). Costs increase from $1,500 to $1,600, so marginal cost equals $5 ($100 ÷ 20). The same is true for the expansion from 120 to 140. Marginal revenue falls because the firm has to cut prices to increase sales, and marginal cost rises because the firm is approaching capacity. Even though marginal revenue is nearly equal to marginal cost, profits still rise. Expanding from 140 to 160 reduces profits. Further price cuts push marginal revenue below marginal cost.

Managers need to understand their costs and must not confuse incremental costs with average costs. Average costs may be higher or lower than incremental costs. If the organization operates well below capacity, average costs usually will exceed incremental costs because of fixed costs. As the firm approaches capacity, however, incremental costs can rise quickly. If the firm needs to add personnel, acquire new equipment, or lease new offices to serve additional customers, incremental cost may well exceed average costs.

The following example illustrates why managers need to understand marginal costs and compare them with marginal revenues. A clinic is operating near capacity when a small PPO (preferred provider organization) approaches it. The PPO wants to bring 100 additional patient visits to the clinic and pay $50 per visit. The manager accepts the deal, even though $50 is less than the clinic's average cost or average revenue. Shortly thereafter, another PPO approaches the clinic. It, too, wants to bring 100 additional patient visits to the clinic and pay $50 per visit. The manager turns down the offer. When criticized for this apparent inconsistency, the manager defends the decision, explaining that the clinic had excess capacity when the first PPO contacted it. The marginal cost for those additional visits was only $10 (see exhibit 11.3). Signing the first contract increased profits by $4,000 because the marginal revenue was $50 for those visits. When the second PPO contacted the clinic, it no longer had excess capacity and would have had to add staff to handle the additional visits. As a result, marginal costs for the second set of visits would have been $510, and profits would have plummeted.

EXHIBIT 11.2 Marginal Cost, Marginal Revenue, and Profits

Quantity	Revenue	Cost	Profit	Marginal Revenue	Marginal Cost
100	$2,000	$1,500	$500		
120	$2,400	$1,600	$800	(2400 – 2000)/ (120 – 100) = $20	$5
140	$2,660	$1,840	$820	$13	$12
160	$2,880	$2,120	$760	$11	$14

EXHIBIT 11.3 Marginal Cost and Profits

	Status Quo	Adding the First PPO	Adding the Second PPO
Quantity	24,000	24,100	24,200
Revenue	$2,400,000	$2,405,000	$2,410,000
Average revenue	$100.00	$99.79	$99.59
Marginal revenue		$50.00	$50.00
Cost	$2,040,000	$2,041,000	$2,092,000
Average cost	$85.00	$84.69	$86.45
Marginal cost		$10.00	$510.00
Profit	$360,000	$364,000	$318,000

11.4 Return on Investment

When examining an entire organization rather than a well-defined project, most analysts focus on **return on equity** rather than return on investment. *Equity* is an organization's total assets minus outside claims on those assets. Equity also can be defined as the initial investments of stakeholders (donors or investors) plus the organization's retained earnings.

return on equity Profits divided by shareholder equity.

What is an adequate return on investment? The answer to this question depends primarily on three factors: the yield on low-risk investments (e.g., short-term US Treasury securities), the riskiness of the enterprise, and the objectives of the organization.

All business investments entail some risk. Those risks may be high, as they are for a pharmaceutical company that is considering allocating research and development funds to a new drug, or they may be low, as they are for a primary care physician purchasing an established practice in a small town. In any case, a profit-seeking investor will be reluctant to commit funds to a project that promises a rate of return similar to the yield of low-risk securities. Consequently, when rates of return on low-risk investments are high, investors will demand high yields on higher-risk investments. The size of this risk premium will usually depend on a project's perceived risk. An investor may be content with the prospect of a 9 percent return on investment from a relatively low-risk enterprise but will not find this yield adequate for a high-risk venture.

Because managers must be responsive to the organization's stakeholders, they must also avoid high-risk investments that do not offer at least a chance of high rates of return. What constitutes a high rate of return

depends on the goals of the organization and the nonfinancial attributes of an investment. In some cases, an organization that is genuinely committed to nonprofit objectives will be willing to accept a low return (or even a negative return) on a project that furthers those goals.

11.5 Producing to Stock or to Order

producing to stock Producing output and then adjusting prices to sell what has been produced.

producing to order Setting prices and then filling customers' orders.

Organizations can **produce to stock** or **produce to order**. An organization that produces to stock forecasts its demand and cost and produces output to store in inventory. Medical supply manufacturers are an example of this type of organization. More commonly in the healthcare sector, firms produce to order. They also forecast demand and cost, but they do not produce anything up front. Instead, they set prices designed to maximize profits and wait to see how many customers they attract. Hospitals are an example of this type of organization. This distinction is important because discussions of profit maximization are usually framed in terms of choosing quantities or choosing prices.

Thus far, the content of this chapter has been framed largely in terms of firms that produce to stock; however, its implications apply to healthcare organizations that produce to order. Only by setting prices based on their expectations about demand and cost do they discover whether they have set prices too high or too low. An organization has set prices too high if its marginal revenue is greater than its marginal cost, because that means additional profitable sales at a lower price were missed. An organization has set prices too low if its marginal revenue is less than its marginal cost. Organizations that produce to order must also make the same decisions about rates of return on equity discussed earlier. Is a 5 percent return on investment large enough to justify operating an organ transplant unit? How important is the unit to the organization's educational goals? What are the alternatives?

When organizations contract with insurers or employers, estimates of marginal revenue should be easy to develop. To estimate marginal revenue for a new contract, calculate projected revenue under the new contract, subtract revenue under the old contract, and divide by the change in volume. For sales to the general public, economics gives managers a tool: marginal revenue equals $p \times (1 + 1/\varepsilon)$, where p is the product price and ε is the price elasticity of demand. (See chapter 8 for more information about elasticity.) Most healthcare organizations face price elasticities in the range of –3.00 to –6.00, so marginal revenue can be much less than the price. For example, if a product sells for $1,000 and the price elasticity of demand is –3.00, its marginal revenue will equal $1,000 × (1 – 1/3.00), or $667. In contrast, if the price elasticity of demand is –6.00, its marginal revenue

will equal \$1,000 × (1 – 1/6.00), or \$833. As demand becomes more elastic, marginal revenue and price become more alike. Unless the elasticity becomes infinite, though, marginal revenue will be less than price.

11.6 Not-for-Profit Organizations

The strategies of not-for-profit organizations may differ from those of for-profit organizations because not-for-profit organizations face more severe **agency** problems, differences in goals, and differences in costs. These forces have multiple effects.

agency
An arrangement in which one person (the agent) takes actions on behalf of another (the principal).

11.6.1 Agency Problems

All organizations have agency problems. Agency problems are conflicts between the interests of managers (the agents) and the goals of other stakeholders. For example, a higher salary benefits a manager, but it benefits stakeholders only if it enhances performance or keeps the manager from leaving (when a comparable replacement could not be attracted for less). Not-for-profit firms face three added challenges. First, they cannot turn managers into owners by requiring them to own company stock (which helps align the interests of managers and other owners). Second, no one owns the organization, so no one may be policing the behavior of its managers to ensure that they are serving stakeholders well. Third, assessing the performance of managers in not-for-profit organizations is a challenge. A not-for-profit organization may earn less than a for-profit competitor for many reasons. Is it earning less because of its focus on other goals, because of management's incompetence, or because the firm's managers are using the firm's resources to live well? Often the cause is difficult to pinpoint.

11.6.2 Differences in Goals

Goals other than profits can influence an organization's behavior, though they need not. Not-for-profit firms gain benefits from the pursuit of goals other than profit. Managers should consider how their decisions affect the benefits derived from these other goals. To best realize its goals, a not-for-profit organization should strive to make marginal revenue plus marginal benefit equal to marginal cost. *Marginal benefit* is the net nonfinancial gain to the firm from expanding a line of business. Three cases are possible:

1. If the marginal benefit is greater than 0, the not-for-profit will produce more than a for-profit.
2. If the marginal benefit equals 0, the not-for-profit will produce as much as a for-profit.

3. If the marginal benefit is less than 0, the not-for-profit will produce less than a for-profit.

A further complication is that the marginal benefit may depend on other income. A struggling not-for-profit may act like a for-profit, but a highly profitable not-for-profit may not.

11.6.3 Differences in Costs

Not-for-profit organizations' costs also may differ. First, the not-for-profit may not have to pay taxes (especially property taxes), which tends to make the not-for-profit's average costs lower. On the other hand, the not-for-profit firm's greater agency problems may result in less efficiency and higher average and marginal costs.

The fundamental problem is that we cannot predict how not-for-profit organizations will differ from for-profit firms. This lack of forecast is frustrating for analysts and raises a question for policymakers: If we do not know how not-for-profit organizations benefit the community, why are they given tax breaks?

Case 11.2 Tax Exemptions for Not-for-Profit Hospitals

Not-for-profit hospitals enjoy federal, state, and local tax exemptions, but they face challenges from governments in both courtrooms and statehouses. As Bai and colleagues (2021) report, not-for-profit hospitals provide less charity care than government or for-profit hospitals (although there is considerable variation within each group).

Contemporary hospitals differ markedly from those that existed at the turn of the twentieth century, which were truly charitable institutions. They were supported almost entirely by donations and largely staffed by volunteers. Thus, the tax exemption for not-for-profit hospitals is arguably a historical relic. When the income tax was established in 1894, there was no Medicare, no Medicaid, and no insurance. Most people with money received care at home. The role of hospitals was to care for the poor.

These days, hospitals serve paying customers. Not surprisingly, not-for-profits' tax-exempt status has come into question.

The 2015 case of Morristown Medical Center in New Jersey illustrates the controversies that this situation can cause. A suit by the city

(continued)

Case 11.2 *(continued)*

was resolved by a settlement that required the hospital pay the town $10.5 million over the next ten years. The settlement resulted from a lawsuit filed by several cities together with the New Jersey branch of the American Federation of Teachers. The controversy centered on the secrecy surrounding the settlement. Maura Collinsgru, health care program director at NJ Citizen Action, argued that "in addition to violating the state constitution, this statute further increases the for-profitization of health care in New Jersey, which drives up costs for all residents and patients" (Insider NJ 2021).

Increasing numbers of localities are asking not-for-profits to make payments in lieu of taxes. For example, Boston received $32.4 million in payments in lieu of taxes in 2017 (City of Boston 2018). Such arrangements are becoming more common as localities seek to cover the cost of services.

Changes in the community benefit standard implemented by the Affordable Care Act (ACA) represented one response to this situation. First, hospitals must prepare a community health needs assessment every three years. This assessment identifies the major health challenges facing that community and lays out a plan for the hospital to address them in the coming years. Second, hospitals must create a financial assistance plan that explains the criteria for offering financial assistance and make the plan freely accessible to the public. Third, hospitals cannot charge patients that qualify for assistance more than insured patients. Fourth, hospitals must make reasonable efforts to establish that a patient is not eligible for assistance before initiating extraordinary collections actions. However, the ACA did not specify the terms of financial assistance plans.

This issue is not likely to go away. In states that expanded Medicaid after 2014, uncompensated care fell (Dunn, Knepper, and Dauda 2021). As more and more people gain health insurance, the case for tax-exempt status becomes harder to make.

Discussion Questions

- How much community benefit do not-for-profit hospitals provide?
- How much community benefit do for-profit hospitals provide?
- Why does using list prices tend to inflate estimates of community benefit?
- Are there other important differences between not-for-profit and for-profit hospitals?

(continued)

Case 11.2 *(continued)*

- Would local governments be better off if they taxed hospitals and paid for charity care?
- Is tax exemption a good way to encourage private organizations to serve the public interest?
- Can you find examples of controversies about hospitals' tax-exempt status?
- Can you find examples of payments in lieu of taxes?
- Does tax exemption for not-for-profit hospitals still make sense?
- Can you propose an alternative to tax exemption?

11.7 Conclusion

Even managers of not-for-profit organizations need to know how to maximize profits. They must identify appropriate product lines, price and promote those product lines to realize an adequate return on investment, and produce those product lines efficiently. Most healthcare organizations are less profitable than they could be because they are less efficient than they could be. Leadership must be effective for efficiency to increase. Cost reductions and quality improvements are easier to talk about than to realize, especially where clinical plans (i.e., physician practices) must change to improve efficiency.

Decisions to expand or contract should be based on incremental costs and revenues. Few healthcare managers know what their costs are, so they often have difficulty forecasting revenues and estimating costs to be able to make these decisions.

Not-for-profit organizations may or may not resemble for-profit organizations. In some cases, their goals and performance are similar. Managers need to understand why the goals of not-for-profit organizations are worthy of tax preferences and be able to make that case to donors and regulators.

Exercises

11.1 A clinic has $1 million in revenues and $950,000 in costs. What is its operating margin?

Its operating margin is 5% = ($1,000,000 – $950,000)/$1,000,000.

11.2 The owners of the clinic in exercise 11.1 invested $400,000. What is the return on investment? Is it adequate?

Its return on equity is 12.5% = ($1,000,000 – $950,000)/$400,000. Whether this return is adequate depends on the level of risk and the other opportunities available to the investors. For some safe investments, 12.5% is an excellent return. For some risky investments, 12.5% is too low to be interesting.

11.3 A laboratory has $4.2 million in revenues and $3.85 million in costs. What is its operating margin?

11.4 The owners of the laboratory in exercise 11.3 invested $6 million. What is the return on investment?

11.5 Go to the website of the Board of Governors of the Federal Reserve System at www.federalreserve.gov/releases/h15/. What is the current annual yield for one-year US Treasury securities?

11.6 Go to the Yahoo! Finance website (finance.yahoo.com) and look up the operating margin and return on equity for Community Health Systems (symbol CYH). It is in the Statistics tab. How does it compare with Pfizer (PFE), Amgen (AMGN), Laboratory Corporation of America (LH), and Tenet Healthcare Corporation (THC)?

11.7 A not-for-profit hospital realizes a 3 percent return on its $200,000 investment in its home health unit. Its current revenue after discounts and allowances is $382,000. Administrative costs are $119,000, clinical personnel costs are $210,000, and supply costs are $47,000. Providing home health care is not a core goal of the hospital, and it will sell the home health unit if it cannot realize a return of at least 12 percent. A process improvement team has recommended changes to the home health unit's billing processes. The team concludes that these changes could reduce costs by $20,000 and increase revenues by $5,000. Analyze the following data and assess whether the changes would make the home health unit profitable enough to keep.

	Old	New
Revenue	$382,000	$387,000
Cost	$376,000	$356,000
Profit	$6,000	$31,000
Return on investment	3%	16%

11.8 The table shows cost and revenue data for a clinic. Calculate the clinic's marginal cost, marginal revenue, and profits at each volume. Which price maximizes its profits?

Surgeries	250	300	350	400	450
Price	$2,000	$1,920	$1,800	$1,675	$1,550
Revenue	$500,000	$576,000	$630,000	$670,000	$697,500
Cost	$516,000	$538,500	$563,500	$591,000	$621,000

Surgeries	250	300	350	400	450
Price	$2,000	$1,920	$1,800	$1,675	$1,550
Revenue	$50,000	$576,000	$630,000	$670,000	$697,500
Cost	$516,000	$538,500	$563,500	$591,000	$621,000
Marginal Revenue		$1,520	$1,080	$800	$550
Marginal Cost		$450	$500	$550	$600
Profit	($16,000)	$37,500	$66,500	$79,000	$76,500

Assuming these are the only possible prices, the clinic maximizes profits at a price of $1,675. At a higher price marginal revenue falls below marginal cost.

11.9 The table shows cost and revenue data for a clinic. Calculate the clinic's marginal cost, marginal revenue, and profits at each volume. Which price maximizes its profits?

Surgeries	250	300	350	400	450
Price	$200	$210	$220	$230	$240
Revenue	$50,000	$63,000	$77,000	$92,000	$108,000
Cost	$49,000	$61,000	$74,750	$90,500	$108,250

11.10 The price–quantity relationship has been estimated for a new prostate cancer blood test: $Q = 4{,}000 - (20 \times P)$. Use a spreadsheet to calculate the quantity demanded and total spending for prices ranging from $200 to $0, using $50 increments. For each $50 drop in price, calculate the change in revenue, the change in volume, and the additional revenue per unit. (Call the additional revenue per unit *marginal revenue*.)

11.11 The table shows output and cost data. Calculate the average total cost, average fixed cost, average variable cost, and marginal cost schedules. If the market price is $500, should the firm shut down in the short run? In the long run?

Quantity	0	5	10	15	20	25	30	35
Total cost	$20,000	$20,500	$20,975	$21,425	$21,850	$22,300	$22,775	$23,275

11.12 A clinic's average and marginal cost per case is $400. It charges $600 per case and serves 1,000 customers. Its marketing team predicts that it will expand its sales to 1,250 customers if it cuts its price to $550. How do profits change if it cuts prices? What is the firm's marginal revenue? Why is marginal revenue not equal to $550?

11.13 A clinic's average and marginal cost per case is $400. It charges $600 per case and serves 1,000 customers. Its marketing team predicts that it will expand its sales to 1,250 if it signs a contract for a price of $550 with a local health maintenance organization. How do profits change if it signs the contract? What is the firm's marginal revenue? Why is its marginal revenue different from the marginal revenue in the previous exercise?

11.14 Why would a for-profit organization that incurs losses choose to operate?

11.15 Why would a profitable for-profit organization choose to exit a line of business?

11.16 Should not-for-profit hospitals pay local sales and income taxes?

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CHAPTER

12

PRICING

Learning Objectives

After reading this chapter, students will be able to

- apply the standard marginal cost pricing model,
- explain why price discrimination can increase profits,
- explain the link between pricing and profits, and
- discuss the importance of price setting.

Key Concepts

- Pricing is important.
- Marginal cost pricing maximizes profits in most cases.
- Marginal cost pricing uses estimates of the price elasticity of demand and incremental cost.
- The consequences of setting prices incorrectly can be substantial.
- Price discrimination is common in healthcare and other industries.
- Price discrimination can substantially increase profits.
- Contracting demands the same information as pricing.

12.1 Introduction

Pricing is important. Prices set too low or too high will drag down profits. The trick is to set prices so that your organization captures profitable business and avoids unprofitable business. To maximize profits, marginal revenue should just equal marginal cost (assuming the product line is profitable). To maximize other objectives, organizations should start with profit-maximizing prices.

Pricing is a continuing challenge for healthcare organizations for three reasons. First, many managers do not have a clear pricing strategy. They lack the necessary data to make good decisions and may be mispricing their products or selling the wrong product lines. Second, many managers lack skills

and experience in setting prices and negotiating contracts. Third, the pricing strategy that is best for the organization may not be the pricing strategy various departments or clinics prefer. Managers of these units may have incentives to price products too high or too low. In the absence of a clear strategy and good data, how prices are set will be up for grabs.

12.2 The Economic Model of Pricing

marginal cost pricing
The use of information about incremental costs and the price elasticity of demand (ε) to set profit-maximizing prices. The profit-maximizing price will equal $[\varepsilon/(1 + \varepsilon)] \times$ incremental cost.

The economic model of pricing, **marginal cost pricing**, clearly identifies a pricing strategy that will maximize profits. This strategy also identifies the information needed to set prices.

The economic model of pricing is simple. First, find out what your incremental costs are. (Remember, incremental costs are the same as marginal costs.) Second, estimate the price elasticity of demand facing *your organization's product*. (Demand for the products of your organization will usually be much more elastic than the overall demand for the product. See chapter 8 for more information about elasticity.) Third, calculate the appropriate markup, which will equal $\varepsilon/(1 + \varepsilon)$. (Here, ε represents the price elasticity of demand for your organization's product.) Multiplying this markup by your organization's incremental cost gives you the profit-maximizing price. The profit-maximizing price will equal $[\varepsilon/(1 + \varepsilon)] \times MC$, where MC represents the incremental cost. So, if the price elasticity of demand is –2.5 and the incremental cost is $3.00, the profit-maximizing price would be $[-2.5/(1 - 2.5)] \times 3.00$, or $5.00.

By now, you may have noted that the pricing rule is just a restatement of the profit maximization rule from chapter 11, which states that the organization should equate marginal revenue and marginal cost. The formula for marginal revenue is $Price \times (1 + \varepsilon)/\varepsilon$, so $MC = Price \times (1 + \varepsilon)/\varepsilon$. Solve this formula for *Price* by dividing both sides by $(1 + \varepsilon)/\varepsilon$, and you end up with $Price = MC/[(1 + \varepsilon)/\varepsilon]$, which is the same as $[\varepsilon/(1 + \varepsilon)] \times MC$.

Data on incremental costs are important for a wide range of management decisions. Pricing is one more reason to estimate incremental costs. Estimating the right price elasticity of demand can be more of a challenge. Three strategies can provide you with this information. One is to hire a marketing consultant. Depending on how much your organization is willing to spend, the consultant can provide you with a rough or detailed estimate. Another strategy is to combine information on overall market price elasticities of demand with information on your market share for this product line. (Chapter 8 lists several market price elasticities.) Dividing the overall price elasticity of demand by your market share gives an estimate of the price elasticity your organization faces. For example, if the overall price elasticity is –0.3 and your organization commands one-eighth of the market, you

Elasticity	Price
–1.5	$30.00
–2.5	$16.67
–3.5	$14.00
–4.5	$12.86
–5.5	$12.22
–6.5	$11.82
–7.5	$11.54
–8.5	$11.33
–9.5	$11.18

EXHIBIT 12.1 Profit-Maximizing Prices When Incremental Costs Equal $10

would estimate that your organization faces a price elasticity of demand of –0.3/0.125, or –2.4. The third strategy is to experiment. For example, raise the price of a product by 5 percent and see how much demand falls. Because the price elasticity of demand equals the percentage change in quantity sold divided by the percentage change in price, this calculation is straightforward.

Exhibit 12.1 illustrates how different profit-maximizing markups can be. An organization facing a price elasticity of demand of –2.5 and an incremental cost of $10.00 should have a markup of $6.67. In contrast, a similar organization facing a price elasticity of demand of –5.5 should set a markup of $2.22. Each of these choices maximizes profits, given market conditions. Clearly, organizations that face less elastic demand enjoy larger markups. The payoffs of differentiating your products can be substantial because these products face less elastic demand.

12.3 Pricing and Profits

What should you do if the rate of return from a line of business is inadequate? The obvious solution is to raise prices. Unfortunately, like many obvious strategies, this one will often be wrong. If a product line yields an inadequate return on investment, four strategies should be explored.

1. Make sure your price is not too high or too low. Return to the maximum pricing formula and see whether you calculated incorrectly, or whether your estimate of the price elasticity of demand was inaccurate.

2. Reassess your estimate of incremental costs. If it is too high, your prices will also be too high, and vice versa.
3. See how much you can cut your costs. Most healthcare firms should be able to reduce costs substantially. To see whether yours can be brought down, look at costs and business practices in firms you think are efficient.
4. If all else fails, exit the line of business.

The consequences of setting price incorrectly can be substantial. In exhibit 12.2, the profit-maximizing price should be $15.00. Setting a price much lower or much higher than $15.00 reduces profits significantly. But being a bit too high or a bit too low is not disastrous. Over- or underestimating incremental cost or the price elasticity of demand usually means that your profits will be little smaller than they could have been.

Pricing is an important component of marketing. How is the marginal cost pricing model too simple? The main concern is that it does not account for strategy. For example, demand for an innovative product will typically be quite inelastic. The resulting high margins, unfortunately, will attract a host of rivals. Your organization may want to forgo some immediate profits to discourage entry by competitors. Alternatively, aggressive price cutting in mature markets is likely to encourage price cutting by your competitors. In markets with relatively few competitors, not rocking the boat by cutting prices may allow everyone to enjoy stable, high prices and high profits. These factors demand careful study, but even if you do not follow the marginal cost pricing scenario, it should be your starting point.

EXHIBIT 12.2 Profits When Incremental and Average Costs Equal $10 and the Price Elasticity of Demand Equals –3.0

Price	Profits
$5.00	($881,059)
$7.50	($130,527)
$10.00	$0
$12.50	$28,194
$15.00	$32,632
$17.50	$30,824
$20.00	$30,824
$22.50	$27,533
$25.00	$24,172

12.4 Price Discrimination

Price discrimination is common in healthcare, as it is in other industries. Price discrimination refers to charging different customers different prices for the same product. Price discrimination makes sense if different customers have different price elasticities of demand and if resale of the product by customers is not possible. Most healthcare providers and their products meet these criteria. Healthcare providers contract with an array of individuals and insurance plans. The price sensitivities of those purchasers differ widely, and services can seldom be resold. So, profit-maximizing healthcare firms will want to explore opportunities for price discrimination (or more politely, different discounts for different customers).

price discrimination Selling similar products to different buyers at different prices.

Price discrimination can increase profits. Suppose half your customers (group A) have price elasticities of –3.00 and half (group B) have price elasticities of –6.00. The demand curve for group A is 16,000 – 800 × *Price*, and the demand curve for group B is 16,000 – 1,045 × *Price*. (You can verify that group A's elasticity is –3.00 at a price of $15.00 and group B's elasticity is –6.00 at a price of $12.00.) Your average and incremental costs are $10. In setting prices, you could use the average price elasticity of demand (–4.50) and charge everyone $12.86. Or you could charge group A $12.00 and charge group B $15.00—this is what the marginal cost pricing model tells us to do. As exhibit 12.3 illustrates, failing to use price discrimination leaves a substantial amount on the table.

So, aside from managers (who are eager to learn new ways to improve profits) and consumers (who are eager to learn new ways to get discounts), why should price discrimination matter to anyone? Some observers think the different prices reflect **cost shifting**, not price discrimination. According to the cost shifting hypothesis, price reductions negotiated by PPOs (preferred provider organizations) or imposed by Medicaid will raise costs for everybody else.

cost shifting The hypothesis that price differences are attributable to efforts by providers to make up for losses in some lines of business by charging higher prices in other lines of business.

The cost shifting hypothesis is unlikely to be true. Most of the empirical evidence from the contemporary marketplace is inconsistent with it (Glied 2021). Why, then, does this hypothesis persist? There are three possibilities.

	Without Price Discrimination			With Price Discrimination		
Group	Price	Quantity	Profit	Price	Quantity	Profit
A	$12.86	5,712	$16,336	$15.00	4,000	$20,000
B	$12.86	2,561	$7,324	$12.00	3,460	$6,920
		8,273	$23,660		7,460	$26,920

EXHIBIT 12.3 Profits With and Without Price Discrimination

First, the cost shifting hypothesis may be a rationalization for widespread discounting. No customer likes getting the smallest discount, so healthcare firms may encourage customers to believe their small discount is due to cost shifting. ("We could give you a better price if Medicare rates weren't so low!") This public relations scenario is the most likely. Second, cost shifting might be real, reflecting poor management on the part of profit-seeking organizations. If a firm raised prices for some customers because other customers negotiated a discount, either prices were too low to begin with or the firm was imprudently raising prices. Third, cost shifting might be real, reflecting responses of not-for-profit firms that had set prices lower than a well-managed, for-profit firm would have. However, pressure on the bottom lines of healthcare organizations—profit and nonprofit—means that, if it existed, cost shifting is probably a thing of the past.

Case 12.1 Price Discrimination in Practice

What do American Airlines, Home Depot, Staples, Stanford University, the Mayo Clinic, and Safeway have in common? They all use price discrimination (Priester, Robbert, and Roth 2020). They charge different customers different amounts for the same product.

Pharmaceutical discounts are the clearest examples of healthcare price discrimination because the products are identical. Only the prices differ. A cash customer (e.g., someone without insurance coverage) may pay the highest price, the list price. In some cases, though, insured customers may pay more, because insurers have not passed on discounts to their beneficiaries (Ornstein and Thomas 2017).

Most customers pay much less than the list price. Insurers negotiate discounts with manufacturers and pharmacies. These discounts are typically about 30 percent (Yang et al. 2020). Some hospitals and HMOs (health maintenance organizations) have their own pharmacies and can negotiate even better deals with manufacturers. These organizations sometimes pay as little as 40 percent of the list price. Most discounts come in the form of rebates, meaning that a purchaser pays list up front but gets a payment from the seller later. This makes resale more difficult and limits price transparency.

(continued)

Case 12.1
(continued)

The federal government has multiple discount programs. The largest is the Medicaid rebate program, which requires manufacturers to pay a rebate that varies by the type of drug. Prices, formularies, and copayments vary from state to state, so it is not clear that the Medicaid rebate program covers the most effective medications or gets the best prices (Dolan and Tian 2020). Many federally funded clinics and hospitals are eligible for the Medicaid discount. However, these agencies can often negotiate better deals because they can buy wholesale and because they can choose drugs for their formularies.

Tribal and territorial governments can use the prices on the Federal Supply Schedule, which federal agencies use to buy common supplies and services. The Department of Defense, the Department of Veterans Affairs (VA), the Public Health Service, and the Coast Guard may get prices that are slightly lower than the Federal Supply Schedule because of a provision called the federal ceiling price. This provision caps the price using a formula based on private-sector transactions. Finally, these agencies can try to negotiate prices below the federal ceiling price. The VA, which uses a national formulary, has used its bargaining power to get low prices. The Government Accountability Office (2020) reports that the VA gets the steepest discounts in the country, with prices as much as 50 percent lower than Medicare prices.

