

Preface	xiii	<b>What Went Right/What Went Wrong</b>	
		Long-Term Capital Management (LTCM)	43
		The Relationship Between Risk and Return	46
		Risk and Decision Analysis	47
		Managing Risk	58
		Summary	63
		Exercises	64
		Case Exercise: The Toro Company and the Probability of Snow	67
<b>PART I</b>		<b>PART II</b>	
<b>Introduction</b>	<b>1</b>	<b>Demand and Forecasting</b>	<b>69</b>
<b>CHAPTER 1</b>		<b>CHAPTER 3</b>	
<b>Introduction and Goals of the Firm</b>	<b>2</b>	<b>Demand Analysis</b>	<b>70</b>
Chapter Preview	2	Chapter Preview	70
<b>Managerial Challenge</b>		<b>Managerial Challenge</b>	
Executive Performance Bonus Plan: Salomon Smith Barney	3	Health-Care Reform and Cigarette Taxes	71
What Is Managerial Economics?	4	Demand Relationships: The Demand Schedule and the Demand Curve	72
Managerial Economics and Economic Theory	5	Demand Relationships: The Demand Function	75
The Decision-Making Model	5	Price Elasticity of Demand	81
The Role of Profits	6	<b>International Perspectives</b>	
Objective of the Firm	9	Free Trade and the Price Elasticity of Demand: Nestle'	97
Alternative Objectives of the Firm	14	Income Elasticity of Demand	97
Implications of Shareholder Wealth Maximization	18	Cross Elasticity of Demand	99
<b>What Went Right/What Went Wrong</b>	<b>19</b>	Other Demand Elasticity Measures	103
Saturn Corporation		Combined Effect of Demand Elasticities	104
Goals in the Public Sector and the Not-for-Profit Enterprise	23	Summary	105
<b>International Perspectives</b>		Exercises	106
Managing in a Global Competitive Economy	25	Case Exercise: Golf Shirt Pricing	113
Summary	26		
Exercises	27	<b>APPENDIX 3A</b>	
Case Exercise: Reducing Greenhouse Gases	28	<b>Indifference Curve Analysis</b>	
Case Exercise: Reforming the Former Soviet Economy	28	of Demand	115
<b>CHAPTER 2</b>		<b>Managerial Challenge</b>	
<b>Fundamental Economic Concepts</b>	<b>30</b>	New Product Pricing at Motorola	115
Chapter Preview	30		
<b>Managerial Challenge</b>			
Revenue Management at Delta Airlines	31		
Marginal Analysis	32		
The Net Present Value Concept	35		
Meaning and Measurement of Risk	39		

Indifference Curves	115
Budget Lines	117
Graphical Determination of the Optimal Combination	118
Graphical Derivation of the Demand Function	119
Income and Substitution Effects	121
Algebraic Determination of the Optimal Combination	122
Exercise	124

## CHAPTER 4

<b>Estimation of Demand</b>	<b>125</b>
Chapter Preview	125
<b>Managerial Challenge</b>	
Demand for Public Transportation	<b>126</b>
Demand Estimation Using Marketing Research Techniques	126
Statistical Estimation of the Demand Function	129
Simple Linear Regression Model	134
Multiple Linear Regression Model	146
Problems in Applying the Linear Regression Model	149
Summary	160
Exercises	162
Case Exercise: Demand Estimation	172
Case Exercise: Soft Drinks	174

## APPENDIX 4A

<b>Nonlinear Regression Models</b>	<b>176</b>
Introduction	176
Semilogarithmic Transformation	176
Double-Log Transformation	177
Reciprocal Transformation	177
Polynomial Transformation	178
Exercises	178

## CHAPTER 5

<b>Business and Economic Forecasting</b>	<b>181</b>
Chapter Preview	181
<b>Managerial Challenge</b>	
What Went Wrong? Demand for Sport Utility Vehicles at Ford Motor Co.	<b>182</b>
Significance of Forecasting	183
Selection of a Forecasting Technique	184
Deterministic Time-Series Analysis	186
Smoothing Techniques	194

Barometric Techniques	199
Survey and Opinion-Polling Techniques	204
Econometric Models	206
Forecasting with Input-Output Tables	215
<b>International Perspectives</b>	
Long-Term Sales Forecasting by General Motors in Overseas Markets	<b>216</b>
Summary	216
Exercises	217
Case Exercise: South Pole Ice Cream Company	224
Case Exercise: Bush Recession Forecast	225
Case Exercise: Lumber Price Forecast	226

## CHAPTER 6

<b>Exchange Rates and International Trade: Managing Exports</b>	<b>227</b>
Chapter Preview	227
<b>Managerial Challenge</b>	
Export Market Pricing at Toyota	<b>228</b>
Import-Export Sales and Exchange Rates	228
<b>International Perspectives</b>	
Collapse of Export and Domestic Sales at Cummins Engine	<b>230</b>
The Market for U.S. Dollars As Foreign Exchange	231
Foreign Exchange Risk Management	234
<b>International Perspectives</b>	
Honda Buys U.S. Assembly Capacity	<b>235</b>
Determinants of Long-Run Trends in Exchange Rates	237
Purchasing Power Parity	242
International Trade: A Managerial Perspective	247
Trade Deficits and the Balance of Payments	260
Summary	265
Exercises	267
Case Exercise: The Value of the U.S. Dollar, 1998 and the Euro, 2000	267

## PART III

<b>Production and Cost</b>	<b>269</b>
----------------------------	------------

## CHAPTER 7

<b>Production Economics</b>	<b>270</b>
Chapter Preview	270

**Managerial Challenge**

What Went Wrong at Large-Scale Electricity Generating Plants?	271
Production Defined	271
The Production Function	272
Production Functions with One Variable Input	275
Determining the Optimal Use of the Variable Input	283
Production Functions with Two Variable Inputs	285
Determining the Optimal Combination of Inputs	289
Determining the Cost-Minimizing Production Process	293
<b>What Went Right/What Went Wrong</b>	
How Exactly Has Computerization and Information Technology Lowered Costs at Chevron and Merck?	295
Returns to Scale	298
Statistical Estimation of Production Functions	302
Summary	309
Exercises	310
Case Exercise: Production Function: Wilson Company	315

