# Managerial Economics and Strategy

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# Managerial Economics and Strategy

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For Jackie, Lisa, Barbara, and Cathy

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# Brief Contents

# Contents

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# Preface

Successful managers make extensive use of economic tools when making important decisions. They use these tools to produce at minimum cost, to choose an output level to maximize profit, and for many other managerial decisions including:

◗ Whether to offer buy-one-get-one-free deals
◗ How much to advertise
◗ Whether to sell various goods as a bundle
◗ What strategies to use to compete with rival firms
◗ How to design compensation contracts to provide appropriate incentives for employees
◗ How to structure an international supply chain to take advantage of cross-country differences in production costs

We illustrate how to apply economic theory using actual business examples and real data. Our experience teaching managerial economics at the Wharton School (University of Pennsylvania) and the Sauder School of Business (University of British Columbia) as well as teaching a wide variety of students at the Massachusetts Institute of Technology; Queen's University; and the University of California, Berkeley, has convinced us that students prefer our emphasis on real-world issues and examples from actual markets.

## Main Innovations

This book differs from other managerial economics texts in three main ways.

◗ It places greater emphasis than other texts on *modern theories* that are increasingly useful to managers in areas such as industrial organization, transaction cost theory, game theory, contract theory, and behavioral economics.
◗ It makes more extensive use of real-world business examples to illustrate how to use economic theory in making business decisions.
◗ It employs a *problem-based* approach to demonstrate how to apply economic theory to specific business decisions.

### Modern Theories for Business Decisions

This book has all the standard economic theory, of course. However, what sets it apart is its emphasis on modern theories that are particularly useful for managers.

**Industrial Organization.** How do managers differentiate their products to increase their profits? When do mergers pay off? When should a firm take (legal)

actions to prevent entry of rivals? What effects do government price regulations have on firms' behavior? These and many other questions are addressed by industrial organization theories.

**Transaction Cost Theory.**  Why do some firms produce inputs while others buy them from a market? Why are some firms vertically integrated whiles others are not? We use transaction cost theory to address questions such as these, particularly in Chapter 7.

**Game Theory.**  Should the manager of a radio station schedule commercial breaks at the same time as rival firms? What strategy should a manager use when bidding in an auction for raw materials? The major issue facing many managers is deciding what strategies to use in competing with rivals. This book goes well beyond other managerial economics texts by making significant use of game theory in Chapters 12–14 to examine such topics as oligopoly quantity and price setting, entry and exit decisions, entry deterrence, and strategic trade policy. Game theory provides a way of thinking about strategies and it provides methods to choose strategies that maximize profits. Unlike most microeconomic and managerial economics books, our applications of game theory are devoted almost exclusively to actual business problems.

**Contract Theory.**  What kind of a contract should a manager offer a worker to induce the employee to work hard? How do managers avoid moral hazard problems so they aren't taken advantage of by people who have superior information? We use modern contract theory to show how to write contracts to avoid or minimize such problems.

**Behavioral Economics.**  Should a manager allow workers to opt in or opt out of a retirement system? How can the manager of a motion picture firm take advantage of movie reviews? We address questions such as these using behavioral economics— one of the hottest new areas of economic theory—which uses psychological research and theory to explain why people deviate from rational behavior. These theories are particularly relevant for managers, but sadly they have been largely ignored by most economists until recently.

## Real-World Business Examples

We demonstrate that economics is practical and useful to managers by examining real markets and actual business decisions. We do so in two ways. In our presentation of the basic theory, we use real-world data and examples. Second, we examine many real-world problems in our various application features.

To illustrate important economic concepts, we use graphs and calculations based on actual markets and real data. Students learn the basic model of supply and demand using estimated supply and demand curves for avocados, and they practice estimating demand curves using real data such as from the Portland Fish Exchange. They study how imported oil limits pricing by U.S. oil producers using real estimated supply and demand curves, derive cost curves from Japanese beer manufacturers using actual estimated production functions, and analyze oligopoly strategies using estimated demand curves and cost and profit data from the real-world rivalries between United Airlines and American Airlines and between Coke and Pepsi.