Discussion Questions

- Why do drug firms give discounts voluntarily?
- Do other healthcare providers routinely give discounts to some customers?
- Why do the uninsured typically pay the highest prices?
- Why is the cash price sometimes lower than the insurance price?
- Why would a hospital usually get a better price for a drug than an insurance company?
- Why does the VA get such low prices?
- Suppose a law was enacted that required drug manufacturers to give state Medicaid agencies the same price they negotiated with the VA. How would Medicaid and VA prices change?
- Should Medicare adopt the VA formulary?

Similar price differences are common in other industries with similar characteristics. Have you ever wondered why it makes sense for one passenger to have paid $340 for a flight and another passenger in the same row to have paid $99? Why does it make sense for a matinee to cost half as much as the same movie shown two hours later?

When the incremental cost of production is small, when buyers can be separated into groups that have very different price elasticities of demand, and when resale is not possible, price discrimination is usually profitable. Most healthcare firms, both not-for-profit and for-profit, fit this profile, so their managers need to know how to price discriminate. With no margin, there is no mission. Price discrimination helps increase margins.

12.5 Multipart Pricing

Thus far, we have focused on simple pricing models. In fact, a wide range of pricing models may be applicable. One is the multipart pricing model, in which customers pay a fee to be eligible to use a service and separate additional fees as they use the services. An obvious example is a managed care plan. The trade-off is that a low entry fee (premium) yields more customers. High copayments reduce costs (either increasing profit margins or reducing premiums), but at some point, high copayments will drive away customers. The right combination is always a balancing act. A related pricing strategy is tying. Tying links the prices of multiple products. Again, the goal is to balance multiple prices to maximize profits.

12.6 Pricing and Managed Care

Are these issues relevant in markets dominated by managed care? Yes. One needs the same information to set a price or to evaluate a contract. Accepting a contract in which marginal revenue is less than incremental cost almost never makes sense. Such a mismatch reduces profits. Such contracts make sense only when these losses are really marketing expenses, and even in these cases the money probably could be better spent elsewhere. Similarly, giving a large discount to a buyer who is not sensitive to price almost never makes sense. For example, a managed care plan that needs your organization's participation to offer a competitive network is not in a good bargaining position and should not get the best discount.

The flip side of the pricing problem, contracting, is even tougher. Economic models of pricing tell us that managers need to know what their

incremental costs are, what markup over incremental costs they should expect, and what their rivals will bid. Each of these will be uncertain to some degree, and many healthcare firms have only sketchy cost data. This fact is especially true for incremental costs, which many firms are not prepared to track. Without good data on incremental costs, managers will be merely guessing and may be tempted to base their bids on average costs. Doing so misses some profitable business opportunities.

Case 12.2 Should My Firm Accept This Contract?

You are the manager of a 20-physician cardiology practice. You are getting ready to advise your board about a proposal for capitated specialty care from a local HMO. Data from your fee-for-service practice show billings per member per month of $100 for visits, $80 for catheterizations, and $115 for lab. The practice owns the labs, and the profits are shared among the partners. You estimate that costs (aside from physician income) equal 25 percent of charges.

The HMO proposes a rate of $275 per member per month. Your immediate reaction is to reject this proposal. Your chief financial officer makes two comments that give you pause: "Our overhead will drop significantly if we accept this proposal and convert 25 percent of our business to capitation. In addition, we should anticipate that our rates for visits, catheterizations, and tests will drop significantly once we convert."

In this case, your town has only two other cardiology groups. You are not sure whether they have been asked to bid. Your legal counsel has warned you that direct discussions with your rivals might leave you open to an antitrust suit.

Discussion Questions

- Why is your initial response to reject the offer?
- Why might overhead go down if you accept the contract?
- Why might utilization rates go down?
- What are the risks of accepting or refusing?
- What should you do next? Should you accept the proposal? Should you make a counteroffer?

12.7 Conclusion

Pricing is important, but many healthcare firms lack direction. Without a clear model of pricing, managers are unable to realize their firm's goals. They do not know what their incremental costs are or what sort of price elasticity of demand their organization faces. As a result, they do not know what prices to charge. This lack of knowledge reduces profits in two ways. The organization may set its prices too high or too low. Alternatively, the organization may participate in the wrong markets. It may accept contracts it should refuse or refuse contracts it should accept.

The economic model of pricing tells managers what they should do. Its implications apply to both pricing and contracting, so it remains an important part of every healthcare manager's tool kit. Applying this model will not always be easy, but not knowing what to do is harder still.

Price discrimination is everywhere in healthcare, and many organizations rely on it to remain profitable. Profitable price discrimination requires more information than setting a single price, so effective price discrimination is challenging. In addition, many healthcare managers are mesmerized by tales of cost shifting, even though it is unlikely to be responsible for differences in price. If managers genuinely believe cost shifting is occurring, the belief steers them in the wrong direction.

Exercises

12.1 The marginal cost pricing model calculates a markup over marginal costs using estimates of the price elasticity of demand. Will any other pricing strategy result in higher profits?

12.2 If cost shifting is just a useful public relations ploy, why does it get so much attention?

12.3 Will raising prices increase the rate of return from a line of business?

12.4 Can you think of a healthcare firm that does not price discriminate (i.e., charge different customers different amounts for the same product)?

12.5 Price discrimination requires the ability to distinguish customers who are the most price sensitive and the ability to prevent arbitrage (resale of your products by customers who buy at low prices). What attributes of healthcare products make these tasks easy to do?

12.6 Your pharmacy provides services to Medicare and PPO patients. You estimate a price elasticity of demand of –3.0 for Medicare patients and –8.0 for PPO patients. Your marginal and average cost for dispensing a prescription is $2. What is the profit-maximizing dispensing fee for Medicare and PPO patients? Why might the price elasticities of demand differ?

Marginal cost is $2.00. For Medicaid patients the profit-maximizing price is $2 \times (-3)/(1 - 3) = \$3.00$. For PPO patients, the profit-maximizing price is $2 \times (-8)/(1 - 8)$, which rounds to $2.29. Demand might be more elastic for PPO patients if the insurer has negotiated contracts with more pharmacies.

12.7 Your pharmacy provides services to Medicare and PPO patients. You estimate a price elasticity of demand of –2.2 for Medicare patients and –5.3 for PPO patients. Your marginal and average cost for dispensing a prescription is $2. What is the profit-maximizing dispensing fee for Medicare and PPO patients? Why might the price elasticities of demand differ?

12.8 Your dental clinic provides 3,000 exams for private pay patients and 1,000 exams for members of a union. Your fixed costs are $50,000 and your incremental cost is $40.

a. Private pay patients have a price elasticity of demand of –3. What do you charge them?

You charge them $-\$40 \times 3/(1 - 3) = \$60$.

b. The union has negotiated a fee of $50. Is it profitable to treat members of the union?

Yes, each union patient generates $50 in revenue and costs $40.

c. What would happen to your profits if you stopped treating members of the union?

If you stopped treating union members, your profits would fall by $10,000.

d. If the union negotiated a fee of $45 instead, what would you charge private pay patients?

You would still charge them $60. That is the price that maximizes profit.

e. What does this tell you about cost shifting versus price discrimination?

Price discrimination is a standard consequence of profit-maximizing behavior. Cost shifting requires another basis.

	Volume	Price	Revenue	Cost	
				$50,000	**Fixed**
Private	3,000	$60	$180,000	$120,000	**Variable**
Union	1,000	$50	$50,000	$40,000	**Variable**
			$230,000	$210,000	

12.9 You provide therapeutic massage services, focusing on stress reduction services that are not covered by insurance. Your monthly overhead is $2,000. You value your time at $20 per half hour (the amount of time a therapeutic massage takes). Supplies per massage cost $4. You currently charge $75 per massage and have a volume of 100 clients per month. Your trade journal says that a 5 percent reduction in prices typically results in a 7.5 percent increase in volume. What would happen to your volume, revenues, and profits if you cut your price to $70? If you raised your price to $80?

12.10 The table shows case-mix-adjusted price and volume data for Dunes Hospital. Calculate its marginal cost, marginal revenue, and profits at each level of output. What price should it choose?

Admissions	**6,552**	**9,048**	**9,672**	**9,984**	**10,296**
Revenue	$52,416,000	$70,574,400	$73,507,200	$73,881,600	$74,131,200
Cost	$42,588,000	$59,264,400	$63,835,200	$66,393,600	$68,983,200
Price	$8,000	$7,800	$7,600	$7,400	$7,200

12.11 Your firm spent $100 million developing a new drug. It has now been approved for sale, and each pill costs $1 to manufacture. Your market research suggests that the price elasticity of demand in the general public is –1.1.

a. What price do you charge the public?
b. What would happen to profits if you charged twice as much?
c. What role does the $100 million in development costs play in your pricing decision?
d. Medicaid has made a take-it-or-leave-it offer of $2 per pill. Do you accept? Why or why not?

12.12 Why are most healthcare providers able to charge different groups of purchasers different prices for the same products?

12.13 A clinic has incremental costs per case of $10 and overhead costs of $100,000. It faces a price elasticity of demand of –2.

a. What is the clinic's profit-maximizing price?
b. How would the profit-maximizing price change if overhead costs doubled?
c. With excess capacity, would serving Medicaid customers for $16 make sense?
d. How would the profit-maximizing price change if Medicaid raised its fee to $18?

12.14 You manage a not-for-profit hospital in a competitive market. Suppose you decide to charge less than the profit-maximizing price to your customers.

a. What effect would that decision have on profits?
b. What effect would that decision have on you and your career?

12.15 Assume the price elasticity of demand for physicians' services is –0.2. If your marginal cost per visit is $20, what is your profit-maximizing price if you control 5 percent of the market? What is your profit-maximizing price if you control 15 percent of the market? What lessons do you draw from this information?

12.16 A busy urgent care clinic has average costs of $40 and incremental costs of $60.

a. How could incremental costs be higher than average costs?
b. The clinic charges $80 for a visit. What price elasticity of demand does this information imply?
c. Volume is currently 200 visits per week. What are the clinic's profits?
d. An HMO guarantees at least 10 patients per week. It proposes a fee of $55. Should the clinic accept the contract?
e. What happens to profits if it accepts the contract?

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CHAPTER

13

ASYMMETRIC INFORMATION AND INCENTIVES

Learning Objectives

After reading this chapter, students will be able to

- define asymmetric information and opportunism,
- describe two strategies for aligning incentives,
- explain why opportunism is a special management challenge in healthcare, and
- discuss challenges in limiting opportunism.

Key Concepts

- Asymmetric information is information that is known to one party in a transaction but not another.
- Asymmetric information allows the better-informed party to act opportunistically.
- Asymmetric information is a common problem for managers.
- Aligning incentives helps reduce the problems associated with asymmetric information.
- Multiple factors limit incentive alignment.
- Incentive-based contracts have become more common, but they are still not the norm.

13.1 Asymmetric Information

Asymmetric information confronts healthcare managers in most of their professional roles. Vendors typically know more about the strengths and weaknesses of their products than do purchasers. Employees typically know more about their health problems than do human resource or health plan managers. Subordinates typically know more about the effort they have put

into their assignments than do their superiors. Providers typically know more about treatment options than do their patients. In all these examples, one party, commonly called an agent, has better information than another party, commonly called a principal. Unless the principal is careful, the agent may take advantage of this asymmetry—in other words, engage in **opportunism**.

opportunism Taking advantage of a situation without regard for the interests of others.

Asymmetric information can result in two types of problems. One is that mutually beneficial transactions may not take place if concern about asymmetric information is too great. The other is that resources may be wasted because of agents' opportunism or principals' costly precautions. For example, an insurer cannot easily discern whether a treatment is really needed (Arrow 1963). In response, an insurer may not cover services that it believes are likely to be abused, may require substantial consumer payments to restrain demand, or may require prior authorization before providing coverage. As a result, consumers may not use helpful services because the services cost too much. Alternatively, the plan, providers, and consumers may experience increased costs due to the requirement for prior authorization. (The insurer must staff the authorization office, the provider must spend time and money getting authorizations, and the consumer is likely to experience delays and repeat visits.) Asymmetric information also affects managers directly. Managers are often poorly informed about the quality, efficiency, and customer satisfaction issues that their subordinates face. But managers are also often poorly informed about whether costs are padded, whether quality problems are avoidable, or whether staffing is adequate. Fearing that subordinates will take advantage of them, managers may require reviews or audits. Both increase costs without increasing the output of the organization.

Asymmetric information is a concern when

1. the interests of the parties diverge in a meaningful way,
2. the parties have an important reason to strike a deal, or
3. determining whether the explicit or implicit terms of the deal have been followed is difficult.

These circumstances are far from rare. Unfortunately, they are an invitation to act opportunistically.

13.2 Opportunism

Opportunism can take many forms. Crime is one. For example, deliberately billing a health plan for services that were not actually rendered is a form of opportunism that is more commonly known as *fraud*. The forms of opportunism that managers deal with are not usually so stark. Cruising the internet rather than making collection calls, using the supplies budget to refurbish

your office, scheduling a physical therapy visit of questionable value to meet volume targets, and referring a patient to a specialist for a problem you could easily handle are also examples of opportunism.

From experience, we know that some individuals are opportunistic some of the time. Some individuals seldom act opportunistically, whereas others often do. As a first step, we try to avoid dealing with those who are the most opportunistic. We then try to set up systems to restrain those who may be tempted. These systems will be imperfect because our ability to anticipate what may happen and how individuals may react is imperfect.

13.2.1 Remedies for Asymmetric Information

Remedies for asymmetric information focus on aligning the interests of the parties or monitoring the behavior of the agent. Changes in incentives are usually part of the preferred strategy because monitoring is usually expensive and nonproductive. For example, healthcare plans are commonly subject to utilization review designed to control the use of services. Utilization review rarely changes recommended therapies, however, despite its cost and annoyance. Health plans would love to eliminate utilization review. Without it, a plan would rapidly gain market share because it could increase consumer satisfaction, increase provider satisfaction, and reduce premiums. In addition to being costly, monitoring may be difficult. For example, a product that a vendor honestly recommended may fail or may not meet your needs, or it may work but have features you do not need and cost more than a more suitable product. Monitoring is likely to be only part of the remedy for asymmetric information.

13.2.2 The Special Challenges for Healthcare

The challenges posed by asymmetric information are not unique to healthcare, although their extent poses special problems for healthcare managers. Three features make asymmetric information especially troublesome in the healthcare sector:

1. By paying the bills of healthcare providers, insurance creates a principal–agent relationship not found in most fields.
2. Insurance reduces the patient's incentive to monitor the performance of healthcare providers because it limits risks of financial opportunism.
3. Asymmetric information affects most provider–patient relationships. Patients typically seek providers' services because they want information, so opportunism is always possible.

Opportunism is such an obvious risk that strategies have developed to limit it (Arrow 1963). One of the most obvious is our preference for dealing with those who have proved themselves. For example, primary care physicians

tend to refer patients to physicians who have served them and their patients well. For fear of losing this business, specialists who might be tempted to provide unnecessary services will be reluctant to do so. These sorts of ongoing relationships—between buyer and seller, patient and provider, and supervisor and subordinate—tend to deter observable opportunism. Much of the regulation of the healthcare sector also serves to deter opportunism. The problem is that these mechanisms work only when opportunism is detectable. In many cases, it is not.

13.2.3 Signaling

signaling
Sending messages that reveal information another party does not observe.

When differences in quality or other attributes of care are hard to observe, agents may use **signaling** to reassure principals. Signals should tell prospective clients about the agent, be hard to counterfeit, and be relatively inexpensive. Brand names are classic signals. Including a Pfizer label on a new drug costs little and reassures consumers that the drug meets stringent quality standards because substandard quality would hurt Pfizer's sales. The challenge is to prevent others from counterfeiting the labels. Surprisingly, branding in the healthcare market, especially branding of healthcare services, is not common. Quality certification is another strategy for dealing with asymmetric information. For example, hospital accreditation by The Joint Commission is a signal of quality that is difficult to counterfeit. Unfortunately, the process is so expensive that many smaller hospitals do not seek accreditation.

Other signals may be useful but are likely to be less credible. For example, high prices and high levels of advertising also serve as quality signals because low-cost, low-quality providers could not afford to advertise frequently or raise prices (Mou and Shin 2018). In markets with standardized products, poorly informed agents can buy information (e.g., by subscribing to *Consumer Reports*) or copy well-informed agents. The more individualized products are, the less this strategy works, so its value in the healthcare market is unclear. Although we can identify healthcare cases in which signaling reduces the problems associated with asymmetric information, it is far from a comprehensive solution.

13.3 Incentive Design for Providers

Recognition that the US insurance system created multiple incentives for inefficiency triggered the growth of managed care. Providers were faced with strong incentives to deliver care if the benefits exceeded their patients' costs, and costly care was often free for insured patients. Neither party had a compelling reason for taking the true cost of care into account. We have already

discussed redesign of consumer payments, so let's consider how incentives relate to provider payments.

Incentives are implicit in the four most common methods of paying providers: volume-based payments, salaries, capitation, and **case-based payment**. Each of these methods has some advantages and disadvantages.

case-based payment
A single payment for an episode of care, regardless of the number of services.

Exhibit 13.1 contrasts the incentives created by different payment systems. Note that volume-based and salary compensation systems incorporate opposite incentives. The incentive structures of capitation and case-based payment systems are similar and fall between these opposite cases. Volume-based, case-based, and capitation payment systems immediately reward providers who have large numbers of clients. Having more clients means higher revenues in all of these systems. In contrast, unless other incentive systems are in place (such as review by superiors or the possibility of promotion), salary and budget payment systems do not reward providers according to the number of clients they serve.

The only form of payment that rewards providers that provide a large volume of services per client is volume-based payment. In case-based and capitation systems, the disincentive for high volumes of service per client is tempered by the rewards for attracting additional clients. Just as they do not reward for large numbers of clients, salary and budget systems also deter providers from delivering high volumes of service per client.

All payment systems (except volume-based payments) encourage providers to avoid clients with complicated, expensive problems (or at least encourage them to prefer clients with simple, inexpensive problems). Expensive clients, when combined with fixed payments per case or per period, are unprofitable. Likewise, all the payment systems (except volume-based

EXHIBIT 13.1 Financial Incentives of Alternative Compensation Systems

	Volume-Based	Case-Based	Capitation	Salary or Budget
Number of clients	+	+	+	–
Services per client	+	–	–	–
Client acuity[a]	+	–	–	
Unbillable services[b]	–	+	+	+

Note: A plus sign indicates that the compensation system rewards producing more of an output or using more of an input. A minus sign indicates that the compensation system rewards producing less of an output or using less of an input.

[a] In this context, client acuity refers to the amount of services that a client is likely to need. Higher acuity means that a client is likely to need more services.

[b] Unbillable services include both services for which the provider cannot bill because of the provisions of the insurance plan and services provided by others.

payments) motivate providers to refer patients to external services (such as church-sponsored organizations or services provided by friends), as long as they are cost-effective from the provider's perspective. From society's perspective, patients should be referred elsewhere if the marginal benefit of doing so exceeds the marginal cost. Providers who are paid based on cases, capitation, or salary may refer patients too often, especially if the provider does not bear the full cost of the services of community organizations or other external services. In contrast, only billable services can be profitable in volume-based systems. Volume-based payment creates an incentive not to use external resources (or at least not to use the organization's resources to improve clients' access to them). Volume-based payment typically rewards providers who refer patients too infrequently, from society's perspective.

None of these payment systems solves the asymmetric information problem. Providers still usually know more about appropriate treatment options than do patients or insurers. Volume-based providers inclined toward opportunism are still able to recommend additional billable services, case-based providers are still able to avoid unprofitable cases, capitated providers are still able to recommend limited treatment plans, and salaried providers are still able to limit how much they do.

This discussion should not be construed as an assertion that only financial incentives matter. Such an assertion would be inconsistent with basic economic theory, which postulates that principals and agents balance alternative objectives. Only some of these goals will be financial. For example, some physicians may offer extensive patient education programs because of their commitment to the health of their patients or because the programs are an effective marketing tool, even if the volume-based payment system does not treat these programs as a billable service. Nonetheless, economics anticipates an aggregate response to financial incentives and predicts that physicians will offer more of such services if the volume-based payment system offers compensation for them or if they are profitable under case-based or capitation arrangements.

Suppose that a physician schedules four patients per hour for 30 hours per week and works 48 weeks per year (see exhibit 13.2). Under plan A, the physician earns $20 per patient and has a total income of $115,200. (This example bases compensation on visits to simplify the discussion, not to define an attractive volume-based compensation plan. More sensible volume-based payment systems base compensation on billings, relative value units, and so forth.) Plan B provides a base salary of $80,000 plus $20 per patient for visits in excess of 4,000. At the margin, plans A and B have the same incentives, even though plan B combines salary- and volume-based payments. Each plan pays $20 per patient and provides the same total income. This example illustrates that blended compensation systems can give agents similar incentives with less risk than pure compensation systems.

Plan	Base Salary	Marginal Compensation	Volume Payments	Total Income
A	$0	$20	$115,200	$115,200
B	$80,000	$20	$35,200	$115,200
C	$100,000	$20	$35,200	$135,200
D	$57,600	$10	$57,600	$115,200

EXHIBIT 13.2 An Illustrative Model of Incentives

The incentives of plan C are subtly different from those of plans A and B. Plan C offers a $100,000 base salary plus $20 per patient for visits in excess of 4,000. Although plan C pays $20 per visit at the margin like plans A and B, the physician's income will be higher under plan C than it would be with the same number of patients under plan A or B. Consequently, the physician may feel less need to add an additional patient at the end of the day or double book to squeeze in an acutely ill patient. In this case, **income effects** are the effects incentive systems have on physicians' decisions about the number of patients they will treat (Fortin, Jacquemet, and Shearer 2021).

income effects The consequences of income shifts on amounts demanded or supplied. (These include changes in income or changes in purchasing power attributable to price changes).

Plan D offers a base salary of $57,600 plus $10 for each patient visit. Even though the physician's income will be the same with 5,760 patients per year under plans A, B, and D, the physician may choose to see fewer patients under plan D because the marginal reward is smaller.

Case 13.1 Incentives in Accountable Care Organizations

An accountable care organization (ACO) is a consortium of doctors, hospitals and other providers who contract to take financial responsibility for the quality of care. ACOs present a complex incentive problem, because they must identify contracts that allow it to meet its quality and cost targets. An ACO also needs to establish contracts with providers that offer incentives for them to provide efficient, high-quality care. In addition, the ACO must do this as the providers are simultaneously being paid using traditional volume-based methods, bundled payments, and a variety of alternative payment models. Whitman (2017) quotes Micky Tripathi, founder and CEO of the Massachusetts eHealth

(continued)

Case 13.1 *(continued)*

Collaborative, as saying, "What makes a successful ACO? As an industry, we don't know."

A consortium that decides to form an ACO contracts with Medicare for three years. Medicare sets a benchmark that is a weighted average of spending by beneficiaries who are attributed to the ACO. One implication of this arrangement is that consortia with high levels of spending in the past find it easier to meet cost goals. In contrast, commercial ACO contracts are based on a negotiated rate and a negotiated degree of risk.

For example, UnityPoint Health, a large system with sites in Iowa, Illinois, Wisconsin, and Missouri, has an ACO that covers more than 80,000 Medicare beneficiaries under the Medicare Next Generation ACO model. Its ACO contracts with private payers, including United Healthcare, Wellmark, and Blue Cross and Blue Shield of Illinois, and with its self-insured health plan cover still more patients (UnityPoint Health 2021). UnityPoint did not reduce costs in its first attempts at a Medicare ACO, but it ultimately succeeded. The system now tracks high-risk patients, standardizes care pathways, uses analytics to understand the population it serves (and the care being provided), and emphasizes incorporating behavioral health in primary care. UnityPoint also delivers a wide array of services to patients in their homes.

UnityPoint had planned to shift away from volume-based compensation for physicians, but like most health systems it has not done so (Reid et al. 2022). Compensation plans often include value-based components, but these tend to be much smaller than volume-based payments.

Discussion Questions

- Why is creating a successful ACO difficult?
- How many Medicare ACOs are there? How are they structured?
- How many commercial ACOs are there? How are they structured?
- How many Medicaid ACOs are there? How are they structured?
- Is the number of ACOs increasing or decreasing?
- What outcomes represent success for an ACO? What predicts success?
- Do ACOs that accept more risk get more shared savings? Why?
- Do some ACOs improve clinical quality? How do they do it?

(continued)

Case 13.1 *(continued)*

- Do some ACOs improve patient satisfaction? How do they do it?
- How does being paid in varied ways complicate ACO design?
- How does being paid in varied ways affect provider incentives?
- What sort of incentives does pure volume-based payment create for providers?
- What sort of incentives does a mixed payment model create for providers?
- What sort of incentives does pure salary create for providers?
- What incentives does the Medicare benchmark create?

13.4 Insurance and Incentives

How much have compensation systems changed since the Affordable Care Act was passed in 2010, given the importance of how providers are paid? Less than you might suspect—but change is taking place. For example, even in areas in which managed care is pervasive, most physicians are still paid based on volume (typically measured by billings, visits, or net revenue), just as they were at the turn of the twenty-first century (Johnston et al. 2021). Many organizations are in the process of changing compensation models, but they are headed in different directions. Some are moving to salaries without quality or productivity bonuses. Some are moving to a mix of quality-based and productivity-based compensation.

In 2015, Congress passed legislation called the Medicare Access and CHIP (Children's Health Insurance Program) Reauthorization Act, commonly called MACRA. While most Medicare payments are still based on volume, MACRA adds incentives for quality. Physicians with high quality scores get paid more, and physicians with low quality scores get paid less. There are two ways of earning bonuses. Physicians can report their performance using the Merit-Based Incentive Payment System or work in an alternative payment model (typically an ACO) and receive a 5 percent bonus each year because their performance is monitored by their ACO. At present, the incentives are modest and the effects appear to be modest (Roberts et al. 2018). But, as case 13.2 suggests, both the incentives and the effects may grow.

13.5 Limits on Incentive-Based Payments

Several factors limit how complete incentive-based payments can be. Concerns about risk, complexity, and team production make agents reluctant to agree to incentive-based compensation arrangements. Likewise, concerns about opportunism make principals reluctant because a high-powered incentive system may leave them worse off if agents respond in unanticipated ways.

13.5.1 Risk

Capitation, utilization withholding, and case-based payment systems are often referred to as *risk-sharing systems*. This term is somewhat misleading. The goal of these systems is incentive alignment; risk sharing is a side effect. For example, capitation gives physicians incentives to use resources wisely, so capitation succeeds if physicians do not run unnecessary tests or if they avoid hospitalizing patients when better community treatment options are available. Full-risk capitation, in which physicians are responsible for all their patients' costs, gives physicians incentives to take such steps. Unfortunately, the financial risks associated with full-risk capitation can be substantial. One patient with a rare, expensive illness can bankrupt a solo practice; an unexpected jump in pharmaceutical prices can bankrupt a small provider-owned HMO (health maintenance organization). These risks are one reason capitation's growth has stalled and many organizations avoid full-risk capitation (Burns and Pauly 2018). Compared with organizations that do not accept full-risk capitation, capitated systems are structured differently. They are generally larger, more likely to have salaried physicians, more likely to have sophisticated information management, and more likely have programs to reduce treatment variation and manage high-risk patients.

13.5.2 Complexity

Providers and employees are more likely to respond to simple, comprehensible systems than to complex, confusing systems. Simple systems limit the use of incentives and the problems they create. If you want the payment system to reward physicians for keeping customer satisfaction high, MMR (measles, mumps, and rubella) vaccination rates high, out-of-formulary drug use low, hospitalization rates low, hospital lengths of stay short, after-hours response times prompt, record updates prompt, and asthma follow-up appointments timely, the system is likely to be unwieldy. Moreover, the reward associated with each component of the system is likely to be small.

Chapter 6 explored the modest impact of new payment models. As Crook and colleagues (2021) note, small shifts away from fee-for-service payment tend to have small effects, and large shifts are hard to make.

13.5.3 Opportunism

Managers must anticipate opportunistic responses to incentive systems. An agent with better information can harm the principal. In many cases, whether an agent has lived up to contract requirements is difficult to ascertain. In other cases, the agent may act in ways the principal did not anticipate. Some responses will necessitate system redesign; some will have to be tolerated to prevent the system from becoming excessively complex. For example, one response to the price reductions introduced by PPOs (preferred provider organizations) was to unbundle services. Physicians and other providers began to bill separately for services once included in the standard office visit. While insurers attempted to limit unbundling in a variety of ways, the fundamental problem remained that the incentives of physicians and insurers were misaligned (Golden, Edgman-Levitan, and Callahan 2017). Physicians' profits would be higher when they billed for more services, but insurers' profits would be higher when physicians billed for fewer services.

13.5.4 Team Production

Team production also limits the use of incentives. Production of healthcare products usually involves multiple people, and the shortcomings of one person can undermine the efforts of the entire team. For example, rudeness by one disaffected team member can negate the efforts of others to provide exemplary customer service. This interdependency can also weaken the effects of individual incentives. Workers who try hard to do a good job or physicians who are conscientious about reducing length of stay are likely to feel that their efforts are not appreciated if the shortcomings of others deny them bonuses. Building and maintaining effective teams are important tasks for managers. Unless carefully structured, financial incentives tend to reward individualistic behavior, which usually weakens teams. Equally problematic, team financial incentives (i.e., every member of the team receives a bonus when the team reaches its goals) often fail to motivate workers.

