Introduction to Economic Decision Making

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The crucial step in tackling almost all important business and government decisions begins with a single question: What is the alternative?

ANONYMOUS

LEARNING OBJECTIVES

LO#1. Describe seven different kinds of decisions that managers face.

LO#2. Outline the six steps in the decision-making process.

LO#3. Contrast decision making in the private and public sectors.

Decision making lies at the heart of most important business and government problems. The range of business decisions is vast: Should a high-tech company undertake a promising but expensive research and development program? Should a petrochemical manufacturer cut the price of its best-selling industrial chemical in response to a new competitor's entry into the market? Should management of a food products company launch a new product after mixed test-marketing results?

Likewise, government decisions range far and wide: Should the Department of Transportation impose stricter rollover standards for sports utility vehicles? Should a city allocate funds for construction of a harbor tunnel to provide easy airport and commuter access? These are all economic decisions. In each case, a sensible analysis of what decision to make requires a careful comparison of the advantages and disadvantages (often, but not always, measured in dollars) of alternative courses of action.

Managerial economics is the analysis of major management decisions using the tools of economics. Managerial economics applies many familiar concepts from economics—demand and cost, monopoly and competition, the allocation of resources, and economic trade-offs—to aid managers in making better decisions. This book provides the framework and the economic tools needed to fulfill this goal.

In this chapter, we begin our study of managerial economics by stressing decision-making applications. In the first section, we introduce seven decision examples, all of which we will analyze in detail later in the text. Although these examples cover only some applications of economic analysis, they represent the breadth of managerial economics and are intended to whet the reader's appetite. Next, we present a basic model of the decision-making process as a framework in which to apply economic analysis. This model proposes six steps to help structure complicated decisions so that they may be clearly analyzed.

After presenting the six steps, we outline a basic theory of the firm and of government decisions and objectives. In the concluding section, we present a brief overview of the topics covered in the chapters to come.

SEVEN EXAMPLES OF MANAGERIAL DECISIONS

The best way to become acquainted with managerial economics is to come face to face with real-world decision-making problems. The seven examples that follow represent the different kinds of decisions that private- and public-sector managers face. All of them are revisited and examined in detail in later chapters.

The examples follow a logical progression. In the first example, a global carmaker faces the most basic problem in managerial economics: determining prices and outputs to maximize profit. As we shall see in Chapters 2 through 6, making decisions requires a careful analysis of revenues and costs.

The second example highlights competition between firms, the subject of Chapters 7 through 10. Here, two ride-sharing companies are battling for market share in a multitude of regional markets. Each is trying to secure a dominant monopoly, but when a rival enters in the same city, they frequently get caught up in price wars. The next two examples illustrate public-sector decisions: The first concerns funding a public project, the second is a regulatory decision. Here, a shift occurs both in the decision maker—from private to public manager—and in the objectives. As we argue in Chapter 11, government decisions are guided by the criterion of benefit–cost analysis rather than by profit considerations.

The final three examples involve decision making under uncertainty. In the fifth example, the failure of Boeing to identify and manage risks culminated in two crashes of its 737 MAX airplanes. In the next example, a pharmaceutical company is poised between alternative risky research and development (R&D) programs. Decision making under uncertainty is the focus of Chapters 13 and 14. In the final example, David Letterman and two rival television networks are locked in a high-stakes negotiation as to which company will land his profitable late-night show. Competitive risk in the context of negotiation is taken up in Chapter 16.

Multinational Production and Pricing

Almost all firms face the problem of pricing their products. Consider a US multinational carmaker that produces and sells its output in two geographic regions. It can produce cars in its home plant or in its foreign subsidiary. It sells cars in the domestic market and in the foreign market. For the next year, it must determine the prices to set at home and abroad, estimate sales for each market, and establish production quantities in each facility to supply those sales. It recognizes that the markets for vehicles at home and abroad differ with respect to demand (i.e., how many cars can be sold at different prices). Also, the production facilities have different costs and capacities. Finally, at a cost, it can ship vehicles from the home facility to help supply the foreign market, or vice versa. Based on the available information, how can the company determine a profit-maximizing pricing and production plan for the coming year?

Market Entry

In 2009, Uber introduced its ride-sharing platform in the United States, and this was quickly followed by competitors like Lyft and Didi Chuxing in China. Prior to ride sharing, people would stand on street corners hoping to flag down taxis. In wet, cold, or stormy weather, this was a miserable and often futile task as many cabs were full. By contrast, summoning a ride by cell phone, knowing when the car would arrive and the exact cost (automatically paid by credit card) ahead of time dramatically changed how people used local transportation around the globe.

However, not every city and town is served by ride sharing. Some countries such as France have imposed restrictions to protect taxi companies from ride-sharing competition. Other places have eagerly welcomed ride sharing. The rapid change in transportation modes raises a number of questions: How do companies assess the profitability of new markets? Where and when should a firm enter new markets? What if a region's ride-sharing demand is sufficient to support only one company? What measures might be taken by incumbent taxi companies to erect entry barriers to stop ride-sharing firms from entering? Can taxi companies and ride-share drivers coexist and survive?

Building a New Bridge

As chief city planner of a rapidly growing Sun Belt city, you face the single biggest decision of your tenure: whether to recommend the construction of a new harbor bridge to connect downtown with the surrounding suburbs located on a northern peninsula. Currently, suburban residents commute to the city via a ferry or by driving a long-distance circular route. Preliminary studies have shown that there is considerable need and demand for the bridge. Indeed, the bridge is expected to spur economic activity in the region as a whole. The projected cost of the bridge is $75 million to $100 million. Toll charges on commuting automobiles and particularly on trucks could be instituted to recoup a portion of the bridge's costs. But, if bridge use falls short of projections, the city will be saddled with a very expensive white elephant. What would you recommend?

