GLOBAL EDITION

Managerial Economics

Economic Tools for Today's Decision Makers

SEVENTH EDITION

Paul Keat • Philip Young • Stephen Erfle

ALWAYS LEARNING

PEARSON

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MANAGERIAL ECONOMICS

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Economic Tools for Today's Decision Makers

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The publisher's policy is to use paper manufactured from sustainable forests.

To my wife, Sheilah, our children, Diana and Andrew, and our seven grandchildren—P. G. K.

To my grandchildren, Hayden and Emerson—P. K. Y. Y.

To my children, David, Kate, and Vera—S. E. E.

Brief Contents

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Preface

One day after class, a student in one of our courses commented on the managerial economics text then being used: "This book is very dry. What it needs is a plot!" To a large extent, the idea for this text stemmed from this remark. This is a text that we believe will excite readers about managerial economics as well as inform them about this vital part of management education. Each chapter begins with a Situation, in which managers in a fictional company, Global Foods, Inc., must make certain key decisions about their products in the beverage industry. After the relevant economic concepts or tools of analysis are presented, each chapter ends with a Solution, a suggested way in which these concepts or tools can be used to help managers make the best decision.

We are well aware of the reputation that economics courses have among some business students, that they are "too theoretical and not practical enough for the real world." In our opinion, nothing could be further from the truth. We know that the instructors in managerial economics will agree with us on this matter. We hope that this text will serve as a solid supplement to their classroom efforts to demonstrate to their students the importance and utility of economic theory for business decision making.

This text is designed for upper-level undergraduate and first-year MBA courses in managerial economics and applied economics. The first two chapters form a general introduction to economics and economic reasoning. A review of the mathematical concepts and tools used in the text has been placed on the Companion Website. In addition to discussing the applications of economic theory to the firm, our text (as is the custom with all texts in managerial economics) includes chapters on various tools of analysis that are helpful to business decision makers but that are not part of the core of traditional microeconomic theory. These are demand, production, and cost estimation using regression analysis, forecasting, capital budgeting, and risk analysis. A discussion of linear programming is also available online, along with a review of the time value of money.

IMPROVEMENTS IN THE SEVENTH EDITION

As in all our previous editions, this edition's changes are based on our classroom teaching, consulting engagements, and corporate education seminars. In addition, we have received a number of useful suggestions from the reviewers of our sixth edition.

In this seventh edition, we welcome co-author, Stephen Erfle of Dickinson College. Steve has been of particular help in revising and improving the quantitative sections of our text. He has also provided a major addition: the use of Excel in the presentation of many of the numerical and graphical illustrations presented throughout the text.

Here are noteworthy additions, improvements, and enhancements to this edition:

- We developed Excel Applications (Excel Apps) for a number of the numerical and graphical illustrations used throughout the text. These apps, noted with the icon, APP are available to readers on our website and an index delineating what is in each Excel App is provided on the inside rear cover of the text. They allow readers to turn the static figures and tables in the text into dynamic illustrations, and they will also strengthen students' ability to use Excel, which we believe is a critical skill in today's job market.