13.6 Incentive Design for Managers

Incentives for managers can be financial or nonfinancial. If both types are used, the two incentive systems should operate in tandem. Otherwise, they may worsen the problems created by asymmetric information (Lagarde and Blaauw 2017).

Incentive pay for managers is a partial response to the asymmetric information problem. It usually takes the form of bonus payments, profit sharing, or stock options. In most cases, it is a modest part of total compensation and

is only loosely tied to managers' performance. Four concepts underlie incentive pay for managers:

1. Financial incentives can strongly motivate people to perform in ways that the organization desires, yet organizations seldom want managers to focus only on duties that will increase their pay. (Volume-based compensation presents the same problem.)
2. Managers' goals are often ill-defined. Managers need to respond creatively to problems or, better yet, position the organization to respond to problems that are not yet evident. Performance assessment based on intangibles would be difficult, if not impossible.
3. Most managers' performance is hard to measure. As a result, compensation based on individual productivity ceases to make sense.
4. What is measurable and what is desired are unlikely to coincide. Compensation based on measurable outputs is likely to increase opportunism as managers react to what is rewarded rather than to what is sought.

For these reasons, incentive pay for managers generally needs to reflect the success of the overall organization. The dilution of incentives that results from using profit sharing or **gainsharing** is a reasonable price to pay for promoting team-oriented behavior. Gainsharing is like profit sharing, but bonuses are based on a broader array of outcomes. Members of a group can earn bonuses for hitting production, customer satisfaction, profit, quality, or cost targets. As individual contributions become less discernible, the more effective group incentives are likely to be. Members of the group will be able to monitor each other more easily, alignment of the group's and the organization's incentives will become more important, and the group will more easily alter how it does its work. For example, hospital care is produced by teams, but pay for many physicians depends on their personal billings. To encourage physicians to participate in hospital performance improvement activities, implementing payments to physicians that are based on the performance of the hospital is often helpful.

gainsharing
A general strategy of rewarding those who contribute to an organization's success. Profit sharing is one form of gain sharing. Rewards can be based on other criteria as well. (Chapter 6 discusses gainsharing in not-for-profit hospitals, where profit sharing is not permitted.)

Incentive pay is only part of an effective incentive system. Economic theory does not imply that individuals will not respond to opportunities to do challenging work, public celebrations of their accomplishments, or a positive review by a trusted mentor. An effective manager will consider these tools as well. Successful organizations require cooperation in management and production, so a nonfinancial system that rewards cooperation is a sensible option for aligning incentives. Promotions typically combine financial and nonfinancial rewards.

Case 13.2 The Total Care and Cost Improvement Program

In 2011, CareFirst BlueCross BlueShield, a plan offering coverage in Maryland, the District of Columbia, and Northern Virginia, implemented a patient-centered medical home (PCMH) program that included enhanced payments for primary care practices, financial incentives for primary care physicians to reduce spending, and care coordination tools to support improved care. The model, called the Total Care and Cost Improvement Program, changed payments to primary care physicians, increasing fees by 12 percent to compensate for extra care coordination and population management activities. The program also established a one-sided system of shared savings, increasing fees for the following year if spending was below the target. For example, savings realized in 2012 would increase fees in 2013. The increases depended upon the savings achieved by the panel, a quality score, panel size, and savings consistency over time. The increases were substantial, averaging 45 percent by 2013 (Afendulis et al. 2017).

How well did the program work? That is still not clear. Afendulis and colleagues (2017) concluded that the savings were small and that many physicians were not fully engaged with the program. A more recent analysis (Kicinger et al. 2019) concluded that a PCMH program with strong financial incentives can increase preventive care.

The differing interpretations may not matter. In September 2017, CareFirst issued a press release hailing "an historic slowing of overall medical cost growth" (CareFirst BlueCross BlueShield 2017). In 2016, CareFirst members seeing PCMH providers had hospital admission rates that were 10.4 percent lower and readmission rates that were 34.7 percent lower than patients receiving care from other providers. What changed? First, the PCMH had become a much more common approach to primary care by 2016. Second, in 2014, CareFirst received a grant from Medicare to extend the program to cover Medicare beneficiaries. This increased its clinical and financial effects. This grant also allowed CareFirst to train staff in the PCMH practices and to hire care coordinators, nurse case managers, consultants, pharmacy managers, clinical pathways specialists, and analysts. Third, organizational change takes time, and three more years had elapsed.

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Case 13.2 *(continued)*

Wagner (2019) argues that becoming an effective primary care practice requires four things:

1. Changing how care is delivered;
2. Changing how patients are supported and educated;
3. Changing how providers are supported and educated; and
4. Changing information systems.

It is not clear that these elements were present during the early years of the Total Care and Cost Improvement Program. Afendulis et al. (2017) reported that physicians in the program were receptive to making quality improvements but not very interested in cost reductions. In addition, most physicians were not familiar with or interested in the shared savings incentives.

Discussion Questions

- Why would physicians not be interested in cost reductions?
- How should the program have been framed to align the goals of CareFirst and physicians?
- How did including Medicare beneficiaries change incentives?
- The Medicare grant added infrastructure to the program. Was that important?
- Have other PCMH programs become more effective as they have matured?
- What should have been done to improve physicians' knowledge of current clinical protocols?
- How could one improve physicians' knowledge of best-practice clinical protocols?
- Why were most physicians unwilling to change their practices to claim incentives?
- Most PCMH programs pay care coordination fees per patient per month for patients with chronic illnesses. How do the incentives differ from those of the CareFirst program?
- Would care coordination fees have been a better strategy than higher visit fees?
- Many of the practices were small. Do you expect they could carry out performance improvements projects?

13.7 Conclusion

Incentive restructuring is an imperfect response to the problem of asymmetric information, as are all responses to this problem. The rewards of incentive systems are usually based on results, not what agents do, and agents can respond opportunistically to virtually any incentive system. The challenge is to align the incentives of all the individuals in a system with the interests of its stakeholders. Because good incentive systems must balance competing objectives, no magic formula exists. In addition, managers must anticipate that incentives may have multiple effects and that designing incentive systems and keeping them up to date will be expensive.

Major changes in payment systems are underway. Both public and private insurers are moving aggressively away from pure volume-based payments. Most of the new systems incorporate quality measures in some way, but quality is multi-dimensional and hard to measure. In addition, measuring quality uses resources. O'Shea (2017) estimates that quality reporting costs more than $40,000 per physician per year, and many are concerned about the burdens imposed on providers. MACRA creates significant incentives for physicians to participate in an Advanced Alternative Payment model, as the reporting burden should fall and revenue should rise. The problems that asymmetric information creates have not gone away, but the new payment systems have created pressure for change.

Exercises

13.1 Describe some healthcare situations in which an agent has taken advantage of a principal. Then describe some healthcare transactions that have not taken place because of fears about asymmetric information.

13.2 Identify some ways that nursing homes can signal high quality to consumers. Which of these signals are most likely to be reliable?

13.3 Provide an example of costly monitoring in the healthcare workplace. Can you think of an employment contract that would reduce monitoring without reducing quality?

13.4 What are some strategies for reducing adverse selection in insurance markets? What sorts of problems do these solutions cause?

13.5 One physical therapist is paid $20 per session. Another is paid $400 per week plus $20 per session in excess of 20 sessions per week. A third is paid $400 per week, plus $200 per week for having all paperwork complete and filed within 48 hours, plus $20 per session in excess of 30 sessions per week. How do the therapists' incentives

to produce sessions compare? How do their incentives to complete paperwork differ?

13.6 One physician is paid $100 per visit. Another is paid $2,500 per week plus $100 per session in excess of 20 sessions per week. A third is paid $2,000 per week plus $100 per session in excess of 20 sessions per week. The third physician is also paid a weekly bonus of $500 for being in the top quartile in management of common chronic diseases, appropriate antibiotic use, preventive counseling, screening tests, and appropriate prescribing in elderly patients. How do the physicians' incentives compare?

13.7 The Federal Trade Commission requires that firms advertise truthfully. Why does this requirement promote competition? Would firms be better or worse off if the Federal Trade Commission adopted a "let the buyer beware" policy?

13.8 Your firm sells backup generators to hospitals and clinics. The generators are guaranteed to operate on demand for two years. Your data show that the generators run an average of 42 hours per year. Your firm offers an extended warranty that covers the next three years. Your data show that repairs are needed for 2 percent of units during this three-year period. When repairs are needed, the average cost is $4,000. You charge $400 for the extended warranty, and about 20 percent of your clients buy it.

a. The extended warranty has been a consistent money loser. Claims average $1,000 per customer. How could this situation happen, given the data above?
b. Would raising the premium to $1,000 solve this problem?
c. What would you recommend that your company do to solve this problem?

13.9 For the population, healthcare spending averages $1,190 per year. Those with a family history of cancer (5 percent of the population) average $20,000, and those with no family history (95 percent of the population) average $200. An insurer is offering first-dollar coverage for $1,200.

a. You are not risk averse and have no family history of cancer. Do you buy coverage?
b. You are not risk averse and have a family history of cancer. Do you buy coverage?
c. If you were risk averse, how would your answers to the last two questions change?
d. What could an insurer do to prevent this sort of adverse selection?

e. What would be wrong with having everyone take a physical exam to get coverage?

13.10 You want to hire a new laboratory technician. Excellent technicians generate $1,000 in value added each week. Adequate technicians generate $500 in value added each week. Half of the graduates are excellent, and half are adequate.

a. You cannot tell who is highly capable and who is adequate. You are prepared to pay each technician his or her value added. What salary do you offer?

b. Who will accept this offer?

c. Is there any way that excellent technicians could communicate their productivity?

d. Propose a compensation system that will attract both types of technicians and pay no one more than his or her value added.

13.11 A new test identifies individuals with a genetic predisposition to develop heart disease before age 70. People who are predisposed to heart disease cost twice as much to insure as those who are not.

a. Can you make a case that a law prohibiting this test would be a good idea?

b. The test is not expensive. Would you prefer to skip the test and buy insurance at a premium that covers everyone or take the test and buy insurance at a premium that covers your group?

13.12 Your hospital wants to buy practices to expand its primary care networks. You are aware that physicians who want to sell their practices differ. Some love to practice medicine and love seeing patients. They want to sell their practices to focus on patient care 50 hours per week. Some physicians love to play golf and want to provide patient care no more than 35 hours per week. Propose a compensation plan that will allow you to hire only physicians who love to practice.

13.13 Having access to the books and understanding local markets better than new owners, the owners of medical practices generally understand their finances better than prospective buyers do. What sorts of transactions tend to take place because of this information asymmetry? What sorts of transactions tend not to take place? What can buyers and sellers do to offset this information asymmetry?

13.14 You are considering acquiring a firm rumored to have developed an effective gene therapy for diabetes. The value of the firm depends on this therapy. If the therapy is effective, the firm is worth $100 per share; otherwise, the firm is worth no more than $20 per share. Your company's management and marketing strengths should

increase the share price by at least 50 percent in either case. You must make an offer for the firm now, before the results of clinical trials are in. The current owner of the firm will sell for the right price. Make an offer for the firm. Explain why you think your offer makes sense.

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CHAPTER

14

ECONOMIC ANALYSIS OF CLINICAL AND MANAGERIAL INTERVENTIONS

Learning Objectives

After reading this chapter, students will be able to

- identify when a cost-minimization analysis is appropriate,
- explain why economic evaluation is necessary in healthcare, and
- discuss the importance of comparing the best alternatives.

Key Concepts

- Analyses of interventions are designed to support decisions, not make them.
- Comparing the most competitive alternatives is vital.
- Four types of analysis are common: cost-minimization analysis (CMA), cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-benefit analysis (CBA).
- Managers will primarily use CMA and CEA.
- CBA and CUA are potentially more powerful, but their validity is uncertain.
- Modeling costs entails identifying the perspective involved, the resources used, and the opportunity costs of those resources.
- Focusing on the direct costs of interventions is best.
- Modeling benefits is the most difficult part of economic evaluation of clinical interventions.

14.1 Introduction

Until recently, economic analyses of clinical interventions were uncommon. Healthcare decision makers had little or no incentive to assess whether procedures were worth their costs, or even whether those procedures could be

done more efficiently. A fee-for-service payment system tells decision makers what procedures are worth. Practical managers in a fee-for-service environment will not worry about genuinely balancing value and cost.

The emergence of bundled payment systems and the growth of capitation have made economic analyses of clinical interventions more relevant. In either system, getting the same outcome at lower cost directly increases profits. In a capitated system, the options are even greater: getting the same outcome more cheaply still increases profits, but strategies such as increasing prevention, self-care, or adherence to clinically effective protocols can also have a significant payoff. In short, the value of analyzing clinical interventions has risen sharply.

Analyses of clinical interventions ask deceptively simple questions, such as "Are the benefits of this intervention greater than its costs?" and "Is this intervention better than the alternatives?" Such questions are often difficult to answer because assessing the benefits of clinical interventions is difficult. While the second question may sound much like the first, it is easier to answer because it does not require assigning the benefits an explicit value.

cost-minimization analysis
An analysis that measures the cost of two or more innovations with the same patient outcomes.

cost-effectiveness analysis
An analysis that measures the cost of an innovation per unit of change in a single outcome.

cost-utility analysis
An analysis that measures the cost of an innovation per quality-adjusted life year.

cost-benefit analysis
An analysis that compares the value of an innovation with its costs. (Value is measured as willingness to pay for the innovation or willingness to accept compensation to not use it.)

These questions must be asked because, even in a wealthy society, resources are limited. When an individual chooses to purchase a drug or be screened for a condition, they cannot use those resources for other purposes. The same is true for society. If money spent on an electrocardiogram could be used to greater benefit elsewhere, the resources should be reallocated to those other uses. Ideally, we would like to use resources to maximum benefit. Practically, we seek to avoid pure waste and interventions in which the benefits are smaller than the costs.

Why are economic analyses of clinical interventions needed? Public and private insurers need information on which to base coverage decisions. Patients seldom are familiar with all the potential outcomes of therapy, their experience may not be typical, and their perceptions of costs are distorted by insurance. In addition, providers often need information to make the case for a new form of treatment. Because the stakes can be high, patients and providers are reluctant to innovate without evidence.

Analyses of clinical interventions are designed to support decision-making, not to make decisions. By providing a framework for synthesizing and understanding information, economic analyses can help decision makers avoid bad decisions.

Four types of analysis are common. **Cost-minimization analysis (CMA)**, **cost-effectiveness analysis (CEA)**, **cost-utility analysis (CUA)**, and **cost-benefit analysis (CBA)** all compare the costs and benefits of alternative interventions. All four use the same methods to measure costs, but they use different strategies for assessing benefits.

CMA is the most useful for managers. Although it is more limited in scope than the other types of analysis, it is simpler to apply. CMA answers our

second question: "Is this intervention better than the alternatives?" Unfortunately, it cannot answer this question in every case. If the better alternative also costs more or if the least expensive alternative does not work as well, CMA is not very helpful.

CEA extends CMA somewhat. When the better strategy costs more, CEA answers the question "What is the cost per unit of this gain?" This simple piece of information is likely to be of genuine value to managers because it will validate strategies with a small cost per unit and negate those with a large cost per unit. CEA does not, however, directly compare the costs and benefits of a strategy as CUA and CBA try to do.

14.2 Cost Analysis

Before examining these four types of analysis in more detail, we will briefly review the basics of cost analysis. Measuring costs involves three tasks:

1. identifying the perspective involved,
2. identifying the resources used, and
3. identifying the opportunity costs of those resources.

Costs are often poorly understood (and poorly measured), even though the issues are seldom very complex.

14.2.1 Identifying a Cost Perspective

Identifying a cost perspective is an essential first step. Confusion about costs often arises because the analyst has not been clear about the perspective. Decision makers usually respond to the costs they see, and different decision makers typically see different portions of the cost. This notion may seem abstract, so here is a simple example. An insurance plan (an HMO, or health maintenance organization) wishes to increase use of a generic drug in place of the brand-name equivalent. The generic product costs $50, of which $4 is paid by the patient and $46 is paid by the plan. The branded product costs $100, of which $5 is paid by the patient and $95 is paid by the plan. From the plan's perspective, switching to the generic saves $49. From the consumer's perspective, switching to the generic saves $1. From the perspective of society, switching to the generic saves $50. These perspectives are all valid, yet they may lead to very different choices.

Another example shows how differences in cost perspectives can lead to different perceptions of the cost of a good or service. Suppose the same HMO encourages use of an over-the-counter drug because the drug is not a covered benefit. The over-the-counter product costs $10, of which $0 is

paid by the plan. The prescription product costs $15, of which $5 is paid by the patient and $10 is paid by the plan. From the consumer's perspective, the switch increases costs from $5 to $10. Because consumers share the costs of covered medications with many other beneficiaries, they will want to switch to over-the-counter medications only if those medications are more effective or more convenient than prescription medications. From the insurer's perspective, the switch reduces costs from $10 to $0. The switch makes sense for the insurer if the prescription medication is not "too much better" than the over-the-counter medication. From the perspective of society, the switch reduces costs from $15 to $10 and makes sense only if the over-the-counter medication is "nearly as good" as the prescription medication.

societal perspective
A perspective that considers all costs and benefits, no matter to whom they accrue.

A **societal perspective** on costs is usually the right perspective, for two reasons. The societal perspective recognizes all costs, no matter to whom they accrue. Other perspectives typically fail to consider important costs, which is seldom a good long-run strategy. Those to whom costs have been shifted try to avoid them and try to avoid organizations that shift costs to them.

14.2.2 Identifying Resources and Opportunity Costs

Cost equals the volume of resources used in an activity multiplied by the opportunity cost of those resources. Keeping these two components of cost separate is useful because either can vary. A clinical understanding of a process helps a manager to identify the resources used in an intervention; a well-documented clinical pathway is even more helpful.

Most of the time, the opportunity cost of a resource simply equals what you paid for it. The opportunity cost of $100 in supplies is $100. The opportunity cost of an hour of nursing time is $27 if the total compensation of a nurse is $27 per hour. Calculating the opportunity cost is more complex when the cost of a resource has changed since you bought it and you would not buy it at its current price. In these cases, you have to calculate the value of the resource in its best alternative use.

Economic theory provides a powerful tool for simplifying cost analyses. It says to focus on the resources you add (or do not need) because of an intervention. In other words, focus on incremental costs. This task can be difficult but is less complex than pondering, for example, exactly what proportion of the chief financial officer's compensation should be allocated to a triage process in the emergency room.

14.2.3 Direct and Indirect Costs

Implicit in this advice is a recommendation to focus on the direct costs of interventions, or those costs that result because an intervention has been tried. For example, the costs of a drug and its administration are direct costs of drug therapy. The costs of associated inpatient and outpatient care are

also direct costs. If healthcare costs associated with ineffectiveness or adverse outcomes are present, those should be counted as well. By the same token, costs incurred by patients because they undertake the treatment are direct costs. Added childcare, transportation, and dietary costs that result directly from therapy should be counted from a societal cost perspective. From the perspective of the healthcare system, however, these added costs for patients would not be counted. (Of course, as noted earlier, a cost perspective that ignores the effects on customers is likely to result in poor decisions.)

Most "indirect" costs represent a confusion of costs with benefits. Healthier people typically spend more on food, recreation, entertainment, and other joys of life, but this additional spending is not a part of the costs of interventions that restored health. (Individuals have independently made the judgment that this additional spending is worthwhile.) By the same token, we should not treat a recovered patient's future spending as a cost of the intervention that permitted the recovery—unless, as with transplant patients' immunosuppressive drugs, these costs are an integral part of the intervention. That a transplant patient feels healthy enough to play tennis certainly signals that the operation was a success, but the cost of knee surgery for this overenthusiastic athlete should not be considered a cost of the transplant.

14.3 Types of Analysis

We have identified four types of analysis: CBA, CEA, CUA, and CMA. Be aware that mislabeling is the norm, not the exception. A "cost-benefit analysis" could be anything, and the meaning of "cost-effectiveness analysis" has changed over the years. Exhibit 14.1 shows when each type of analysis is needed.

If deciding which strategy is best is very difficult, the choice of strategy should not matter because they all support decision-making. If the options

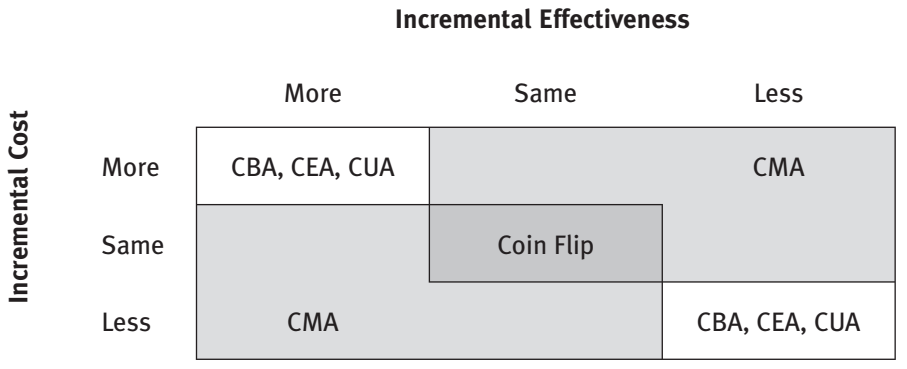

EXHIBIT 14.1 Using Decision-Support Tools

look so similar that choosing the best one is difficult, do not do a detailed analysis. A coin flip will suffice. Of course, when populations are large, even small differences in cost or benefit per case can result in significant differences from society's perspective. However, for working managers, small differences are not worthy of attention.

14.4 Cost-Minimization Analysis

The simplest and most productive type of analysis is CMA, which identifies the intervention with the lowest costs. If the intervention has outcomes at least as good as those of the alternatives, CMA is the analysis of choice. While CMA avoids most of the problems associated with measuring benefits, it does not escape them entirely. The most common problem in CMA is a lack of evidence that the least-cost option has outcomes at least as good as the other choices.

Steps in Cost-Minimization Analysis

1. Estimate the expected costs for each option.
2. Show that the least-cost option has outcomes at least as good as higher-cost alternatives.

An Example of Cost-Minimization Analysis

Treatment guidelines for patients hospitalized with community-acquired pneumonia recommend antibiotic therapy for eight days. The scientific basis for this treatment is limited, however; some researchers have suggested that briefer treatments may be appropriate. Because community-acquired pneumonia is a common problem, substantial savings might be possible with briefer treatments.

Dinh and colleagues (2021) conducted a randomized controlled trial to compare three-day treatment with longer antibiotic therapies. At day three of treatment, patients with community-acquired pneumonia who had significantly improved were randomly assigned to discontinue antibiotics or complete the course of treatment prescribed by

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their physician. Patients were then followed for 30 days. Shorter treatments also led to less antimicrobial resistance, fewer adverse effects, lower cost, and improved adherence. The CMA found lower costs and better outcomes.

14.5 Cost-Effectiveness Analysis

CEA recognizes that measuring the incremental cost of improving outcomes may be useful when a more effective intervention costs more. In at least some cases, the incremental cost will be so high or so low that a decision can be based on it.

In some cases, CEA is not helpful. If the cost per life year saved is $5,000,000 or if the cost per injury prevented is $100,000, the answer will not seem obvious. In these cases, CBA or CUA may be needed.

Steps in Cost-Effectiveness Analysis

1. Estimate the expected costs for each option.
2. Establish how much the higher-cost option improves outcomes.
3. Calculate the cost per unit of improvement in outcome (e.g., the cost per life year gained or the cost per infection avoided).

An Example of Cost-Effectiveness Analysis

People should stop smoking for many reasons, but many smokers are not ready to quit. To increase quit rates in this group, Ali and colleagues (2018) offered a variety of medical and behavioral tools. Doing so led to substantial quit rates, but the average cost per quit for medical interventions was nearly $20,000, and the average cost per quit for behavioral interventions was over $11,000. This cost was substantially more than the average cost per quit among smokers ready to quit. Given that many smokers who want to quit are not offered the most effective treatments, most would conclude that this should be a priority.

Case 14.1

Was Medicaid Expansion Worth It?

The Affordable Care Act was designed to extend Medicaid to low-income individuals and families, but court decisions allowed states to opt out of Medicaid expansion. As of 2020, 38 states had expanded Medicaid coverage. Did the benefits of expansion exceed its costs?

A detailed analysis concluded that the benefits of expansion substantially exceeded its costs, while also making clear the complexity of the calculations. Borgschulte and Vogler (2020) compared changes in mortality in expansion-state counties to changes in mortality in matched, non-expansion-state counties. Although mortality rates declined in all states between 2013 and 2017, by 2017, mortality rates fell by 15 additional people per 100,000 in expansion states. Thus, the authors concluded that expansion reduced mortality for those under age 65 by just over 12,000. Using the value of a statistical life (an estimate based on the effects of market choices on mortality risks; see EPA 2020), they estimated the value of Medicaid expansion at $102 billion. Medicaid expansion cost $70 billion, meaning that the benefits were greater than the costs.

Discussion Questions

- Why might mortality have fallen between 2013 and 2017 in non-expansion states?
- How would having insurance coverage reduce mortality?
- Are there benefits of insurance coverage other than reducing the risk of premature death?
- Why might Medicaid expansion affect people who did not gain coverage as a result?
- What sort of analysis is this?

14.6 Cost-Benefit Analysis

CBA is also relatively simple, but its validity is unknown. CBA is appropriate when the option with the best outcomes costs more. CBA begins with a comparison of two or more options to find out how their costs differ, then attempts to estimate the difference in benefits directly. Two very different

strategies are used for doing so. One uses statistical techniques to infer how much consumers are willing to pay to avoid risks. The other uses surveys of the relevant population to determine whether the added benefits are worth the cost.

Neither method's validity has been clearly established. The fundamental challenge arises from concerns about consumers' abilities to make decisions involving small probabilities of harm. If consumers do not assess these probabilities accurately, their life choices and their responses to surveys will not be reliable. In addition, multiple challenges to the validity of statistical inferences are always present, and statistical estimates of benefits are imprecise. Surveys may not give us valid measures of willingness to pay or willingness to accept compensation. First, they ask consumers to make complex assessments of services they have not yet used. Answers to complex hypothetical questions are suspect. Second, consumers may misrepresent their preferences, believing they will have to pay more out of pocket if they answer willingness-to-pay questions accurately. Therefore, even though CBA can provide invaluable information to decision makers, its accuracy is not clear.

Two other criticisms are worth noting. Early CBA studies used data on increases in labor market earnings to estimate benefits. A few minutes of reflection will reveal problems with this approach. Is improved health for retired persons of no value? If people are willing to pay out of pocket for the care of their pets (who have no earning power), are changes in earnings an accurate guide to the value of medical interventions? Earnings-based estimates of benefits have left a legacy of skepticism of CBA among healthcare analysts. A second complaint is that willingness to pay usually rises with income. However, this finding is profoundly troubling to analysts, who would prefer a healthcare system that is more egalitarian than the current system in the United States. (While this complaint is not really a criticism of CBA, it is sometimes presented as such.)

For an illustration of how CBA works, return to the example of switching from a branded product to a generic one. Recall that the branded drug costs $100 and the generic drug costs $50. Uninsured consumers would buy the branded product only if its benefits were large enough for them to be willing to pay $100. Few consumers would be willing to pay this much to get the branded product because branded and generic drugs seldom differ. Current users of a branded drug, however, face both real and perceived risks to switching, such as the risk of an allergic reaction to different inert ingredients. Remember, from the insured consumer's perspective, the cost differential is only $1, from $5 for the branded product to $4 for the generic. Current users of the drug may be willing to pay $75, in which

case the marginal benefit of the branded drug will appear larger than its marginal cost. Current users have an incentive to make sure others bear the financial risk of higher costs. Asking people who are not current users is also problematic. The opinion of someone who does not have a disease the drug is intended to treat or who has not used both drugs is not likely to hold much value.

Steps in Cost-Benefit Analysis

1. Estimate the expected incremental costs of the more expensive option.
2. Survey consumers to find out whether they would be willing to (a) pay enough to cover the added costs of an option with better outcomes or attributes or (b) accept payment that would be less than the cost savings of an option with worse outcomes or attributes. Alternatively, use market data to estimate how much consumers are willing to pay to avoid risks or willing to accept to take on risks.
3. Compare the incremental benefits and costs.

An Example of Cost-Benefit Analysis

Adult-onset diabetes often causes workers to retire. A recent study measured willingness to pay for work accommodations for people with adult-onset diabetes (Nexo et al. 2017).

Time off with pay was by far the most highly valued option, but being able to work part-time was a close second. Interestingly, people with adult-onset diabetes systematically viewed work accommodations as less valuable than did a matched sample of other people. People with adult-onset diabetes viewed paid time off for medical visits as more valuable than part-time work, customized work, or additional paid breaks. One would need to calculate the costs of the various options to determine which offered the highest net benefit (benefit minus cost), but the study clearly warned against making inferences about value from individuals who have not experienced the illness.