A Regulatory Problem

Environmental regulations have a significant effect on business decisions and consumer behavior. Charles Schultze, former chairperson of the President's Council of Economic Advisers, describes the myriad problems associated with the regulations causing electric utilities to convert from oil to coal.

> Petroleum imports can be conserved by switching [utilities] from oil-fired to coal-fired generation. But barring other measures, burning high-sulfur Eastern coal substantially increases pollution. Sulfur can be "scrubbed" from coal smoke in the stack, but at a heavy cost, with devices that turn out huge volumes of sulfur wastes that must be disposed of and about whose reliability there is some question. Intermittent control techniques (installing high smoke stacks and turning off burners when meteorological conditions are adverse) can, at a lower cost, reduce local concentrations of sulfur oxides in the air, but cannot cope with the growing problem of sulfates and widespread acid rainfall. Use of low-sulfur Western coal would avoid many of these problems, but this coal is obtained by strip mining. Strip-mine reclamation is possible but substantially hindered in large areas of the West by lack of rainfall. Moreover, in some coal-rich areas the coal beds form the underlying aquifer, and their removal could wreck adjacent farming or ranching economies. Large coal-burning plants might be located in remote areas far from highly populated urban centers in order to minimize the human effects of pollution. But such areas are among the few left that are unspoiled by pollution, and both environmentalists and the residents (relatively few in number compared to those in metropolitan localities but large among the voting populations in the particular states) strongly object to this policy. Fears, realistic or imaginary, about safety and accumulation of radioactive waste have increasingly hampered the nuclear option.[1]

Schultze's points apply directly to today's energy and environmental trade-offs. Actually, he penned this discussion in 1977! Important questions persist. How, when, and where should the government intervene to achieve and balance its energy and environmental objectives? How would one go about quantifying the benefits and costs of a particular program of intervention?

Boeing and Aircraft Design Risks

Boeing and Airbus are the dominant manufacturers of commercial aircraft in the world. The vast majority of commercial airlines fly either Boeing planes, Airbus planes, or a combination of both. In response to the demand by major airlines for a new more fuel-efficient narrow body plane, Boeing began development of the 737 MAX (an advanced version of its popular 737 model) featuring new high efficiency, high power engines, offering 15% greater fuel savings.

Despite the promise of superior economies and moderate price, the 737 MAX proved to have crucial design safety problems. In particular, when maximum power was applied to its engines, the plane's nose rose in the air too high and the plane could stall. To prevent this Boeing installed a software system to automatically push down the nose of the plane. However, this system was poorly designed and could malfunction without warning, forcing pilots to manually override the

[1] C. L. Schultze, *The Public Use of Private Interest* (Washington, DC: The Brookings Institution, 1977), 9–10.

system to restore flight stability. Whether pilots would be able to do so in a matter of 30 seconds represented an enormous risk. In 2018 and 2019, the malfunctioning software caused fatal crashes in Indonesia and Ethiopia. As a result, the United States Federal Aviation Administration grounded the MAX, ordered an investigation, and oversaw Boeing's extensive reengineering of the system. While hoping the MAX will be cleared to fly by late 2020, Boeing has already suffered billions of dollars in payments to airlines and lost profits.

Boeing's experience raises important questions: What types of decisions should companies take to identify, quantify, manage, and hedge against the inevitable risks they face?

An R&D Decision

A five-year-old pharmaceutical company faces a major research and development decision. It already has spent a year of preliminary research toward producing a protein that dissolves blood clots. Such a drug would be of tremendous value in the treatment of heart attacks, some 80 percent of which are caused by clots. The primary method the company has been pursuing relies on conventional, state-of-the-art biochemistry. Continuing this approach will require an estimated $100 million additional investment and should lead to a commercially successful product, although the exact profit is highly uncertain. Two of the company's most brilliant research scientists are aggressively advocating a second R&D approach. This new biogenetic method relies on gene splicing to create a version of the human body's own anticlotting agent and is considerably riskier than the biochemical alternative. It will require a $200 million investment and has only a 20 percent chance of commercial success. However, if the company accomplishes the necessary breakthroughs, the anti-clotting agent will represent its first blockbuster, genetically engineered drug. If successful, the method will entail minimal production costs and generate annual profits two to five times greater than a biochemically based drug would. Which method should the firm choose for its R&D investment?

Wooing David Letterman

In January 1993, David Letterman made it official—he would be leaving *Late Night* on NBC for a new 11:30 P.M. show on CBS beginning in the fall. A tangled web of negotiations preceded the move. In 1992, NBC chose the comedian Jay Leno, instead of Letterman, to succeed Johnny Carson as the host of *The Tonight Show* in an effort to keep its lock on late-night programming. Accordingly, CBS, a nonentity in late-night television, saw its chance to woo David Letterman.

After extensive negotiations, CBS offered Letterman a $14 million salary to do the new show (a $10 million raise over his salary at NBC). In addition, Letterman's own production company would be paid $25 million annually to produce the show. But, NBC was unwilling to surrender Letterman to CBS without a fight. The network entered into secret negotiations with Letterman's representative, Michael Ovitz, exploring the possibility of dumping Leno and giving *The Tonight Show* to Letterman.

One group of NBC executives stood firmly behind Leno. Another group preferred replacing Leno to losing Letterman to CBS. In the end, NBC offered *The Tonight Show* to Letterman—but with the condition that he wait a year until Leno's current contract was up. David Letterman faced the most difficult decision of his life. Should he make up and stay with NBC or take a new path with CBS? In the end, he chose to leave.

The Letterman negotiations raise a number of questions. How well did Michael Ovitz do in squeezing the most out of CBS on behalf of Letterman? In its negotiations, what (if anything) could NBC have done differently to keep its star?