## Problem-Based Learning

Managers have to solve business problems daily. We use a problem-solving approach to demonstrate how economic theory can help mangers make good decisions. In each chapter, we solve problems using a step-by-step approach to model good problem-solving techniques. At the end of the chapter, we have an extensive set of questions. Some of these require the student to solve problems similar to the solved problems in the chapter, while others ask the student to use the tools of the chapter to answer questions about applications within the chapter or new real-world problems. We also provide exercises asking students to use spreadsheets to apply the theory they have learned to real-world problems.

# Features

This book has more features dedicated to showing students how to apply theory to real-world problems than do rival texts.

**Managerial Implications.**  Managerial Implications sections contain simple bottom-line statements of economic principles that managers can use to make key managerial decisions. For example, we describe how managers can assess whether they are maximizing profit by using data to estimate demand elasticities. We also show how they can structure discounts to maximize profits, promote customer loyalty, design auctions, prevent gray markets, and use important insights from game theory to improve managerial decisions.

**Mini-Cases.**  Over a hundred Mini-Cases apply economic theory to interesting and important managerial problems. For example, Mini-Cases demonstrate how price increases on iTunes affect music downloads (using actual data), how to estimate Blackberry's production function using real-world data, why some top-end designers limit the number of designer bags customers can buy, how "poison pills" at Yahoo! affected shareholders, how Pfizer used limit pricing to slow entry of rivals, why advertisers pay so much for Superbowl commercials, and how managers of auto manufacturing firms react to tariffs and other regulations.

**Q&As.**  After the introductory chapter, each chapter provides three to five Q&As (Questions & Answers). Each Q&A poses a qualitative or quantitative problem and then uses a step-by-step approach to solve the problem. Most of the 55 Q&As focus on important managerial issues such as how a cost-minimizing firm would adjust to changing factor prices, how a manager prices bundles of goods to maximize profits, how to determine Intel's and AMD's profit-maximizing quantities and prices using their estimated demand curves and marginal costs, and how to allocate production across plants internationally.

**Managerial Problems and Managerial Solutions.**  After the introductory chapter, each chapter starts with a Managerial Problem that motivates the chapter by posing real-world managerial questions that can be answered using the economic principles and methods developed in the chapter. At the end of each chapter, we answer these questions in the Managerial Solution. Thus, each pair of these features combines the essence of a Mini-Case and a Q&A.

**End-of-Chapter Questions.**  Starting with Chapter 2, each chapter ends with an extensive set of questions, many of which are based on real-world problems. Each Q&A has at least one associated end-of-chapter question that references the Q&A and allows the student to answer a similar problem, and many of the questions are related to Mini-Cases that appear in the book. The answers to selected end-of-chapter problems appear at the end of the book, and all of the end-of-chapter questions are available in MyEconLab for self-assessment, homework, or testing.

**Spreadsheet Exercises.**  In addition to the verbal, graphical, and mathematical exercises, each chapter has two end-of-chapter spreadsheet exercises. These exercises demonstrate how managers can use a spreadsheet to apply the economic methods described in the chapter. They address important managerial issues such a choosing the profit-maximizing level of advertising or designing compensation contracts to effectively motivate employees. Students can complete the spreadsheet exercises in MyEconLab, which includes additional spreadsheet exercises.

**Using Calculus.**  Calculus presentations of the theory appear at the appropriate points in the text in a Using Calculus feature. In contrast, most other books relegate calculus to appendices, mix calculus in with other material where it cannot easily be skipped, or avoid calculus entirely. We have a few appendices, but most of our calculus material is in Using Calculus sections, which are clearly identified and structured as discrete treatments. Therefore this book may be conveniently used both by courses that use calculus and those that do not. Some end-of-chapter questions are designed to use calculus and are clearly indicated.

# Alternative Organizations

Because instructors differ in the order in which they cover material and in the range of topics covered, this text has been designed for maximum flexibility. The most common approach to teaching managerial economics is to follow the sequence of the chapters in the order presented. However, many variations are possible. For example, some instructors choose to address empirical methods (Chapter 3) first. Some instructors skip consumer theory (Chapter 4), which they can safely do without causing problems in later chapters.

Chapter 7, Firm Organization and Market Structure, provides an overview of the key issues that are discussed in later chapters, such as types of firms, profit maximization and its alternatives, conflicts between managers and owners (and other "agency" issues), and the structure of markets. We think that presenting this material early in the course is ideal, but all of this material except for the section on profit maximization can be covered later.