14.7 Cost-Utility Analysis

CUA rivals CBA as a complete comparison of alternative interventions (note that many analyses do not distinguish between CEA and CUA). CUA seeks to measure consumer values by eliciting valuations of health states. This information is then used to "quality adjust" health gains, so that decision makers can consider the cost per quality-adjusted life year (QALY) saved (how QALYs are calculated will be explained later in this chapter).

CUA is complex, and its validity is unknown. It is appropriate whenever CBA is, and at a formal level, the two are essentially equivalent. At a practical level, however, the process of calculating benefits is different. CUA measures how alternative interventions change the health status of patients and how patients evaluate those changes.

Exhibit 14.2 walks you through the calculations for a CUA. Suppose 215 people each received treatments A and B. At the end of one year, the number of survivors differs for the two treatments (N_A and N_B), as does the average utility level (U_A and U_B). We use these data to calculate how many additional QALYs we get as a result of using treatment B. We then calculate the cost per QALY if we switch to treatment B.

Four uncertainties are associated with this calculation, aside from the usual problems of assessing the clinical effectiveness of treatments. First, should we limit our questions to patients? Family, friends, and strangers are sometimes willing to help patients afford care. Second, can patients answer questions about utility adequately and accurately? Third, what discount rate should we use? While the example uses 3 percent, another rate might give us

EXHIBIT 14.2
A Cost-Utility Analysis

	$QALY_A$					$QALY_B$	$QALYB - QALY_A$	
							Discounted	
	N_A	U_A	$N_A \times U_A$	N_B	U_B	$N_B \times U_B$	0%	3%
Year 1 outcomes	200	0.95	190.00	210	0.96	201.60	11.60	11.26
Year 2 outcomes	195	0.94	183.30	199	0.93	185.07	1.77	1.67
							13.37	12.93
Cost per QALY (with a $300,000 cost difference between A and B)							$22,438	$23,201

Note: N_A and N_B refer to the number of participants. U_A and U_B refer to the average utility score of participants.

different answers, and we do not know what the right rate is. Fourth, assuming all other calculations are correct, at what cost per QALY should we draw the line? At the risk of sounding unduly negative, the validity of CUA hinges on finding satisfactory answers to these questions, which is not likely.

Unlike CMA or CBA, CUA requires that the analyst explicitly discount future QALYs. A technique commonly used in banking and finance, **discounting** reflects that benefits we realize far in the future are worth less than benefits we realize now. Discounting is valid because money can earn interest. To pay a bill that will come due in the future, one can set aside a smaller amount today. For example, if we invest $100 at an interest rate of 7 percent, we will have $160.58 at the end of ten years. We can reverse this calculation to show that the value of a guaranteed payment of $160.58 that we will get in ten years is $100.

discounting Adjusting the value of future costs and benefits to reflect the willingness of consumers to trade current consumption for future consumption. (Usually future values are discounted by $1/(1 + r)^n$, with r being the discount rate and n the number of periods in the future the cost or benefit will be realized.)

If the interest rate is fixed, discounting is easy to figure on a spreadsheet. A single formula, $PV \times (1 + r)^n = FV$, lets us do all the necessary calculations. In this formula, PV refers to the present value of future costs or benefits, or the amount we are investing today; r refers to the interest rate; n refers to the number of time periods involved; and FV refers to the future value of future costs or benefits, or the amount we will have at the end of the investment period. We use the same formula to calculate the present value of future costs and benefits. The formula becomes $PV = FV/(1 + r)^n$. If we knew the size and timing of an intervention's costs and benefits and the right discount rate, calculating the present value of the QALYs associated with it would be a simple matter. In fact, we do not know the right discount rate and are not sure that the discount rate is constant for a given individual, let alone for different individuals. Sensitivity analysis is the best we can do in this regard. This analysis entails varying the discount rate over a reasonable range (typically 0 to 10 percent) and seeing if the answer changes. If not, the result is insensitive to the value of the discount rate. But if the answer does change, we have to use our judgment.

Steps in Cost-Utility Analysis

1. Estimate the expected costs for each option.
2. Estimate the number of people alive in each year in each cohort.
3. Using a survey of consumers, estimate the average utility score for each option for each person who is alive in each year.

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4. Multiply the utility score (which will range from zero to one) by the number of people alive in each year for all the cohorts being compared. The product is the number of quality-adjusted life years (QALYs) for each cohort.
5. Discount the QALYs using rates of 2 to 5 percent.
6. Add the QALYs for each option, then find the difference.
7. Divide the difference in cost between options by the difference in QALYs.
8. Decide whether the cost per QALY is too high.

An Example of Cost-Utility Analysis

Idiopathic normal pressure hydrocephalus is one of the few treatable causes of dementia. It is also fairly common. Treatment usually involves shunt surgery. (A shunt is a hollow tube that is inserted in a blood vessel for a variety of conditions.)

Tullberg and colleagues (2018) compared the costs and outcomes for groups who were offered immediate or delayed surgery. Immediate surgery cost a little less than $15,000 more per person, but QALYs were about 1.73 higher. (This is a very large difference.) So, the cost per QALY gained was less than $9,000. This calculation, which is called the incremental cost-effectiveness ratio, divides the cost difference by the QALY difference. The team concluded that stent surgery was an excellent use of resources.

Case 14.2

Teledermatology

Most dermatologists reside in metropolitan areas, so teledermatology should be considered as an option for individuals living outside these areas. However, two questions must be answered. How much does it cost? How valuable is it?

A limited number of studies have explored these questions (Wang et al. 2020). Most have concluded that teledermatology increases

(continued)

Case 14.2 *(continued)*

costs from a health system perspective, but it sharply reduces costs from a societal perspective. Patients incur much lower travel costs and can access care more easily. In addition, the quality of care observed in teledermatology seems to be equivalent to the quality of face-to-face care.

A number of insurers and health systems have implemented telehealth visits (Bailey 2021). Some of these decisions were a consequence of the pandemic. Others were a reaction to patient preferences.

Discussion Questions

- Would you be willing to use teledermatology? Why or why not?
- Which perspective on costs seems more valid to you?
- What is your recommendation for assessing the value of teledermatology?
- Would you be willing to adopt teledermatology for your health system?
- Should Medicare use economic evaluation in making coverage decisions?
- Congress has largely banned considering costs in making coverage decisions. Do you agree?
- Can you find published examples of CMA? CEA? CBA? CUA?

14.8 Conclusion

Except for CMA or possibly CEA, our advice is "Don't try this at home." When you need evidence to make a decision, turn to the literature. If no guidance is to be found there, do CMA or CEA (or modify existing studies using your costs). If these tools do not provide a clear direction, use clinical judgment. CBA and CUA are research tools, not management tools. Still, these techniques can help make your organization more efficient. Applied judiciously, they will help your organization identify and provide the most efficient therapies, which will reduce your costs and increase your options.

The importance of comparing the right options is often lost in the discussion of these analyses. Failing to compare reasonable alternatives renders CMA, CEA, CBA, and CUA useless. The best choice will usually be clear if the most plausible alternatives are compared. And if the best choice is not clear, either choice may be appropriate.

Exercises

14.1 Why have economic analyses of clinical and administrative innovations become more important?

14.2 Why is cost-minimization analysis most likely to be useful for managers?

14.3 Why would an economist object to including overhead costs in CMA analysis?

14.4 A clinic finds that it can reduce costs by eliminating appointments. The clinic can eliminate some telephone staff, and physicians become more productive. Patients wait until the physician is available, so the physician has virtually no downtime. Does this analysis adopt a societal view of costs? Why might this analysis result in a bad managerial decision?

14.5 Treating a patient with lung cancer using modern drugs increases average life expectancy by 0.25 years. The added cost of therapy is $24,000. What is the cost per life year? Should modern drugs be used?

The cost per life year is $96,000 = $24,000/0.25. This is an example of cost effectiveness analysis. No definite answer is possible, but this pushes toward the upper cost per life year ceiling.

14.6 A test for bladder cancer costs $100. If this test is given to 1,000 individuals, it will reduce medical costs by $80,000 and increase average life expectancy from 15.0 to 15.1. What is the cost per life year? Should you screen this population?

14.7 Compared with a drip system, an infusion pump reduces the cost of administering chemotherapy from $25 per dose to $20 per dose. The complication rate of each system is 2 percent. Which should you choose? What sort of analysis should you do?

14.8 After choosing between the options in exercise 14.6, you discover that an infusion pump with a dosage-monitoring system cost $15 per dose. Its monitoring functions reduce the complication rate to 1 percent. Which of the three options do you prefer? What principle does this illustrate?

14.9 Switching from one anesthesia drug to another reduces costs by $100 per patient. What additional information do you need to do a cost-minimization analysis?

14.10 A vaccine costs $200 per patient. Administration of the vaccine to 1,000 people is expected to increase the number of pain-free days for this population from 360,000 to 362,000. Calculate the cost per additional pain-free day due to vaccination. Is vaccination a good investment?

14.11 An acute care hospital has found that having geriatric nurse specialists take charge of discharge planning for stroke patients reduces length of stay from 5.4 days to 5.2 days. On average the geriatric nurse specialist (who earns $27 per hour including fringe benefits) spends 3.3 hours on discharge planning per patient. Supply and telephone costs are less than $10 per discharge plan. Your accounting staff tell you the average cost per day is $860 and the incremental cost per day is about $340. Is this innovation financially attractive? Whether it is or not, what alternatives should the hospital consider?

14.12 The current cost function for a lab that evaluates pap smears is $C = 200{,}000 + 25 \times Q$. Q, the annual volume of tests, is forecast to be 30,000. The incremental cost is $25 because each evaluation requires $20 worth of a technician's time and $5 worth of supplies. Calculate the average cost of an evaluation.

At a volume of 30,000, total and average cost are lower for the automated system, which has higher fixed costs and lower incremental costs than the current system. Average cost for the automated system is $30.00 = 300,000/30,000 + 20. Average cost for the current system is $31.67 = 200,000/30,000 + 25. So, for this level of volume, choose the automated system. Note that the automated system has outcomes at least as good as the current system, so a cost minimization is appropriate.

14.13 You are comparing replacing the current lab, which has a cost function of $C = 200{,}000 + 25 \times Q$, with an automated lab that has a cost function of $C = 300{,}000 + 20 \times Q$. Doing so would reduce the error rate from 1.5 percent to 1 percent. Your volume is expected to be 18,000 tests per year. Should you choose the automated lab? Briefly explain your logic.

14.14 The expected cost of Betazine therapy is $544. It is effective 57 percent of the time, with a 6 percent chance of an adverse drug reaction. The table shows data for Alphazine, a new treatment. Estimate the rate of adverse drug reaction and the expected cost of

treatment. Use Microsoft Excel to construct a decision tree for this problem. Should you choose Alphazine or Betazine?

			Probability	Cost
Effective	63%	Adverse drug reaction	5%	$700
		No adverse drug reaction	95%	$500
Ineffective	37%	Adverse drug reaction	5%	$800
		No adverse drug reaction	95%	$600

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CHAPTER

15

PROFITS, MARKET STRUCTURE, AND MARKET POWER

Learning Objectives

After reading this chapter, students will be able to

- describe standard models of market structure,
- discuss the importance of market power in healthcare,
- portray bargaining between insurers and providers,
- calculate the impact of market share on pricing,
- apply Porter's model to pricing, and
- discuss the determinants of market structure.

Key Concepts

- If the demand for its products is not perfectly elastic, a firm has some market power.
- Most healthcare firms have some market power.
- Having fewer rivals increases market power.
- Firms with no rivals are called monopolists.
- Firms with only a few rivals are called oligopolists.
- More market power allows larger markups over marginal cost.
- Barriers to entry and product differentiation can increase market power.
- Regulation can be a source of market power.
- In the United States, prices depend on bargaining between providers and insurers.

15.1 Introduction

What distinguishes very competitive markets (those with below-average profit margins) from less competitive markets (those with above-average profit

margins)? An influential analysis by Porter (1985) argues that profitability depends on five factors:

1. The nature of rivalry among existing firms
2. The risk of entry by potential rivals
3. The bargaining power of customers
4. The bargaining power of suppliers
5. The threat from substitute products

Porter's model explains profit variations in terms of variations in market power. Firms in industries with muted price competition, little risk of entry by rivals, limited customer bargaining power, and few satisfactory substitutes have significant market power. These firms face relatively inelastic demand and can get large markups. In contrast, even though entry is usually limited in healthcare, other firms face much more challenging markets. For example, Roberts, Chernew, and McWilliams (2017) show that smaller medical practices systematically get paid less than larger practices. To help understand these differences, this chapter will use Porter's framework to explore links among profits, market structure, and market power.

Three characteristics of healthcare markets reduce their competitiveness. First, many healthcare markets have only a few competitors, which mutes rivalry. Second, this muted rivalry can persist because cost and regulatory barriers limit entry. Third, many healthcare products have few close substitutes. This makes market demand less elastic and may make the demand for an individual firm's products less elastic. These factors give healthcare firms market power.

In addition, consolidation has been proceeding apace for more than 20 years, and it continues. Nearly 1,000 hospital mergers or acquisitions took place between 2011 and 2021 (Singh 2022), and increasing numbers of physicians are becoming employees of hospitals or health systems.

These trends represent significant changes in healthcare markets. In the United States, healthcare prices result from bargaining between insurers and providers, so the market positions of both matter. An insurer with a small market share will typically be forced to pay higher prices to providers. Likewise, a health system with a larger market share can usually negotiate higher prices, especially if it offers services that rivals do not (Cooper et al. 2019).

Profit-oriented managers will usually seek to gain market power. The most ambitious will try to change the nature of competition. For example, faced with determined managed care negotiators, healthcare providers may merge to reduce costs and improve their bargaining positions, which can improve margins. But even when an organization cannot change a market's

competitive structure, it still has two options: it can seek to become the low-cost producer, or it can seek to differentiate its products from those of the competition. Either strategy can boost margins, even in competitive markets.

The Effects of Increased Concentration

How have increases in market concentration among hospitals, medical groups, and health plans affected consumers? Hospital consolidation has been common since at least the early 1980s, but the implementation of the Affordable Care Act spurred a resurgence of hospital mergers and acquisitions. A good deal of evidence indicates that hospital prices are higher in concentrated markets, which increases out-of-pocket costs and premiums.

There is limited evidence about the effects of consolidation on physicians' prices, but increasingly physicians are shifting into larger practices and practices that are owned by health systems. Although there are a number of reasons for this consolidation, the ability to negotiate higher prices appears to be one. For example, the price for an office visit averaged $97 for large practices, but averaged $88 for small practices dealing with the same insurers (Roberts, Chernew, and McWilliams 2017).

15.2 Rivalry Among Existing Firms

Most healthcare organizations have some market power. Price elasticities of demand are small enough that an organization will not lose all its business to rivals with slightly lower prices. Market power has several implications. Obviously, it means that firms have some discretion in pricing because the market does not dictate what they will charge. Flexibility in pricing and product specifications means managers must consider a broad range of strategies, including how to compete. Some markets have aggressive competition in price and product innovation; other markets do not. Managers have to decide what strategy best fits their circumstances. The prospect of market power also gives healthcare organizations a strong incentive to differentiate their products. The amount of market power an organization has typically depends on how much its products differ from competitors' in terms of quality, convenience, or some other attribute.

Healthcare organizations generally have market power because their competitors' products are imperfect substitutes. Reasons that competitors'

products are imperfect substitutes include differences in location or other attributes, or even product familiarity. For example, a pharmacy across town is less convenient than one nearby, even if it has lower prices. Because consumers choose to patronize the more expensive but closer pharmacy, it has market power.

Medical goods and services are typically "experience" products, in that consumers must use a product to ascertain whether it offers better value than another. For instance, patients do not know whether a new dentist will meet their needs until the first visit. Likewise, consumers must try a generic drug to be sure it works as well as the branded version. Because of this need to try out healthcare products, comparison of medical goods and services is costly, and consumers tend not to change products when price differences are small. Consumers have difficulty assessing whether experience products have good substitutes, which increases market power.

As we will see in section 15.8, advertising decisions depend on the differences that determine market power. Attribute-based differences usually demand extensive advertising. Information-based differences often reward restrictions on advertising.

Many healthcare providers have few competitors. This statement is true for hospitals and nursing homes in most markets, and often for rural physicians. Where the market is small, either because the population is small or because the service is highly specialized, competitors will usually be few. And when a firm has few rivals, all have some market power, if only because each controls a significant share of the market. Firms with few competitors recognize that they have flexibility in pricing and that what their rivals do will affect them.

15.3 Defining Market Structures

A perfectly competitive market, in which buyers and sellers are price takers (i.e., a market in which both believe that they cannot alter the market price), offers a baseline with which to contrast other market structures. In perfect competition, firms operate under the assumption that demand is very price elastic. The only way to realize above-average profits is to be more efficient than the competition. Firms disregard the actions of their rivals, in part because potential entrants face no barriers and in part because firms have so many rivals. In any other market structure, organizations will produce less and charge higher prices.

Few healthcare markets even remotely resemble perfectly competitive markets. Some have only one supplier and are said to be *monopolistic*. For example, the only pharmacist in town is a **monopolist**. Other markets have many rivals, all claiming a small share of the market. At first glance, these markets may look perfectly competitive, but they have one key

monopolist
A firm with no rivals.

difference: Customers do not view the services of one supplier as perfect substitutes for the services of another. Each dentist has a different location, a different personality, or a different treatment style. Firms such as these are said to be **monopolistic competitors**.

Firms with only a few competitors and are said to be **oligopolists**. Firms with large market shares are also viewed as oligopolists even if they have with many rivals. A local market with two hospitals serving the same area is oligopolistic, as is a market with 15 PPOs (preferred provider organizations), the two largest of which have 40 percent of the market. Because the decisions of some competitors determine the strategies of others, oligopolistic markets differ from other markets in an important way. Oligopolists must act strategically and recognize their mutual interdependence.

monopolistic competitor
A firm with multiple rivals whose products are imperfect substitutes.

oligopolist
A firm with only a few rivals or a firm with only a few large rivals.

15.4 Customers' Bargaining Power

A distinguishing feature of healthcare markets is that they contain many buyers, most of which have limited bargaining power. Of course, in some markets, a single insurer has a very large market share, meaning that it has significant market power. For example, Blue Cross and Blue Shield of Alabama holds 97 percent of the individual market and 94 percent of the large group market in that state (Kaiser Family Foundation 2021). Increasingly insurers have sought to identify efficient providers with low prices. So in addition to the number of sellers, healthcare market structures depend on the market shares of insurers (including Medicare and Medicaid, where appropriate) and the number of each in the market.

Case 15.1 Should Governments Participate in Price Negotiations?

Cardiac catheterization, a procedure that involves inserting a long, flexible tube into an artery or vein and threading it through to the heart, is used to diagnose and treat cardiovascular conditions. Patients who are having a heart attack often receive cardiac catheterization. In the United States, the average payment negotiated by private insurers for cardiac catheterization is $7,090 (International Federation of Health Plans 2019). The average Medicare fee for outpatient cardiac catheterization is less than half that. But the Medicare price is higher than the price in most wealthy countries.

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Case 15.1
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High private insurance prices represent a fundamental reason why healthcare is so expensive in the United States. Switzerland also has private insurance, relatively high prices, and the second-highest healthcare costs in the world. However, an abdominal CT scan averages $770 less in Switzerland than in the United States; a colonoscopy averages $2,290 less; and a normal delivery averages $6,100 less (International Federation of Health Plans 2019). Although there are exceptions, most healthcare prices are much higher in the United States than in other rich countries. (This discussion is about amounts paid, not amounts charged.)

These high prices and the process that leads to them have many consequences. Out-of-pocket costs are much higher in the United States, and serious illnesses can result in medical bankruptcy. High prices increase private health insurance premiums, and many Americans cannot afford private insurance. Furthermore, private insurers increasingly rely on narrow networks of providers to get better prices. This makes getting care more complex and can expose patients to very high out-of-pocket costs if they get care from an out-of-network provider.

Discussion Questions

- Why are private prices so high in the United States?
- How are commercial insurance prices set for hospital services?
- How are Medicare prices set for physicians' services?
- How are Medicare prices set for hospital services?
- Should governments be involved in private price negotiations?
- Would consumers be better off if healthcare prices were nationally negotiated?
- Are other countries' governments involved in healthcare pricing?

15.5 The Bargaining Power of Suppliers

The bargaining power of suppliers tends to be high in the following situations:

- There are many buyers and few suppliers.
- The supplies are differentiated, high-value products.
- Suppliers can threaten to enter the industry they currently supply.
- Buyers cannot threaten to manufacture supplies.
- The industry is not a key customer for suppliers.

The bargaining power of suppliers varies in healthcare, even though the number of suppliers tends to be much smaller than the number of providers. Some suppliers sell highly complex, highly specialized products such as MRIs; others sell relatively generic products such as medical gloves. Most of these product lines have multiple suppliers, so pricing by suppliers tends to be competitive.

In some cases, providers may have very strong bargaining position. In markets where there are few providers (rural or poor areas), providers can compete with health systems in several service lines. Ambulatory surgery centers, freestanding imaging centers, and other enterprises can compete with hospitals and health systems, so providers have considerable leverage. But in markets with many providers, their bargaining position is much weaker.

15.6 Entry by Potential Rivals

Barriers to entry in healthcare markets may be market based or regulation based. Generally, regulation-based barriers are more effective. Whatever the source, restrictions on entry reduce the number of competing providers and make demand less price elastic. In other words, entry restrictions, whether necessary or not, increase market power.

The best way to erect entry barriers and gain market power is to have the government do it. This strategy has two fundamental advantages. First, it is perfectly legal and eliminates public and private suits alleging antitrust violations. Second, the resulting market power is usually more permanent because government-sanctioned entry barriers will not be eroded by market competition.

State licensure forms much of the basis for market power in healthcare. Licensure prevents entry by suppliers with similar qualifications and encroachments by suppliers with lesser qualifications. For example, state licensure laws typically require that pharmacy technicians work under the direct supervision of registered pharmacists and that a registered pharmacist supervise no more than two technicians. These restrictions clearly protect pharmacists' jobs by limiting competition from technicians.

Intellectual property rights can also provide entry barriers. Innovating organizations can establish a monopoly for a limited period by securing patents. A US patent gives the holder a monopoly for 17 years. The patent holder must disclose the details of the new product or process in the application but is free to exploit the patent and sell or license the rights. Patents are vital in the pharmaceutical industry because generic products are excluded from the market until the patent expires.

Copyrights create monopolies that protect intellectual property rights. Unlike patents, copyrights protect only a particular expression of an idea, not the idea itself. Copyright monopolies normally last for the life of the author plus 50 years. Trademarks (distinctive visual images that belong to a particular organization) also grant monopoly rights. As long as they are used and defended, trademarks never expire. All these legal monopolies create formidable barriers to entry for potential competitors.

Strategic actions can also prevent or slow entry by rivals. Rivals will not want to launch unprofitable ventures, and firms can try to ensure entrants will lose money. **Preemption**, **limit pricing**, innovation, and mergers are common tactics. Preemption involves moving quickly to build excess capacity in a region or product line and thereby ward off entry. For example, building a hospital with excess capacity means that a second hospital would face formidable barriers. Not only would it exacerbate the capacity surplus, but this excess capacity could cause a price war. Managed care firms would not miss the opportunity to grab larger discounts. Worse still for the prospective entrant, most of the costs of the established firm are fixed. Its best strategy would be to capture as much of the market as it can by aggressive price cutting. In contrast, the rival's costs are all incremental. It can avoid years of losses by building elsewhere.

preemption
Building excess capacity in a market to discourage potential entrants.

limit pricing
Setting prices low enough to discourage entry into a market.

Limit pricing is another tactic established firms or those with established products can use. Limit pricing means setting prices low enough to discourage potential entrants. By giving up some profits now, an organization can avoid the even bigger profit reductions that competition might cause later. In essence, the firm acts as though demand were more elastic than it is. Limit pricing only works if the firm is an aggressive innovator. Otherwise, competitors will eventually enter the market with lower costs or better quality, and the payoff to limit pricing will be minimal.

Innovation by established organizations can deter entry as well. Relentless cost reductions and quality improvement mean entrants will always have to play catch-up, which does not promise substantial profits.

Mergers increase market power by changing market structure. A well-conceived, well-executed merger can reduce costs or increase market power, either of which can increase profit margins. The publicized goal of most mergers is cost reductions resulting from consolidation of some functions. The accompanying anticipation of improvement in the firm's bargaining position is usually left unspoken. Customers and suppliers usually must do business with the most powerful firms in a market. For example, failure to contract with a dominant health system will pose problems for customers and suppliers, so the system can anticipate better deals. Whether cost savings or market share gains are the more important goal of a merger is debatable.

15.7 Market Structure and Markups

Having market power does not eliminate the need to set profit-maximizing prices. Organizations should still set prices so that marginal revenue equals marginal cost. If the return on equity is inadequate, the organization should exit the line of business.

15.7.1 Markups

A gain in market power will result in markups. A firm with substantial market power will find it profitable to set prices well above marginal cost. Exhibit 15.1 shows that a firm with substantial market power ($\varepsilon = -2.5$) will have a 67 percent markup. In contrast, a firm with moderate market power ($\varepsilon = -7.5$) will only have a 15 percent markup. Finally, a firm with very little market power ($\varepsilon = -12.0$) will have a 9 percent markup.

Organizations with market power benefit from markups. However, because customers face higher prices, they will use the product less or not at all. As a result, managers' goals depend on whether they are buying or selling. Managers seek to reduce their suppliers' market power while increasing their own. If your suppliers have substantial market power and you have none, your profit margins will suffer.

Market Share	Market Elasticity	Firm's Elasticity	Marginal Cost	Profit-Maximizing Price
48%	–0.60	–1.25	$10.00	$50.00
24%	–0.60	–2.5	$10.00	$16.67
8%	–0.60	–7.5	$10.00	$11.54
5%	–0.60	–12	$10.00	$10.91

EXHIBIT 15.1 Market Share and Markups

Mergers Result in Price Increases

Since 2012 more than 600 hospital mergers and acquisitions have taken place in the United States, meaning that the consolidation of hospital markets continues (Gaynor 2021). In principle, the merger of two hospitals allows cost savings. The merged hospitals would need less excess capacity to cope with spikes in demand, could avoid

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duplicate services, and could share some overhead expenses. Schmitt (2017) estimates that acquired hospitals reduce their costs by an average of 7 percent over four years, but these savings only occur when hospitals are acquired by a health system. (The acquiring hospital or system does not appear to experience cost reductions.) For the most part, hospitals that are acquired by other hospitals in the same local market do not reduce their costs, suggesting that other motives matter as well.

The other motive for consolidation is to increase market power. A single hospital or a two-hospital system is in a much better bargaining position than two independent hospitals serving the same area. For example, Dauda (2017) concludes that the merger of two hospitals in a market with five hospitals would result in substantial price increases.

Recognizing that hospital consolidations could push prices up, federal antitrust authorities have opposed some hospital mergers. The authorities have lost most of these suits. Courts have generally seen the not-for-profit status of merging hospitals as a guarantee of price restraint, although the economics literature provides little support for this expectation.

On the contrary, most studies have found that merging not-for-profit hospitals significantly increase prices (Handel and Ho 2021), but the effects of mergers depend on the nature of the hospitals and the nature of the competition in their market. The literature suggests that if two small hospitals in a competitive market merge, their ability to negotiate higher prices will be limited. In contrast, if two large hospitals in a smaller market merge, their ability to negotiate can be substantial.

15.7.2 The Impact of Market Structure on Prices

Economists often use the **Hirschman-Herfindahl Index (HHI)** to identify **concentrated markets**. The HHI equals the sum of the squared market shares of the competitors in a market. The HHI gets larger as the number of firms gets smaller or as the market shares of the largest firms increase. For example, a market with five firms, each with 20 percent of the market, would have an HHI of 2,000. In contrast, a market with five firms, four of which each claimed 15 percent of the market while the fifth claimed 40 percent, would have an HHI of 2,500. A higher HHI usually results in higher prices (Handel and Ho 2021).

Hirschman-Herfindahl Index (HHI)
A measure used to identify concentrated markets, calculated as the sum of the squared market shares of firms in a market. For example, if firms had market shares of 40, 30, 20, and 10, the HHI would be 3,000 = 1,600 + 900 + 400 + 100. (A potential source of confusion is that some calculate the HHI treating a 40 percent market share as 0.40 and others treat it as 40. This book uses the second approach.)

concentrated market
A market that has few competitors or a few dominant firms.

Attributes other than market power can also result in high markups. Handel and Ho (2021) point out that in addition to having a large market share, providing specialized services, having a good reputation, and being a member of a system also result in higher prices.

Insurer Market Structure Affects Prices

Most hospitals operate in markets with many insurers, but most insurers, in contrast, confront local markets with only a few competing hospitals or health systems. Not surprisingly, prices tend to be higher in markets in which health systems have merged and lower in markets in which a few insurers have large market shares.

Three changes are underway that may change negotiations between hospitals and insurers. First, insurers are merging, so concentration in the health insurance market is increasing in some markets. Second, insurers are offering plans that exclude high-priced hospitals. These are called narrow networks. Third, insurers anticipate selling many more policies to individuals. They also expect that demand for these individual policies will be much more sensitive to differences in premiums. All of these changes will tend to increase the bargaining power of private insurers relative to hospitals. But entry into insurance markets is easier than entry into the hospital market. Between 2010 and 2014, the median hospital HHI increased from 2,163 to 2,288. In the insurer market, the median HHI decreased from 2,255 to 2,209 (Scheffler and Arnold 2017).