**APPENDIX 7A**

<b>Maximization of Production Output Subject to a Cost Constraint</b>	<b>317</b>
Exercise	318

**APPENDIX 7B**

<b>Production and Linear Programming</b>	<b>319</b>
Algebraic Formulation of the Output-Maximization Problem	319
Graphical Representation and Solution of the Output-Maximization Problem	320
Profit-Maximization Problem	323
Exercise	324

**CHAPTER 8**

<b>Cost Analysis</b>	<b>325</b>
Chapter Preview	325
<b>Managerial Challenge</b>	
US Airways' Cost Structure	326
The Meaning and Measurement of Cost	327
Short-Run Cost Functions	331
Long-Run Cost Functions	338
Economies and Diseconomies of Scale	341

**International Perspectives**

How Japanese Companies Deal with the Problems of Size	346
Summary	348
Exercises	348
Case Exercise: Cost Analysis	354

**APPENDIX 8A**

<b>The Cobb-Douglas Production Function and the Long-Run Cost Function</b>	<b>356</b>
The Cobb-Douglas Production Function	356
Exercises	357

**CHAPTER 9**

<b>Applications of Cost Theory</b>	<b>359</b>
Chapter Preview	359
<b>Managerial Challenge</b>	
Product Costing and CAM-I	360
Estimation of Cost Functions	361
Short-Run Cost Functions	361
<b>What Went Right/What Went Wrong</b>	
Boeing: Rising Marginal Cost of 747s	366
Long-Run Cost Functions	369
<b>International Perspectives</b>	
Economies of Scale and International Joint Ventures in Chipmaking	376
Break-even Analysis, Contribution Analysis, and Operating Leverage	377
Linear Break-Even Analysis	379
Summary	389
Exercises	389
Case Exercise: Cost Functions	392
Case Exercise: Charter Airline Operating Decisions	394

**APPENDIX 9A**

<b>The Learning Curve</b>	<b>396</b>
Learning Curve Relationship	396
Estimating the Learning Curve Parameters	398
The Percentage of Learning	399
Exercise	399

## PART IV

## Pricing and Output Decisions: Strategy and Tactics 401

## CHAPTER 10

### Prices, Output, and Strategy: Pure and Monopolistic Competition 402

Chapter Preview 402

**Managerial Challenge**

Resurrecting Apple Computer? 403

The Relevant Market Concept 404

Porter's Five Forces Strategic Framework 404

A Continuum of Market Structures 413

Price-Output Determination Under Atomistic  
(Pure) Competition 417

Monopolistic Competition 422

**What Went Right/What Went Wrong**

The Dynamics of Competition at Amazon.com 423

Selling and Promotional Expenses 426

Summary 430

Exercises 431

Case Exercise: Apple Computer 437

## CHAPTER 11

### Competitive Markets under Asymmetric Information 438

Chapter Preview 438

**Managerial Challenge**

Debugging Computer Software: Intel 439

Asymmetric Information Exchange 439

Asymmetric Information in a "Lemons Market" 441

Solutions to the Adverse Selection Problem 444

Contractual Approaches to Asymmetric  
Information Exchange 449

Cost Revelation in Joint Ventures and Partnerships 451

**International Perspectives**Joint Venture in Memory Chips: IBM, Siemens,  
and Toshiba 454

An Optimal Incentives Contract 454

**International Perspectives**

Joint Ventures in Appliances: Maytag and Whirlpool 456

The Principal-Agent Problem in Managerial  
Labor Markets 456Screening and Sorting Managerial Talent with  
Optimal Incentives Contracts 461

Summary 464

Exercises 465

Case Exercise: Designing a Managerial  
Incentive Contract 466

## CHAPTER 12

### Price and Output Determination: Monopoly and Dominant Firms 467

Chapter Preview 467

**Managerial Challenge**Dominant Microprocessor Company Lagging  
Behind Next Trend 468

Monopoly Defined 469

Sources of Market Power for a Monopolist 469

Price and Output Determination for a Monopolist 472

Optimal Mark-Up, Contribution Margin, and the  
Gross Profit Margin Percentage 476