SIX STEPS TO DECISION MAKING

The examples just given represent the breadth of the decisions in managerial economics. Different as they may seem, each decision can be framed and analyzed using a common approach based

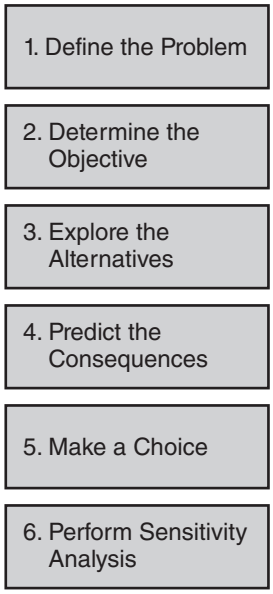


FIGURE 1.1

The Basic Steps in Decision Making

The process of decision making can be broken down into six basic steps.

on six steps, as Figure 1.1 indicates. With the examples as a backdrop, we will briefly outline each step. Later in the text, we will refer to these steps when analyzing managerial decisions.

Step 1: Define the Problem

What is the problem the manager faces? Who is the decision maker? What is the decision setting or context, and how does it influence managerial objectives or options?

Decisions do not occur in a vacuum. Many come about as part of the firm's planning process. Others are prompted by new opportunities or new problems. It is natural to ask, what brought about the need for the decision? What is the decision all about? In each of the examples given earlier, the decision problem is reasonably well defined. In practice, however, managerial decisions do not come so neatly packaged; rather, they are messy and poorly defined. Thus, problem definition is a prerequisite for problem management. In fact, the decision in the fourth example—the conversion of utilities to coal—raises interesting issues concerning problem definition. How narrowly does one define the problem? Is the crux of the problem minimizing pollution from utilities? Presumably, cost is also important. Thus, the problem involves determining how much pollution to clean up, by what means, and at what cost. Or is the problem much broader: reducing US dependence on foreign energy sources? If so, which domestic energy initiatives (besides or instead of utility conversion to coal) should be undertaken?

A key part of problem definition involves identifying the context. The majority of the decisions we study take place in the private sector. Managers representing their respective firms are responsible for the decisions made in five of the examples. By contrast, the third and fourth examples occur in the public sector, where decisions are made at all levels of government: local, state, and national. The recommendation concerning construction of a new bridge is made by a city agency and must be approved by the state government. Similarly, the chain of decisions accompanying the conversion of utilities from oil to coal involves numerous public-sector authorities. As one might imagine, the larger the number of bodies that share policy responsibility and the pursuit of different goals, the greater is the likelihood that decision-making problems and conflicts will occur.

Step 2: Determine the Objective

What is the decision maker's goal? How should the decision maker value outcomes with respect to this goal? What if he or she is pursuing multiple, conflicting objectives?

When it comes to economic decisions, it is a truism that "you can't always get what you want."[2] But to make any progress at all in your choice, you have to know what you want. In most private-sector decisions, **profit** is the principal objective of the firm and the usual barometer of its performance. Thus, among alternative courses of action, the manager will select the one that will maximize the profit of the firm. Attainment of maximum profit worldwide is the natural objective of the multinational carmaker, the drug company, and the management and shareholders of Uber, Lyft, Boeing, Airbus, NBC, and CBS.

The objective in a public-sector decision, whether building a bridge or regulating a utility, is broader than the private-sector profit standard. The government decision maker should weigh all benefits and costs, not solely revenues and expenses. According to this benefit–cost criterion, the bridge in the fourth example may be worth building even if it fails to generate a profit for the government authority. In turn, regulating the production decisions of the utility depends on a careful comparison of benefits (mainly in the form of energy conservation and independence) and costs (in dollar and environmental terms).

In practice, profit maximization and benefit–cost analysis are not always unambiguous guides to decision making. One difficulty is posed by the timing of benefits and costs. Should a firm (the drug company, for example) make an investment (sacrifice profits today) for greater profits 5 or 10 years from now? Are the future benefits to commuters worth the current capital expense of building the bridge? Both private and public investments involve trade-offs between present and future benefits and costs.

Uncertainty poses a second difficulty. In some economic decisions, risks are minimal. For instance, a fast-food chain might know that it can construct a new outlet in 75 days at a cost of $500 per square foot. The cost and timing of construction are not entirely certain, but the margin of error is small enough to be safely ignored. In contrast, the cost and date of completing a mammoth petrochemical plant are highly uncertain (due to unanticipated design changes, cost overruns, schedule delays, government regulations, and the like). At best, the plant owners may be able to estimate a range of cost outcomes and completion dates and assess probabilities for these possible outcomes.

The presence of risk and uncertainty has a direct bearing on the way the decision maker thinks about his or her objective. Both Boeing and the pharmaceutical company seek to maximize company profit, but there is no simple way to apply the profit criterion to determine their best actions and strategies. In designing, building, and launching a new aircraft, Boeing knows that its costs, timetable of delivery, number of aircraft ordered, and final negotiated prices are all highly uncertain. Similarly, the drug company cannot use the simple rule of "Choose the method that will yield the greater profit," because the ultimate profit from either method cannot be pinned down ahead of time. There are no profit guarantees; rather, the drug company faces a choice between two risky research options. Similarly, public programs and regulatory policies generate future benefits and costs that cannot be predicted with certainty.

Step 3: Explore the Alternatives

What are the alternative courses of action? What are the variables under the decision maker's control? What constraints limit the choice of options?

[2]Many readers will recognize this quote as a lyric penned by Mick Jagger of the Rolling Stones. What many may not know is that Jagger briefly attended the London School of Economics before pursuing the path to rock stardom.

After addressing the question, "What do we want?" it is natural to ask, "What are our options?" Given human limitations, decision makers cannot hope to identify and evaluate all possible options. Still, attractive options should not be overlooked or, if discovered, not mistakenly dismissed. Moreover, a sound decision framework should be able to uncover options in the course of the analysis.

In our examples, the main work of problem definition has already been carried out, greatly simplifying the identification of decision options. In the first example, the carmaker is free to set prices at home and abroad. These prices will largely determine the numbers of vehicles the firm can expect to sell in each market. It still remains for the firm to determine a production plan to supply its total projected sales; that is, the firm's other two decision variables are the quantities to produce in each facility. The firm's task is to find optimal values of these four decision variables—values that will generate a maximum level of profit.