Because our treatment of game theory is divided into two chapters (Chapters 12 and 13), instructors can conveniently choose how much game theory to present. Later chapters that reference game theory do so in such a way that the game theoretical material can be easily skipped. Although Chapter 11 on oligopoly and monopolistic competition precedes the game theory chapters, a course could cover the game theory chapters first (with only minor explanations by the instructor). And a common variant is to present Chapter 14 on uncertainty earlier in the course.

The last chapter, Global Business (17), should be very valuable for instructors who take an international perspective. To promote this viewpoint, every chapter contains examples of dealing with firms based in a variety of countries in addition to the United States.

# MyEconLab

MyEconLab's powerful assessment and tutorial system works hand-in-hand with this book.

## Features for Students

MyEconLab puts students in control of their learning through a collection of testing, practice, and study tools. Students can study on their own, or they can complete assignments created by their instructor. In MyEconLab's structured environment, students practice what they learn, test their understanding, and pursue a personalized study plan generated from their performance on sample tests and quizzes. In Homework or Study Plan mode, students have access to a wealth of tutorial features, including the following:

◗ Instant feedback on exercises taken directly from the text helps students understand and apply the concepts.

◗ Links to the eText version of this textbook allow the student to quickly revisit a concept or an explanation.

◗ Enhanced Pearson eText, available within the online course materials and offline via an iPad/Android app, allows instructors and students to highlight, bookmark, and take notes.

◗ Learning aids help students analyze a problem in small steps, much the same way an instructor would do during office hours.

◗ Temporary Access for students who are awaiting financial aid provides a 14-day grace period of temporary access.

## Experiments in MyEconLab

Experiments are a fun and engaging way to promote active learning and mastery of important economic concepts. Pearson's Experiment program is flexible and easy for instructors and students to use.

◗ Single-player experiments allow students to play against virtual players from anywhere at any time they have an Internet connection.

◗ Multiplayer experiments allow instructors to assign and manage a real-time experiment with their classes.

◗ Pre- and post-questions for each experiment are available for assignment in MyEconLab.

For a complete list of available experiments, visit **www.myeconlab.com**.

## Features for Instructors

MyEconLab includes comprehensive homework, quiz, text, and tutorial options, where instructors can manage all assessment needs in one program.

◗ All of the end-of-chapter questions are available for assignment and auto-grading.

◗ Test Item File questions are available for assignment or testing.

◗ The Custom Exercise Builder allows instructors the flexibility of creating their own problems for assignments.

◗ The powerful Gradebook records each student's performance and time spent on the tests, study plan, and homework and can generate reports by student or by chapter.

◗ Advanced Communication Tools enable students and instructors to communicate through email, discussion board, chat, and ClassLive.

◗ Customization options provide new and enhanced ways to share documents, add content, and rename menu items.

◗ A prebuilt course option provides a turn-key method for instructors to create a MyEconLab course that includes assignments by chapter.

# Supplements

A full range of supplementary materials to support teaching and learning accompanies this book.

◗ The *Online Instructor's Manual* by Souren Soumbatiants of Franklin University has many useful and creative teaching ideas. It also offers additional discussion questions, and provides solutions for all the end-of-chapter questions in the text.

◗ The *Online Test Bank* by Todd Fitch of the University of California, Berkeley, features problems of varying levels of complexity, suitable for homework assignments and exams. Many of these multiple-choice questions draw on current events.

◗ The *Computerized Test Bank* reproduces the Test Bank material in the TestGen software, which is available for Windows and Macintosh. With TestGen, instructors can easily edit existing questions, add questions, generate tests, and print the tests in a variety of formats.

◗ The *Online PowerPoint Presentation* by Nelson Altamirano of National University contains text figures and tables, as well as lecture notes. These slides allow instructors to walk through examples from the text during in-class presentations.

These teaching resources are available online for download at the Instructor Resource Center, **www.pearsonhighered.com/perloff**, and on the catalog page for *Managerial Economics and Strategy*.

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J. M. P.