Regulated Monopolies 482

The Economic Rationale for Regulation 483

**What Went Right/What Went Wrong**What Went Wrong at Public Service Company  
of New Mexico? 484

The Regulatory Process 487

Special Issues in Utility Regulation 489

Summary 492

Exercises 494

Case Exercise: A Market Solution to Crowded Airspace 497

## CHAPTER 13

### Price and Output Determination: Oligopoly 499

Chapter Preview 499

**Managerial Challenge**

American Airlines Restructures Its Fares 500

Oligopolistic Market Structures 501

Interdependencies in Oligopolistic Industries 503

Ignoring Interdependencies 504

Cartels and Other Forms of Collusion 505

**International Perspectives**

The International Oil Producers' Cartel (OPEC) 515

Price Leadership 517

The Kinked Demand Curve Model 521

Avoiding Price Wars 523

**What Went Right/What Went Wrong**

Good-Better-Best Product Strategy at Kodak 525

<b>What Went Right/What Went Wrong</b>		<b>What Went Right/What Went Wrong</b>	
What Went Right at Interlink Surgical Steel?	526	Motorola: What They Didn't Know Hurt Them	606
Oligopolistic Rivalry and Game Theory	528	The Concept of An Optimal Mechanism Design	607
Summary	534	Auction Design and Information Economics	610
Exercises	535	Summary	622
		Exercises	624
		Library Exercise: Vertical Integration at GM-Fisher Body	625
		Case Exercise: Spectrum Auction	625
<b>CHAPTER 14</b>		<b>CHAPTER 16</b>	
<b>Game-Theoretic Rivalry:</b>		<b>Pricing Techniques and Analysis</b>	626
Best-Practice Tactics	539	Chapter Preview	626
Chapter Preview	539	<b>Managerial Challenge</b>	
<b>Managerial Challenge</b>		Pricing of Apple Computers: Market Share	
Price Differentials in Computers	540	versus Profitability	627
Business Strategy Games	540	Conceptual Framework for Proactive	
Business Rivalry as a Sequential Game	546	Value-Based Pricing	627
Entry Deterrence and Accommodation	557	Differential Pricing	628
Simultaneous Games	564	Price Discrimination	630
Escape From Prisoner's Dilemma	568	Mathematics of Price Discrimination	636
Summary	578	Pricing of Multiple Products	641
Exercises	580	Pricing of Joint Products	645
<b>International Perspectives</b>		Transfer Pricing	649
Case Exercise: Reciprocating Protectionism:		<b>International Perspectives</b>	
Boeing v. Airbus	582	Transfer Pricing, Taxes, and Ethics	657
		Pricing in Practice	657
<b>APPENDIX 14A</b>		Other Pricing Strategies	662
<b>Capacity Planning and Pricing Against a</b>		Summary	665
Low-Cost Competitor: A Case Study of		Exercises	666
Piedmont Airlines and People Express	583	Case Exercise: Transfer Pricing	672
Airline Entry Strategy	583		
Large-Scale Accommodation	584	<b>APPENDIX 16A</b>	
Exercises	586	<b>Revenue Management</b>	674
<b>CHAPTER 15</b>		The Concept of Revenue Management	674
<b>Organizational Form, Governance</b>		Revenue Management Decisions	679
and Mechanism Design	587	Summary	687
Chapter Preview	587	Exercises	687
<b>Managerial Challenge</b>		<b>CHAPTER 17</b>	
Fidelity Teams with W. R. Hambrecht & Co.		<b>Government Regulation</b>	688
in Dutch Auction for IPOs	588	Chapter Preview	688
Choice of Organizational Form	590	<b>Managerial Challenge</b>	
<b>What Went Right/What Went Wrong</b>		The Coase Theorem and Government Regulation	689
Controlling the Vertical: Ultimate TV	600	Market Structure, Conduct, and Performance	690
<b>What Went Right/What Went Wrong</b>			
Dell Replaces Vertical Integration with Virtual			
Integration	603		

Antitrust: Government Regulation of Market Conduct and Structure	696
Regulatory Constraints: An Economic Analysis	702
Government Support of Business	708
<b>International Perspectives</b>	
The U.S. Sugar Import Quota	<b>710</b>
Summary	712
Exercises	713
Case Exercise: The Price Fixing on Commissions Charged to Sellers at Auctions	718
Case Exercise: Microsoft Tying Arrangements	718

## APPENDIX 17A

<b>Economic Externalities and Market Failure</b>	<b>719</b>
Externalities	719
Possible Solutions to the Externalities Problem	726
Summary	732
Exercises	732

## PART V

# Long-Term Investment Decisions and Risk Management 737

## CHAPTER 18

<b>Long-Term Investment Analysis</b>	<b>738</b>
Chapter Preview	738
<b>Managerial Challenge</b>	
What Went Right? What Went Wrong? Are Fat Margins About to Plummet at Nokia?	<b>739</b>
The Nature of Capital Expenditure Decisions	740
A Basic Framework for Capital Budgeting	740
The Capital Budgeting Process	742
Estimating the Firm's Cost of Capital	750
Cost-Benefit Analysis	756
Steps in Cost-Benefit Analysis	758
Objectives and Constraints in Cost-Benefit Analysis	760
Analysis and Valuation of Benefits and Costs	761
The Appropriate Rate of Discount	763
Cost-Effectiveness Analysis	765
Summary	767
Exercises	768
Case Exercise: Cost-Benefit Analysis	773

## WEB CHAPTER A

<b>Optimization Techniques</b>	<b>1</b>
Web Chapter Preview	1
<b>Managerial Challenge</b>	
A Skeleton in the Stealth Bomber's Closet	<b>2</b>
Types of Optimization Techniques	2
Differential Calculus	5
Applications of Differential Calculus to Optimization Problems	12
Partial Differentiation and Multivariate Optimization	16
<b>International Perspectives</b>	
Dealing with Import Restraints: Toyota	<b>18</b>
Summary	18
Exercises	19

## WEB CHAPTER A APPENDIX

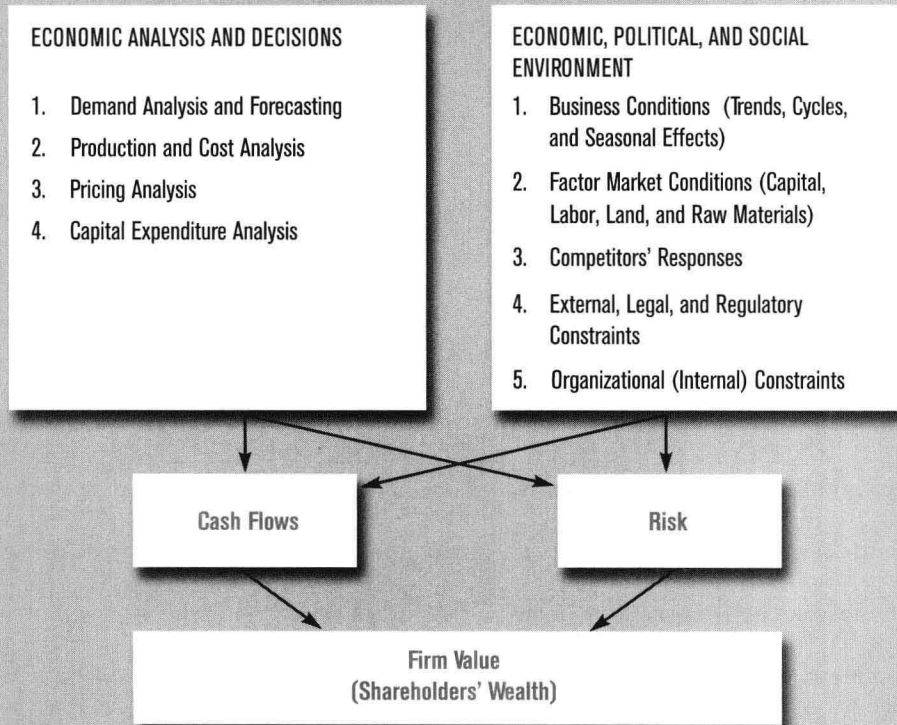
<b>Constrained Optimization and Lagrangian Multiplier Techniques</b>	<b>24</b>
Simple Constrained Optimization	24
Lagrangian Multiplier Techniques	26
Exercises	27