In the other examples, the decision maker faces a choice from a relatively small number of alternatives. But even when the choices are limited, there may be more alternatives than first meet the eye. In designing and manufacturing aircraft, Boeing faces a myriad of choices concerning passenger capacity, fuel-efficiency, cabin details and amenities, safety features, and the use of new technologies. How to market and price its various models of aircraft are other crucial decisions. Similarly, the utilities example illustrates the way in which options can multiply. There, the limitations and repercussions of the "obvious" alternatives lead to a wider consideration of other choices, which, unfortunately, have their own side effects.

The drug company might appear to have a simple either/or choice: pursue the biochemical R&D program or proceed with the biogenetic program. But there are other alternatives. For instance, the company could pursue both programs simultaneously. This strategy means investing resources and money in both but allows the firm to commercialize the superior program that emerges from the R&D competition.

Most managerial decisions involve more than a once-and-for-all choice from among a set of options. Typically, the manager faces a sequence of decisions from among alternatives. For instance, in the battle for David Letterman, each side had to formulate its current negotiation stance (in light of how much value it might expect to get out of alternative deals). How aggressive or conciliatory an offer should it make? How much can it expect the other side to concede? Thus, a commonly acknowledged fact about negotiation is that the main purpose of an opening offer is not to have the offer accepted (if it were, the offer probably was far too generous); rather, the offer should direct the course of the offers to follow. To sum up, in view of the myriad uncertainties facing managers, most ongoing decisions should best be viewed as *contingent* plans.

Step 4: Predict the Consequences

What are the consequences of each alternative action? Should conditions change, how would this affect outcomes? If outcomes are uncertain, what is the likelihood of each? Can better information be acquired to predict outcomes?

Depending on the situation, the task of predicting the consequences may be straight-forward or formidable. Sometimes elementary arithmetic suffices. For instance, the simplest profit calculation requires only subtracting costs from revenues. The choice between two safety programs might be made according to which saves the greater number of lives per dollar expended. Here the use of arithmetic division is the key to identifying the preferred alternative.

In more complicated situations, however, the decision maker often must rely on a model to describe how options translate into outcomes. A **model** is a simplified description of a process, relationship, or other phenomenon. By deliberate intent, a model focuses on a few key features of a problem to examine carefully how they work while ignoring other complicating and less important factors. The main purposes of models are to explain and to predict—to account for past outcomes and to forecast future ones.

The kinds of predictive models are as varied as the decision problems to which they are applied. Many models rest on economic relationships. Suppose the multinational carmaker predicts that a 10 percent price cut will increase unit sales by 15 percent in the foreign market. The basis for this prediction is the most fundamental relationship in economics: the demand curve. A firm's decision of when and how to enter a new market depends on predictions of demand and cost and of how its rivals might be expected to respond. These elements may be captured with a model of competitive behavior among oligopolists.

Other models rest on statistical, legal, and scientific relationships. The construction and configuration of the new bridge (and its likely environmental impact) and the plan to convert utilities to coal depend in large part on engineering predictions. Evaluations of test-marketing results rely heavily on statistical models. Legal models, interpretations of statutes, precedents, and the like are pertinent to predictions of a firm's potential patent liability and to the outcome in other legal disputes. Finally, the drug company's assessment of the relative merits of competing R&D methods rests on scientific and biological models.

A key distinction can be drawn between deterministic and probabilistic models. A **deterministic model** is one in which the outcome is certain (or close enough to a sure thing that it can be taken as certain). For instance, a soft-drink manufacturer may wish to predict the numbers of individuals in the 10-to-25 age group over the next five years. There are ample demographic statistics with which to make this prediction. Obviously, the numbers in this age group five years from now will consist of those who today are between ages 5 and 20, minus a predictable small number of deaths. Thus, a simple deterministic model suffices for the prediction. However, the forecast becomes much less certain when it comes to estimating the total consumption of soft drinks by this age group or the market share of a particular product brand. The share of a particular drink will depend on many unpredictable factors, including the advertising, promotion, and price decisions of the firm and its competitors, as well as consumer preferences. As the term suggests, a **probabilistic model** accounts for a range of possible future outcomes, each with a probability attached.

Step 5: Make a Choice

After all the analysis is done, what is the preferred course of action? For obvious reasons, this step (along with step 4) occupies the lion's share of the analysis and discussion in this book. Once the decision maker has put the problem in context, formalized key objectives, and identified available alternatives, how does he or she go about finding a preferred course of action?

In the majority of decisions we take up, the objectives and outcomes are directly quantifiable. Thus, a private firm (such as the carmaker) can compute the profit results of alternative price and output plans. Analogously, a government decision maker may know the computed net benefits (benefits minus costs) of different program options. The decision maker could determine a preferred course of action by **enumeration**, that is, by testing a number of alternatives and selecting the one that best meets the objective. This is fine for decisions involving a small number of choices, but it is impractical for more complex problems. For instance, what if the car company drew up a list of two dozen different pricing and production plans, computed the profits of each, and settled on the best of the lot? How could management be sure this choice is truly the best of all possible plans? What if a more profitable plan, say, the twenty-fifth candidate, was overlooked? Expanding the enumerated list could reduce this risk, but at considerable cost.

Fortunately, the decision maker need not rely on the painstaking method of enumeration to solve such problems. A variety of methods can identify and cut directly to the best, or **optimal**, decision. These methods rely to varying extents on marginal analysis, decision trees, game theory, benefit–cost analysis, and linear programming, all of which we take up later in this book. These

approaches are important not only for computing optimal decisions but also for checking why they are optimal.

Step 6: Perform Sensitivity Analysis

What features of the problem determine the optimal choice of action? How does the optimal decision change if conditions in the problem are altered? Is the choice sensitive to key economic variables about which the decision maker is uncertain?