J. A. B.

# Introduction

<div align="right">

# 1

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*An Economist's Theory of Reincarnation: If you're good, you come back on a higher level. Cats come back as dogs, dogs come back as horses, and people—if they've been very good like George Washington—come back as money.*

I f all the food, clothing, entertainment, and other goods and services we wanted were freely available, no one would study economics, and we would not need managers. However, most of the good things in life are scarce. We cannot have everything we want. Consumers cannot consume everything but must make choices about what to purchase. Similarly, managers of firms cannot produce everything and must make careful choices about what to produce, how much to produce, and how to produce it. Studying such choices is the main subject matter of economics. **Economics** is the study of decision making in the presence of scarcity.[1]

   **Managerial economics** is the application of economic analysis to managerial decision making. Managerial economics concentrates on how managers make economic decisions by allocating the scarce resources at their disposal. To make good decisions, a manager must understand the behavior of other decision makers, such as consumers, workers, other managers, and governments. In this book, we examine decision making by such participants in the economy, and we show how managers can use this understanding to be successful.

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**Main Topics**

**In this chapter, we examine two main topics:**

1. **Managerial Decision Making:** Economic analysis helps managers develop strategies to achieve a firm's objective—such as maximizing profit—in the presence of scarcity.
2. **Economic Models:** Managers use models based on economic theories to help make predictions about consumer and firm behavior, and as an aid to managerial decision making.

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## 1.1  Managerial Decision Making

A firm's managers allocate the limited resources available to them to achieve the firm's objectives. The objectives vary for different managers within a firm. A production manager's objective is normally to achieve a production target at the lowest possible cost. A marketing manager must allocate an advertising budget to promote the product most effectively. Human resource managers design compensation systems

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[1]Many dictionaries define economics as the study of the production, distribution, and consumption of goods and services. However, professional economists think of economics as applying more broadly, including any decisions made subject to scarcity.

to encourage employees to work hard. The firm's top manager must coordinate and direct all these activities.

Each of these tasks is constrained by resource scarcity. At any moment in time, a production manager has to use the existing factory and a marketing manager has a limited marketing budget. Such resource limitations can change over time but managers always face constraints.

## Profit

Most private sector firms want to maximize *profit*, which is the difference between revenue and cost. The job of the senior manager in a firm, usually called the *chief executive officer* (CEO), is to focus on the *bottom line*: maximizing profit.

The CEO orders the production manager to minimize the cost of producing the particular good or service, asks the market research manager to determine how many units can be sold at any given price, and so forth. Minimizing cost helps the firm to maximize profit, but the CEO must also decide how much output to produce and what price to charge. It is the job of the CEO (and other senior executives) to ensure that all managerial functions are coordinated so that the firm makes as much profit as possible. It would be a major coordination failure if the marketing department set up a system of pricing and advertising based on selling 8,000 units a year, while the production department managed to produce only 2,000 units.

The CEO is also often concerned with how a firm is positioned in a market relative to its rivals. Senior executives at Coca-Cola and Pepsi spend a lot of time worrying about each other's actions. Managers in such situations have a natural tendency to view business rivalries like sporting events, with a winner and a loser. However, it is critical to the success of any firm that the CEO focus on maximizing the firm's profit rather than beating a rival.

## Trade-Offs

People and firms face trade-offs because they can't have everything. Managers must focus on the trade-offs that directly or indirectly affect profits. Evaluating trade-offs often involves *marginal* reasoning: considering the effect of a small change. Key trade-offs include:

◗ **How to produce:** To produce a given level of output, a firm must use more of one input if it uses less of another input. Car manufacturers choose between metal and plastic for many parts, which affects the car's weight, cost, and safety.

◗ **What prices to charge:** Some firms, such as farms, have little or no control over the prices at which their goods are sold and must sell at the price determined in the market. However, many other firms set their prices. When a manager of such a firm sets the price of a product, the manager must consider whether raising the price by a dollar increases the profit margin on each unit sold by enough to offset the loss from selling fewer units. Consumers, given their limited budgets, buy fewer units of a product when its price rises. Thus, ultimately, the manager's pricing decision is constrained by the scarcity under which consumers make decisions.

## Other Decision Makers

It is important for managers of a firm to understand how decisions made by consumers, workers, managers of other firms, and governments constrain their firm. Consumers purchase products subject to their limited budgets. Workers decide on which jobs to take and how much to work given their scarce time and limits on their abilities. Rivals may introduce new, superior products or cut the prices of existing products. Governments around the world may tax, subsidize, or regulate products.

Thus, managers must understand how others make decisions. Most economic analysis is on the assumption that decision makers are maximizers: they do the best they can with their limited resources. However, economists also consider some contexts in which economic decision makers do not successfully maximize for a variety of psychological reasons—a topic referred to as *behavioral economics*.