## WEB CHAPTER B

<b>Linear-Programming Applications</b>	<b>1</b>
Web Chapter Preview	1
<b>Managerial Challenge</b>	
Military Airlift Command	<b>2</b>
A Profit-Maximization Problem	2
The Dual Problem and Interpretation of the Dual Variables	10
A Cost-Minimization Problem	12
A New Technique for Solving Large-Scale Linear-Programming Problems	16
Additional Linear-Programming Examples	17
Summary	21
Exercises	21
Appendix A: The Time Value of Money	A-1
Appendix B: Tables	B-1
Check Answers to Selected End-of-Chapter Exercises	C-1
Index	I-1



# PART I Introduction



Part I (Introduction) presents an overview of managerial economics analysis and introduces some key economic concepts and tools. In the first chapter, the goals of the enterprise (both the for-profit firm and the not-for-profit organization) are developed; the decision-making process and the philosophy of optimization are introduced; the role of profit is discussed; and the relationship between managerial economics techniques and accounting, finance, marketing, operations management, and labor relations are highlighted. Chapter 2 reviews fundamental econom-

ic concepts, including marginal analysis, net present value, risk versus return analysis, the measurement of risk, decision analysis, and managing risk. Web Chapter A provides a self-contained introduction to optimization and constrained optimization techniques, including applications of basic calculus. Linear programming applications appear later (in Web Chapter B), following the discussion of production and cost. The tools and concepts developed in Part I are central to the analyses used throughout the balance of the text.

## 1

# Introduction and Goals of the Firm

**CHAPTER PREVIEW** Managerial economics is the application of microeconomic theory and methodology to decision-making problems faced by private, public, and not-for-profit institutions. Managerial economics assists decision makers (managers) in efficiently allocating scarce resources, planning corporate strategy, and executing effective tactics. Economic profit is defined and the role of profits in allocating resources in a free enterprise system

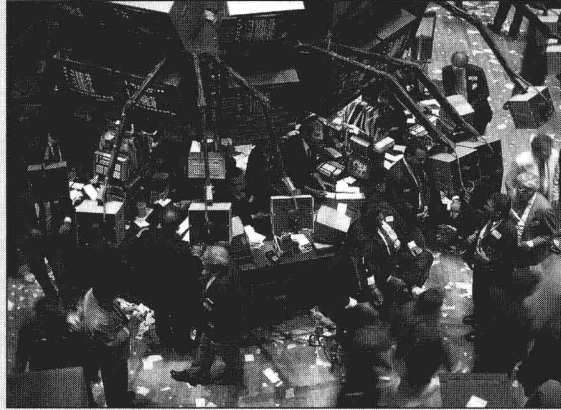
is examined. The primary normative goal of the firm, namely, shareholder wealth maximization, is developed along with a discussion of how managerial decisions influence shareholder wealth. Next, the problems associated with the separation of ownership and control and agency relationships in large corporations are explored. Finally, appropriate normative goals to guide resource-allocation decisions in public sector and not-for-profit enterprises are discussed.



# MANAGERIAL CHALLENGE

## Executive Performance Bonus Plan: Salomon Smith Barney<sup>1</sup>

Separation of ownership (shareholders) and control (management) in large corporations permits managers to pursue goals, such as maximization of their own personal welfare, that are not always in the long-term interests of shareholders. As the result of pressure from large institutional shareholders and recent tax law changes,<sup>2</sup> a growing number of corporations are seeking to forge a closer alliance between the interests of shareholders and managers by structuring compensation plans that have a larger proportion of the manager's compensation in the form of performance-based bonuses.



One such plan, devised by Salomon Brothers, the investment banking predecessor of Salomon Smith Barney, paid the chairman, Deryck C. Maughan, an annual base salary of \$1 million plus an annual performance bonus of up to \$24 million. This bonus was based on Salomon's overall rate of return on equity and its rate of return relative to the firm's five major competitors.<sup>3</sup> The following table shows the possible performance bonuses that the chairman could earn. For example, if Salomon's annual return on equity was 5 percent, and was equal to that of the average rate of return of the five rival investment banking firms

Annual bonus, in millions of dollars							
Salomon Brothers' return on equity versus the average of five competitors	+10	\$1	\$2.5	\$7	\$12	\$17	\$24
	+5	\$0.5	\$2	\$6	\$9	\$12	\$17
	0	\$0	\$1.5	\$5	\$7	\$9	\$12
	-5	\$0	\$1	\$4	\$6	\$8	\$10
	-10	\$0	\$0.5	\$3	\$4	\$5	\$7
		5%	10%	15%	20%	25%	30%
Salomon Brothers' return on equity							

Source: Salomon Brothers Inc. proxy statements, U.S. Security and Exchange Commission

(i.e., 5 percent, 0), then the chairman would earn no performance bonus. On the other hand, the payment of the maximum \$24 million bonus would require the firm to have a very extraordinary year—Salomon's return on equity would have to be 30 percent (or more), and this rate of return would have to be 10 (or more) percentage points above the average of its five major competitors.

The objectives of the firm and how to motivate managers to pursue these objectives are some of the topics discussed in this chapter.