In tackling and solving a decision problem, it is important to understand and be able to explain to others the "why" of your decision. The solution, after all, did not come out of thin air. It depended on your stated objectives, the way you structured the problem (including the set of options you considered), and your method of predicting outcomes. Thus, **sensitivity analysis** considers how an optimal decision is affected if key economic facts or conditions vary.

Here is a simple example of the use of sensitivity analysis. Senior management of a consumer products firm is conducting a third-year review of one of its new products. Two of the firm's business economists have prepared an extensive report that projects significant profits from the product over the next two years. These profit estimates suggest a clear course of action: Continue marketing the product. As a member of senior management, would you accept this recommendation uncritically? Probably not. After all, you may be well aware that the product has not yet earned a profit in its first two years. (Although it sold reasonably well, it also had high advertising and promotion costs and a low introductory price.) What lies behind the new profit projection? Greater sales, a higher price, or both? A significant cost reduction? The process of tracking down the basic determinants of profit is a key aspect of sensitivity analysis.[3]

Behavioral Economics

These decision steps offer a guide. In actual practice, how well do individuals and business people do in analyzing and making decisions? Much of economic analysis is built on a description of ultra-rational self-interested individuals and profit-maximizing businesses. While this framework does an admirable job of describing many of the decisions occurring in markets and within organizations, we all know that real-world human behavior is much more complicated than this. The ultrarational analyzer and calculator (e.g., Mr. Spock of *Star Trek*) is an extreme type, a caricature.

Over the last 25 years, research in behavioral economics has shown that beyond economic motives, human actions and decisions are shaped by psychological factors, cognitive constraints, and altruistic and cooperative motives.[4] For instance, credit card use encourages extra spending because it is psychologically less painful to pay on credit than to part with cold cash. Many of us, whether age 25 or 55, lack the foresight, self-control, and financial acumen to plan for and save enough for retirement. And not all our actions are governed by dollars and cents. I'm happy to snow-blow the driveway of the elderly widow next door (because it is the right thing to do), and she is happy to look after my kids in a pinch. Neighbors help neighbors; altruism and reciprocity are the norm alongside everyday monetary transactions.

Twin lessons emerge from behavioral economics. On the one hand, personal and business decisions are frequently marked by biases, mistakes, and pitfalls. We're not as smart or as efficient as we think we are. On the other, decision makers can gain from their experience, learn from their mistakes, benefit from thoughtful analysis—all of which make for better decision making.

[3]Sensitivity analysis is also invaluable in testing the effects of uncertainty. Management should recognize that the revenue and cost projections of its consumer product are highly uncertain. Accordingly, it should investigate the profit effects if outcomes differ from the report's forecasts. What if sales are 12 percent lower than expected? What if projected cost reductions are not realized? What if the price of a competing product is slashed? By answering these what-if questions, management can determine the degree to which its profit projections are sensitive to the uncertain outcomes of key economic variables.

[4]For a discussion of behavioral economics, see D. Kahneman, "Maps of Bounded Rationality: Psychology for Behavioral Economics," *The American Economic Review* (September 2003): pp. 1449–1475; and D. Brooks, "The Nudge Debate," *The New York Times*, August 9, 2013, p. A19.

PRIVATE AND PUBLIC DECISIONS: AN ECONOMIC VIEW

Our approach to managerial economics is based on a model of the firm: how firms behave and what objectives they pursue. The main tenet of this model, or **theory of the firm**, is that management strives to maximize the firm's profits. This objective is unambiguous for decisions involving predictable revenues and costs occurring during the same period of time. However, a more precise profit criterion is needed when a firm's revenues and costs are uncertain and accrue at different times in the future. The most general theory of the firm states that

> Management's primary goal is to maximize the value of the firm.

Here, the firm's value is defined as the present value of its expected future profits. Thus, in making any decision, the manager must attempt to predict its impact on future profit flows and determine whether, indeed, it will add to the value of the firm.

Business Behavior: Maximizing Value

Value maximization is a compelling *prescription* concerning how managerial decisions *should* be made. Although this tenet is a useful norm in describing actual managerial behavior, it is not a perfect yardstick. After all, large-scale firms consist of many levels of authority and myriad decision makers. Even if value maximization is the ultimate corporate goal, actual decision making within this complex organization may look quite different. There are several reasons for this:

1. Managers may have individual incentives (such as job security, career advancement, increasing a division's budget, resources, power) that are at odds with value maximization of the total firm. For instance, it sometimes is claimed that company executives are apt to focus on short-term value maximization (increasing next year's earnings) at the expense of long-run firm value.
2. Managers may lack the information (or fail to carry out the analysis) necessary for value-maximizing decisions.
3. Managers may formulate but fail to implement optimal decisions.

Although value maximization is the standard assumption in managerial economics, three other decision models should be noted. The model of **satisficing** behavior posits that the typical firm strives for a satisfactory level of performance rather than attempting to maximize its objective. Thus, a firm might aspire to a level of annual profit, say $40 million, and be satisfied with policies that achieve this benchmark. More generally, the firm may seek to achieve acceptable levels of performance with respect to multiple objectives (profitability being only one such objective).

A second behavioral model posits that the firm attempts to **maximize total sales** subject to achieving an acceptable level of profit. Total dollar sales are a visible benchmark of managerial success. For instance, the business press puts particular emphasis on the firm's sales revenue and market share.[5] In addition, a variety of studies show a close link between executive compensation and company sales. Thus, top management's self-interest sometimes lies as much in sales maximization as in value maximization.