Interactions between economic decision makers take place primarily in markets. A **market** is an exchange mechanism that allows buyers to trade with sellers. A market may be a town square where people go to trade food and clothing, or it may be an international telecommunications network over which people buy and sell financial securities. When we talk about a single market, we refer to trade in a single good or group of goods that are closely related, such as soft drinks, movies, novels, or automobiles. The primary participants in a market are firms that supply the product and consumers who buy it, but government policies such as taxes also play an important role in the operation of markets.

## Strategy

When interacting with a small number of rival firms, a manager uses a strategy—a battle plan that specifies the *actions* or *moves* that the manager will make to maximize the firm's profit. A CEO's strategy might involve choosing the level of output, the price, or advertising now and possibly in the future. In setting its production levels and price, Pepsi's managers must consider what choices Coca-Cola's managers will make. One tool that is helpful in understanding and developing such strategies is *game theory*, which we use in several chapters.

# 1.2 Economic Models

Economists use economic models to explain how managers and other decision makers make decisions and to explain the resulting market outcomes. A **model** is a description of the relationship between two or more variables. Models are used in many fields. For example, astronomers use models to describe and predict the movement of comets and meteors, medical researchers use models to describe and predict the effect of medications on diseases, and meteorologists use models to predict weather.

Business economists construct models dealing with economic variables and use such models to describe and predict how a change in one variable will affect another. Such models are useful to managers in predicting the effects of their decisions and in understanding the decisions of others. Models allow managers to consider hypothetical situations—to use a *what-if analysis*—such as "What would happen if we raised our prices by 10%?" or "Would profit rise if we phased out one of our product lines?" Models help managers predict answers to what-if questions and to use those answers to make good decisions.

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| **Mini-Case**<br><br>**Using an Income Threshold Model in China** | According to an *income threshold model*, no one who has an income level below a particular threshold buys a particular consumer durable, such as a refrigerator or car. The theory also holds that almost everyone whose income is above that threshold buys the product.<br><br>If this theory is correct, we predict that, as most people's incomes rise above the threshold in emergent economies, consumer durable purchases will increase from near zero to large numbers virtually overnight. This prediction is consistent with evidence from Malaysia, where the income threshold for buying a car is about $4,000.<br><br>In China, incomes have risen rapidly and now exceed the threshold levels for many types of durable goods. As a result, many experts correctly predicted that the greatest consumer durable goods sales boom in history would take place there. Anticipating this boom, many companies have greatly increased their investments in durable goods manufacturing plants in China. Annual foreign direct investments have gone from $916 million a year in 1983 to $116 billion in 2011. In expectation of this growth potential, even traditional political opponents of the People's Republic—Taiwan, South Korea, and Russia—are investing in China.<br><br>One of the most desirable durable goods is a car. Li Rifu, a 46-year-old Chinese farmer and watch repairman, thought that buying a car would improve the odds that his 22- and 24-year-old sons would find girlfriends, marry, and produce grandchildren. Soon after Mr. Li purchased his Geely King Kong for the equivalent of $9,000, both sons met girlfriends, and his older son got married. Four-fifths of all new cars sold in China are bought by first-time customers. An influx of first-time buyers was responsible for China's ninefold increase in car sales from 2000 to 2009. By 2010, China became the second largest producer of automobiles in the world, trailing only Germany. In addition, foreign automobile companies built Chinese plants. For example, Ford invested $600 million in its Chongqing factory in 2012.[2] |

## Simplifying Assumptions

*Everything should be made as simple as possible, but not simpler.* —Albert Einstein

A model is a simplification of reality. The objective in building a model is to include the essential issues, while leaving aside the many complications that might distract us or disguise those essential elements. For example, the income threshold model focuses on only the relationship between income and purchases of durable goods. Prices, multiple car purchases by a single consumer, and other factors that might affect durable goods purchases are left out of the model. Despite these simplifications, the model—if correct—gives managers a good general idea of how the automobile market is likely to evolve in countries such as China.

We have described the income threshold model in words, but we could have presented it using graphs or mathematics. Representing economic models using mathematical formulas in spreadsheets has become very important in managerial decision making. Regardless of how the model is described, an economic model is a simplification of reality that contains only its most important features. Without simplifications, it is difficult to make predictions because the real world is too complex to analyze fully.

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[2]The sources for Mini-Cases are available at the back of the book.