- We have developed a series of regression Excel Apps that provide readers with a more detailed discussion of many of the topics in regression analysis touched on in Chapter 5. See the Excel Apps listing on the back cover for additional information about coverage about regression topics in various chapters.
- We have completely rewritten Chapter 11, “Game Theory and Asymmetric Information.” User feedback requested more in-depth coverage of this challenging topic. The chapter now includes increased coverage of game theory and bargaining as well as a more in-depth discussion of adverse selection and moral hazard.
- Chapter 15, “The Global Soft Drink Industry,” is an entirely new chapter. Throughout the text, we try to show how the economic concepts and tools of analysis can be applied to the beverage industry by introducing in each chapter a Situation and a Solution for our hypothetical company called Global Foods. In our concluding chapter, we discuss how the basic concepts of supply and demand can be applied to the real global soft drink industry. This chapter was written especially for this edition by a seasoned industry consultant, Farshad Sarmad. Using current industry data and his own experiences, Farshad shows how the factors affecting supply and demand can be applied to various segments of the soft drink industry in countries around the world.
- Significant developments in information and communications technology (e.g., cloud computing, social media, and Internet commerce) have enabled businesses to store massive amounts of data generated in digital format. We introduce readers to these developments in Chapter 5, “Demand Estimation and Forecasting.” We asked Dr. Mukal Patki, a business analytics specialist at PayPal, to help us with this task. In Appendix 5B, “Understanding Consumer Behavior Through Testing,” he talks about how “big data” has enabled companies to conduct in-depth studies of consumer behavior using a technique called “test and learn.”
- In Chapter 14, “Government and Industry: Challenges and Opportunities for Today’s Manager,” we have added a discussion of patent laws and the concept of protecting intellectual property (IP), such as trademarks and copyrights. These are significant ways that government affects commerce in a free market economy. This section was written by Riyon Harding, an expert in the commercialization of IP at IBM, a company that is recognized throughout the world for the number of new patents it receives from the U.S. government every year.
- To give readers a better idea of how managerial economics can be applied in some of the BRIC countries (Brazil, Russia, India, and China), we asked Navin Punjabi, a professor of business in Mumbai, to discuss some of the challenges of doing business in India (Chapter 13). We also asked Lisa Vortsman, a product manager for the dressings category in an actual “Global Foods” company (Lisa requested that her company not be identified) to talk about the challenges of increasing the demand for this category in countries like Russia and Brazil.
- We have also received the help of outside experts to improve our discussions about other topics of importance and current interest in business. F. John Mathis, Professor of Global Economics and Finance, has written a highly informative summary of the causes and consequences of the 2008 financial crisis (Chapter 14). To provide our readers with a better idea of the actual challenges of initiating and implementing a supply chain management system, we interviewed Steve Martson. Steve, a recently retired executive who has led supply chain systems implementation in companies such as Dell and IBM, talks about some of his experiences working in this very important field (Appendix 7C).

As we have done in all of our previous editions, we have updated our examples wherever appropriate. We have kept some of the examples that we first introduced in our previous editions if we believe they serve as good teaching illustrations, regardless of when they occurred.

FEATURES

The Case of Global Foods

This case, which runs throughout the entire text, helps to integrate and apply the key concepts presented in each chapter with an everyday consumer product: soft drinks and other nonalcoholic beverages. Each chapter's Situation and Solution are based on actual challenges faced by companies in the beverage industry. The stories told in each case are intended to stimulate reader interest by bringing the concepts and tools of analysis to life, which are presented in the graphs and numerical examples.

Global Applications

The Global Applications sections exemplify how the concepts and tools of analysis can be applied in other countries. In this edition, more examples, both in the Global Application sections and in the main body of the chapter, are drawn from world growth markets such as China, India, Brazil, and Russia.

In-Text Icons

References to the Mathematical Appendix are noted by the symbol and references to the appendix about the Time Value of Money are noted by the symbol TVM. As explained on the inside front cover, there are now two types of Excel icons. References to Excel exercise modules are noted by and a listing of Excel modules is provided on the inside front cover. References to Excel Apps are noted by APP and a list of Excel Apps is provided on the inside rear cover.

Learning Objectives

Each chapter begins with a list of Learning Objectives, which outline the concepts students should be able to take away once they've read the chapter. These Learning Objectives frame the tools that future managers need to know to succeed.

ANCILLARY MATERIALS

Companion Website (www.pearsonglobaleditions.com/keat)

The website contains Internet exercises, activities, and resources related specifically for *Managerial Economics: Economic Tools for Today's Decision Makers.*

A number of other resources are available on the Companion Website such as the Mathematical Appendix, Time Value of Money Appendix, and Excel exercise modules. The modules provide students with templates of the economic models in the text. In this edition, we have introduced a new feature for our Companion Website: Excel Apps APP. A listing of Excel Apps is provided on the inside back cover. The Excel Apps provide students with instructions to build their own models. In so doing, they gain a deeper understanding of the underlying assumptions of the models themselves.

Business Simulation: New to the seventh edition is an online, computer-based business simulation available on the text's Companion Website. In this simulation, a student becomes the product manager of 'alpha', a consumer product similar to bottled water or soft drinks. The student has the choice of being a low-price competitor (e.g., a private-label bottled water) or a premium-price competitor (e.g., Evian or San Pellegrino). The student competes against two computer-generated companies. One is a low-price competitor; the other is a premium-priced competitor. Students make decisions on price, marketing, process development (to lower costs), and production capacity. By making these decisions and getting the results, students learn in a dynamic and engaging way about the concepts of price and marketing elasticities and the interdependency of pricing in oligopolistic markets.