A third issue centers on **Corporate Social Responsibility**. In modern capitalist economies, business firms contribute significantly to economic welfare. Within free markets, firms compete

[5]Business analysts sometimes claim that raising the firm's current market share is the best prescription for increasing long-run profitability. In particular circumstances (for instance, when learning-curve effects are important), share increases may indeed promote profitability. But this does not mean that the firm's ultimate objective is gaining market share. Rather, gaining market share remains a means toward the firm's ultimate end: maximum value.

to supply the goods and services that consumers demand. Pursuing the profit motive, they constantly strive to produce goods of higher quality at lower costs. By investing in research and development and pursuing technological innovation, they endeavor to create new and improved goods and services. In the large majority of cases, the economic actions of firms (spurred by the profit motive) promote social welfare as well: business production contributes to economic growth, provides widespread employment, and raises standards of living.

The objective of value maximization implies that management's primary responsibility is to the firm's shareholders. But the firm has other stakeholders as well: its customers, its workers, even the local community to which it might pay taxes. This observation raises an important question: To what extent might management decisions be influenced by the likely effects of its actions on these parties? For instance, suppose management believes that downsizing its workforce is necessary to increase profitability. Should it uncompromisingly pursue maximum profits even if this significantly increases unemployment? Alternatively, suppose that because of weakened international competition, the firm has the opportunity to profit by significantly raising prices. Should it do so? Finally, suppose that the firm could dramatically cut its production costs with the side effect of generating a modest amount of pollution. How should it weigh such adverse environmental side effects?

All of these examples suggest potential trade-offs between value maximization and other possible objectives and social values. Thus, there are circumstances in which business leaders choose to pursue other objectives at the expense of some forgone profits. For instance, management might decide that retaining 100 jobs at a regional factory is worth a modest reduction in profit.

In 2019, the Business Roundtable, whose 188 members comprise the CEOs of the largest US corporations, overwhelmingly agreed to change its statement of corporate purpose to recognize its responsibilities to all stakeholders—not only shareholders. According to the statement, corporations should deliver value to customers, deal fairly with its workers and strive to support the communities where they operate—in addition to maximizing long-term shareholder value. Indeed, in many instances, CSR success can increase shareholder value. For example, higher wages or better working conditions can enhance worker productivity. Or a strong environmental record might well serve as a positive advertisement for the firm's brand. Clearly, top management should seek out and grasp these positive opportunities. In other situations, management will have to decide when and how to trade off corporate profits versus CSR goals.

To sum up, value maximization is not the only model of managerial behavior. Nonetheless, the available evidence suggests that it offers the best description of a private firm's ultimate objectives and actions.

Lower Drug Prices in Africa

Over the last decade, in response to growing international outcries, major American and European pharmaceutical companies have dramatically reduced the prices of AIDS drugs in Africa. Drug companies such as Abbott Laboratories, Bristol-Myers Squibb Co., GlaxoSmithKline PLC, and Merck & Co. have variously pledged to cut prices by 50 percent or more, sell the drugs at or below cost, or in some cases even supply the drugs for free.[6] In 2005, Glaxo offered its powerful cocktail of AIDS drugs at a price of $1,300 per year in Africa (whereas the price was greater than $11,000 in the United States). Since then, there have been further rounds of price cuts.

The problem of health and disease in the developing world presents a stark conflict between the private profit motive and social welfare. The outbreak of disease in sub-Saharan Africa is considered to be the world's number one health problem. Some 30 million African inhabitants are

[6]This account is based on many published reports including, G. Harris, "Maker of Costly Hepatitis C Drug Sovaldi Strikes Deal on Generics for Poor Countries," *The New York Times*, September 16, 2014, p. B1; G. Harris and K. Thomas, "Low-Cost Drugs in Poor Nations Get a Lift in Indian Court," *The New York Times,* April 2, 2013, p. A1; J. Whelan, "Glaxo Cuts Price of HIV Drugs for World's Poorest Countries," *The Wall Street Journal*, February 20, 2008, p. D7; "A Gathering Storm," *The Economist*, June 9, 2007, p. 71.

infected with HIV, the virus that causes AIDS. Millions of others suffer from a host of tropical diseases including malaria, river blindness, and sleeping sickness. Over the last decade, such groups as the World Health Organization, Doctors without Borders, and national governments of developing countries have argued for low drug prices and abundant drug supplies to deliver the greatest possible health benefits. However, global pharmaceutical companies have little profit incentive to invest in drugs for tropical diseases since those afflicted are too poor to pay for the drugs. Given the enormous R&D costs (not to mention marketing costs) of commercializing new drugs, multinational companies maximize their profits by selling drugs at high prices to high-income nations.

What accounts for the dramatic change in the drug companies' position since the turn of the millennium? Pharmaceutical executives professed their willingness to cut prices and therefore sacrifice profit only after being convinced of the magnitude of Africa's health problem. In addition, the "voluntary" cuts in drug prices were spurred by two other factors. First was the competitive threat of two Indian companies that already were promoting and selling generic (copycat) versions of a host of AIDS drugs and other drugs in Africa. Second, several national governments, notably South Africa, Thailand, and Brazil, have threatened to revoke or ignore drug patents. (From the 1970s to the present, the Indian government has refused to acknowledge international drug patents.) In return for the companies' price concessions, the World Health Organization has reaffirmed the validity of the companies' patents. The major multinational drug companies seem willing to make targeted price cuts (they are unwilling to cut prices for the poor in industrial economies) in return for patent assurances.

The ultimate solution for the health crisis in developing nations will require additional initiatives such as (1) resources for more doctors and hospitals as well as for disease prevention and drug distribution, (2) improved economic conditions, education, and in many regions the end of civil war, and (3) monetary aid from world health organizations and foreign governments.

Public Decisions

In government decisions, the question of objectives is much broader than simply an assessment of profit. The purpose of public decisions is to promote the welfare of society, where the term *society* is meant to include all the people whose interests are affected when a particular decision is made. However, difficulties arise because inevitably some groups will gain and others will lose from any public decision. In our earlier example of the bridge, businesses and commuters in the region can expect to gain, but nearby neighbors who suffer extra traffic, noise, and exhaust emissions will lose. The program to convert utilities from oil to coal will benefit the nation by reducing our dependence on foreign oil. However, it will increase many utilities' costs of producing electricity, which will mean higher electric bills for many residents. The accompanying air pollution will bring adverse health and aesthetic effects in urban areas. Strip mining has its own economic costs and environmental risks, as does nuclear power. In short, any significant government program will bring a variety of new benefits and costs to different affected groups.