Economists make many *assumptions* to simplify their models. When using the income threshold model to explain car purchasing behavior in China, we *assume* that factors other than income, such as the color of cars, do not have an important effect on the decision to buy cars. Therefore, we ignore the color of cars that are sold in China in describing the relationship between income and the number of cars consumers want. If this assumption is correct, by ignoring color, we make our analysis of the auto market simpler without losing important details. If we're wrong and these ignored issues are important, our predictions may be inaccurate. Part of the skill in using economic models lies in selecting a model that is appropriate for the task at hand.

## Testing Theories

*Blore's Razor: When given a choice between two theories, take the one that is funnier.*

Economic *theory* refers to the development and use of a model to test *hypotheses*, which are proposed explanations for some phenomenon. A useful theory or hypothesis is one that leads to clear, testable predictions. A theory that says "If the price of a product rises, the quantity demanded of that product falls" provides a clear prediction. A theory that says "Human behavior depends on tastes, and tastes change randomly at random intervals" is not very useful because it does not lead to testable predictions and provides little explanation of the choices people make.

Economists test theories by checking whether the theory's predictions are correct. If a prediction does not come true, they might reject the theory—or at least reduce their confidence in the theory. Economists use a model until it is refuted by evidence or until a better model is developed for a particular use.

A good model makes sharp, clear predictions that are consistent with reality. Some very simple models make sharp or precise predictions that are incorrect. Some more realistic and therefore more complex models make ambiguous predictions, allowing for any possible outcome, so they are untestable. Neither incorrect models nor untestable models are helpful. The skill in model building lies in developing a model that is simple enough to make clear predictions but is realistic enough to be accurate. Any model is only an approximation of reality. A good model is one that is a close enough approximation to be useful.

Although economists agree on the methods they use to develop and apply testable models, they often disagree on the specific content of those models. One model might present a logically consistent argument that prices will go up next quarter. Another, using a different but equally logical theory, may contend that prices will fall next quarter. If the economists are reasonable, they will agree that pure logic alone cannot resolve their dispute. Indeed, they will agree that they'll have to use empirical evidence—facts about the real world—to find out which prediction is correct. One goal of this book is to teach managers how to think like economists so that they can build, apply, and test economic models to deal with important managerial problems.

## Positive and Normative Statements

Economic analysis sometimes leads to predictions that seem undesirable or cynical. For instance, an economist doing market research for a producer of soft drinks might predict that "if we double the amount of sugar in this soft drink we will significantly increase sales to children." An economist making such a statement is not seeking to undermine the health of children by inducing them to consume excessive amounts of sugar. The economist is only making a scientific prediction about the relationship between cause and effect: more sugar in soft drinks is appealing to children.

Such a scientific prediction is known as a **positive statement**: a testable hypothesis about matters of fact such as cause-and-effect relationships. *Positive* does not mean that we are certain about the truth of our statement; it indicates only that we can test the truth of the statement.

An economist may test the hypothesis that the quantity of soft drinks demanded decreases as the price increases. Some may conclude from that study that "The government should tax soft drinks so that people will not consume so much sugar." Such a statement is a value judgment. It may be based on the view that people *should* be protected from their own unwise choices, so the government *should* intervene.

This judgment is *not* a scientific prediction. It is a **normative statement**: a belief about whether something is good or bad. A normative statement cannot be tested because a value judgment cannot be refuted by evidence. A normative statement concerns what somebody believes *should* happen; a positive statement concerns what *is* or what *will* happen. Normative statements are sometimes called *prescriptive* statements because they prescribe a course of action, while positive statements are sometimes called *descriptive* statements because they describe reality. Although a normative conclusion can be drawn without first conducting a positive analysis, a policy debate will be better informed if a positive analysis is conducted first.[3]

Good economists and managers emphasize positive analysis. This emphasis has implications for what we study and even for our use of language. For example, many economists stress that they study people's *wants* rather than their *needs*. Although people need certain minimum levels of food, shelter, and clothing to survive, most people in developed economies have enough money to buy goods well in excess of the minimum levels necessary to maintain life. Consequently, in wealthy countries, calling something a "need" is often a value judgment. You almost certainly have been told by some elder that "you *need* a college education." That person was probably making a value judgment—"you *should* go to college"—rather than a scientific prediction that you will suffer terrible economic deprivation if you do not go to college. We can't test such value judgments, but we can test a (positive) hypothesis such as "Graduating from college or university increases lifetime income."