<http://>

You can access financial information as well as the annual report for Salomon Smith Barney on the Internet at [http://www.Smithbarney.com/abt\\_sb/about.html](http://www.Smithbarney.com/abt_sb/about.html).

<sup>1</sup>Michael Siconofli, "Salomon's Chief Stands to Hit the Jackpot," *Wall Street Journal*, 5 May 1994, p. C1.

<sup>2</sup>Changes in the tax laws (1993) bar publicly held corporations from deducting (in computing taxable income) compensation of more than \$1 million for each of its top executives, unless it is based on performance goals approved by shareholders.

<sup>3</sup>These competitors are Merrill Lynch, Morgan Stanley, Bear Sterns, J. P. Morgan, and Bankers Trust.

## WHAT IS MANAGERIAL ECONOMICS?

Managerial economics deals with the application of microeconomic reasoning to real-world decision-making problems faced by private, public, and not-for-profit institutions. The field of managerial economics has experienced rapid growth over the past three decades. This growth reflects a realization that analysts, directors, and senior managers can use economic theory to make decisions consistent with the goals of the organization. Managerial economics extracts from microeconomic theory those concepts and techniques that enable the decision maker to select strategic direction, to allocate efficiently the resources of the organization, and to respond effectively to tactical issues.

The tools of managerial economics can be applied by managers in profit-seeking firms and in the public and not-for-profit sectors of the economy, because managers in all types of enterprises face a common set of problems. Managerial problems generally follow this form:

To identify the alternative means of achieving given objective(s), and then to select the alternative that accomplishes the objective(s) in the most resource efficient manner, taking into account the constraints and the likely actions and reactions of interdependent rival decision makers.

### Example

#### DECISION PROBLEM: TOYOTA MOTORS

Consider Toyota Motors operations in the United States. Toyota faces increasing demand for its U.S.-manufactured vehicles. It has identified two possible strategies (S1 and S2) to meet the growing demand for its products. Strategy S1 represents an internal expansion of capacity. Strategy S2 represents the purchase of a surplus plant now owned by General Motors. The objective of Toyota's managers is to maximize the value today (present value) of expected future returns (profit) from the capacity expansion. This problem can be summarized as follows:

Objective function: Maximize (present value) profit (S1, S2)

In this example, the following decision rule can be created:

Decision rule: Choose strategy S1 if Profit (S1)  $\geq$  Profit (S2)

Choose strategy S2 if Profit (S1) < Profit (S2)

<http://>

Learn more about Toyota's operations by accessing their website at

<http://www.toyota.com/times>

Although this is a simple problem, it illustrates the essential elements of resource-allocation problems. Economic theory can assist a manager in deciding on the appropriate objective function and in clarifying the decision rules.

## MANAGERIAL ECONOMICS AND ECONOMIC THEORY

Economics traditionally is divided into *microeconomics* and *macroeconomics*. Microeconomics deals with the theory of individual choice; that is, decisions made by a particular consuming unit, such as an individual, or a producing unit, such as a business firm. Macroeconomics focuses on the overall economy and general economic equilibrium conditions. Managerial economists draw on both of these branches of economics during the decision-making process. Although a firm's managers can do little to affect the aggregate economy, their decisions should be consistent with the current economic outlook.

The types of decisions made by managers usually involve questions of resource allocation within the organization in both the short and the long run. In the short run, a manager may be interested in estimating demand and cost relationships to make decisions about the price to charge for a product and the quantity of output to produce. The areas of microeconomics dealing with demand theory and with the theory of cost and production are obviously useful in making decisions on such matters. Macroeconomic theory also enters into decision making when a manager attempts to forecast future demand based on forces influencing the overall economy.

In the long run, decisions must be made about expanding or contracting production and distribution facilities, developing and marketing new products, and possibly acquiring other firms. Basically, these decisions require the organization to make capital expenditures; that is, expenditures made in the current period that are expected to yield returns in future periods. Economists have developed a theory of capital budgeting that can be used in deciding whether to undertake specific capital expenditures.

## THE DECISION-MAKING MODEL

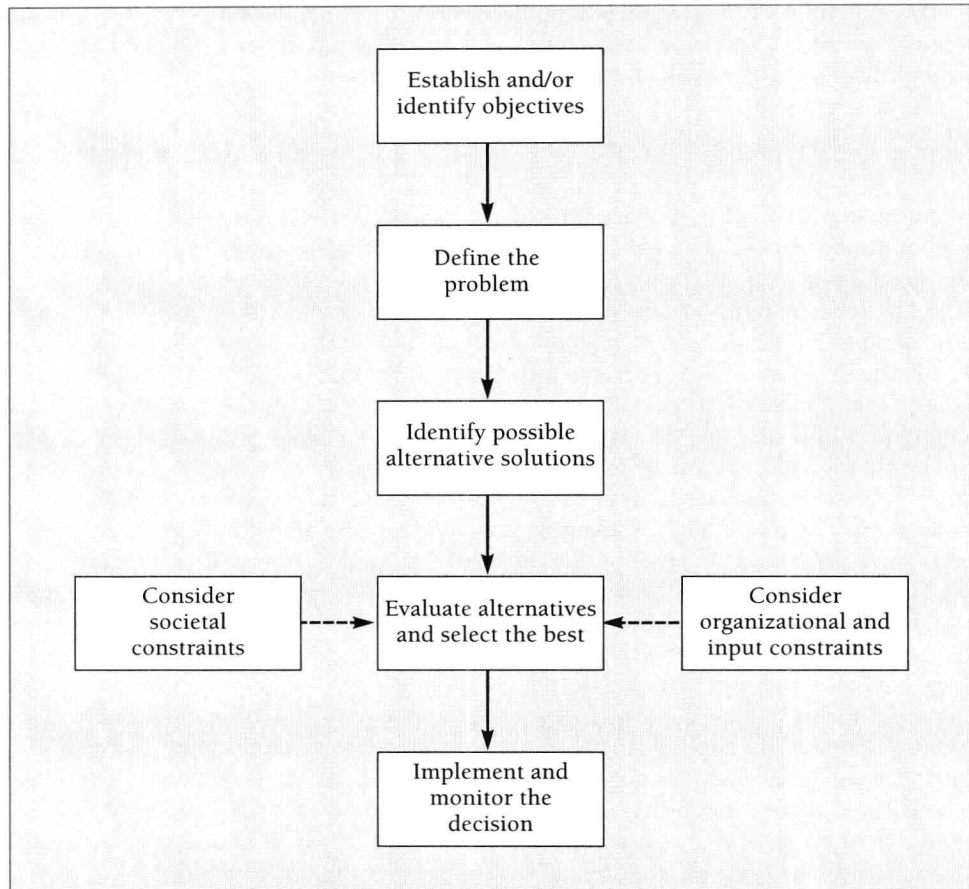
The ability to make good decisions is the key to successful managerial performance. Managers of profit-seeking firms are faced with a wide range of important decisions in the areas of pricing, product choice, cost control, advertising, capital investments, and dividend policy, to name but a few. Managers in the not-for-profit and the public sectors are faced with a similarly wide range of decisions. For example, the dean of your school must decide how to allocate funds among such competing needs as travel, phone services, and secretarial support. Longer-range decisions must be made about new facilities, new programs, the purchase or lease of a new computer, and the decision to establish an executive training center. Public sector managers face such decisions as the need for a "Stealth" bomber, the capacity planning for public transit systems, the enforcement of antitrust laws, the economic viability of passive restraint devices in automobiles, and alternatives to reduce energy consumption.