The important question is: How do we weigh these benefits and costs to make a decision that is best for society as a whole? One answer is provided by benefit–cost analysis, the principal analytical framework used in guiding public decisions. **Benefit–cost analysis** begins with the systematic enumeration of all of the potential benefits and costs of a particular public decision. It goes on to measure or estimate the dollar magnitudes of these benefits and costs. Finally, it follows the decision rule: Undertake the project or program if and only if its total benefits exceed its total costs. Benefit-cost analysis is similar to the profit calculation of the private firm with one key difference: Whereas the firm considers only the revenue it accrues and the cost it incurs, public decisions account for all benefits—whether or not recipients pay for them (i.e., regardless of whether revenue is generated)—and all costs (direct and indirect).

THINGS TO COME

Figure 1.2 presents a schematic diagram of the topics and decision settings to come. As the figure indicates, the central focus of managerial economics is the private firm and how it should go about maximizing its profit. Chapters 2 and 3 begin the analysis by presenting a basic model of the firm and considering the case of profit maximization *under certainty*— that is, under the assumption that revenues and costs can be predicted perfectly. Specifically, the chapters show how the firm can apply the logic of marginal analysis to determine optimal outputs and prices. Chapters 3 and 4 present an in-depth study of demand analysis and forecasting. Chapters 5 and 6 present analogous treatments of production and cost. Chapter 12 turns its attention to the operations and decisions of not-for-profit firms (in close parallel to the analysis of for-profit firms in Chapter 2). The firm's resource allocations using linear programming are deferred to Chapter 17.

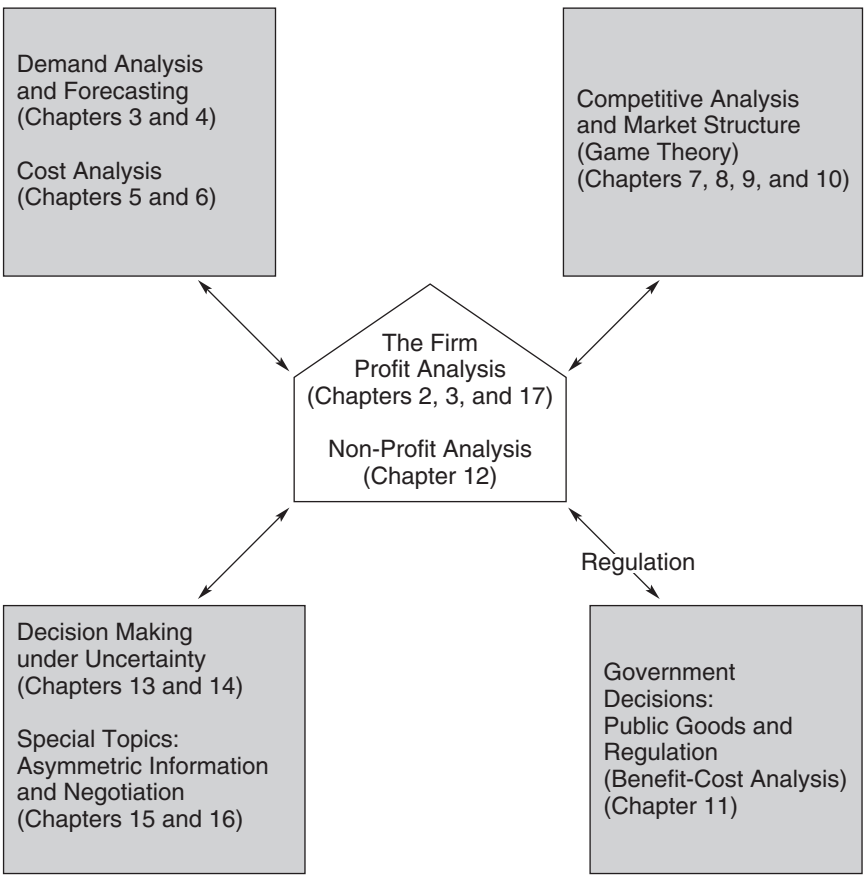
Chapters 7 through 10 focus on market structure and competitive analysis and constitute the second major section of the text. This discussion stresses a key point: The firm does not maximize profit in a vacuum; rather, the market environment it inhabits has a profound influence on its output, pricing, and profitability. Chapters 7 and 8 present overviews of perfect competition and pure monopoly, while Chapter 9 examines the case of oligopoly and provides a rich treatment of competitive strategy. Chapter 10 applies the discipline of game theory to analyze strategic behavior.

Chapter 11 considers the regulation of private markets and government provision of goods and services. These topics are particularly important in light of the divergent views of government

FIGURE 1.2

Topics in Managerial Economics

This flow chart shows the relationship among the main topics in managerial economics: decisions of the firm, market structure, decisions under uncertainty, and government decisions.



held by the person on the street. Some see government as the essential engine to promote social welfare and to check private greed. Others call for "less" government, insisting that "for every action, there is an equal and opposite government regulation." Our discussion focuses on the discipline of benefit-cost analysis to help evaluate how well government programs and regulations function.

Chapters 13 and 14 extend the core study of management decisions by incorporating risk and uncertainty. Managerial success increasingly depends on taking calculated risks. Managers must strive to envision the future outcomes of today's decisions, measure and weigh competing risks, and determine which risks are acceptable. Chapter 13 shows how decision trees can be used to structure decisions in high-risk environments. Chapter 14 examines the value of acquiring information about relevant risks prior to making important decisions. Chapters 15 and 16 present thorough analyses of three topics that are on the cutting edge of managerial economics and are of increasing importance to managers: asymmetric information, organizational design, and negotiation.