## SUMMARY

**1. Managerial Decision Making.** Economic analysis helps managers develop strategies to pursue their objectives effectively in the presence of scarcity. Various managers within a firm face different objectives and different constraints, but the overriding objective in most private-sector firms is to maximize profits. Making decisions subject to constraints implies making trade-offs. To make good managerial decisions, managers must understand how consumers, workers, other managers, and governments will act. Economic theories normally (but not always) assume that all decision makers attempt to maximize their well-being given the constraints they face.

**2. Economic Models.** Managers use models based on economic theories to help make predictions and decisions, which they use to run their firms. A good model is simple to use and makes clear, testable predictions that are supported by evidence. Economists use models to construct *positive* hypotheses such as causal statements linking changes in one variable, such as income, to its effects, such as purchases of automobiles. These positive propositions can be tested. In contrast, *normative* statements, which are value judgments, cannot be tested.

[3]Some argue that, as (social) scientists, we economists should present only positive analyses. Others argue that we shouldn't give up our right to make value judgments just like the next person (who happens to be biased, prejudiced, and pigheaded, unlike us).

# Supply and Demand

# 2

*Talk is cheap because supply exceeds demand.*

Burning fossil fuels such as gasoline, coal, and heating oil releases gases containing carbon into the atmosphere.[1] These "greenhouse" gases are widely believed to contribute to global warming. To reduce this problem and raise tax revenues, many environmentalists and political leaders have proposed levying a *carbon tax* on the carbon content in fossil fuels.[2]

When governments impose carbon taxes on gasoline, managers of firms that sell gasoline need to think about how much of the tax they have to absorb and how much they can pass through to firms and consumers who buy gasoline. Similarly, managers of firms that purchase gasoline must consider how any pass-through charges will affect their costs of shipping, air travel, heating, and production. This pass-through analysis is critical in making short-run managerial decisions concerning how much to produce, whether to operate or shut down, and how to set prices and make long-run decisions such as whether to undertake capital investments.

The first broad-based carbon taxes on fuels containing carbon (such as gasoline) were implemented in Finland and Sweden at the beginning of the 1990s. Various other European countries soon followed suit. However, strong opposition to carbon taxes has limited adoption in the United States and Canada. The first North American carbon tax was not introduced until 2006 in Boulder, Colorado, where it was applied to only electricity generation. In 2007 and 2008, the Canadian provinces of Quebec and British Columbia became the first provinces or states in North America to impose a broad-based carbon tax. Australia adopted a carbon tax in 2012. During the 2012–2013 U.S. federal government budget negotiations, several Congressional leaders called for carbon taxes to help balance the budget.

Such carbon taxes harm some industries and help others. The tax hurts owners and managers of gasoline retailing firms, who need to consider whether they can stay in business in the face of a significant carbon tax. Shippers and

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[1]Each chapter from Chapter 2 on begins with a Managerial Problem that contains a specific question, which is answered at the end of the chapter using the theories presented in the chapter. Sources for the Managerial Problems, Mini-Cases, and Managerial Implications appear at the back of the book.

[2]Their political opponents object, claiming that fears about global warming are exaggerated and warning of large price increases from such taxes.

manufacturers that use substantial amounts of fuel in production, as well as other firms, would also see their costs of operating rise.

Although a carbon tax harms some firms and industries, it creates opportunities for others. For example, wind power, which is an alternative to fossil fuels in generating electricity, would become much more attractive. Anticipating greater opportunities in this market in the future, Google invested nearly $1 billion in wind and other renewable energy as of 2012. In 2013, Warren Buffett acquired two utility-scale solar plants in Southern California for between $2 and $2.5 billion. DONG Energy A/S and Iberdrola (IBE) SA's Scottish Power unit announced that they would invest £1.6 billion ($2.6 billion) to build a large wind farm off northwest England by 2014.

Motor vehicle sector managers would need to consider whether to change their product mix in response to a carbon tax, perhaps focusing more on fuel-efficient vehicles. Even without a carbon tax, recent increases in gasoline prices have induced consumers to switch from sport utility vehicles (SUVs) to smaller cars. A carbon tax would favor fuel-efficient vehicles even more.

At the end of this chapter, we will return to this topic and answer a question of critical importance to managers in the motor vehicle industry and in other industries affected by gasoline prices: What will be the effect of imposing a carbon tax on the price of gasoline?