15.8 Market Power and Profits

Market power does not guarantee profits. A firm with market power will set prices well above marginal cost, it but may not earn an adequate return on equity. However, firms with market power can use strategies to boost profits that firms without market power cannot.

Three competitive strategies are common among firms with market power: **price discrimination**, **collusion,** and **product differentiation**. We discussed price discrimination in chapter 12; in this chapter, we will focus on collusion and product differentiation.

collusion
A secret agreement between parties for a fraudulent, illegal, or deceitful purpose.

product differentiation
The process of distinguishing a product from others.

15.8.1 Collusion

Collusion, or conspiring to limit competition, has a long history in medicine. As in other industries, the temptation to avoid the rigors of market

competition can be strong. Collusion is profitable because demand is less elastic for the profession than for each individual participant. For example, if the price elasticity of demand for physicians' services is –0.20 and the price elasticity of demand for an individual physician's services is –3.00, an individual physician can earn a greater income by cutting prices, yet cutting prices will reduce the income of the profession as a whole.

Exhibit 15.2 shows how a 10 percent price increase would change total revenue for organizations facing different elasticities. (The change in total revenue due to price cut equals [percentage change in price + percentage change in quantity] + [percentage change in price × percentage change in quantity].) For the profession as a whole, raising prices will increase revenues because demand is inelastic. For each individual professional, raising prices will reduce revenues unless other professionals change their prices, which would make demand less elastic. Of course, others are likely to respond to price cuts by cutting their own prices, so revenues will climb far less than a naive analysis would suggest.

The implication of exhibit 15.2 is that physicians as a group would increase their incomes if they refused to give discounts to managed care organizations. What is good for the profession, however, is not what is good for its individual members. Individual physicians would be tempted to decry managed care discounts but make private deals with HMOs (health maintenance organizations). From the perspective of the profession, penalizing defectors would prevent this problem.

In the 1930s, Oregon physicians did just that. Faced with an oversupply of physicians, excess capacity in the state's hospitals, and widespread concern about the costs of healthcare, insurance companies in Oregon attempted to restrict use of physicians' services. Medical societies in Oregon responded by threatening to expel physicians who participated in these insurance plans. Because membership in a county medical society was usually a requirement for hospital privileges, this response was a serious threat. This threat and

EXHIBIT 15.2 Elasticity and Revenue Changes

Price Increase	Elasticity	Quantity Change	Revenue Change
10%	–0.1	–1%	8.9%
10%	–0.2	–2%	7.8%
10%	–0.3	–3%	6.7%
10%	–3.0	–30%	–23.0%
10%	–3.5	–35%	–28.5%
10%	–4.0	–40%	–34.0%

physicians' ultimate refusal to deal with insurance companies led the insurers to abandon efforts to restrict use of physicians' services (Starr 2017).

In most industries, these steps would be recognized as illegal and anticompetitive. However, the belief that antitrust laws did not apply to the medical profession was widespread until a 1982 US Supreme Court decision to the contrary. Since then, the Federal Trade Commission has sued to prevent boycotts of insurers, efforts to deny hospital privileges to participants in managed care plans, and attempts to restrict advertising. In short, healthcare professionals and healthcare organizations are treated no differently than other businesses.

The benefits of collusion are clear. By restricting competition, firms can reduce the price elasticity of demand and increase markups. Collusion only increases profits, however, until it is detected.

15.8.2 Product Differentiation and Advertising

Product differentiation takes two forms: attribute based and information based. In **attribute-based product differentiation**, customers recognize that two products have different attributes, even though they are fairly close substitutes, and may not respond to small price differences. In **information-based product differentiation**, customers have incomplete information about how well products suit their needs. Information is expensive to gather and verify, so customers are reluctant to switch products once they have identified one that is acceptable. Both forms of product differentiation reduce the price elasticity of demand for a product and create market power (Caves and Williamson 1985).

attribute-based product differentiation Making customers aware of differences among products.

information-based product differentiation Making customers aware of a product's popularity, reputation, or other signals that suggest high value.

Both attribute-based and information-based product differentiation are common in healthcare. For example, a board-certified pediatrician who practices on the west side of town clearly provides a service that is different from a board-certified pediatrician who practices on the east side of town. If the two practices were closer together, more customers would view them as equivalent. Alternatively, armed only with a sense that the technical skills, interpersonal skills, and prices of surgeons can vary significantly, a potential customer who has found an acceptable surgeon is not likely to switch just because a neighbor was charged a lower fee for the same procedure. Of course, the customer might be more likely to switch if complication rates, patient satisfaction scores, and prices for both surgeons were posted on the internet for easy comparison.

The role of information differs sharply in attribute-based and information-based product differentiation. Extensive advertising makes sense for products that differ in attributes that matter to consumers. The more clearly customers see the differences, the less elastic demand will be and the higher markups can be for "better" products. In contrast, restrictions on

advertising (and even restrictions on disclosure of information) make sense in situations with information-based product differentiation. The harder it is for customers to see that products do not differ in ways that matter to them, the less elastic demand will be and the higher markups can be.

The coexistence of attribute-based and information-based product differentiation in healthcare leads to confusing advertising patterns. Attribute-based product differentiation demands advertising. Getting information about product differences into the hands of customers is integral to this type of product differentiation. For example, pharmaceutical manufacturers have launched extensive direct-to-consumer advertising campaigns. On the other hand, better customer information erodes the market power created by information-based product differentiation. Where information-based product differentiation is common, as it is in much of healthcare, a temptation to restrict advertising is present. Because private restrictions on advertising are usually illegal, the most successful limits have been based in state law.

Despite these divergent incentives, advertising has increased in recent years. One reason has been court rulings that professional societies cannot limit advertising. However, advertising has also increased in some sectors—such as inpatient care—where advertising has long been legal. The real driving force seems to be increased competition for patients.

The nature of healthcare products and the nature of healthcare markets combine to make advertising more common. Most healthcare firms have market power and competition to some degree. Advertising helps differentiate one product from another, so it increases margins. In monopoly markets (e.g., the only hospital in an isolated town), product differentiation is not useful. The provider already has high margins, and advertising is unlikely to increase them. In markets with many providers (e.g., retailers of over-the-counter pain medications), margins may be low, but differentiating one seller from another is difficult and advertising expenditures will be unlikely to increase revenues.

Patients cannot easily assess the quality of most healthcare goods and services before using them. Because of this fact, advertising can perform a useful service by giving consumers information they would have difficulty getting otherwise. If consumers gained no information from advertising, they would probably ignore it. Having information about a product differentiates it from products about which one does not have information. Providers who offer exceptional values also need to advertise to ensure that consumers are aware of their low prices or high quality. Studies of advertising in healthcare generally find that banning advertising results in higher prices. Indeed, increasing price transparency represents one strategy for reducing healthcare prices, although there are reasons for skepticism (Mehrotra, Chernew, and Sinaiko 2018).

The economic logic behind advertising and innovating is simple: continue as long as the increase in revenue is greater than the increase in cost. Stop when marginal revenue from advertising or product differentiation just equals the marginal costs. This logic differs from the standard rule only in that the cost of differentiation (advertising or innovating) is included in the marginal costs. Exhibit 15.3 shows the calculations organizations need to consider. Suppose the firm starts with profits of $100,000. In case 1, it anticipates that incremental advertising costs of $10,000 will allow it to increase revenues by $50,000. Because the incremental costs of production are only $30,000, spending more on advertising makes sense in case 1. In case 2, the firm has the same production cost forecasts but anticipates that it will need to spend $22,000 on advertising to increase revenues by $50,000. The higher advertising costs in case 2 mean that an attempt to increase sales would be unprofitable. As long as the incremental costs of production and advertising are less than incremental revenue, increasing advertising will increase profits. Managers need to take into account both advertising and production costs. Advertising only makes sense for products with significant margins.

The profit-maximizing amount of advertising is determined by consumers' responses to advertising and prices. The profit-maximizing rule is that advertising costs (measured as a percentage of sales) should equal $-\alpha/\varepsilon$. In other words, an organization will maximize profits when its ratio of advertising to sales equals –1 times the ratio of the advertising elasticity of demand, $-\alpha$, to the price elasticity of demand, ε. The advertising elasticity of demand is the percentage increase in the quantity demanded when advertising expenses increase by 1 percent. Obviously, advertising that does not increase sales is not worth doing. Firms with less elastic demand will want to spend more on advertising. A firm with an advertising elasticity of demand of 0.1 should spend 2.5 percent of its revenues on advertising if its price elasticity of demand is –4.00, but another firm with an advertising elasticity of demand of 0.1 should spend 5 percent of revenues on advertising if its price elasticity of demand is –2.00.

	Incremental Revenue	Incremental Costs		Profit
		Production	Advertising	
Baseline				$100,000
Case 1	$50,000	$30,000	$10,000	$110,000
Case 2	$50,000	$30,000	$22,000	$98,000

EXHIBIT 15.3 Advertising and Profits

Case 15.2 Deregulating Pharmaceutical Advertising

Direct-to-consumer advertising is legal only in the United States and New Zealand among wealthy countries. The value of direct-to-consumer advertising of prescription drugs is widely debated, as are its effects on prescription sales and costs. Direct-to-consumer advertising on television started in 1997, when the Food and Drug Administration authorized it.

The case against direct-to-consumer advertising is that consumers lack the expertise to make informed decisions about prescription medications and that only expensive, branded products will be advertised, creating barriers to entry for generic products. The case for direct-to-consumer advertising is that it provides consumers with information about products that have been rigorously reviewed for safety and effectiveness. That includes information about more convenient dosing, reduced side effects, and fewer interactions.

From another perspective, pharmaceutical companies use advertising to differentiate their products and increase margins.

Discussion Questions

- How could advertising be a barrier to entry?
- Could advertising reduce barriers to entry for a new product?
- Presumably drug companies are trying to differentiate their products from the competition. Will consumers be better off or worse off if the companies succeed?
- Consumers generally favor direct-to-consumer advertising, and healthcare professionals generally oppose it. Does this difference in attitudes make sense?
- Should direct-to-consumer advertising be banned?

Product differentiation (through innovation or advertising) is a process, not an outcome. Differentiation, although potentially profitable, tends to erode. Product differentiation can be clear-cut (e.g., an open MRI facility), less distinguishable (e.g., "patient-centered care"), barely noticeable (e.g., "meals that don't taste like hospital food"), emotional (e.g., "doctors who care"), or frivolous (e.g., stripes in tooth gel). In all of these instances,

however, successful differentiation asks to be copied and generally is, necessitating ceaseless efforts to differentiate products.

15.9 Conclusion

Most healthcare firms have some market power. Market power allows higher markups and can result in higher profits. As a result, firms try to acquire market power or defend the market power they have. The best way to acquire or defend market power is via regulation. Competitors find it more difficult to erode market power gained because of government action.

Organizations can take steps to gain market power without government action. Common strategies include preemption, limit pricing, and innovation, all of which are designed to discourage potential entrants. Mergers can also result in market power, as can collusion with rivals. Unlike other strategies for gaining market power, mergers and collusion often create legal problems. Mergers may result in public or private antitrust lawsuits, as does collusion once it has been discovered.

Firms with market power can compete in a variety of ways. When feasible, firms seek to gain market power through product differentiation and advertising. This situation makes managers' roles more challenging. Of course, the profit potential of market power creates an incentive to seek it, even without a guarantee of profits.

Exercises

15.1 What does it mean to have market power? Are firms with market power extremely profitable?

15.2 Can you identify a healthcare firm with market power? What characteristics led you to choose that firm?

15.3 Why would a merger reduce costs? Why would a merger increase markups? Why do many mergers fail nonetheless?

15.4 What information would you like to have when planning advertising spending?

15.5 Why might banning advertising drive up prices?

15.6 Offer examples of attribute-based and information-based product differentiation.

15.7 Two physical therapy firms want to merge. The price elasticity of demand for physical therapy is –0.40. Firm A has a volume of 10,400, fixed costs of $50,000, marginal costs of $20, and a market

share of 8 percent. Firm B has a volume of 15,600, fixed costs of $60,000, marginal costs of $20, and a market share of 12 percent. The merged firm has a volume of 26,000, fixed costs of $100,000, marginal costs of $20, and a market share of 20 percent.

a. What are the total costs, prices, revenues, and profits for each firm and for the merged firm?

b. How does the merger affect markups and profits?

15.8 A local hospital offered to buy firm A in exercise 15.7 for $5,000, and the offer was refused. However, many observers now perceive that firm A is "in play" and may be sold if the right offer comes along.

a. In successful transactions, purchasers have typically paid 10 times current profits. How much would firm A be worth to a buyer from outside the industry?

b. Would you expect firm B to be willing to pay more or less than an outside buyer?

c. What is the most firm B would be willing to pay for firm A?

15.9 Two clinics want to merge. The price elasticity of demand is –0.20, and each clinic has fixed costs of $60,000. One clinic has a volume of 7,200, marginal costs of $60, and a market share of 2 percent. The other clinic has a volume of 10,800, marginal costs of $60, and a market share of 4 percent. The merged firm would have a volume of 18,000, fixed costs of $80,000, marginal costs of $60, and a market share of 6 percent.

a. What are the total costs, revenues, and profits for each clinic and for the merged firm?

b. How does the merger affect markups and profits?

15.10 What would each of the clinics in exercise 15.9 be worth to an outside buyer (using the guideline of 10 times annual profits)? What would each of the clinics be worth to each other?

15.11 A hospital anticipates that spending $100,000 on an advertising campaign will increase bed days by 1,000. The marketing department anticipates that each additional bed day will yield $2,000 in additional revenue and will increase costs by $1,200. Should the hospital proceed with the advertising campaign?

15.12 A clinic is considering reducing its advertising budget by $20,000. The clinic forecasts that visits will drop by 100 as a result. Costs are $140 per visit and revenues are $180 per visit. Should the clinic reduce its advertising budget?

15.13 The price elasticity of demand for dental services is –0.25. In a market with 100 dentists, the local dental society demanded and

received an 8 percent increase in prices from the dominant dental insurance company. What should happen to the dentists' revenues and profits? (Assume that average costs equal marginal costs.) Would this agreement be stable? Explain.

15.14 The marginal cost of a physician visit is $40. In a county with 50 physicians, the local medical society negotiated a rate of $90. Previously, any physician who offered discounts to an insurer or a patient could be cited for unethical behavior, be expelled from the medical society, and lose admitting privileges to the county's sole hospital. But having lost an antitrust lawsuit, the medical society has agreed to stop enforcing its prohibitions against discounting, to allow any physician with a valid license to be a member of the medical society, and to stop linking admitting privileges to medical society membership.

a. The price elasticity of demand for physicians' services is –0.18. What price maximizes profits for the individual physicians in the county?

b. If all the physicians act independently, will their incomes go up or down?

c. Is there any way the physicians could legally act to sustain a price of $90?

15.15 Harvoni is a lifesaving medication for people with hepatitis C. A four-week supply averaged $31,620 for privately insured patients in the United States in 2017. In Germany, the average price was $14,570. Why are the prices so different? Should the government intervene to reduce the price? How might the government intervene?

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CHAPTER

16

GOVERNMENT INTERVENTION IN HEALTHCARE MARKETS

Learning Objectives

After reading this chapter, students will be able to

- describe the advantages of perfectly competitive markets,
- explain when markets may be inefficient, and
- discuss alternative approaches to market failure.

Key Concepts

- Given the right conditions, competitive markets can produce optimal outcomes.
- Markets organize vast amounts of information about costs and preferences.
- Perfectly competitive markets lead to efficient production and consumption.
- Markets are dynamically efficient.
- Most markets are imperfect.
- Markets may be inefficient when externalities or public goods are present.
- Markets may be inefficient when competition or information is imperfect.
- Efficient market outcomes may not be equitable.
- Clear assignment of property rights may improve market outcomes.
- Taxes or subsidies may improve the efficiency of some markets.
- Public provision of some products may be efficient.

16.1 Government Intervention in Healthcare

Government intervention in healthcare is extensive, even in a market-oriented society like the United States. This chapter explores the rationale for government intervention, assuming that the goal is the promotion of the public well-being. We will begin by looking at the virtues of markets and then examine problems with markets. The chapter concludes by considering ways that governments might intervene.

16.1.1 On the Virtues of Markets

Pareto optimal
An allocation of resources in which no reallocation of resources is possible that will improve the well-being of one person without worsening the well-being of another.

Under the right conditions, competitive markets can lead to an allocation of resources that is **Pareto optimal**—that is, no one can be made better off without making someone worse off (Debreu 1959). These conditions are restrictive:

1. Each market should have large numbers of buyers and sellers.
2. Products are undifferentiated.
3. All buyers and sellers know all the relevant information about the market.

Markets also require maintenance of law, order, and property rights, so this list of conditions may be incomplete. Nonetheless, these conditions are seldom satisfied, leaving us with questions that are more complex and more difficult. Would relying more on markets to allocate resources make us better or worse off? Would changing the laws and regulations make us better or worse off? The difficulty is that we must choose not between perfect markets and perfect governments but between imperfect versions of each. Much of this chapter focuses on the shortcomings of markets. First, though, let's explore some of the virtues of markets.

16.1.2 Information Processing

What should the price of gasoline be? Is an additional flight between Chicago and Tulsa, Oklahoma, worth enough to consumers to justify the cost of operating it? Are consumers willing to pay for the capabilities of satellite telephones? Is there a shortage of nurses? Markets help us answer such questions.

In an ideal market, goods and services are made, distributed, and used so that the market value of production is as large as possible. The resulting prices spread information throughout the economy, coordinating the decisions of many decentralized producers and consumers. The quest for profits encourages producers to seek low-cost ways of creating the products consumers most want while using resources in the most valuable way possible. Because the decisions made by consumers are designed to maximize

satisfaction, maximizing market values results in maximizing well-being. The equilibrium of an ideal market is Pareto optimal. Furthermore, market exchange is voluntary. Individuals can choose whether to trade, affording considerable freedom to participants.

In a planned economy, well-intentioned officials who use their power wisely and justly may find price setting difficult. The planning process does not automatically yield the information needed to set prices. In addition, because price setting is a political act in a planned economy, officials may have difficulty setting prices correctly even when they know the proper levels.

Case 16.1 Setting Prices for Walkers

Walmart sells a walker called the Carex Explorer for $63.98. Medicare covers the Explorer, but it used to pay between $99.77 and $143.65. As a result of competitive bidding, the current price ranges from $44.90 to $50.61 (CGS 2018). Between 1989 and 2011, Medicare paid for equipment such as walkers using a fee schedule equal to 95 percent of a product's average wholesale price (an unverified number provided by manufacturers). This system kept Medicare fees substantially higher than typical retail prices.

As a part of the Medicare Modernization Act of 2003, Medicare accepted bids for ten types of equipment in ten metropolitan areas. The median accepted bid was 26 percent lower than the existing Medicare fee. Equipment manufacturers and retailers responded by lobbying Congress to discard the bids and delay the program, and the US House of Representatives obliged by passing a bill to ditch the bids. In fact, it was only with the passage of the Affordable Care Act that Medicare was able to launch competitive bidding in 2011 (Newman, Barrette, and McGraves-Lloyd 2017). Even though Medicare anticipated savings of 45 percent on competitively bid products and 72 percent for mail-order products, in 2015, Representative Tom Price and 82 cosponsors introduced a bill to suspend competitive bidding (Newman, Barrette, and McGraves-Lloyd 2017). This example demonstrates three points. First, a well-designed bidding process can result in lower prices for public programs. Second, such programs are expensive and take a long time to set up and implement. Third, efforts to switch to a bidding process will encounter opposition from those whose profits are at risk.

(continued)

Case 16.1 *(continued)*

Some supplier organizations argue that that the program encourages bidders to offer only the lowest-cost products rather than those best suited to beneficiaries' needs. An analysis reported that competitive bidding reduced prices for some products by more than 40 percent and reduced sales by less than 5 percent (Ding, Duggan, and Starc 2021).

Discussion Questions

- What are the risks of a bidding process like the one described in this case?
- Why would elected representatives side with the manufacturers and retailers on this issue?
- If Medicare sought bids for cardiac care to serve beneficiaries in your hometown, what would happen economically and politically?
- Bidding has led to a drop in the number of medical equipment firms. Is this a concern?
- Could you design a way of insulating Medicare from political pressure? Would you want to?
- What problems other than paying too much might distorted fee schedules cause?

16.1.3 Static Resource Allocation

Perfectly competitive markets allocate products efficiently to the consumers who are most willing to pay for them. In other words, production and consumption are efficient. Products are produced as inexpensively as possible. No resources are wasted in making goods and providing services. Reorganization of production would increase costs.

Exchanges of goods and services in perfectly competitive markets all take place at the same price. As a result, consumers who value products will buy them. Products are not wasted on consumers who feel they are worth less than the amount spent to produce them.

Perfectly competitive markets result in an optimal mix of output. Their combination of least-cost production and highest-value consumption means that changes would reduce satisfaction. At the competitive optimum, price equals marginal benefit, which, in turn, equals marginal cost. Shifts in the output of the economy would cause the marginal cost to be higher or lower than the marginal value to consumers, which would not be optimal.

Perfectly competitive markets are not necessarily fair. Different distributions of incomes result in different market outcomes. A perfectly

competitive market might lead to an efficient outcome in which most consumers have comparable incomes, or a perfectly competitive market might lead to an efficient outcome in which most consumers are inadequately housed and nourished while a handful live in palaces.

16.1.4 Dynamic Resource Allocation

In a market economy, successful innovations are highly profitable. Unsuccessful innovations and inertia are highly unprofitable. As a result, markets are efficient in a dynamic sense. They respond quickly to changes in economic conditions and encourage innovation.

At the simplest level, markets squelch products that customers do not want. A product that does not create more value for potential buyers than its alternatives will fail quickly. Compounding this effect, those in authority or those with established products have difficulty preventing change; rivals are free to develop new products, and customers are free to buy them.

More important, markets reward innovation that customers want. A product that is as good as its alternatives is not likely to be more profitable than the others, whereas a better product promises high short-term profits. Customers will pay a premium for a better product, and substantial profits will follow if the market is large enough. Before too long, though, competitors will introduce similar products, and profit margins will fall. Producers must innovate continuously to maintain above-average profit margins.

Because innovation is intrinsic to market economies, we often fail to notice it. For most of human history, however, innovation was not routine. Before the eighteenth century, most people used the same technology their grandparents used. Income per capita changed little for hundreds of years (Mazzucato and Semieniuk 2017).

The dynamic efficiency of markets is so important that it may trump static efficiency concerns. Suppose, for example, that a market is dominated by a few large firms. In this market, prices will be somewhat higher than they would be in a more competitive market. But if those large firms invest more in research and development than smaller firms would, it might not be long before the resulting innovation would make consumers better off.

16.2 Market Failure

Despite their many virtues, markets do not always perform well. We will now consider the main reasons markets fail:

1. Externalities
2. Public goods
3. Imperfect competition

4. Imperfect information
5. Natural monopoly
6. Income redistribution

We will explore each of these failures in detail.

16.2.1 Externalities

externality
A benefit or cost accruing to someone who is not a party to the transaction that causes it.

external benefit
A benefit for a consumer or producer not involved in a transaction.

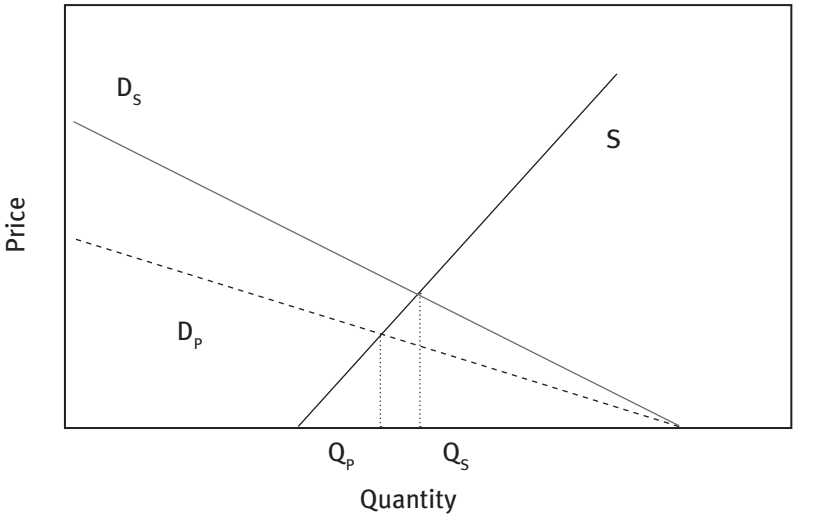
external cost
A cost for a consumer or producer not involved in a transaction.

Production or consumption of some products may directly affect others. These side effects are called **externalities**. When the side effects benefit others, they are called **external benefits**. When the side effects harm others, they are called **external costs**. When these side effects are not considered in market exchanges, the resulting equilibrium may entail volumes that are too high or too low.

For example, immunization confers external benefits on people who have not been immunized. If you are immunized, my risk of becoming ill decreases. In return for this benefit, I might be willing to pay a part of the cost of your immunization and part of the cost of others' immunizations. As a practical matter, though, providing subsidies to the thousands of people I want to help would be difficult. I would be able to subsidize only a small number of immunizations, which defeats the purpose of my offer.

Exhibit 16.1 illustrates this concept. The private demand curve, which ignores the product's external benefits, is D_P. The social demand curve, which incorporates these benefits, is D_S. The market equilibrium, which ignores the external benefits of immunization, results in a volume of Q_P. An

EXHIBIT 16.1
Market Equilibrium with External Benefits



equilibrium that takes the external benefits into account would result in the larger volume of Q_S. In short, the market equilibrium is not fully efficient.

Externalities need not be positive. If I let my untreated sewage contaminate your well, I am imposing external costs on you to have the sewage treated. I am considering the amount I would have to spend on water to get rid of waste, but I am not considering your costs. If the society includes just the two of us, you could pay me to produce less sewage. If the society includes 100 people like me, and our sewage affects 500 or 5,000 people, these private payments become complex, and problems are likely to ensue. External benefits and costs that affect large numbers of people are characteristic of *public goods* (see section 16.2.2).

A classic example of an externality is the **tragedy of the commons**. If everyone in a village can graze livestock on a common pasture, each person has an individual incentive to overuse the resource. The overgrazing may become so severe that all the livestock starve and the village collapses. In other words, each person's livestock consume resources that imperil everyone else's livestock. More contemporary examples include vehicle congestion in cities, in which each driver ignores the costs imposed on others; overuse of the Ogallala aquifer in the central United States, in which each farmer's pumping increases the costs for others; and excessive production of greenhouse gases by one country that causes a climate change affecting all countries.

tragedy of the commons Overuse or underuse of a resource that occurs when ownership of the resource is unclear and users produce externalities.

The use of antibiotics in healthcare is another example of the tragedy of the commons. Patients benefit from the liberal use of antibiotics, but society suffers because overuse speeds the development of antibiotic-resistant strains of bacteria.

The flip side of the tragedy of the commons is a **network externality**—a value the each additional user adds for existing users. Communications equipment of all sorts promotes network externalities. Electronic health record systems are a good example. An electronic health record system is valuable to a hospital. It transmits records quickly throughout the hospital, and any physician can instantly access a patient's record. If the other hospitals in town adopt compatible systems, the value of that electronic health record system increases. Its value increases further if all providers in the country adopt compatible systems. The hospital will be able to offer more appropriate treatment to a patient from another town because it will have access to that patient's past treatments, test results, and vital signs.

network externality The effect that each additional user of a product or service has on the value of that product or service for existing users.

Standards also promote network externalities. For example, one reason that healthcare costs are high in the United States is the absence of widely accepted standards for billing. Insurers have their own systems, and providers must submit bills in a wide range of formats to be paid in a timely fashion. If two insurers adopt a common standard, they will save some money, but

hospitals and clinics (which are not parties to the decision to standardize) will save even more. The value of this standardization increases as more and more insurers adopt the standard.

16.2.2 Public Goods

public good
A good whose consumption is nonrival and nonexcludable.

nonrival consumption
Use by one person that does not prevent simultaneous use by another person.

nonexcludable consumption
A situation that occurs when preventing use by someone who did not pay for a product is not feasible.

A **public good** is an extreme example of externalities. A pure public good has two unusual characteristics: consumption by one person does not prevent consumption by another, and exclusion is difficult. One person's use of a pure public good does not interfere with another's use of it, so its consumption is **nonrival**: the marginal cost of letting one more person use the public good is zero. For instance, my enjoyment of clean air in the country does not limit your enjoyment of it. Alternatively, I can use the new research that you are using. In addition, preventing people from using pure public goods is difficult, so their use is **nonexcludable consumption**, meaning that everyone has access to them.

A radio broadcast illustrates the difference between these two concepts. When a program is broadcast, anyone in the reception area can get the signal. Adding another listener does not affect current listeners, so consumption of the broadcast is clearly nonrival. In contrast, a radio broadcast may or may not be excludable. Most commercial radio in the United States does not exclude any potential listeners, but Sirius Satellite Radio is only available to subscribers, so exclusion is possible. Because exclusion is possible, radio broadcasts are not public goods.