Decision making in each of these areas shares several common elements. First, the decision maker must establish or identify the objectives of the organization. The failure to identify organizational objectives correctly can result in the complete rejection of an otherwise well-conceived and well-implemented plan. Later sections of this chapter deal with the issue of organizational objectives.

Next, the decision maker must identify the problem requiring a solution. For example, the manager of a brewing plant in Milwaukee may note that the plant's profit margin on

**FIGURE 1.1**

The Decision-Making  
Process



sales has been decreasing. This could be caused by pricing errors, labor force problems, or the use of outdated production equipment. Once the source or sources of the problem are identified, the manager can move to an examination of potential solutions. If the problem is the use of technologically inefficient equipment, two possible solutions are (1) updating and replacing the plant's equipment or (2) building a completely new plant. The choice between these alternatives depends on the relative costs and benefits, as well as other organizational and societal constraints that may make one alternative preferable to another. For example, the decision to build a new brewery in a suburban area may not be politically desirable if it means a major inner-city facility must be closed.

The final step in the process, after all alternatives have been identified and evaluated and the best alternative has been chosen, is the implementation of the decision. This phase often requires constant monitoring to ensure that results are as expected. If they are not, corrective action needs to be taken when possible. This five-step decision-making process is illustrated in Figure 1.1.

#### Economic Profit

The difference between total revenue and total economic cost. Economic cost includes a "normal" rate of return on the capital contributions of the firm's partners.

## THE ROLE OF PROFITS

**Economic profit** is the difference between total revenue and total economic cost. *Total revenue* is measured as the sales receipts of a firm, that is, price times quantity sold. The *economic cost* of any activity may be thought of as the highest valued alternative



opportunity that is foregone. To attract economic resources to some activity, the firm must pay a price for these factors (labor, capital, and natural resources) that is sufficient to convince the owners of these resources to sacrifice other alternatives and commit the resources to this use. Thus, economic costs may be thought of as *opportunity costs*, or the costs of attracting a resource from its next best alternative use. In a general sense, economic profit may be defined as *the difference between total revenue and total economic cost*.

Throughout this text the term *profit* refers to economic profits. Accordingly, the term *cost* includes all economic costs, both explicit and implicit,<sup>4</sup> and includes in it a normal return (profit) for the owners who have contributed their financial resources. When we refer to profit maximization in this book, we mean an objective of maximizing the economic profit of the firm.

### Why Are Profits Necessary?

In a free enterprise system, economic profits play an important role in guiding the decisions made by the thousands of competing, independent economic units. The existence of profits (resulting from the excess of revenues over costs) determines the type and quantity of goods and services that are produced and sold. It also determines the demand for various factors of production—labor, capital, and natural resources. Because of the important role played by profits in our system, we review several theories of profit.

**Risk-Bearing Theory of Profit** Some economists have argued that economic profits above a normal rate of return are necessary to compensate the owners of the firm for the risk they assume when making their investments. Because a firm's shareholders are not entitled to a fixed rate of return on their investment—that is, they are residual claimants to the firm's resources—they need to be compensated for this risk in the form of a higher rate of return.

### Example

#### RISK AND PROFITABILITY: CIRCUS CIRCUS

The relationship between risk and profit levels can be seen in the case of Circus Circus, the Las Vegas hotel and casino operator. During 1994 Circus Circus earned a return on net worth of about 20.5 percent, compared with a mean return on net worth of 12.5 percent for all firms in the hotel/gaming industry and of 15.0 percent for all industrial, retail, and transportation firms followed by *Value Line*. The hotel and gaming industries are subject to substantial swings in profitability over time. Firms operating in these industries also are subject to severe competitive pressures. In addition, Circus Circus is financed with a high proportion of debt (50 percent of total capital), compared with an average of 39 percent for the other firms followed by *Value Line*. Other firms in this industry did not perform as well as Circus Circus during 1994. Mirage Resorts earned 11.5 percent on net worth, Hilton earned 10.5 percent, and Bally earned 2.5 percent. Firms that operate in a high-risk industry such as this one require the incentive of high potential profits to attract capital. The high returns of Circus Circus came with high risk however. By 1996, the return to net worth fell by half to 10.2%, then to 7.4% in 1998. Finally in 2000, profitability returned to the 12.0% hotel and casino average.

http://

The website for Circus Enterprises is

<http://www.circuscircus.com>

<sup>4</sup>The concepts of economic costs and profits are discussed in more detail in Chapter 8.