Online Study Guide: The Online Study Guide offers students another opportunity to sharpen their problem-solving skills and to assess their understanding of the text material. The Online Study Guide grades each question submitted by the student, provides immediate feedback for correct and incorrect answers, and allows students to e-mail results to up to four e-mail addresses.

Instructor's Resource Center

This password-protected site is accessible from www.pearsonglobaleditions.com/keat and hosts all of the resources listed below. Instructors may click on the Resources link to access files or may contact their sales representative for additional information.

Online Instructor's Manual: This manual, written by the textbook authors, contains all answers to the questions and problems found in the text.

Online Test Item File and TestGen: Written by James Holcomb of the University of Texas, El Paso, and available to instructors in test generator software (TestGen with Quizmaster), this test bank contains multiple-choice questions and a set of analytical questions for use in testing students on the material presented in each chapter of the text. Answers are also provided. TestGen's graphical interface enables instructors to view, edit, and add questions; transfer questions to tests; and print different forms of tests. Instructors also have the option of reformatting tests with fonts and styles, margins, and headers and footers, as in any word-processing document. Search and sort features let the instructor quickly locate questions and arrange them quickly in a preferred order. Quizmaster can work with your school's computer network to automatically grade the exams, store the results electronically, and allow the instructor to view and print a variety of reports.

Online PowerPoint Presentation: This lecture presentation tool, prepared by Gary F. Wilkinson of Indiana Wesleyan University, offers outlines and summaries of important text material, tables and graphs, and additional examples. The package allows instructors to make full-color, professional-looking presentations and custom handouts for students.

ACKNOWLEDGMENTS

We wish to thank our colleagues at Thunderbird School of Global Management and Dickinson College, and former colleagues at IBM and Pace University for their help and encouragement in our work for this and all previous editions. We also wish to thank those who have helped us to improve this seventh edition. As noted earlier, they are: Riyon Harding, Stephen C. Marston, Dr. F. John Mathis, Dr. Navin Punjabi, Dr. Mukal Patki, Farshad Samad, and Lisa Vortsman.

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About the Authors

Paul G. Keat has been a member of the Global Business Faculty at Thunderbird School of Global Management for the past twenty-five years. At present he is an Associate Professor Emeritus. Prior to his coming to Thunderbird, he was associated for many years with the International Business Machines Corporation in professional and managerial capacities.

His education includes a B.B.A. in accounting from the Baruch School of the City University of New York, an M.A. from Washington University, and an M.A. and Ph.D. in economics from the University of Chicago.

Dr. Keat began his IBM career in the department of economic research and then moved into the long-range planning area. Later, as a member of the finance function, he spent several years at IBM's European headquarters in Paris, as manager in the financial planning area and then as the financial manager for the company's European software business. After his return to the United States, Dr. Keat served as manager in the pricing area of one of the company's manufacturing groups. Before leaving IBM in 1987, he was associated with the company's International Finance, Planning and Administration School (IFPA), where he taught managerial economics, lectured on finance in a number of company-related courses, and managed academic courses. He also taught at IBM's IFPA School at La Hulpe, Belgium.

Dr. Keat has taught at several U.S. universities, including Washington University, the City University of New York (CUNY), and Iona College. He was an adjunct professor of finance at the Lubin Graduate School of Business at Pace University, and he also taught in Pace University's Executive MBA program.

Philip K. Y. Young (www.philipkyoung.com) is the founder and president of Nth Degree Systems, Inc., a consulting firm that provides customized education and training programs to major corporations around the world. He recently co-founded Learning Burst Academy (www.learningbursts.com), a company that produces courses in business education in an innovative, digital format. He is also a member of the global faculty network of Duke Corporate Education. He has thirty years of teaching experience as a professor of economics in MBA programs and over twenty-five years of experience developing and teaching customized education and training programs.

Most of Dr. Young's teaching career was spent in the Lubin School of Business at Pace University in New York, followed by several years as clinical professor of management at Thunderbird School of Global Management. His list of clients includes a number of multinational corporations in industries such as information technology, telecommunications, fast-moving packaged consumer goods, consulting services, advertising and public relations, pharmaceuticals, semiconductor manufacturing and design, diversified manufacturing, and financial services. He teaches for these companies in the United States, Latin America, western and central Europe, Asia, and the Middle East.