In contrast, a reduction in levels of sulfur dioxide in the air is a public good. One person's enjoyment of better air quality does not prevent another person from enjoying it too, so consumption of improved air quality is nonrival. In addition, preventing anyone from taking advantage of cleaner air would be hard to imagine, so consumption is nonexcludable.

Markets are not likely to result in the right amounts of public goods being consumed. If market transactions lead to any consumption of public goods, the quantities are likely to be too small.

Because everyone can simultaneously enjoy a public good, the marginal benefit of a public good equals the sum of the marginal benefits for everyone in society. So, if a 1 percent reduction in sulfur dioxide (SO_2) in the atmosphere is worth \$1 to Jordan, \$2 to Kim, and \$4 to Logan, it will be worth \$7 to the three of them. The marginal benefit to society is the sum of the marginal benefits to the members of society, and the members of this three-person society should be seeking an outcome in which the marginal benefit to society equals the marginal cost.

Exhibit 16.2 illustrates this situation. If the three members of society act independently, only Logan will pay for sulfur dioxide reduction and the level chosen will be small. At this cost Jordan and Kim will be unwilling

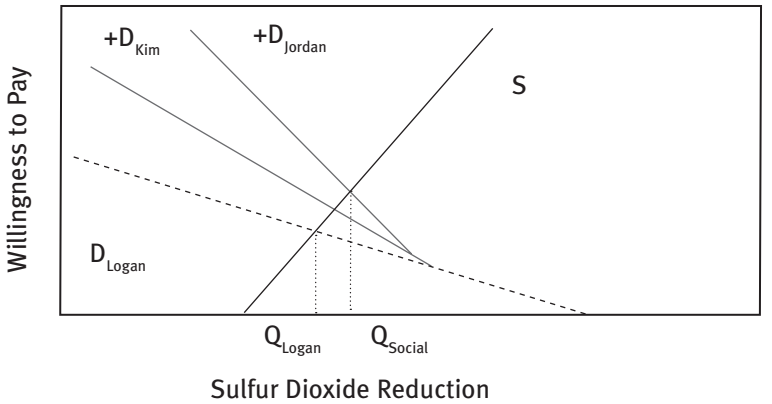


EXHIBIT 16.2 Demand for a Public Good

to pay for any reduction in sulfur dioxide, although they will benefit from Logan's spending. However, they will be willing to pay for a much larger reduction in sulfur dioxide if they recognize that reducing sulfur dioxide levels is a public good and pool their resources. This level of reduction, which equates the marginal benefit and marginal cost, would be optimal for this three-person society.

Cooperation could therefore lead to an optimal result. The difficulty is that Jordan would be even better off if Kim and Logan paid for the reduction in sulfur dioxide. After all, Jordan will benefit whether he pays or not. This situation is called the **free rider** problem. In a three-person society, everyone could probably be persuaded to pay, but cooperation is less likely to be possible in a society of 300 million people.

free rider Someone who benefits from a public good without bearing any of its cost.

Case 16.2 To Vaccinate or Not

When students start school, they must prove that they have been vaccinated against diseases such as chickenpox, polio, and measles, which can spread quickly through an unprotected group. Students with compromised immune systems may be exempted from the requirement, as the immunizations might be dangerous to them. In many states, parents also can get exemptions based on their personal beliefs.

(continued)

Case 16.2 *(continued)*

California Senate Bill 277, passed in 2015, eliminated exemptions for personal beliefs. The law was prompted by a measles outbreak that started at Disneyland in 2014 and infected more than 150 people. That outbreak was likely exacerbated by low vaccination rates.

California's law sought to remove personal-belief exemptions to increase vaccination rates and herd immunity, a form of indirect protection that occurs when a large percentage of a population has become immune to a disease. Herd immunity helps protect people who, for medical reasons, cannot be vaccinated and are vulnerable to infections. It seems to have worked. The percentage of California's kindergartners with all the required vaccinations as of the previous fall rose from 93 percent in 2014 to 96 percent in 2016 (Lin 2017).

You may have noticed that vaccination mandates are not universally popular. This is not new. McNamara (2021) notes that the Anti-Vaccination Society of America was established 1879. Its effort to repeal smallpox vaccination mandates used language that might sound familiar today: "Liberty cannot be given, it must be taken."

Discussion Questions

- What are the external effects of a vaccine?
- Are people who rely solely on herd immunity free riders?
- What are the scientifically verified potential harms of vaccines?
- What are the possible health outcomes of COVID-19, chickenpox, polio, and measles?
- What are the external effects of these diseases?
- Have vaccination rates risen or fallen in the United States?
- Would too few people be vaccinated if it were not mandatory? Is there evidence?
- Are vaccination rates lower in states with personal-belief exemptions?
- What steps do governments take to increase vaccination rates?
- What steps do private companies take to increase vaccination rates? Why?
- Was there resistance to vaccines before the COVID-19 pandemic?

16.2.3 Imperfect Competition

At equilibrium in a perfectly competitive market, price equals marginal cost. Producing more volume than the amount produced at equilibrium would be inefficient because the value of the additional output would be less than its cost. In an imperfectly competitive market, however, every producer has some market power, so producers will set prices to make marginal revenue equal marginal cost.

Exhibit 16.3 illustrates an imperfectly competitive market. Because the producer has some price flexibility, marginal revenue is less than price. To maximize profits, the producer sets the price so that marginal revenue (MR) equals marginal cost (a point on the supply curve). As a result, volume will be Q_P. In a perfectly competitive market, the price would equal marginal cost and volume would be Q_S.

16.2.4 Imperfect Information and Incomplete Markets

The efficiency of market outcomes rests on the assumption that buyers and sellers have perfect information, which is seldom the case in healthcare. As Arrow (1963) argued, the purpose of a visit to a physician is often the reduction of uncertainty; people seek care because they need more complete information. If patients are unsure about the benefit they will gain from a physician visit, they may decide to forgo the visit, which can lead to less than optimal market outcomes.

Exhibit 16.4 illustrates three possible outcomes for the scenario in the last section. D_1, D_2, and D_3 describe different consumers' willingness to pay

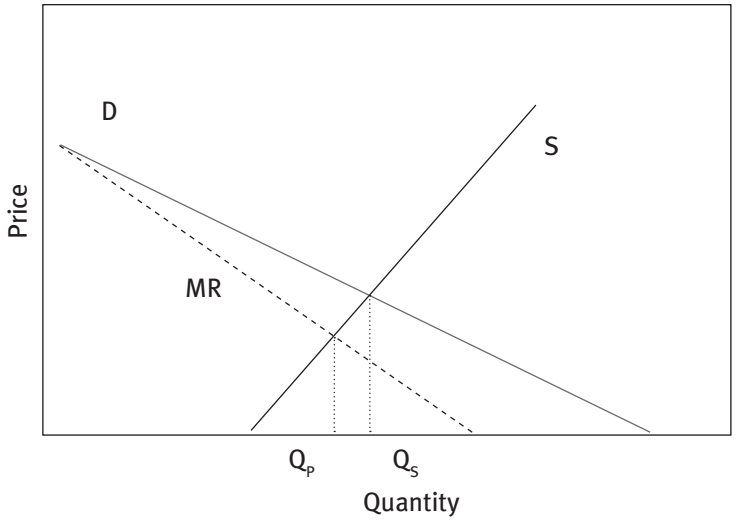
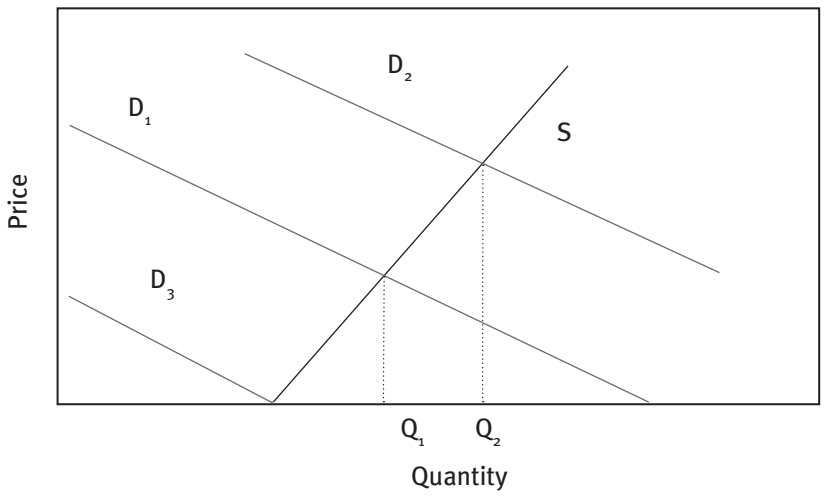


EXHIBIT 16.3 Imperfect Markets and Market Outcomes

for care. D_1 represents the willingness of a consumer who correctly understands the value of a physician visit. Given the marginal cost of producing this information, the consumer will buy Q_1. D_2 describes the willingness of a consumer who overstates the value of a physician visit. This consumer will buy Q_2, which is substantially larger than Q_1. More important, the true value of the visit at Q_2 is well below marginal cost. (The true value lies on the D_1 demand curve.) This individual would be better off reallocating spending to other products. Finally, D_3 describes the willingness of a consumer who understates the value of a physician visit. In this example, the consumer makes no visits and forgoes all the benefits those visits might have provided. This consumer would be better off reallocating spending from other areas to physician visits. In short, we cannot be sure that the market outcome will be optimal if information is imperfect.

The situation is even more complex than exhibit 16.4 suggests. Physicians and other experts may have discretion in recommending services. Even after a service has been provided, the consumer may have difficulty ascertaining whether the expert made the best recommendation, especially if the expert reaps large profits from the recommended service. Insurance further complicates matters. Insurers have difficulty tracking the true costs of services, and the conventional wisdom is that slow adjustments in insurance fees distort the profitability of some services. For example, the cost of MRI equipment dropped sharply even as the quality of images increased and the time needed to obtain an image has gone down. As a result, the cost of producing a scan dropped, but prices for scans went down only slowly. As a result, MRI scans became so profitable that many individual physicians

EXHIBIT 16.4
Market Outcomes with Imperfect Information



began installing them in their offices and use of MRI scans increased rapidly. Growth has slowed considerably, as coverage has become more restrictive and patients face higher copayments (Andrews 2017).

16.2.5 Natural Monopoly

If fixed costs are so high that only one firm can survive in the long run, that firm is a **natural monopoly**. Monopolies develop relative to the structure of costs and the size of the market. In a small market, only one hospital may be able to survive. In a larger market, multiple competitors can thrive.

natural monopoly A market that can be most efficiently served by a single firm.

The larger the investment needed to set up a firm, the more likely the firm is to be a natural monopoly. If an imaging center has fixed costs of $20 million, it will be a natural monopoly in many markets. If an imaging center has fixed costs of $2 million, it will be a natural monopoly only in the smallest markets. Like any monopoly, natural monopolies tend to sell their products and services at overly high prices, resulting in low sales.

16.2.6 Income Redistribution

A substantial part of government spending can be described as insurance or redistribution. Medicaid and Social Security Disability Insurance are examples. Taxes are levied on the healthy and wealthy to provide medical care and income to those less fortunate.

Redistribution is usually rationalized in one of two ways. One views redistribution as a public good. We all have some sympathy for the unfortunate, and we all benefit if someone offers them aid. Individual gains are small, however, and we may be tempted to let others provide our share of the redistribution. People who benefit at another's expense or without the usual cost or effort are free riders. Free riding results in under-provision of the public good.

A related approach introduced by John Rawls (1971) argues that if we were ignorant of our circumstances, we would want a society that allowed for some redistribution. In this approach, we would decide on how much redistribution was appropriate behind a "veil of ignorance," meaning that we would not know whether we were healthy or unhealthy, wealthy or poor.

16.3 Remedies

The remainder of this chapter explores possible remedies for market failure. Remember that doing nothing is always an option. Government intervention will not necessarily improve the situation. Governments also fail, and intervention could even worsen the situation.

16.3.1 Assignment of Property Rights

Many externalities result from ambiguities about the ownership of property rights. For example, does a downstream city have a right to clean water, or does an upstream city have a right to use a river as a sewer? Often the first step in solving externality problems is defining who has the right to use an asset. Once users are defined, asset sales, private agreements, regulations, or taxes can be used to produce efficient outcomes.

An influential analysis by Coase (1960) pointed out that ambiguity about property rights underlies many externality problems. If the costs of reaching and enforcing an agreement are small, the people involved in an externality case can reach agreements that solve the problem. For example, if the upstream city has the right to pollute, the downstream city can pay it to refrain from polluting the river. If the downstream city has the right to pure water, the upstream city will have to pay for the right to pollute (and usually will find it can pay less if it limits its pollution). Either way, the property owners can reach an efficient solution. With unclear property rights, who should pay whom is unclear, and too much of the externality is likely to be produced. If it is not clear that the upstream city has to pay for the right to pollute or it is not clear that the downstream city has to pay to prevent pollution, the upstream city is likely to underestimate the cost of pollution as a way of disposing of waste and dump too much waste into the water.

If an externality affects many people or is caused by many people, the costs of reaching and enforcing an agreement will be high. As a result, workable private agreements will be hard to reach. For example, pollution of Chesapeake Bay is caused by millions of people and affects millions of people. In such cases, governments typically claim property rights and use a variety of tools to improve outcomes.

In recent years, governments have taken steps to create markets for pollutants. First, the government asserts its ownership of the property right affected by pollution. Then, firms or jurisdictions are issued permits to pollute. These permits are worth more to firms or jurisdictions that have difficulty reducing pollution and are worth less to firms that reduce pollution more easily. Trades among potential polluters establish a price per unit of pollution and push potential polluters to equalize the costs of pollution reduction. Firms that incur low costs to reduce pollution have an incentive to do more to clean up than do firms that incur high costs to reduce pollution; the latter buy permits so that they can limit their cleanup efforts.

The 1990 Clean Air Act amendments set national caps for emission of sulfur dioxide by power plants, issued permits equal to this cap to plants, and allowed plants to trade permits. This program significantly reduced emissions of sulfur dioxide, and most observers consider it a success. The price of compliance was low, so compliance was high, and firms were encouraged to innovate to reduce emissions.

16.3.2 Taxes and Subsidies

If a product generates significant external benefits, a subsidy can be used to make the market outcome more efficient. Whether the subsidy goes to producers or consumers does not matter. Either way, the market price will fall and consumption will rise.

Exhibit 16.5 illustrates the effects of a subsidy. The demand curve D_1 describes the willingness of consumers to pay for a product. Because it yields external benefits, the market outcome will be Q_1, which is inefficiently small. Giving consumers a subsidy will expand consumption to Q_2, which will be the efficient level if the right subsidy has been chosen. Alternatively, one could subsidize producers, thereby reducing the marginal cost (and shifting out the supply curve). This subsidy will also cause consumption to increase to Q_2.

If this product generated external costs, a tax could be imposed to reduce consumption. The challenge with the tax or subsidy is determining the appropriate rate. Changing tax or subsidy rates is not an easy political process, and the market will not always make the appropriate rate evident.

16.3.3 Public Provision

Public provision of products is another approach to market failure. Public provision is especially useful for pure public goods. When significant externalities are present and excluding certain potential customers is difficult or inefficient, public provision may be the best response. Even if private firms can profitably produce some of the output consumers seek, using prices (as private firms must) to pay for such products is undesirable. For example,

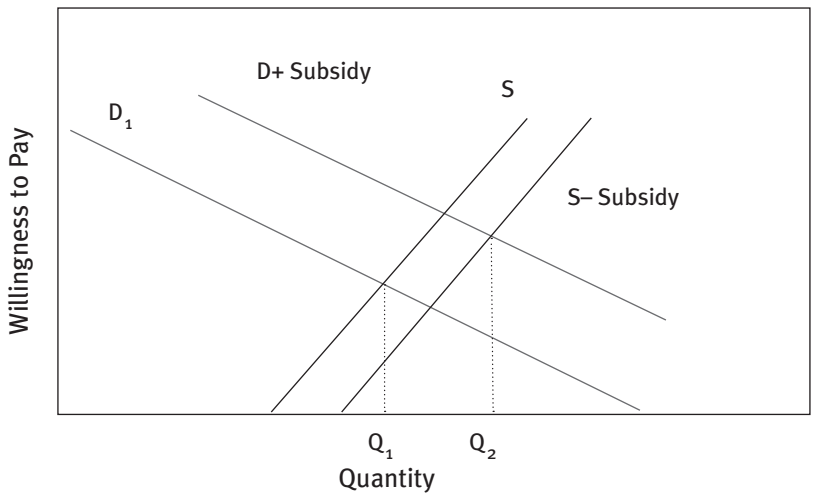


EXHIBIT 16.5 Market Outcomes with a Subsidy

private research firms might be able to profitably conduct some public health research by disseminating the results only to organizations that pay to get access to it. But this approach is inefficient because too few people will get access to the research. The cost of sharing the results with additional organizations is very small, and the value of the research is not reduced if it is more widely shared.

If redistribution is a goal, using prices to affect product consumption may also be undesirable. For example, prices that are high enough to allow a clinic to survive may also be high enough to prevent low-income citizens from using the clinic.

Public provision does not necessarily mean public production. For example, medical research has many of the attributes of public goods. Although government employees perform medical research, a large share of research is performed by scholars who are not government employees, but private researchers competing for tax-supported research funds. In another example of public provision with private production, medical care for the poor is usually provided to improve the health of our least fortunate citizens, meaning that the goal is largely redistribution. In some cases, this care is provided by government hospitals and clinics. More commonly, though, care is provided by private hospitals and clinics but funded by tax-supported programs such as Medicaid.

16.3.4 Regulation

Chapter 17 will examine regulation. Regulation is an important form of government intervention in markets, especially in healthcare. Markets need rules to work, so regulation is not an alternative to markets. Some regulations cause markets to work well; other regulations have the opposite effect.

16.4 Conclusion

Markets have many virtues, not the least of which is the ability to reveal information about cost and value. Many forms of government intervention falter because key information about cost and value is lacking. In addition, the impulse to innovate inherent in markets is important for improved health and well-being. A long-standing criticism of governments is their bias toward inaction and the status quo.

A key question about government intervention is hard to answer: Will intervention improve the well-being of the public? Intervention will not necessarily improve an imperfect market. Effective interventions are hard to design and even harder to implement. In the rough-and-tumble of political life, good intentions do not always translate into good effects, and proposals backed by advocates are not always good ideas. Furthermore, government

interventions can improve the well-being of individuals or groups even if the interventions do not improve overall well-being.

This critique should not be pushed too far. Government support for research has problems, but the strong consensus seems to be that the overall benefits are considerable and that government action is necessary. The government's public health activities also have problems, but there is no consensus that ending these activities would make our citizens better off. On the other hand, some interventions should be ended. The challenge is to determine what new programs to start and which existing programs to expand, contract, or terminate.

Exercises

16.1 Global warming is a classic example of a public good. Analyze this statement and explain your answer.

16.2 The existence of market failure does not signal what should be done in response. Analyze this statement and explain your answer.

16.3 Imperfect competition is the norm, so healthcare markets cannot work. Analyze this statement and explain your answer.

16.4 Markets work; governments do not. Analyze this statement and explain your answer.

16.5 Are market forces strong enough to deliver efficient healthcare? Explain your answer.

16.6 For each scenario, assess whether an externality is present.

a. Vaccinating children against influenza reduces its incidence among older people.

b. Newly graduated nurses flock to teaching hospitals for training. After working for a year, many leave to work for competitors.

c. A couple who planned to move to Florida to retire find that the plummeting housing market has wiped out their equity.

d. Physicians complain that they spend a third of their time explaining to patients why television advertisements about medications for their conditions do not apply to them.

16.7 The supply of measles vaccine is given by $Q = 450 \times P$. The demand for measles vaccine is given by $Q = 20{,}000 - 50 \times P$.

a. What is the market equilibrium price and quantity?

b. The demand curve implies that private willingness to pay is $P = 400 - Q/50$. However, external benefits are associated with each measles vaccination, so the social demand curve is $Q = 20{,}000 - 50 \times (P - 5)$. What are the equilibrium price and quantity if these external benefits are considered?

c. Propose an intervention that will result in this equilibrium volume.

16.8 The supply of an antibiotic is $Q = 30 \times P - 200$. The demand for it is $Q = 8{,}800 - 20 \times P$.

a. What is the market equilibrium price and quantity?

b. Use of the antibiotic creates $20 in external costs due to water pollution. Would the market outcome be different if a $20 tax were levied on producers instead?

16.9 Vaccination schedules are predictable, meaning that insurance coverage for vaccinations does not protect consumers against risks. Insurance coverage for vaccinations drives up costs because more people get vaccinated if coverage is available and because insurers have overhead costs. Does insurance coverage for vaccines do anything useful? Explain your answer.

16.10 About two-thirds of funding for substance abuse treatment comes from taxpayers. Does substance abuse treatment have external benefits that warrant this level of public funding?

16.11 Provide examples of the following types of government intervention in healthcare:

a. Government production

b. Subsidies for products

c. Taxes on products

d. Price regulation

e. Quality regulation

f. Inaction

16.12 Provide healthcare examples of the following types of market failure:

a. External benefits

b. External costs

c. Public goods

d. Imperfect competition

e. Imperfect information

16.13 Private foundations support medical research. Doesn't that prove that tax funding of medical research is unnecessary? Please explain.

16.14 Public health information can be broadcast at a cost of $100. Public health information is a pure public good, in that many people can use the information simultaneously and preventing people from using the information is very difficult. One group of residents has a demand curve for public health information of the form $Q = 50 - P$. Here Q is the number of public health broadcasts per month and

P is the price per broadcast. Another group has a demand curve of $Q = 140 - P$.

a. At a price of $100 per broadcast, how many broadcasts per month will be demanded? (Add the quantities demanded by each group.)
b. What is the total willingness to pay for 85 broadcasts? (Recast the demand curve to reveal willingness to pay and add the amounts for the two groups. For one group, willingness to pay equals $50 - Q$. For the other, it equals $140 - Q$. For both groups the minimum is $0.)
c. At what level of output does willingness to pay equal $100?
d. What do these results imply?

16.15 Every 1 percent reduction in the level of particulates in the air costs $200,000. Low-income residents in a region have a demand for particulate reduction of $R = 10 - P$ (R is the level of particulate reduction and P is the price per 1 percent reduction). High-income residents have a demand for particulate reduction of $R = 40 - 2P$.

a. Is reduction of the level of particulates a public or private good?
b. What will the market demand for particulate reduction be?
c. What is the optimal level of particulate reduction?

16.16 Few orthopedic surgeons publish data describing their surgical volumes, infection rates, mortality rates, functional gain rates, or customer satisfaction rates.

a. How much would a regulation requiring publication of such data cost?
b. Would such a regulation improve the workings of the market?
c. Would such regulation be an appropriate government activity?
d. Do we need a regulation requiring publication of data for surgeons if private physician rating firms already exist?

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CHAPTER

17

REGULATION

Learning Objectives

After reading this chapter, students will be able to

- describe the importance of regulation for managers;
- explain the interest group model of regulation;
- analyze the effects of regulations on firms, rivals, and consumers; and
- discuss alternative approaches to market failure.

Key Concepts

- Healthcare is extensively regulated.
- Regulation can make or break an organization (or its competitors).
- The objective of regulation is consumer protection.
- The rationale for consumer protection regulations is consumer ignorance.
- Legislation and regulation reflect interest group politics.
- When markets are imperfect, regulation cannot always improve outcomes.
- Providers are likely to "capture" the regulatory process.
- Market responses to consumer ignorance can limit the need for regulation.

17.1 Introduction

Healthcare is extensively regulated, and new regulations are constantly under consideration. Regulation is important to managers for five reasons:

1. Changes to regulations can make or break an organization. For example, hospitals in states that elected to expand Medicaid following the passage of the Affordable Care Act were much less likely to close than hospitals in other states (Moghtaderi et al. 2020).

2. In some circumstances, firms can use regulations to gain a competitive edge, especially when the regulations prevent entry by a potential rival. For example, Carilion Children's Hospital was able to use Virginia's **certificate of need law** to prevent the construction of a competing neonatal intensive care unit (Boehm 2017). Claims of regulatory violations by competitors can delay or derail projects, even if the claims are ultimately dismissed. For these reasons, managers must understand the impact of regulations on their organizations, react effectively to changes to regulations, and know when political action is necessary.
3. Managers need to understand the impetus behind healthcare regulation. Regulations are politically acceptable because the complexity of healthcare makes consumers feel vulnerable. Healthcare organizations must address these feelings of vulnerability because failure to do so invites additional regulation or loss of business.
4. Managers need to understand that legislating and regulating are ongoing political contests. Most organizations have little to gain and much to lose in these risky contests. Few organizations can command the political power to win lasting advantages through the political process, but all organizations need to be aware of these threats.
5. Some regulations work poorly because they conflict with powerful financial incentives. Many of the same incentives that reinforce or undermine regulations also affect private contracts. Managers must know when regulations or contracts will work and when incentives will undermine them.

certificate of need law
A law that requires state approval of healthcare construction projects.

As noted in chapter 16, markets and regulation are inseparable. Markets function badly with poorly designed rules, and regulations work badly when they conflict with market incentives. How well a market functions depends crucially on its regulatory structure.

17.2 Market Imperfections

Objections to regulation often stress that unfettered markets serve consumers well. This assertion may be true for perfectly competitive markets, but most healthcare markets fall far short of this ideal. At the heart of this imperfection is "rational ignorance," which reduces consumers' ability to make good choices. Before we discuss this important issue in healthcare regulation, let's look at three other important imperfections that beset healthcare markets: insurance, market power, and **externalities**.

17.2.1 Insurance

By distorting consumers' incentives, insurance reduces the likelihood that healthcare markets will function ideally. Patients are shielded from the true costs of healthcare, and even the most ethical provider will feel comfortable recommending goods and services that patients would be unwilling to buy if they had to pay the full cost. Moreover, the healthcare system in the United States limits the role of consumers in choosing insurance plans. Because patients are insulated from the true costs of care, their healthcare choices are unlikely to fully reflect their values. This lack of connection between what consumers value and what healthcare products cost is an important market imperfection.

17.2.2 Market Power

Most healthcare providers have some market power, which means that prices will exceed marginal cost. To guarantee that markets will allocate resources at least as well as any other system, prices need to reflect the opportunity cost of using a good or service. By driving a wedge between the costs and prices of products, market power compounds the distortions introduced by insurance and may cause markets to function poorly. Moreover, in markets with firms that have market power, price controls can be useful tools. In a perfectly competitive market, price controls can be irrelevant (when market prices fall below regulated levels) or harmful (when market prices rise above regulated levels). When organizations have significant market power, a third outcome is possible: Price controls can result in lower prices and higher output. Price controls are not guaranteed to work in such markets, however; they can still be irrelevant or harmful. But price controls can be beneficial if the distortions they create are smaller than the distortions they remove.

17.2.3 Externalities

Some healthcare issues involve significant externalities. As noted in chapter 16, an externality is a benefit received by, or a cost imposed on, someone who is not a party to a transaction. For example, installation of a catalytic converter in a car in Los Angeles will make the air cleaner not only for the owner of the car but also for others who live there and across the country. Markets typically do not work well when externalities are significant. Consumers and producers generally focus on the private benefits of transactions, which results in underconsumption of products that generate external benefits and overconsumption of products that generate external costs. Not surprisingly, the regulatory role of government tends to be substantial in these instances. For example, consider three activities that generate externalities: the search for new knowledge, the control of communicable

diseases, and the maintenance of the environment. Patent and copyright laws restrict use of new knowledge, so producers are able to profit from selling it and thus are motivated to produce it. Public health regulations can mandate immunizations or require treatment of those infected with communicable diseases. Environmental regulations may restrict how resources are used or effectively change ownership rights. The details of these regulations can be controversial, but few societies leave resource allocation entirely to market forces.

17.3 Rational Consumer Ignorance

Healthcare regulations serve multiple purposes, but the ostensible objective of most regulations has long been consumer protection. The argument is that consumers need protection because they are rationally ignorant about the healthcare choices they must make.

At some point, everyone has difficulty making healthcare choices. In many cases, decision makers must rely on ambiguous or incomplete information. Although the scientific aura of modern medicine may suggest otherwise, many therapies lack a firm scientific basis. Even when the scientific evidence is good (in cases in which investigators have carried out controlled clinical trials), decision makers may have a hard time applying it. Moreover, the results of controlled trials do not always translate to the uncontrolled environment of community practice. Even valid evidence involves probabilities, and most people (including most healthcare providers) have difficulty using this sort of information well. We tend to see patterns where none exist, place too much emphasis on cases that are memorable or recent, and ignore the rules of probability.

Patients face additional problems. They often must make decisions when they do not feel well and are experiencing a great deal of stress. They typically lack the experience, information, and skills they need to make healthcare choices. Even after they have chosen a course of action, consumers may have difficulty assessing whether they were diagnosed correctly, whether they were prescribed the right therapy, and whether that therapy was executed properly.