The risk-bearing theory of profits is explained in the context of normal profits, where *normal* is defined in terms of the relative risk of alternative investments. Normal profits for a high-risk firm, such as a casino operator, should be higher than normal profits for firms of lesser risk, such as water utilities. Indeed, the industry average return on net worth for the hotel/gaming industry was 12 percent in 2000, compared with 10 percent for the water utility industry.

**Dynamic Equilibrium (Friction) Theory of Profit** According to the dynamic equilibrium or friction theory of profit, there exists a long-run equilibrium normal rate of profit (adjusted for risk) that all firms should tend to earn. At any point in time, however, an individual firm or the firms in a specific industry might earn a rate of return above or below this long-run normal return level. This can occur because of temporary dislocations (shocks) in various sectors of the economy. For example, U.S. firms that produced oil and natural gas experienced a dramatic increase in profits in response to supply shortages following the invasion of Kuwait by Iraq in 1990. Rates of return rose substantially. However, those high returns declined shortly after the war ended when market conditions led to excess supplies.

Similarly, if a new, inexpensive, and readily available energy source were to be discovered, oil prices would decline substantially. Over time, some producers would leave this increasingly unprofitable market until a normal rate of profit is restored for the remaining firms. The inability of our economic system to adjust instantaneously to changes in market conditions may result in short-term profits above or below normal levels.

**Monopoly Theory of Profit** In some industries, one firm is effectively able to dominate the market and potentially earn above-normal rates of return for a long period of time. This ability to dominate the market may arise from economies of scale (a situation in which one large firm can produce additional units of output at a lower cost than can smaller firms), control of essential natural resources, control of critical patents, or governmental restrictions that prohibit competition. The conditions under which a monopolist can earn above-normal profits are discussed in greater depth in Chapter 12.

**Innovation Theory of Profit** The innovation theory of profit suggests that above-normal profits are the reward for successful innovations. Firms that develop unique, high-quality products (such as Microsoft in the computer software industry) or firms that successfully identify unique market opportunities (such as Federal Express) are rewarded with the potential for above-normal profits. Indeed, the U.S. patent system is designed to ensure that these above-normal return opportunities furnish strong incentives for continued innovation.

**Managerial Efficiency Theory of Profit** Closely related to the innovation theory is the managerial efficiency theory of profit. This theory maintains that above-normal profits can arise because of the exceptional managerial skills of well-managed firms. The ability to earn above-normal profits by exercising high-quality managerial skills is a continuing incentive for greater efficiency in our economic system.

No single theory of profit can explain the observed profit rates in each industry, nor are these theories necessarily mutually exclusive. Profit performance is invariably the result of many factors, including differential risk, innovation, managerial skills, the existence of monopoly power, and chance occurrences. The important thing to remember is that profit and profit opportunities play a major role in determining the efficient allocation

tion of resources in our economy. Without the market signals that profits give, it would be necessary to develop alternative schemes on which to base resource-allocation decisions. These alternatives are often highly bureaucratic and frequently lack the responsiveness to changing market conditions that a free enterprise system provides.

## OBJECTIVE OF THE FIRM

One common economic model of the firm assumes that the objective of the owners of the firm is to maximize profits. This profit-maximization model of firm behavior has been extremely rich in its decision-making implications. The marginal (and incremental) decision rules that have been derived from this theory provide very useful guidelines for making a wide range of resource-allocation decisions. For example, if incremental cost is defined as the change in total cost resulting from a decision, and if incremental revenue is defined as the change in total revenue resulting from a decision, then any business decision is profitable if one of these results occurs:

1. It increases revenue more than costs.
2. It decreases some costs more than it increases others (assuming revenues remain constant).
3. It increases some revenues more than it decreases others (assuming costs remain constant).
4. It reduces costs more than revenue.

The simple profit-maximization model of the firm has provided decision makers with useful insights regarding efficient resource management and allocation. However, the profit-maximization model is limited because it does not incorporate the time dimension in the decision process and it does not consider risk. The shareholder wealth-maximization model of the firm overcomes these limitations.

## The Shareholder Wealth-Maximization Model of the Firm

### Shareholder Wealth

A measure of the value of a firm. Shareholder wealth is equal to the value of a firm's common stock, which, in turn, is equal to the present value of all future cash returns expected to be generated by the firm for the benefit of its owners.

Effective economic decision making requires an understanding of the goal(s) of the firm. What objective(s) should guide business decision making? That is, what *should* management try to achieve for the owners of the firm? The most widely accepted objective of the firm is to maximize the value of the firm for its owners; that is, to *maximize shareholder wealth*. Shareholder wealth is measured by the market price of a firm's common stock.

The shareholder wealth-maximization goal states that a firm's management should maximize the *present value* of the *expected future* cash flows to the equity owners (shareholders). For simplicity, at this point let us consider cash flows to be the same as profits. Hence, the value of a firm's stock is equal to the present value of all expected future profits, discounted at the shareholders' required rate of return, or

$$V_0 \cdot (\text{Shares Outstanding}) = \frac{\pi_1}{(1 + k_e)^1} + \frac{\pi_2}{(1 + k_e)^2} + \frac{\pi_3}{(1 + k_e)^3} + \dots + \frac{\pi_\infty}{(1 + k_e)^\infty}$$

$$V_0 \cdot (\text{Shares Outstanding}) = \sum_{t=1}^{\infty} \frac{\pi_t}{(1 + k_e)^t} \quad [1.1]$$

where  $V_0$  is the current (present) value of a share of stock,  $\pi_t$  represents the profits expected in each of the future periods (1 through  $\infty$ ), and  $k_e$  equals the investors' required rate of return. Equation 1.1 assumes that the reader is familiar with the concept

of discounting and present values. (A review of this concept is found in Appendix A at the end of the book.) For the purposes of analysis here, it is only necessary to recognize that \$1 received one year from today is generally worth less than \$1 received today because \$1 today can be invested at some rate of interest, for example, 15 percent, to yield \$1.15 at the end of one year. Thus, an investor who requires (or has an opportunity to earn) a 15 percent annual rate of return on an investment would place a current value of \$1 on \$1.15 expected to be received in one year.