Dr. Young received a B.A. from the University of Hawaii, a master's degree in international relations from Columbia University, and a Ph.D. in economics from New York University.

Stephen E. Erfle began his career as a managerial economist during a 1994–1995 sabbatical at Seagram Classics Wine Company (SCWC). During those fourteen months, he maintained offices at Sterling Vineyards and at Mumm Cuvée Napa, where, respectively, the finance and marketing departments of SCWC resided. Trained as a microeconomic theorist, he began to use his economist's toolkit to analyze concrete business questions, such as, Should Mumm raise the price of Brut Prestige a dollar a bottle? When does it make sense to have another tasting room associate on the floor in Sterling's tasting room?

On returning to Dickinson College, Dr. Erfle decided to refocus his teaching in a more applied direction. He helped found the International Business and Management department and major during the late 1990s. One of the core courses in that major is his course, Managerial Economics, which uses Excel as a teaching platform. This course is modeled after what he did during his SCWC sabbatical. In the past fifteen years, he has taught more than a thousand undergraduates how to build economic models in order to do comparative statics analysis and how to do regression modeling in Excel.

Dr. Erfle received a B.S. in mathematics and B.A. in economics from the University of California, Davis, and a master's and Ph.D. in economics from Harvard University. He has also taught in the Economics Department at Dickinson College and in the School of Social Sciences at the University of California, Irvine. He is also involved in wine education; he has taught wine-tasting classes and conducted wine tastings since his graduate school days as the resident economics and wine tutor for Harvard's Leverett House.

Chapter 1

Introduction

Learning Objectives

Upon completion of this chapter, readers should be able to:

- Define managerial economics and discuss briefly its relationship to microeconomics and other related fields of study such as finance, marketing, and statistics.
- Cite the important types of decisions that managers must make concerning the allocation of a company's scarce resources.
- Provide specific examples of how changes in customers, competition, and technology can affect the ability of a company to earn an acceptable return on its owners' investments.
- Cite and compare the three basic economic questions from the standpoint of both a country and a company.

The Situation

The last of the color slides was barely off the screen when Bob Burns, the CEO of Global Foods, Inc., turned to his board of directors to raise the question that he had been waiting all week to ask. "Well, ladies and gentlemen, are you with me in this new venture? Is it a 'go'? Shall we get into the soft drink business?"

"It's not that easy, Bob. We need some time to think it over. You're asking us to endorse a very major *decision,* one that will have a long-term impact on the direction of the company."

"I appreciate your wish to deliberate further, Dr. Breakstone," Bob responded, "but I would like to reach a decision today. As the president of a major university, you have been especially valuable in advising this company in matters relating to social and governmental policies. But we must diversify our business very soon in order to maintain the steady growth in profits that we have achieved in recent years. As my presentation showed, the manufacturing and marketing of our own brand of soft drink is one of the best ways to do this. It represents a significant diversification, yet it is very closely related to our core business: food.

"The *economics* of the soft drink market tell us that we would be foolish to pass up the kind of *investment return* that the market offers to those newcomers willing to take the *risk*. The food business is generally a mature one. On the other hand, our *forecast* indicates that there is still a lot of room for growth in the soft drink market. To be sure, there is a tremendous amount of *competition* from the 'red team' and the 'blue team.' But we already have expertise in the food business, and it should carry over into the beverage market."

"That's just it, Bob," interjected another board member. "Are we prepared to take this risk? You yourself acknowledged that the *market power* wielded by the two dominant companies in this business is not to be taken lightly. Others have tried to take market share from them and have failed miserably. Moreover, the projections that you have shown for a growing soft drink market are based on the *assumption* that the growth rate will remain the same as it has been in the past ten years or so. As we all know, the soft drink market has been growing, but it has also been very fickle. Only recently, Americans were on a health kick, and fruit juices and bottled waters along with health foods were in fashion. Now it seems that soft drinks are back in style again.

(*continued*)

(*continued*)

Who knows what people will want in the future? Maybe we'll all go back to drinking five cups of coffee a day. And what about all the money that we're going to have to spend up front to *differentiate* our product? As you well know, in the processed-food business, establishing brand recognition—not to mention brand loyalty—can be extremely difficult and costly."