To analyze the price and other effects of carbon taxes, managers use an economic tool called the *supply-and-demand model*. Managers who are able to anticipate and act on the implications of the supply-and-demand model by responding quickly to changes in economic conditions, such as tax changes, make more profitable decisions.

The supply-and-demand model provides a good description of many markets and applies particularly well to markets in which there are many buyers and many sellers, as in most agricultural markets, much of the construction industry, many retail markets (such as gasoline retailing), and several other major sectors of the economy. In markets where this model is applicable, it allows us to make clear, testable predictions about the effects of new taxes or other shocks on prices and other market outcomes.

## Main Topics

**In this chapter, we examine six main topics**

1. **Demand:** The quantity of a good or service that consumers demand depends on price and other factors such as consumer incomes and the prices of related goods.

2. **Supply:** The quantity of a good or service that firms supply depends on price and other factors such as the cost of inputs and the level of technological sophistication used in production.

3. **Market Equilibrium:** The interaction between consumers' demand and producers' supply determines the market price and quantity of a good or service that is bought and sold.

4. **Shocks to the Equilibrium:** Changes in a factor that affect demand (such as consumer income) or supply (such as the price of inputs) alter the market price and quantity sold of a good or service.

5. **Effects of Government Interventions:** Government policy may also affect the equilibrium by shifting the demand curve or the supply curve, restricting price or quantity, or using taxes to create a gap between the price consumers pay and the price firms receive.

6. **When to Use the Supply-and-Demand Model:** The supply-and-demand model applies very well to highly competitive markets, which are typically markets with many buyers and sellers.

# 2.1 **Demand**

Consumers decide whether to buy a particular good or service and, if so, how much to buy based on its price and on other factors, including their incomes, the prices of other goods, their tastes, and the information they have about the product. Government regulations and other policies also affect buying decisions. Before concentrating on the role of price in determining quantity demanded, let's look briefly at some other factors.

*Income* plays a major role in determining what and how much to purchase. People who suddenly inherit great wealth might be more likely to purchase expensive Rolex watches or other luxury items and would probably be less likely to buy inexpensive Timex watches and various items targeted toward lower-income consumers. More broadly, when a consumer's income rises, that consumer will often buy more of many goods.

The *price of a related good* might also affect consumers' buying decisions. Related goods can be either *substitutes* or *complements*. A substitute good is a good that might be used or consumed instead of the good in question. Before deciding to go to a movie, a consumer might consider the prices of potential substitutes such as streaming a movie purchased online or going to a sporting event or a concert. Streaming movies, sporting events, and concerts compete with movie theaters for the consumer's entertainment dollar. If sporting events are too expensive, many consumers might choose to see movies instead. Different brands of essentially the same good are often very close substitutes. Before buying a pair of Levi's jeans, a customer might check the prices of other brands and substitute one of those brands for Levi's if its price is sufficiently attractive.

A complement is a good that is used with the good under consideration. Digital audio players such as the iPod application (app) for the iPhone and online audio recordings are complements because consumers obtain recordings online and then download them to audio players to listen to them. A decline in the price of digital audio players would affect the demand for online music. As consumers respond to the decline in the price of audio players by purchasing more such devices, they would also be more inclined to purchase and download online music. Thus, sellers of online music would experience an increase in demand for their product arising from the price decline of a complementary good (audio players).

Consumers' *tastes* are important in determining their demand for a good or service. Consumers do not purchase foods they dislike or clothes they view as unfashionable or uncomfortable. The importance of fashion illustrates how changing tastes affect consumer demand. Clothing items that have gone out of fashion can often be found languishing in discount sections of clothing stores even though they might have been readily purchased at high prices a couple of years (or even a few weeks) earlier when they were in fashion. Firms devote significant resources to trying to change consumer tastes through advertising.

Similarly, *information* about the effects of a good has an impact on consumer decisions. In recent years, as positive health outcomes have been linked to various food items, demand for these healthy foods (such as soy products and high-fiber breads) has typically risen when the information became well known.

*Government rules and regulations* affect demand. If a city government bans the use of skateboards on its streets, demand for skateboards in that city falls. Governments might also restrict sales to particular groups of consumers. For example, many political jurisdictions do not allow children to buy tobacco products, which reduces the quantity of cigarettes consumed.