The ignorance of most patients is explainable. Few of us know the healthcare choices we will have to make or when we will have to make them. We do not want to invest the time to inform ourselves because we might never use the information. We would rather have somebody else do the research. Of course, rational ignorance is not universal. Patients with chronic illnesses often are well informed about their care because they expect to make ongoing decisions and are motivated to become knowledgeable.

Consumers' struggle with medical decisions makes them vulnerable in a number of ways. Consumers often do not know when to seek care. They can have difficulty evaluating the recommendations of healthcare professionals, the quality of care, or the price of that care. They may be unable to differentiate care that is worth more from care that costs more. To reduce their vulnerability, consumers may turn to medical professionals for advice.

Unfortunately, securing provider recommendations does not render consumers unassailable. Providers often have incentives to be imperfect agents. Providers may sell a product because they are being paid by the producer to sell it, or they may recommend a therapy because it is more profitable than another treatment. Patients may wind up undergoing treatment that is ineffective or harmful, or taking the advice of incompetent or unethical providers. In short, relying on providers for advice can reduce, but not necessarily efface, consumers' vulnerability.

For these reasons, providers have an interest in reducing consumers' concerns about their vulnerability. Consumers who cannot distinguish good advice from bad may ignore all of it. Consumers who cannot distinguish reliable from unreliable healthcare professionals may decide to forgo care. Regulations serve provider interests by signaling quality to consumers. As long as competent, trustworthy professionals find it easier to live with the regulations than incompetent, untrustworthy professionals do, regulations can be useful for both consumers and providers. Indeed, for this reason, much of the demand for regulation comes from the groups to be regulated, and many groups engage in self-regulation. For example, a group of physicians with a particular specialty may decide to create its own regulations that it expects will keep less qualified physicians out of the specialty. This approach would help the group's own market share and help the public.

Rational ignorance and distortions induced by insurance, market power, and externalities will continue to make healthcare markets imperfect. Remember, however, that market regulation of such influences does not guarantee improved outcomes. Regulations are usually imperfectly designed and imperfectly implemented. In addition, the consumer protection rationale of regulations may be just that: a rationale. Regulations can be used to gain a competitive advantage and may harm, not help, consumers.

17.4 The Interest Group Model of Regulation

interest group model of regulation
The view that regulations are attempts to further the interests of affected groups, usually producer groups.

Legislation need not serve the public interest. Given that groups can use regulations to expand their markets and gain market power, the **interest group model of regulation** argues that legislatures are similar to markets, in that individuals and groups seek regulations to further their interests.

Regulatory barriers to competition are often better than other competitive advantages because they are harder for competitors to breach (especially for new firms or firms from outside an area, which have little or no political influence). Product features can be duplicated and marketing plans can be copied by even the most insignificant start-up firm, but large, well-established firms have significant political advantage.

17.4.1 Limiting Competition

One of the best ways to gain market power is to limit competition. Regulation is an effective way of limiting competition. For example, licensure laws appear to have been used to limit entry by telehealth providers (Gaynor 2020). Similarly, dental societies have long supported state laws prohibiting people who are not licensed as dentists to fit and dispense dentures. Although lobbying the legislature to pass laws to prevent competition is legal, working together to prevent competition is illegal. In addition, the industry being regulated is likely to control the regulatory process, so consumer protection legislation may represent "existing firm protection" and not protect the consumer. Managers cannot ignore politics; doing so can put an organization at risk.

17.4.2 Licensure

Licensure is professional control of the regulatory process. A profession can be regulated in many ways. Professional regulation often protects the economic interests of the regulated group far better than it protects the health and safety interests of the public. States generally regulate health professionals via licensure, certification, and registration. Licensure prohibits people from performing the duties of a profession without meeting requirements set by the state. Certification prohibits those who do not meet requirements set by the state from using a title, but not from practicing. Registration requires practitioners to file their names, addresses, and relevant qualifications.

Licensure is the most restrictive form of regulation. It can prohibit practice by individuals without the right qualifications or require that they practice under the supervision of another professional. Its use is often justified by concerns about safety. While recognizing that certification considerably reduces consumer ignorance, advocates of licensure contend that it prevents unwary consumers from making unsafe choices. In some cases, however, licensure can prevent consumers from making choices that might make sense for them. Furthermore, it forces consumers to use highly trained, expensive personnel even when viable alternatives may be available.

17.4.3 Regulation as a Competitive Strategy

Regulations that affect the structure or process of an organization's operations typically increase costs and reduce flexibility. Naturally, firms resist regulation (even if their business plans are consistent with the regulation's goals).

For these reasons, imposing regulations on rivals (but not on oneself) can be an effective competitive strategy. Most regulation of the health professions has been a result of this strategy because existing professionals have been grandfathered in and regulations apply only to newly licensed practitioners.

17.5 Regulatory Imperfections

When markets are not perfect, regulation can improve outcomes. For three reasons, however, regulation is likely to be equally imperfect: the need for decentralized decision-making, conflicts between regulatory and financial incentives, and **capture** by regulated firms. Therefore, although new regulations can improve outcomes, this result is not guaranteed.

capture
The takeover of the regulatory process by a special interest.

Regulations work best when decision-making is centralized and when "one size fits all." Medical care does not fit these criteria. Patients' healthcare needs, preferences, and circumstances vary considerably, so decision-making needs to be decentralized and individualized. In addition, regulatory and financial incentives need to be aligned to work well. When they are not, regulations are likely to be ignored or circumvented. For example, we know that healthcare organizations respond to financial incentives. If physicians find that treating patients in the hospital is more convenient than treating them in their offices, and physicians receive no financial incentives to encourage outpatient care, utilization review (an analysis of patterns of care by an employer or insurer) is unlikely to reduce hospitalization rates.

Furthermore, the groups being regulated are likely to capture regulations even if they are well intended. Capture occurs when a group gains control of the administration of the regulations. Capture matters because the way the laws are implemented and enforced is as important as the laws themselves, and sooner or later the groups being regulated are likely to take control of the enforcement process. They have better information than consumers, pay more attention to the regulatory process than consumers, and have a more intense interest in the regulatory process than consumers. Regulation does not eliminate consumers' rational ignorance (although regulations about disclosing information may reduce it). As a result, regulators are likely to be members of the regulated group or are likely to rely on members of the regulated group for advice. Compounding this dependence is the regulated group's ongoing interest in the regulations. Consumers and their advocates, in contrast, are likely to lose interest once the problems that led to the regulations have eased. Finally, the group being regulated typically has an intense interest in the outcome of the process, and most consumers do not. This disparity further increases the odds of capture because in the political arena, a small group with an intense interest is likely to prevail over a larger group with more diffuse interests. As a result, regulation can best be described as "for the profession" rather than "of the profession."

Case 17.1 Monks, Caskets, and the Supreme Court

The Louisiana State Board of Embalmers and Funeral Directors formed in 1914 to regulate embalmers, funeral homes, and funeral directors, and handle consumer complaints. The board has one consumer representative. The other members all work in funeral homes (Louisiana State Board of Embalmers and Funeral Directors 2018).

Louisiana does not require burials in caskets, nor does it set any standards for caskets. Buying a casket online is perfectly legal. Nonetheless, Louisiana deemed it a crime to sell "funeral merchandise" without a funeral director's license (Keene 2021).

The monks of Louisiana's Saint Joseph Abbey must work to support it. After inquiries from consumers, they decided to sell the sort of primitive cypress caskets in which Saint Joseph Abbey has long buried its dead. A complaint was filed by a funeral director, who argued that "illegal third-party casket sales place funeral homes in an unfavorable position with families." The Louisiana State Board of Embalmers and Funeral Directors moved to prevent the monks from selling caskets. To meet the board's standards, each monk would have to earn 30 hours of college credit and apprentice for a year at a licensed funeral home. None of the skills thus gained would be related to coffin building.

After failing to get the law changed because of opposition from the funeral industry, the abbey sued the board. The abbey won in US district court in 2011 and in the Fifth Circuit Court of Appeals in 2013. In its unanimous decision, the Fifth Circuit said, "The great deference due state economic regulation does not demand judicial blindness to the history of a challenged rule or the context of its adoption nor does it require courts to accept nonsensical explanations for regulation." The US Supreme Court rejected the board's petition for review, so the circuit court ruling stands (Gill 2019).

Discussion Questions

- Why were funeral directors so opposed to the monks making caskets?
- Why would licensing casket makers be a good idea?
- How does licensing casket makers protect the public?
- Does your state license funeral directors?

(continued)

Case 17.1 *(continued)*

- In a state that licenses funeral directors, what is the composition of the board?
- Who sits on your state board that regulates pharmacy? Medicine? Dentistry?
- Do members of the profession make up a majority of the board?
- Is this an example of regulatory capture?
- Would allowing entry into the casket market reduce prices?
- Are there other anticompetitive laws and regulations for funerals?
- In medicine, licensure and certification coexist. Is this true in any other fields?
- How do licensure and certification differ in their protections for ill-informed consumers?

17.5 Market Responses to Market Imperfections

Market responses to consumer ignorance can limit the need for regulation. Even imperfectly functioning markets incorporate incentives to serve consumers well. For most providers, repeat sales and customers are essential, so the incentives to meet customers' expectations are strong. Even when repeat customers are not major contributors to the business (as with nursing homes or plastic surgeons), the provider's reputation is one of its most important assets. Customers are not likely to detect profound agency problems. (See chapter 13 for a fuller discussion of asymmetric information and agency.) Aware of their ineptitude for assessing poor performance, they often are willing to pay for information about quality and turn to consumer organizations (e.g., AARP) or information services (e.g., the National Committee for Quality Assurance) to aid them.

17.5.1 Tort Law and Contract Law

Tort law, which addresses compensation for a broad array of injuries, and contract law, which addresses breaches of agreement, can also remediate the shortcomings of healthcare markets. These legal remedies have powerful advantages. First, the threat of action is often enough to ensure compliance with explicit or implicit norms. If the probability of detecting noncompliance is high enough and the penalties are large enough, the threat of legal action will keep firms' behavior in check. Second, an agent's financial liability for nonperformance of a treatment usually exceeds the expected costs of

the treatment, so tort law and contract law create incentives for providers to perform. Aside from prompting legal costs, fines, and penalties, liability can damage the agent's reputation. Third, legal liability is outcome oriented. Historically, regulation has focused on whether the structure of care and the processes of care comply with unverified norms, so its utility in matters of law is limited. Fourth, the legal system is more difficult to capture than most regulatory systems, especially when plaintiffs can take their cases to juries. Because consumers can initiate legal action themselves and because some lawyers are willing to accept the financial risks of failed suits by accepting contingency fees, access to legal remedies is more difficult to restrict than access to regulatory remedies.

Despite the power of tort law and contract law, their use also has disadvantages. To begin, legal remedies are costly to apply. Because of the costs of bringing suit, consumers may face barriers when accessing the legal system. Second, consumer ignorance may compromise the effectiveness of legal remedies. If consumers do not realize that their bad outcome resulted from a breach of duty on the part of their provider, they will not bring suit. Alternatively, ignorant consumers may file suits when undesired outcomes resulted from bad luck, not negligence.

Absent a credible threat of being sued, incompetent or unscrupulous providers can continue unchecked. Even worse, the incentive for competent, scrupulous providers to invest resources in improving the quality of care may become diluted.

17.5.2 Information Dissemination

The legal system is both powerful and limited. First, it limits physicians to areas in which they are competent, more effectively than state licensing boards do. Medical licenses do not recognize differences in the skills of physicians. Were licenses the only guide, family practitioners would be able to perform neurosurgery. In fear of liability claims, hospitals also limit physicians to specific practices. Physicians, too, restrict their practices.

Second, studies of medical malpractice have shown that the majority of consumers who have suffered serious injuries as a result of negligence do not sue and receive no compensation. In addition, a high proportion of malpractice suits do not appear to involve provider negligence (Rodziewicz, Houseman, and Hipskind 2020). As a result, the malpractice system does not provide useful information on quality, and malpractice litigation's effect on the quality of care is not clear. In principle, publication of providers' malpractice histories should help consumers choose. Publication of risk-adjusted outcomes data would be better because it would put pressure on organizations to improve quality and could reduce consumer ignorance.

17.5.3 Contracts

Contracts are a private regulatory system (although it does not work when collective mechanisms for enforcing contracts do not function effectively). As with public regulations, contracts work best when financial and regulatory incentives are aligned. A contract that pays more for better performance will usually produce more satisfactory results than a contract that stipulates minimum performance requirements.

For example, modification of physicians' practice patterns is a challenge for physician organizations seeking to become medical homes or accountable care organizations. Hilligoss and colleagues (2017) note that these new organizations need new payment systems to align incentives for physicians. These new contracts with physicians may blend capitation, pay for performance, gainsharing, and fee-for-service payment. For example, a primary care physician might receive a base capitation payment, share a bonus if the practice met patient satisfaction targets, and share another bonus if the practice met cost targets. These contracts seek to change practice patterns by aligning the organization's and physicians' incentives. It is important to recognize, nonetheless, that financial realignment is just part of the realignment.

Case 17.2 Using Report Cards

Physician quality report cards are everywhere: the federal government, consumer groups, professional organizations, *US News & World Report*, and ProPublica all produce reports on physicians' quality of care. However, accurately assessing physician performance is difficult. The measures must be **valid** and **reliable**. Assessment requires appropriate data that are risk adjusted. If the data are good, presenting results in a patient-friendly way can still be challenging.

Researchers have found little evidence that physician report cards have much impact (Shi et al. 2017). In principle, report cards may push out low-quality firms, induce entry by high-quality firms, or encourage existing firms to improve quality, but the evidence is not compelling. Most studies have found that report cards have modest impacts on referrals and market share, probably because referring physicians already steer patients to higher quality providers.

Bhandari and colleagues (2019) argue that expecting report cards to have much effect does not make sense. Many consumers are

(continued)

valid
When a measure accurately measures what it is supposed to.

reliable
When a measure always gives the same result unless the facts have changed.

Case 17.2 *(continued)*

choosing from a small number of local providers, and others are not eager to change providers. Furthermore, it is not clear what sorts of information should induce consumers to switch providers. As James (2018) notes, quality has multiple dimensions. Care should be safe, efficient, timely, up to date, and consistent with consumers' goals. How can a consumer tell whether care is safe, efficient, or up to date?

Discussion Questions

- Do patients use report cards?
- What evidence can you find that report cards have improved quality?
- How could report cards improve reported outcomes?
- Does the scarcity of scientific evidence on the effectiveness of report cards matter?
- Could publication of performance data be advantageous to physicians?
- How do report cards address information asymmetries?
- Would reducing information asymmetries guarantee better markets?
- Does it matter whether report cards are produced by governments or private organizations?
- Why are a few patient switches enough to influence market outcomes?

17.6 Conclusion

Markets and regulations complement each other. Well-regulated markets generally work well, and badly regulated markets generally work poorly. The usual reaction of managers is that less regulation is better than more, but this view is not always true. For example, in 2003 (18 years after it was established), Medicare Advantage enrolled only 5.3 million beneficiaries. But subsequent changes in regulations sharply increased its attractiveness, and the number of enrollees more than quadrupled by 2020 (Biniek et al. 2020).

Healthcare managers must understand the importance of regulations for their organizations and incorporate the effects of regulations in their decision-making. Losses in the legislative or bureaucratic arenas may instigate regulations that put an organization at a significant disadvantage. Although

managers may be tempted to see regulations as competitive tools, in practice their value is usually limited in competing with rivals in the same sector. Although zoning laws and certificate of need laws are notable exceptions, regulations usually apply the same rules for all the competitors in a sector.

Even when regulations could afford them a competitive advantage (perhaps by suppressing competition from rivals from other sectors), few organizations have the political strength and staying power to secure a long-lasting competitive advantage through political action. The exceptions tend to be large organizations that have a well-defined goal shared by all members, are well funded, and have a positive reputation. For most organizations, the challenge is to resist the creation of laws and regulations that threaten to put them at a disadvantage. Fortunately, preventing change usually takes much less influence than causing it.

The interests of healthcare providers appear to require more regulation than governments can be induced to develop. Nongovernmental regulation is widespread in healthcare. For example, certification of health plans and physicians grew out of the need to give customers more detailed information about quality than regulatory bodies could provide. This trend is likely to continue. Managers need to prepare their organizations to compete in environments in which competitive pressures force the release of detailed, audited information about costs and outcomes. Organizations that do not perform well, and thus are unable to attract well-informed customers, are likely to fail.

Markets need a sound regulatory underpinning to secure property rights, define liability, enforce contracts, and constrain or sanction forms of competition. However, designing effective regulations is not easy. Even well-intentioned regulations can stifle innovation, and regulations do not guarantee improved outcomes.

Exercises

17.1 Why are many consumers likely to be rationally ignorant about their options?

17.2 Why would insurance coverage tend to increase rational ignorance?

17.3 A proposal has been advanced to limit advertising of pharmaceutical prices to prevent unfair pricing by national chains. You estimate that limits on price advertising will change the price elasticity of demand from –5 to –4. The marginal cost of a typical prescription is $40. A typical small pharmacy fills 25 prescriptions per day. A typical consumer fills 20 prescriptions per year. What economic effects will the limit have on consumers and on pharmacists? Which group is likely to be the more effective advocate for its position?

The reduction in the price elasticity of demand would increase the profit maximizing price from \$50 = \$40 × –5/(1 – 5) to \$53.33 = \$40 × –4/(1 – 4). Assuming that small pharmacies will fill more than 300 prescriptions per year, the resulting price increase is worth over \$1,000 to them. Consumers will pay just over \$66 more. The stakes are clearly much higher for small pharmacies than consumers, so you would expect the pharmacies to have an advantage. This would be offset by the ability of national chains to lobby the legislature.

17.4 Suppose that independent practice by dental hygienists was made legal. What would be the effects on consumers in rural areas? What would be the effects on dentists in rural areas?

17.5 Why are many economists opposed to licensure of medical facilities and personnel?

17.6 Identify circumstances in which both public and private regulation are present. Which serves consumers better? Why?

17.7 Find out who is on the board of the licensing agency for one of the health professions for your state. Does the board include more members of the profession being regulated or more consumers?

17.8 To reduce the costs of resolving insurance disputes, insurers have required that customers use arbitration. Arbitrators are required to be knowledgeable about medicine and insurance contracts. Why might you anticipate that the arbitration mechanism would wind up favoring the interests of the insurers?

17.9 How might the US Food and Drug Administration be subject to capture? Who would be likely to capture the agency?

17.10 Hospital privileges usually restrict what physicians can do. Medical licenses do not. What drives this difference?

17.11 Consumers Union, the Leapfrog Group, and the US Department of Health and Human Services have websites that provide consumer information about hospitals. Why are multiple sources of information available? Which of these sources did you find the most interesting?

17.12 Give an example of a healthcare product that is financed by the government but produced by private firms. Can you explain why this arrangement exists?

17.13 Prices for a medical procedure average \$1,000 and range from \$800 to \$1,200. How much could a consumer paying full price save by getting the best price? Suppose that insurance is responsible for 75

percent of the consumer's spending and out-of-pocket spending is limited to $250. How much could the consumer save by getting the best price?

Consumers could save up to $400 = $1,200 – 800. But with a deductible of only $250, all of the providers will cost $250 (unless the consumer has already met the deductible, so that all providers cost $0).

17.14 Prices for a medical procedure average $8,000 and range from $6,000 to $12,000. How much could a consumer paying full price save by getting the best price? Suppose that insurance is responsible for 75 percent of the consumer's spending and that out-of-pocket spending is limited to $5,000. How much could the consumer save by getting the best price?

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CHAPTER

18

BEHAVIORAL ECONOMICS

Learning Objectives

After reading this chapter, students will be able to

- explain why rational decision-making has its limits,
- describe some ways that bounded rationality affects decision-making, and
- identify several ways to use behavioral economics to improve decision-making.

Key Concepts

- Brainpower and time are scarce resources, so decision shortcuts make sense.
- Some shortcuts result in poor decisions.
- Some decisions suggest inconsistent preferences.
- Status quo bias means that some people tend to avoid even beneficial changes.
- Overconfidence often leads to poor decisions.
- Problematic shortcuts include availability, anchoring, confirmation, and hindsight bias.
- Awareness of framing bias is especially important in management.
- Changes in how choices are set up can improve decision-making.

18.1 Introduction

Standard economic models start with assumptions that are not really true. These assumptions include the notions that decision makers are always rational, have unlimited willpower, and are concerned only about themselves. These assumptions were once viewed as harmless simplifications, but researchers have shown that being more realistic could be important in management and policy. For example, cash bonuses may reduce work effort

(especially if the work is intrinsically interesting or important), but symbolic payments (such as praise) tend to increase work effort (Bareket-Bojmel, Hochman, and Ariely 2017). For a purely rational worker, that finding would not make sense. Surely praise coupled with cash would be a more powerful motivator than praise alone. Economics that drops the assumptions of complete rationality, complete willpower, and complete selfishness is called **behavioral economics**.

behavioral economics
A field of study that integrates psychology and economics.

Behavioral economics addresses the choices that individuals make when they use shortcuts and rules of thumb in decision-making. Our brainpower and time are scarce resources, so it makes sense to use rules of thumb in making decisions. Unfortunately, these shortcuts sometimes result in poor decisions.

18.2 Inconsistent Preferences

A standard assumption in economics is that consumers make reasonable forecasts about what they will do in the future and make plans on that basis. Behavioral economics notes, to the contrary, that many people appear to have inconsistent preferences. A classic example is procrastination. For example, we may conclude that the cost of exercising is more than offset by its benefits, especially if we commit to start exercising next week. But when next week arrives, we do not want to work out; we want to put it off for another week. Last week, the costs were in the future; this week, they will be realized right now. Decisions that I make today may conflict with decisions that I make next week, even though nothing has changed.

This inconsistency appears to involve rather odd patterns of discounting future benefits and costs (Wang and Sloan 2018). For example, if you regard being paid $988 today as just as good as being paid $1,000 in three months, your personal discount rate is less than 5 percent per year.[1] Would you prefer getting $790 now to getting $1,000 in three months? If so, you are acting as though your discount rate is more than 150 percent per year. A discount rate of more than 150 percent per year seems pretty high, but the real anomaly is that people sometimes use 5 percent and sometimes use 150 percent or more for seemingly similar transactions.

A standard assumption is that people will use the same discount rate for short-term financial gains, long-term financial gains, short-term financial costs, and long-term financial costs because someone could make money by exploiting discount rate variations. But many people discount the future very heavily and treat short delays much differently from longer delays. For example, would you be willing to pay an annual rate of more than 300 percent to borrow $200 for three weeks? Nearly two million taxpayers thought this

proposition was a good deal in 2017, when they signed up for refund anticipation checks that allowed them to pay their tax preparation fees out of their tax refunds (Eisenberg-Guyot et al. 2018). The fee for this privilege was typically $30 or more. Most people who agreed to refund anticipation checks had very low incomes (so coming up with $200 to pay a tax preparation fee would be a problem) and probably were not financially sophisticated (given that a number of ways to have a simple return filled out cost much less than $200).

Case 18.1 Encouraging Employees and Patients to Be Active

Many people struggle to change health-related behaviors. One reason is that people seeking to lose weight, increase exercise, or stop smoking act in a time-inconsistent manner. For example, someone joins a gym but does not go. These inconsistencies not only affect the individual's health but also increase health insurance costs because of poor health. As a result, firms, insurers, policymakers, and health professionals are exploring the use of financial incentives to change health behaviors. Using financial incentives to change behaviors, however, poses two problems. First, participants may get paid for doing what they already planned to do anyway (i.e., people who go to the gym three times per week would have done so without the incentive). Second, participants may revert back to their old behaviors when the incentive ends.

For example, Jones, Molitor, and Reif (2019) designed and executed a clinical trial of a comprehensive workplace wellness program for a large employer. The study showed evidence of selection bias. Employees who accepted the offer to participate had lower medical expenditures and healthier behaviors before the program started than those who did not. Health screening rates rose, but the program did not have obvious impacts on medical expenditures, health behaviors, productivity, or health status.

An alternative strategy is to give a "nudge." Haile and colleagues (2020) gave automated reminders to stretch, take breaks, exercise, hydrate, and so on. The nudges reduced sitting time and increased standing time. The nudges also appeared to improve employees' mental health, but they did not appear to change fitness very much.

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Case 18.1 *(continued)*

Unfortunately, paying people to exercise appears to be the best approach (Wilson 2021). It is just not a terribly good approach.

Discussion Questions

- Why do people act in a time-inconsistent manner?
- Have you ever acted in a time-inconsistent manner? Why?
- Can you find examples of firms incentivizing workers?
- Can you find examples of insurers incentivizing beneficiaries?
- Can you find examples of providers incentivizing patients?
- How could you avoid paying people to do what they were going to do anyway?
- Why would getting a "nudge" increase exercise?
- Can you find other examples of nudges?
- Can you identify other approaches to improving fitness?

18.3 Risk Preferences

Why do people smoke or drive without seat belts? That these behaviors are risky is not exactly news. One could argue that many smokers are addicted, but that argument just pushes the question back a step. Why do people start smoking if they know that cigarettes are addictive and that smoking is dangerous? One possibility is that people who make risky choices like risk. Another is that they misunderstand the risks they are taking. For example, many people appear to underestimate health risks, and this underestimation is a factor in their decision not to buy insurance. Another way to describe underestimation of risk is to say that people are overconfident (as section 18.4 discusses further). Whether we should treat this choice as the result of overconfidence, bad information about risk, or difficulty in understanding the meaning of risks does not matter too much. Any of these will lead to poor decisions.

Some evidence links risk preferences to risky behavior. (Recall from chapter 4 that risk seekers seek more variable outcomes and risk-averse people seek less variable outcomes. Risk seekers seldom buy insurance. Risk-averse people will buy insurance if the premium is not too much larger than the expected loss.) For example, Macy and colleagues (2019) found that teenagers who did not use seat belts very often were more likely to smoke and drink alcohol.

Misunderstanding the dangers of risky behavior and the probability of those dangers is a major problem for younger people. Aversion to risk typically increases with age. Few children are risk averse, a slightly larger share of adolescents are risk averse, and most adults are risk averse (Romer, Reyna, and Satterthwaite 2017). Typically, someone who is risk averse tends to discount the future less than someone who is risk seeking, so these two tendencies reinforce each other (Harrison et al. 2018).

Not surprisingly, most people who become addicted to cigarettes did so as adolescents (Barlow et al. 2017). Their willingness to accept risk was high, their concern about the future was low, and their ability to imagine the consequences of becoming addicted was limited.

18.4 Incorrect Beliefs

Drivers of all ages claim to be more skillful than average (Horswill et al. 2017). But does this overconfidence matter? It does because overconfident drivers are more likely to use their cell phones while driving, which significantly increases the risk of an accident.

More broadly, overconfident decision makers are likely to make bad choices. They are likely to overestimate their chances of success and to attribute failures to bad luck (thereby failing to learn from them). For example, the fact that companies often lose money when they buy other companies is common knowledge. Acquiring a company requires a bid above its current market valuation, and its current market valuation is unlikely to be too low. So, it takes a very confident management team—one convinced of their skill and of unrecognized synergies—to buy another company. In many cases this confidence amounts to overconfidence and the acquisition is unprofitable (Brunzel 2021). Overconfident CEOs often make money-losing acquisitions.

Several cognitive traps feed into overconfidence:

- Availability bias
- Anchoring bias
- Confirmation bias
- Hindsight bias

We will discuss each of these biases in turn.

Availability bias can occur because certain outcomes are very easy to imagine or very hard to imagine. For example, if you run a public health agency, which threat to life should be your top priority, tornadoes or asthma? If you were asked this question right after reading about a deadly tornado, you might have said tornadoes. The news reports made them easy

availability bias A cognitive trap that occurs when some facts are very easy or very hard to recall.

to remember. In fact, the two threats are not even close. Between 2018 and 2021, tornadoes killed an average of only 74 people each year (National Weather Service 2022). More than 4,000 people die from asthma each year, and quite a few of these deaths are preventable (National Center for Health Statistics 2022). If you have never known anyone who died as a result of asthma, you might have a difficult time imagining asthma as a cause of death and pay too little attention to it.

anchoring bias
A cognitive trap that occurs when an irrelevant fact influences a decision.

Anchoring bias occurs when some initial estimate, even if it is not based on evidence or is simply wrong, affects future discussions. In a strategy discussion about whether to add a long-term care facility to a system, one board members says, "I hope the return on equity is better than the 5 percent that home health care firms earn." That comment is not really relevant because long-term care and home health care are fairly distinct markets. True or not, the comment is likely to influence the subsequent discussion.

Irrelevant information can influence decision-making. If a job candidate starts by mentioning a desired salary of $150,000, the candidate will probably get a higher offer than if they started by mentioning a current salary of $85,000. Neither of these numbers may fall within the pay range for the job in question, but mentioning the $150,000 tends to anchor the discussion.

Even experienced professionals can be affected by anchoring (Sharma, McManus, and Kuo 2021). For example, a young woman came to the emergency department with a sore throat, fever, nausea, and body aches. A CT scan showed a mass on her thyroid, and cancer was the initial diagnosis. (Please note that thyroid cancer tends to be overdiagnosed and is uncommon in young people.) She was referred to endocrine surgery for diagnosis and treatment. While waiting to be seen there, she came back to the emergency department repeatedly with worsening symptoms. She was not able to eat or drink, had multiple other symptoms, and was living with a cancer diagnosis. When she was finally evaluated by the endocrine surgery staff, an ultrasound strongly suggested she had an abscess as a result of a bacterial infection. Her treatment went well and her symptoms went away. Had she initially gotten an ultrasound (an inexpensive, noninvasive test), she could have been spared several terrifying weeks. However, the anchor of the cancer diagnosis blocked other diagnostic work.

confirmation bias
The tendency to focus on information that supports one's beliefs.