Equation 1.1 explicitly considers the *timing* of future profits. By discounting all future profits at the required rate of return,  $k_e$ , Equation 1.1 recognizes that a dollar received in the future is worth less than a dollar received immediately.

Equation 1.1 also provides a conceptual basis for evaluating differential levels of *risk*. For example, if a series of future profits is highly uncertain (i.e., likely to diverge substantially from their expected values), the discount rate,  $k_e$ , can be increased to account for this risk. Thus, the greater the risk associated with receiving a future benefit (profit), the lower the value placed by investors on that benefit. The shareholder wealth-maximization model of the firm is therefore capable of dealing with the two primary shortcomings of the static profit-maximization model.

## Example

### SHAREHOLDER WEALTH MAXIMIZATION: BERKSHIRE HATHAWAY CORPORATION

Warren E. Buffett, chairman and CEO of Berkshire Hathaway, Inc., has described the long-term economic goal of Berkshire Hathaway as follows: "to maximize the average annual rate of gain in intrinsic business value on a per-share basis."<sup>5</sup> Berkshire's book value per share has increased from \$19.46 in 1964, when he acquired the firm, to \$19,011 at the end of 1996, a compound annual rate of growth of about 23 percent. The growth rate in the market value of Berkshire's shares has been even greater, with the market value per share reaching \$36,500 at the end of 1996. Berkshire's directors are all major stockholders. At least four of the directors have over 50 percent of their family's net worth invested in Berkshire. Insiders own over 47 percent of the firm's stock. Buffett's firm has placed a high premium on the goal of maximizing shareholder wealth, that is, maximizing the value of the owners' portion of the firm. Recently, Buffett appeared prominently in an ad for fractional ownership of corporate jets. His message was one of shareholder wealth maximization; shared planes usually available on short notice are cheaper than those owned outright despite the occasional inconvenience to the executives and the fact that the reduced access sometimes necessitates a high-priced rental.

Additional insight regarding the achievement of the shareholder wealth-maximization goal can be gained by decomposing the profit concept,  $\pi$ , into its important elements. Profit in period  $t$ ,  $\pi_t$ , is equal to total revenue ( $TR_t$ ) minus total costs ( $TC_t$ ), or

$$\pi_t = TR_t - TC_t \quad [1.2]$$

Similarly, total revenue in period  $t$  equals price per unit ( $P_t$ ) times quantity sold ( $Q_t$ ), or

$$TR_t = P_t \cdot Q_t \quad [1.3]$$

<sup>5</sup>Annual Report, Berkshire Hathaway, Inc., 1996.

http://

Access interim shareholder  
reports and book value infor-  
mation for Berkshire  
Hathaway  
<http://www.berkshirehathaway.com>

Total cost in period  $t$  equals variable cost per unit ( $V_t$ ) times the number of units of output ( $Q_t$ ) plus fixed costs in period  $t$ , or

$$TC_t = V_t \cdot Q_t + F_t \quad [1.4]$$

By combining Equations 1.2, 1.3, and 1.4 with Equation 1.1, we get

$$V_0 \cdot (\text{Shares Outstanding}) = \sum_{t=1}^{\infty} \frac{P_t \cdot Q_t - V_t \cdot Q_t - F_t}{(1 + k_e)^t} \quad [1.5]$$

The term  $P_t \cdot Q_t$  represents the total revenue generated by the firm. From a decision-making perspective, this value is dependent on the firm's demand function (discussed in Chapters 3–4) and the firm's pricing decisions (see Chapters 10–16).

The firm's costs, both fixed ( $F_t$ ) and variable ( $V_t$ ) are discussed in Chapters 8–9. In addition, the choice of investments made by the firm—the capital budgeting decisions—determines what proportion of total cost will be fixed and what proportion will be variable. A firm that chooses a capital-intensive production technology will tend to have a higher proportion of its total costs of operation represented as fixed costs than will a firm that chooses a more labor-intensive technology. Capital budgeting decisions are considered in Chapter 18.

The discount rate,  $k_e$ , that investors use to value the stream of income generated by a firm is determined by the perceived risk of the firm and by conditions in the financial markets, including the level of expected inflation. Risk and its relationship to required rates of return are discussed in Chapter 2.

In making its pricing, output, production, and cost decisions, management is faced with several legal, behavioral, value-based, and environmental constraints on its actions. These constraints are briefly considered in the next section and discussed in greater detail in Chapter 17.

The integrative nature of the wealth-maximization model is illustrated in Figure 1.2.

## Example

http://

Firms such as IBM can also develop the expertise to produce complementary products through the acquisition process. You can learn about IBM's recent acquisitions at <http://www.ibm.com/Investor/acquisitions.html>

## RESOURCE-ALLOCATION DECISIONS AND SHAREHOLDER WEALTH MAXIMIZATION: IBM CORPORATION

Consider the case of IBM. Its research and development personnel must develop products that will appeal to its customers and/or increase current operating efficiency. Engineers design production facilities to produce products in the most cost-efficient manner. Marketing researchers try to identify customer needs and provide important information about competitors that influences pricing, product quality, and product feature decisions. Financial managers must acquire the funds needed to produce IBM's products and fund its capital outlays. Personnel managers work to attract and retain a cost-effective workforce. These decisions are made against a backdrop of internal resource constraints, government regulation, and legal constraints. By working together toward the common goal, shareholder wealth can be maximized.

In summary, the value of an enterprise is determined by the amount, timing, and risk of the profits expected to be generated by the enterprise.

## Profits Versus Cash Flows

In the previous discussion of the shareholder wealth-maximization objective, we have talked about maximizing the present value of expected future *profits*. The economic