"Well, ladies and gentlemen, all your concerns are certainly legitimate ones, and believe me, I have given much thought to these drawbacks. This is one of the biggest decisions that I will have made since becoming CEO. My staff has spent hundreds of hours analyzing all available data to arrive at a judgment. Our findings indicate a strong probability of earning an above-average return on an investment in the soft drink business, a return commensurate with the kind of risk we know exists in that market. But if we could make all our decisions with 100 percent certainty simply by feeding numbers into a computer, we'd all be out of a job. To be sure, details on production, cost, pricing, distribution, advertising, financing, and organizational structure remain to be ironed out. However, if we wait until all these details are worked out, we may be missing a window of opportunity that might not appear again in this market for a long time. I say that we should go ahead with this project as soon as possible. And unanimity among the board members will give me greater confidence in this endeavor."

INTRODUCTION: ECONOMICS AND MANAGERIAL DECISION MAKING

Managerial Economics is one of the most important and useful courses in your curriculum of studies. It will provide you with a foundation for studying other courses in finance, marketing, operations research, and managerial accounting. It will also provide you with a theoretical framework for tying together courses in the entire curriculum so you can have a cross-functional view of your studies.

Economics is "the study of the behavior of human beings in producing, distributing and consuming material goods and services in a world of scarce resources."[1] *Management* is the discipline of organizing and allocating a firm's scarce resources to achieve its desired objectives.[2] These two definitions clearly point to the relationship between economics and managerial decision making. In fact, we can combine these two terms and define **managerial economics** as the use of economic analysis to make business decisions involving the best use of an organization's scarce resources.

Joel Dean, author of the first managerial economics textbook, defines managerial economics as "the use of economic analysis in the formulation of business policies." He also notes a "big gap between the problems of logic that intrigue economic theorists and the problems of policy that plague practical management [which] needs to be bridged in order to give executives access to the practical contributions that economic thinking can make to top-management policies."[3]

William Baumol, a highly respected economist and industry consultant, stated that an economist can use his or her ability to build theoretical models and apply them to any business problem, no matter how complex, break it down into essential components, and describe the relationship among the components, thereby facilitating a systematic search for an optimal solution. In his extensive experience as a consultant to both industry and government, he found that every problem that he worked on was

[1]Campbell McConnell, *Economics,* New York: McGraw-Hill, 1993, p. 1.
[2]For books supporting this definition, see Peter Drucker, *Management,* New York: Harper & Row, 1973.
[3]Joel Dean, *Managerial Economics,* Englewood Cliffs, NJ: Prentice-Hall, 1951, p. vii.

helped in some way by "the method of reasoning involved in the derivation of some economic theorem."[4]

William H. Meckling, the former dean of the Graduate School of Management at the University of Rochester, expressed a similar sentiment in an interview conducted by *The Wall Street Journal*. In his view, "economics is a discipline that can help students solve the sort of problems they meet within the firm." Recalling his experience as the director of naval warfare analysis at the Center for Naval Analysis and as an economic analyst at the Rand Corporation, one of the nation's most prominent think tanks, Meckling stated that these institutions are "dominated by physical scientist types, really brilliant people." However, he went on to say that "the economists knew how to structure the problems . . . the rest of the people knew a lot about technical things but they had never thought about how you structure big issues."[5]

As it has evolved in undergraduate and graduate programs over the past half century, managerial economics is essentially a course in applied microeconomics that includes selected quantitative techniques common to other disciplines such as linear programming (management science), regression analysis (statistics, econometrics, and management science), capital budgeting (finance), and cost analysis (managerial and cost accounting). From our perspective as economists, we see that many disciplines in business studies have drawn from the core of microeconomics for concepts and theoretical support. For example, the economic analysis of demand and price elasticity can be found in most marketing texts. The division of markets into four types—perfect competition, pure monopoly, monopolistic competition, and oligopoly—is generally the basis for the analysis of the competitive environment presented in books on corporate strategy and marketing strategy.[6]

There are a number of other examples to be found. The economic concept of opportunity cost serves as the foundation for the analysis of relevant cost in managerial accounting and for the use of the "hurdle rate"[7] in finance. As shown in Chapter 2, opportunity cost also plays an important part in understanding how firms create "economic value" for their shareholders. Finally, in recent years, certain authors have linked their managerial economics texts thematically with strategy and human resources.[8] Figure 1.1 illustrates our view that managerial economics is closely linked with many other disciplines in a business curriculum.