Confirmation bias occurs when we filter evidence to prove that our conclusions are right. How did you react when a political candidate you support said something stupid? Most of us will offer an example of the opponent's failings rather than switch candidates.

A management example of confirmation bias can be found in the hiring process. Suppose you interview several people, and Ms. Jones seems to stand out. You are confident that she is the best choice. You call several references, they say mostly good things about the candidate, and those are

the comments that you include in your notes. Ms. Jones turns out to be a disaster. You used the interview to support your positive impression, not to look for warning signs. You did not follow up when a reference said "Well, she wasn't here that long" and another said "She was only in my unit for about three months."

Hindsight bias occurs when you feel that you "knew it all along"—that is, when you believe that you made a prediction that you did not. This bias creates two decision traps. First, your overconfidence may grow. Second, you have no incentive to explore why your predictions were faulty. Neither bodes well for future decisions.

hindsight bias The tendency to overstate how predictable an outcome was beforehand.

Hindsight bias is widespread, having been documented in diverse situations including labor disputes, medical diagnoses, managerial decisions, and public policy (Antonacci et al. 2021). Hindsight bias has serious consequences because it impairs performance. For example, researchers have found that investment bankers who earned the least had the largest hindsight bias (Merkle 2017). Hindsight bias also makes effective investigations of accidents and near misses difficult, leaving future patients at risk because no fundamental changes are made (Zwaan et al. 2017).

18.5 Representativeness and the Law of Small Numbers

To assess a possible merger with another practice, you interview six CEOs from practices that went through mergers. After you complete the interviews, you notice that the three CEOs from the successful mergers were accountants and the three CEOs from the failed mergers were physicians. What should you infer from that?

You should infer nothing. Your sample is too small and may be biased. If you looked at a larger, more representative sample, you might find any pattern. For example, you might find that merged practices led by accountants were more likely to fail. Nonetheless, you may be tempted to think that having an accountant as the CEO is important.

Several factors are at work here. First, humans are prone to see patterns even if no pattern exists. We are apt to think that our experience with a small number of people will be typical of the whole group. This tendency is called **representativeness bias** (O'Sullivan and Schofield 2019). We are also apt to forget that statistics based on small numbers can be very misleading. This tendency is the **law of small numbers bias**.

representativeness bias The tendency to overstate how typical a small sample is.

law of small numbers bias Generalizations based on small samples.

The problem is greatest when our own experience suggests a conclusion. We easily dismiss colleagues' stories as being mere anecdotes. Our stories seem different. They feel meaningful to us. We have no trouble saying, "The plural of *anecdote* is not *evidence*," unless the anecdote is ours. Our stories seem compelling.

18.6 Inconsistent Decision-Making: Framing

Real-life choices appear to be affected by how they are presented. In fact, framing appears to be one of the strongest decision-making biases. Framing is especially relevant to health decisions because the stakes are high and because older adults (who are more likely to have to make health decisions) appear more likely to use shortcuts that cause **framing bias**.

framing bias
The effect of presenting the same data in different ways.

A standard way of illustrating framing bias is to use a treatment choice problem. Treatment 1 is guaranteed to save 200 of 1,000 people with a fatal disease. Treatment 2 offers a 20 percent chance of saving 1,000 lives and an 80 percent chance of saving no one. Which do you prefer? Most people prefer treatment 1 because it seems less risky, even though its outcomes are the same.

Now consider another scenario. If you choose treatment 3, 800 of 1,000 people with a fatal disease will die. With treatment 4, you have an 80 percent chance that everyone will die and a 20 percent chance that no one will die. Which do you prefer? Most people choose treatment 4.

The only difference between these two scenarios is that the first is framed in terms of how many people live and the second is framed in terms of how many die. They are otherwise identical, yet choices typically differ. By changing the emotional context of a decision, framing can change choices.

Framing can take several forms. It can describe the attributes of choices in different ways, describe the outcomes of choices in different ways, and describe the risks of choices in different ways. For example, people tend to prefer a choice when its attributes are presented in positive terms (Altay and Mercier 2020). Thus, consumers are more apt to choose a hospital that stresses its high patient satisfaction (a positive attribute frame) rather than its low mortality rates (a negative attribute frame). An example of goal framing would be to describe the effect of a new strategy as a gain in market share (a positive goal frame) or as avoiding stagnation (a negative goal frame). Most people are influenced by **loss aversion**, meaning they worry more about avoiding losses than they do about realizing gains. As a result, people may respond more to negative goal frames. The treatment choice example given earlier in this section illustrates risk framing. The same problem can be presented in terms of lives saved (a positive risk frame) or in terms of deaths prevented (a negative risk frame). People tend to be more willing to accept risk to avoid negative outcomes than they are to gain positive outcomes.

loss aversion
A focus on avoiding losses rather than maximizing gains.

The importance of framing appears to vary. Some decision makers appear to be immune to framing, with decision makers with the best mathematics skills the least likely to be affected. In addition, goal framing appears to have smaller effects than attribute or risk framing (Harrington and Kerr 2017). The challenge for managers is determining when framing will matter and when it will not.

A number of countries rely on consumer demand to limit medical costs. An important mechanism is the willingness of consumers to switch to less expensive health insurance plans, which pressures insurers to offer low-cost plans and pressures providers to reduce what they charge for care. However, consumers often find insurance choices daunting, which may result in reluctance to switch plans. This reluctance dilutes the effects of competition on costs. For example, Drake, Ryan, and Dowd (2019) note that rates of switching between insurers have been very low, even though prices and out-of-pocket costs varied among comparable plans.

Why were switching rates so low? Behavioral economics offers several reasons. First, a significant **status quo bias** is at work. Consumers are often reluctant to make changes if they do not have to. Second, too many choices can stop consumers from making any choice. This problem is called **decision overload**. Third, consumers tend to worry about making what turns out to be a bad choice. One way to avoid regret about a choice is to avoid making a choice. Fourth, consumers appear to give more weight to avoiding losses than to realizing gains. This loss aversion tends to inhibit making changes. Finally, many insurance plans have narrow networks, so switching plans may require switching providers.

status quo bias The tendency not to change, even when it would be advantageous to do so.

decision overload The poorer decision-making that occurs as choices become more complex.

Case 18.2 Children's Health Insurance

More than two-thirds of the millions of children without health insurance appear to be eligible for Medicaid or the Children's Health Insurance Program (CHIP) (Williams and Garfield 2021). For many of these children, health insurance would be free. Not accepting free health insurance makes sense in standard economics only if you believe that the hassles of signing up for these programs outweigh their considerable benefits, but behavioral economics notes several other reasons for this pattern. First, parents may focus on the up-front hassles and give much less emphasis to the future benefits. That is, the parents may heavily discount the future benefits. Second, the well-known problem of procrastination means that tomorrow or next week are always better times than today to go to the trouble of enrolling a child. Third, we know that many decision makers have trouble with probabilities, meaning that the parents of these uninsured children make poor assessments of the chance that their child will become seriously ill or that better access to medical care will be important.

(continued)

Case 18.2
(continued)

Between 1984 and 2009, a series of reforms sought to streamline and simplify enrollment in Medicaid and CHIP. These reforms allowed states to permit continuous enrollment, to eliminate face-to-face interviews, to simplify verification procedures, to grant temporary eligibility, and to use the results of one eligibility process (e.g., the Supplemental Nutrition Assistance Program) to determine eligibility.

Advances in information technology made these reforms possible, and the Affordable Care Act (ACA) financially supported upgrades to outdated Medicaid eligibility systems, which are integrated with or connected to health insurance marketplaces in every state. As of January 2017, 39 states could make Medicaid eligibility determinations within 24 hours, and in 28 states, applicants could apply using mobile devices (Brooks et al. 2017). Not surprisingly, the increased convenience of these new systems has boosted enrollment in Medicaid and CHIP. For example, Alabama removed asset tests for children, eliminated the requirement for in-person interviews, made eligibility last for a full year, and simplified the application process in other ways. As a result, the share of eligible children with coverage rose from 91 percent in 2008 to 95 percent in 2015 (Georgetown University Center for Children 2017). Much of this growth occurred after implementation of the ACA, but not because many children gained coverage under marketplace plans. Less than 1 percent of the eligible children got their coverage this way.

Alabama's enhancements incorporate ideas from behavioral economics. They make enrollment easier, rather than emphasizing traditional outreach strategies or price reductions. Unfortunately, many children who are eligible for health insurance subsidies remain uninsured. Saleska and Choi (2021) suggest that adults bring multiple cognitive biases to medical decision-making. Knowledge may also be a major issue (Davey et al. 2021). Providing community health workers to help families apply for insurance, find providers, and access social services seems to have worked. More children got coverage, accessed medical and dental care, reduced out-of-pocket costs, increased parental satisfaction, and improved quality of care.

Discussion Questions

- Why are children who are eligible for free coverage uninsured?
- What behavioral economics approaches would further increase coverage?

(continued)

Case 18.2 *(continued)*

- Why are adults who are eligible for low-cost coverage uninsured?
- What behavioral economics approaches would further increase coverage?
- How does status quo bias affect health insurance decisions?
- How does loss aversion affect health insurance decisions?
- How does decision overload affect health insurance decisions?
- How might insurance decisions be reframed to increase enrollment?
- How could enrollment in health insurance for children be further simplified?
- How could health insurance be simplified overall?

18.7 Conclusion

People use shortcuts when they make hard or emotionally charged decisions. In other words, patients, clinicians, and managers use shortcuts when they buy insurance, when they make medical decisions, when they make strategic decisions at work, and when they hire and fire employees. Shortcuts are common.

Sometimes, unfortunately, shortcuts lead to poor choices. Patients may choose insurance plans that expose them to significant financial risks. Clinicians may recommend problematic treatment plans. And managers may make business decisions that harm clients or their organizations. The stakes can be high.

What can managers do to limit bad decision-making attributable to shortcuts? Fortunately, a number of strategies are available:

- Look hard for evidence that you are wrong.
- Appoint someone to tear apart your analyses.
- Reward those who express honest disagreement.
- Seek out the opinions of people who disagree with you, and listen carefully.
- Try to reframe problems to view them from different perspectives.
- Talk about your feelings to see whether they are leading you astray.
- Postpone committing to strategies as long as you can.
- Make sure that a review process and an exit strategy are part of decision-making.
- Be aware that your decision-making can lead to mistakes.

These steps will not shield you from making errors. They may help you make fewer mistakes, though.

Exercises

18.1 You will receive a $10,000 insurance payment in two months. If you are willing to pay $50 for expedited handling, you can be paid in one month. What annual interest rate does this imply?

A payment of $50 implies an interest rate of 6.2 percent. That is, $10,000/$9,950 = 1.005025126, which equals 1.062 when compounded for 12 months. That is, multiply 1.005025126 times itself 12 times and the answer rounds to 1.062.

18.2 You will receive a $20,000 insurance payment in 12 months. If you are willing to accept a reduced payment, you can be paid in 11 months. Would you be willing to accept $19,800? $19,500? $19,000? Less? What annual interest rate does this imply? Does knowing the answer affect your decision?

18.3 Texting while driving is dangerous, and most drivers know it. Does behavioral economics offer any tools to reduce texting?

18.4 How could you use behavioral economics to increase the number of insured employees in your firm?

18.5 A town has two hospitals. One averages 30 births per day; the other averages 15. Overall, half of the babies are boys, but some days, more than 60 percent of the babies are boys. Is either hospital likely to have a greater number of days with a high proportion of boys?

18.6 Eighty percent of the participants at a meeting are physicians. The rest are nurse practitioners. Your neighbor Amy is there. She is 40, married, and highly motivated. Colleagues have told you that Amy is extremely capable and promises to be very successful. What is the probability that Amy is a physician?

18.7 Will you be in the top half of your class or the bottom? What proportion of your classmates will forecast that they will be in the top half? What implications does this scenario have for decision-making?

18.8 You have finished interviewing candidates for an assistant director position. One of them stands out as the best candidate to you. You know that this view sets you up for confirmation bias as you check references. What steps can you take to prevent this bias?

18.9 Your vice president is an accountant and believes that accountants make the best practice managers. One of the three practice manager finalists has an accounting background. Everyone on the search team has ranked this candidate lowest of the finalists. You fear that your vice president will tend to selectively read the team's recommendations and lean toward hiring this person. What can you do to offset this potential confirmation bias?

18.10 Thirty-four percent of the employees in your health system are obese, and 16 percent of their children are obese. Obese employees are less productive, have higher medical costs, and miss more work. Employees with obese children also miss more work, so persuading employees and their families to lose weight looks like a good investment for the system. In fact, cost-effective interventions are available to reduce obesity, and you offer them to your employees and their families. You have recently begun to make weight loss interventions available for free, but only 1 percent of your employees have signed up for them. What behavioral economics tools can you use to help your employees lose weight?

18.11 How could you use behavioral economics to increase vaccination rates?

18.12 Physicians must make many decisions, often with limited information. So, they use rules of thumb, sometimes with poor outcomes. For example, some physicians overprescribe opioids. What behavioral economics tools could be used to reduce the use of opioids?

18.13 Can nudges be used to improve nutrition?

Note

1. If getting $988 is as good as getting $1,000 in three months, your discount rate is 4.95 percent per year. Dividing $1,000 by $988 gives a three-month discount factor of 1.012145749. Taking this result to the fourth power (to convert it to an annual rate) gives 1.04948. It is customary to subtract 1.00 from this discount factor and express the results in percentage terms. Doing so gives 4.95 percent.

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GLOSSARY

accountable care organization. A network of providers that have financial incentives to reduce spending and improve outcomes.

adverse selection. A situation that occurs when buyers have better information than sellers. For example, high-risk consumers are willing to pay more for insurance than low-risk consumers are. (Organizations that have difficulty distinguishing high-risk from low-risk consumers are unlikely to be profitable.)

agency. An arrangement in which one person (the agent) takes actions on behalf of another (the principal).

agent. A person who provides services and recommendations to clients (who are called *principals*).

anchoring bias. A cognitive trap that occurs when an irrelevant fact influences a decision.

asymmetric information. A situation in which one party in a transaction has less information than the other party.

attribute-based product differentiation. Making customers aware of differences among products.

availability bias. A cognitive trap that occurs when some facts are very easy or very hard to recall.

average cost. Total cost divided by total output. It is sometimes abbreviated as AC.

average fixed costs. Fixed costs divided by total volume. It is sometimes abbreviated as AFC.

average variable costs. Variable costs divided by total volume. It is sometimes abbreviated as AVC.

behavioral economics. A field of study that integrates psychology and economics.

bundled payment. Payment of a fixed amount for an episode of care. The payment might cover just hospital care, or it might include physician, hospital, and rehabilitation.

capitation. Payment per person. (The payment does not depend on the services provided.)

capture. The takeover of the regulatory process by a special interest.

case-based payment. A single payment for an episode of care. (The payment does not change if fewer services or more services are provided.)

center of excellence. An integrated program to treat a condition (e.g., breast cancer care). Certification is possible, but structures and approaches vary. From the employer's or the insurer's perspective, a center of excellence is defined by the contract with the provider and by demonstrated high quality and efficiency.

certificate of need law. A law that requires state approval of healthcare construction projects.

coinsurance. A form of cost sharing in which a patient pays a share of the bill, not a set fee.

collusion. A secret agreement between parties for a fraudulent, illegal, or deceitful purpose.

community health workers. Local, nonclinical workers who help patients live healthier lives and help providers understand patients' needs.

competitive advantage. The ability to outperform rivals (e.g., profitably offering products at lower cost, at the same cost and higher quality, or offering products that customers are willing to pay more for.)

complement. A product used in conjunction with another product (e.g., home health is a complement for joint replacement surgery). Complements have negative cross-price elasticities.

concentrated market. A market that has few competitors or a few dominant firms.

confirmation bias. The tendency to focus on information that supports one's beliefs.

contingency planning. A form of planning that designs a response to a worst-case scenario.

copayment. A fee the patient must pay in addition to the amount paid by insurance.

cost. The value of a resource in its next best use.

cost-benefit analysis. An analysis that compares the value of an innovation with its costs. (Value is measured as willingness to pay for the innovation or willingness to accept compensation to not use it.)

cost-effective. Improving outcomes at a modest cost. There is no consensus as to what a modest cost is, but this is the sort of judgment that managers must make.

cost-effectiveness analysis. An analysis that measures the cost of an innovation per unit of change in a single outcome.

cost-minimization analysis. An analysis that measures the cost of two or more innovations with the same patient outcomes.

cost sharing. The general term for direct payments to providers by insurance beneficiaries. (Deductibles, copayments, and coinsurance are forms of cost sharing.)

cost shifting. The hypothesis that price differences are attributable to efforts by providers to make up for losses in some lines of business by charging higher prices in other lines of business.

cost-utility analysis. An analysis that measures the cost of an innovation per quality-adjusted life year.

cross-price elasticity of demand. The ratio of the percentage change in sales volume associated with a percentage change in another product's price. For example, if prices of the other product rose by 2.0 percent and the quantity demanded fell by 5.0 percent, the cross-price price elasticity would be –0.05/0.02, which equals –2.50.

decision overload. The poorer decision-making that occurs as choices become more complex.

decision tree. A chart that depicts the values and probabilities of the outcomes of a choice.

deductible. The amount a consumer must pay before insurance covers any healthcare costs.

demand. The amounts of a product that will be purchased at different prices when all other factors are held constant.

demand curve. A graph that describes how much consumers are willing to buy at different prices.

diagnosis-related group (DRG). The basis of Medicare's case-based payment system for hospitals.

discounting. Adjusting the value of future costs and benefits to reflect the willingness of consumers to trade current consumption for future consumption. (Usually future values are discounted by $1/(1 + r)^n$, with r being the discount rate and n the number of periods in the future the cost or benefit will be realized.)

economies of scale. When larger organizations have lower average costs.

economies of scope. When multiproduct organizations have lower average costs.

efficient. Producing the most valuable output possible, given the inputs used. (Viewed differently, an efficient organization uses the least expensive inputs possible, given the quantity and quality of output it produces.)

elastic. A term that describes demand when the quantity demanded changes by a larger percentage than the price. For example, a price elasticity of –4.55 would signify elastic demand. (This term is usually applied only to price elasticities of demand.)

equilibrium price. The price at which the quantity demanded equals the quantity supplied. (There is no shortage or surplus.)

expected value. The sum of the value of each possible outcome weighted by its probability.

external benefit. A benefit for a consumer or producer not involved in a transaction.

external cost. A cost for a consumer or producer not involved in a transaction.

externality. A benefit or cost accruing to someone who is not a party to the transaction that causes it.

fee-for-service (FFS). An insurance plan that pays providers on the basis of their charges for services.

fixed costs. Costs that do not vary when output changes.

framing bias. The effect of presenting the same data in different ways.

free rider. Someone who benefits from a public good without bearing any of its cost.

gainsharing. A general strategy of rewarding those who contribute to an organization's success. Profit sharing is one form of gain sharing. Rewards can be based on other criteria as well.

global, risk-adjusted budget. Payment of a fixed amount per person to the organization that is responsible for providing care to a population. Risk adjustment means that the amount per person is higher for people with higher risk of expensive illnesses.

group model HMO. A plan that contracts with a physician group to provide services.

high-deductible plan. A plan that has a deductible of at least $1,000 and may be combined with a health savings account.

hindsight bias. The tendency to overstate how predictable an outcome was beforehand.

Hirschman-Herfindahl Index (HHI). A measure used to identify concentrated markets, calculated as the sum of the squared market shares of firms in a market. For example, if firms had market shares of 40, 30, 20, and 10, the HHI would be 3,000 = 1,600 + 900 + 400 + 100. (A potential source of confusion is that some calculate the HHI treating a 40 percent market share as 0.40 and others treat it as 40. This book uses the second approach.)

HMO (health maintenance organization). A plan that provides comprehensive benefits to enrollees in exchange for a premium. (Originally, HMOs were distinct from other insurance firms because providers were not paid on a fee-for-service basis and because enrollees faced no cost-sharing requirements.)

income effects. The consequences of income shifts on amounts demanded or supplied. (These include changes in income or changes in purchasing power because of price changes.)

income elasticity. The percentage change in the quantity demanded divided by the percentage change in income. For example, if visits were 0.04 percent higher for consumers with incomes that were 1 percent higher, the income elasticity would equal 0.04 = 0.0004/0.010.

incremental change. A small change.

inelastic. A term that describes demand when the quantity demanded changes by a smaller percentage than the price. For example, a price elasticity of –0.55 would signify inelastic demand. (This term is usually applied only to price elasticities of demand.)

information-based product differentiation. Making customers aware of a product's popularity, reputation, or other signals that suggest high value.

input. A good or service used in production.

interest group model of regulation. The view that regulations are attempts to further the interests of affected groups, usually producer groups.

IPA (independent practice association) HMO. A plan that contracts with independent practice associations, which, in turn, contract with physician groups.

law of small numbers bias. Generalizations based on small samples.

life year. One additional year of life. A life year can equal one added year of life for an individual or an average of $1/n$th of a year of life for n people. (For example, the addition of one life year would increase life expectancy by 1/100 for 100 people.)

limit pricing. Setting prices low enough to discourage entry into a market.

loss aversion. A focus on avoiding losses rather than maximizing gains.

low-value care. Care that has been scientifically evaluated and found to be of little or no clinical value or to have potential harms greater than its benefits.

managed care. A loosely defined term that includes all plans except open-ended fee-for-service. It is sometimes used to describe the techniques that insurance companies employ.

marginal analysis. The analysis of small changes in a decision variable (e.g., price, volume of output) on outcomes (e.g., costs, profits, probability of recovery).

marginal change. A small change.

marginal cost pricing. The use of information about incremental costs and the price elasticity of demand (ε) to set profit-maximizing prices. The profit-maximizing price will equal $[\varepsilon/(1 + \varepsilon)] \times$ incremental cost.

marginal or incremental cost. The cost of producing an additional unit of output. It is sometimes abbreviated as MC.

marginal or incremental revenue. The revenue from selling an additional unit of output.

market system. A system that uses prices to ration goods and services.

mean absolute deviation. The average absolute difference between a forecast and the actual value. (It is absolute because it converts both 9 and –9 to 9.) The Excel function = ABS( ) performs this conversion.

Medicaid. A collection of state-run insurance programs that meet standards set by the Centers for Medicare & Medicaid Services and serve those with

incomes low enough to qualify for their state's program. Medicaid enrollment has increased by more than 20 percent as a result of state expansions under the Affordable Care Act.

Medicare. A federal insurance program for older and disabled Americans that is administered by the Centers for Medicare & Medicaid Services.

Medicare Part A. Coverage for inpatient hospital, skilled nursing, hospice, and home health services.

Medicare Part B. Coverage for outpatient services and medical equipment.

monopolist. A firm with no rivals.

monopolistic competitor. A firm with multiple rivals whose products are imperfect substitutes.

moral hazard. The incentive to use additional care that having insurance creates.

moving average. The unweighted mean of the previous n data points.

natural monopoly. A market that can be most efficiently served by a single firm.

network externality. The effect that each additional user of a product or service has on the value of that product or service for existing users.

network HMO. A plan that offers a variety of contracts with physician groups, IPAs, and individual physicians. A network HMO may also own some of its hospitals and employ some of its physicians.

nonexcludable consumption. A situation that occurs when preventing use by someone who did not pay for a product is not feasible.

nonrival consumption. Use by one person that does not prevent simultaneous use by another person.

normative economics. The use of values to identify the best options.

objective probability. An estimate based on frequencies.

oligopolist. A firm with only a few rivals or a firm with only a few large rivals.

opportunism. Taking advantage of a situation without regard for the interests of others.

opportunity cost. The value of what you cannot do as a result of making a choice.

out-of-pocket maximum. A cap on the amount that the consumer has to pay out of pocket.

out-of-pocket spending. Direct spending for care by a consumer.

output. A good or service produced by an organization.

Pareto optimal. An allocation of resources in which no reallocation of resources is possible that will improve the well-being of one person without worsening the well-being of another.

percentage adjustment. An increase or decrease in the average of the past *n* periods. (The adjustment is essentially a best guess of what is expected to happen in the next year.)

per-service payment. Payment for each billable service. Providing an additional service increases the bill.

point-of-service (POS) plan. A plan that allows members to see any physician but increases cost sharing for physicians outside the plan's network. (This arrangement has become so common that POS plans may not be labeled as such.)

positive economics. The use of objective analysis and evidence to answer questions about individuals, organizations, and societies.

PPO (preferred provider organization). A plan that contracts with a network of providers. (Network providers may be chosen for a variety of reasons, but a willingness to discount fees is usually required.)

preemption. Building excess capacity in a market to discourage potential entrants.

price discrimination. Selling similar products to different buyers at different prices.

price elasticity of demand. The ratio of the percentage change in sales volume associated with a percentage change in a product's price. For example, if prices rose by 2.5 percent and the quantity demanded fell by 7.5 percent, the price elasticity would be $-3.00 = -0.075/0.025$.

principal. The organization or individual represented by an agent.

producing to order. Setting prices and then filling customers' orders.

producing to stock. Producing output and then adjusting prices to sell what has been produced.

product differentiation. The process of distinguishing a product from others.

profits. Total revenue minus total cost.

public good. A good whose consumption is nonrival and nonexcludable.

quantity demanded. The amount of a good or service that will be purchased at a specific price when all other factors are held constant.

range. The difference between the largest and smallest values.

rational decision-making. Choosing the course of action that offers the best outcome, given the existing constraints.

reference pricing. A pricing design that sets a maximum amount that an insurer will pay for a product. Patients typically must pay the full difference between the product's price and the reference price.

reliable. When a measure always gives the same result unless the facts have changed.

representativeness bias. The tendency to overstate how typical a small sample is.

return on equity. Profits divided by shareholder equity.

return on investment. Annual profit divided by the initial investment.

risk averse. Preferring a smaller, less risky payoff to a larger payoff with more variability. (A risk-averse person would choose getting $5 for sure to a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10.)

risk aversion. Willingness to accept a lower payoff to reduce risk.

risk neutral. Not caring about risk. (A risk-neutral person would think that getting $5 for sure is as good as a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10.)

risk seeker. A person who prefers more risk to less. (A risk seeker would prefer a gamble with a 50 percent chance of getting nothing and a 50 percent chance of getting $10 to getting $5 for sure.)

risk seeking. Willingness to accept a lower payoff in order to increase risk.

salary. Fixed compensation per period.

scarce resources. Anything useful in consumption or production that has alternative uses.

scenario analysis. Evaluating outcomes under different assumptions.

seasonalized regression analysis. A least squares regression that includes variables that identify subperiods (e.g., weeks) that historically have had above- or below-trend sales.

sensitivity analysis. Varying the assumptions of an analysis to see how outcomes change.

shift in demand. A shift that occurs when a factor other than the price of the product (e.g., consumer income) changes. A shift in demand changes the entire price-quantity schedule (creating a new demand curve, not a movement along an existing curve).

shift in supply. A shift that occurs when a factor (e.g., an input price) other than the price of the product changes.

shortage. A situation that occurs when the quantity demanded at the prevailing price exceeds the quantity supplied. (The best indication of a shortage is that prices are rising.)

signaling. Sending messages that reveal information another party does not observe.

social determinants of health. Factors that affect health independently of healthcare, such as education and housing.

societal perspective. A perspective that considers all costs and benefits, no matter to whom they accrue.

staff model HMO. A plan that employs staff physicians to provide services.

standard deviation. The square root of a variance.

status quo bias. The tendency not to change, even when it would be advantageous to do so.

subjective probability. An estimate based on judgment.

substitute. A product used instead of another product. (e.g., using home health services for rehabilitation rather than a rehabilitation hospital). Substitutes have positive cross-price elasticities.

sunk costs. Costs that have been incurred and cannot be recouped.

supply curve. A graph that depicts how much producers are willing to sell at different prices.

surplus. A situation that occurs when the quantity supplied, at the prevailing price, exceeds the quantity demanded. (The best indication of a surplus is that prices are falling.)

tragedy of the commons. Overuse or underuse of a resource that occurs when ownership of the resource is unclear and users produce externalities.

underwriting. The process of assessing the risks associated with an insurance policy and setting the premium accordingly.

valid. When a measure accurately measures what it is supposed to.

value-based payment. Payment that adjusts the amount paid based on measures of quality.

variable costs. Costs that change when output changes.

variance. The squared deviation of a random variable from its expected value. (If a variable takes the value 3 with a probability of 0.2, the value 6 with a probability of 0.3, and the value 9 with a probability of 0.5, its expected value is 6.9. Its variance is 5.49, which is $0.2 \times [3 - 6.9]^2 + 0.3 \times [6 - 6.9]^2 + 0.5 \times [9 - 6.9]^2$.)

volume-based payment. Payment that increases as a provider delivers more services.

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Note: Italicized page locators refer to exhibits.

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