SUMMARY

Decision-Making Principles

1. Decision making lies at the heart of most important problems managers face. Managerial economics applies the principles of economics to analyze business and government decisions.
2. The prescription for sound managerial decisions involves six steps: (1) Define the problem; (2) determine the objective; (3) explore the alternatives; (4) predict the consequences; (5) make a choice; and (6) perform sensitivity analysis. This framework is flexible. The degree to which a decision is analyzed is itself a choice to be made by the manager.
3. Experience, judgment, common sense, intuition, and rules of thumb all make potential contributions to the decision-making process. However, none of these can take the place of a sound analysis.

Nuts and Bolts

1. In the private sector, the principal objective is maximizing the value of the firm. The firm's value is the present value of its expected future profits. In the public sector, government programs and projects are evaluated on the basis of net social benefit, the difference between total benefits and costs of all kinds. According to the criterion of benefit–cost analysis, a public program should be undertaken if and only if its total dollar benefits exceed its total dollar costs.
2. Models offer simplified descriptions of a process or relationship. Models are essential for explaining past phenomena and for generating forecasts of the future. Deterministic models take the predicted outcome as certain. Probabilistic models identify a range of possible outcomes with probabilities attached.
3. Besides maximizing the value of the firm, other management goals sometimes include maximizing sales or taking actions in the interests of stakeholders (its workers, customers, neighbors).
4. Sensitivity analysis considers how an optimal decision would change if key economic facts or conditions are altered.

QUESTIONS AND PROBLEMS

1. What is managerial economics? What role does it play in shaping business decisions?
2. Management sometimes is described as the art and science of making decisions with too little information. What kinds of additional information would a manager want in the seven examples cited in the chapter?

3. Suppose a soft-drink firm is grappling with the decision about whether to market a new carbonated beverage with 25 percent real fruit juice. How might it use the six decision steps to guide its course of action?

4. Listed here are several examples of bad, or at least questionable, decisions. Evaluate the decision maker's approach or logic. In which of the six decision steps might the decision maker have gone wrong?

   a. Mr. and Mrs. A recently bought a house, the very first one they viewed.

   b. Firm B has invested five years and $6 million in developing a new product. Even now, it is not clear whether the product can compete profitably in the market. Nonetheless, top management decides to commercialize it so that the development cost will not be wasted.

   c. You are traveling on a highway with two traffic lanes in each direction. Usually traffic flows smoothly, but tonight traffic moving in your direction is backed up for half a mile. After crawling for 15 minutes, you reach the source of the tie-up: a mattress is lying on the road, blocking one lane. Like other motorists before you, you shrug and drive on.

   d. The sedative thalidomide was withdrawn from drug markets in 1962 only after it was found to be the cause of over 10,000 birth defects worldwide, many of which resulted in death. (An exception was the United States, where the use of thalidomide was severely restricted.)

   e. A couple, nervous about boarding their airline flight on time, patiently wait together in one of three baggage check-in lines.

   f. While devoting himself to successfully leading his company, the CEO's marriage broke up.

   g. Each year, State F allocates $400,000 to provide special ambulance service for heart attack victims and $1,200,000 for improvements in highway safety (better lighting, grading, and the like). The former program saves an estimated 20 lives per year; the latter saves 40 lives. Recently, the ambulance budget was cut by 40 percent, and the highway safety budget increased by 10 percent.

   h. In August 2001, the Federal Emergency Management Agency judged the two likeliest natural catastrophes to be a massive earthquake in San Francisco and a hurricane in New Orleans causing its levees to be breached. In August 2005, Hurricane Katrina struck New Orleans, flooding the city and causing an estimated $125 billion in economic damage.

   i. "After 9/11, to do nothing would constitute an abject surrender to terrorism. On the other hand, the United States cannot fight multiple wars against terrorist factions everywhere in the world. The only sane alternative, then, is to identify and stop terrorists from operating in the United States, even if this means sacrificing certain civil liberties."

   j. Mr. G is debating how to spend his summer vacation. Should he spend a quiet week at home, go to the beach, or go to the mountains, where his parents and several other relatives live? Unable to make up his mind, he decides to list the pros and cons of each option. The points he cares about are (1) relaxation and quiet, (2) some exercise, and (3) seeing family and old friends. With respect to these points, he ranks the alternatives as shown in the table:

	Relaxation	Exercise	Family/Friends
Home	1st	3rd	2nd
Beach	2nd	1st	3rd
Mountains	3rd	2nd	1st

   Now he is ready to compare the options. Which is his better choice: home or beach? Since home ranks higher than beach on two of the three points, he gives it two pros and one con and judges it the better choice. What about home versus mountains? Mountains versus beach?

Discussion Question A town planning board must decide how to deal with the Kendall Elementary School building. Twenty years ago, the Kendall school (one of four in the town) was closed due to falling enrollment. For the last 20 years, the town has rented 60 percent of the building space to a nonprofit organization that offers classes in the creative and performing arts. The group's lease is up, and now the board is mulling other options:

a. Renew the current lease agreement. This will generate a small but steady cash flow and free the town of building maintenance expenses (which under the lease are the tenant's responsibility).

b. Renegotiate the lease and solicit other tenants.

c. Use the building for needed additional town office space. (A minimal conversion would allow reconversion to a school in 5 to 10 years, when the elementary school population is expected to swell.)

d. Sell the building to a private developer, if one can be found.

e. Convert the building to condominiums to be sold by the town.

f. Raze the building and sell the site and all or part of the surrounding playing fields as building lots (from 6 to 12 lots, depending on how much land is sold).

Apply the six decision-making steps presented in the chapter to the town's decision. What objectives might the town pursue in making its decision? What additional information would the planning board need in carrying out the various steps? What kind of analysis might the board undertake?

SUGGESTED REFERENCES

A number of valuable references chart different approaches to analyzing and making decisions.

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