Our approach in this text is to show linkages of economics with other business functions, while maintaining a focus on the heart of managerial economics—the microeconomic theory of the behavior of consumers and firms in competitive markets. When clearly understood and exemplified in actual business examples, this theory provides managers with a basic framework for making key business decisions about the allocation of their firm's scarce resources. In making these decisions, managers must essentially deal with the following questions listed in abridged form:

1. What are the economic conditions in a particular market in which we are or could be competing? In particular:
   a. Market structure?
   b. Supply and demand conditions?

[4]William Baumol, "What Can Economic Theory Contribute to Managerial Economics?" *American Economic Review,* 51, 2 (May 1961), p. 114.
[5]"Economics Has Much to Teach the Businessman," *Wall Street Journal,* May 3, 1983.
[6]Professor Michael Porter, whose books on strategy have greatly influenced this field of study, is himself a Ph.D. in economics.
[7]Essentially, this is a company's cost of funds expressed as a percentage (e.g., 15 percent). Any project funded by the company should have a rate of return that is greater than this level.
[8]See for example, David Besanko et al., *Economics of Strategy,* New York: John Wiley & Sons, 2009, and James A. Brickley et al., *Managerial Economics and Organizational Architecture,* New York, McGraw-Hill, 2003.

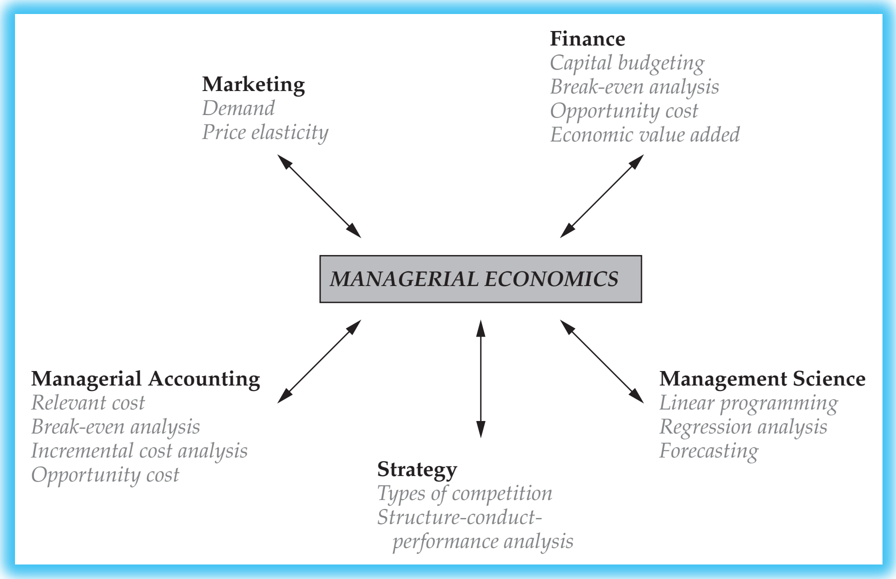

Figure 1.1 Managerial Economics and Other Business Disciplines

   c. Technology?
   d. Government regulations?
   e. International dimensions?
   f. Future conditions?
   g. Macroeconomic factors?
2. Should our firm be in this business?
3. If so, what price and output levels should we set in order to maximize our economic profit or minimize our losses in the short run?
4. How can we organize and invest in our resources (land, labor, capital, managerial skills) in such a way that we maintain a competitive advantage over other firms in this market?
   a. Cost leader?
   b. Product differentiation?
   c. Focus on market niche?
   d. Outsourcing, alliances, mergers, acquisitions?
   e. International dimension—regional or country focus or expansion?
5. What are the risks involved?

Perhaps the most fundamental management question is question 2, which concerns whether a firm should be in the business in which it is operating. This is the very question addressed by Bob Burns and the rest of the board of directors of Global Foods in this chapter's "The Situation" vignette.

Note that question 5 has to do with a firm's risk. Uncertainty pervades our everyday lives, especially when we are considering what may happen in the future, and uncertainty, or risk, is always present in the operations of a business. Of course, some things are fairly certain. A company that buys steel can get a price quote and be certain what it will pay for a ton. A company with temporary excess cash to invest for a short period of time can ascertain the interest rate it will earn. An investor purchasing a U.S. Treasury bill is virtually certain that he or she will be repaid in full at maturity.