

Microeconomics *for* Today

7e



Irvin B. Tucker

Dear Student,

My objective in writing this book is to provide you with everything you need for success in the course and to improve your ability to make better decisions in your everyday life – especially understanding economic issues in the news. My writing style is intended to be engaging, clear, and straightforward with an emphasis on real-world applications. As I was writing the text, I viewed myself explaining the concepts to a student in my office. As a result, there is a conversational tone to the text. To avoid boredom, the text uses a fast-paced, action-packed approach that explains all essential concepts without becoming an encyclopedia.

As a principles of economics instructor for over 30 years, I know from first-hand experience that many students are apprehensive about taking economics. In fact, I still recall vividly that, as a freshman about to take my first economics course, I had only the vaguest idea of what this subject was about. To my delight, my freshman principles of economics course opened my eyes to a new way of thinking. And my years of teaching this powerful reasoning process inspired me to try to write a text that conveyed my excitement about economics to students.

Please read through the preface, which takes you on a tour of the special pedagogical features and ancillary materials that have been created to help you maximize your learning experience with this textbook.

Regards,

Irvin Tucker

Irvin Tucker



7TH EDITION

MICROECONOMICS *for* Today

IRVIN B. TUCKER
UNIVERSITY OF NORTH CAROLINA CHARLOTTE



Australia • Brazil • Japan • Korea • Mexico • Singapore • Spain • United Kingdom • United States

This is an electronic version of the print textbook. Due to electronic rights restrictions, some third party content may be suppressed. Editorial review has deemed that any suppressed content does not materially affect the overall learning experience. The publisher reserves the right to remove content from this title at any time if subsequent rights restrictions require it. For valuable information on pricing, previous editions, changes to current editions, and alternate formats, please visit www.cengage.com/highered to search by ISBN#, author, title, or keyword for materials in your areas of interest.

**Microeconomics for Today,
Seventh Edition**
Irvin B. Tucker

Vice President, Editorial Director:
Jack W. Calhoun

Publisher: Joe Sabatino

Senior Acquisitions Editor: Steven Scoble
Developmental Editor: Michael
Guendelsberger

Senior Marketing Manager: John Carey

Senior MarCom Manager: Sarah Greber

Content Project Manager: Kelly Hillerich

Editorial Assistant: Allyn Bismeyer

Marketing Coordinator: Suellen Ruttkay

Media Editor: Deepak Kumar

Senior Frontlist Buyer, Manufacturing:
Sandra Milewski

Production Service: PreMediaGlobal

Senior Art Director: Michele Kunkler

Cover and Internal Designer: Kim Torbeck/
Imbue Design

Cover Image: © Media Bakery;
© IMAGEMORE Co, Ltd.

© 2011, 2009 South-Western, a part of Cengage Learning

ALL RIGHTS RESERVED. No part of this work covered by the copyright herein may be reproduced, transmitted, stored or used in any form or by any means graphic, electronic, or mechanical, including but not limited to photocopying, recording, scanning, digitizing, taping, Web distribution, information networks, or information storage and retrieval systems, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without the prior written permission of the publisher.

For product information and technology assistance, contact us at
Cengage Learning Customer & Sales Support, 1-800-354-9706

For permission to use material from this text or product,
submit all requests online at cengage.com/permissions
Further permissions questions can be emailed to
permissionrequest@cengage.com

Library of Congress Control Number: 2010934780

ISBN 13: 978-0-538-46941-8

ISBN 10: 0-538-46941-2

South-Western Cengage Learning

5191 Natorp Boulevard
Mason, OH 45040
USA

Cengage Learning is a leading provider of customized learning solutions with office locations around the globe, including Singapore, the United Kingdom, Australia, Mexico, Brazil, and Japan. Locate your local office at:
international.cengage.com/region

Cengage Learning products are represented in Canada by
Nelson Education, Ltd.

For your course and learning solutions, visit **academic.cengage.com**

Purchase any of our products at your local college store or at our preferred online store **www.cengagebrain.com**

Printed in Canada

1 2 3 4 5 6 7 14 13 12 11 10

IRVIN B. TUCKER

Irvin B. Tucker has over thirty years of experience teaching introductory economics at the University of North Carolina Charlotte. He earned his B.S. in economics at N.C. State University and his M.A. and Ph.D. in economics from the University of South Carolina. Dr. Tucker is former director of the Center for Economic Education at the University of North Carolina Charlotte and a longtime member of the National Council on Economic Education. He is recognized for his ability to relate basic principles to economic issues and public policy. His work has received national recognition by being awarded the Meritorious Levy Award for Excellence in Private Enterprise Education, the Federation of Independent Business Award for Postsecondary Educator of the Year in Entrepreneurship and Economic Education, and the Freedom Foundation's George Washington Medal for Excellence in Economic Education. In addition, his research has been published in numerous professional journal articles on a wide range of topics including industrial organization, entrepreneurship, and economics of education. Dr. Tucker is also the author of the highly successful *Survey of Economics*, seventh edition, a text for the one-semester principles of economics courses, published by Cengage South-Western Publishing.

Brief Contents

PART 1	Introduction to Economics	1
Chapter 1	Introducing the Economic Way of Thinking Appendix to Chapter 1: Applying Graphs to Economics	2 21
Chapter 2	Production Possibilities, Opportunity Cost, and Economic Growth	34
PART 2	Microeconomic Fundamentals	57
Chapter 3	Market Demand and Supply Appendix to Chapter 3: Consumer Surplus, Producer Surplus, and Market Efficiency	58 91
Chapter 4	Markets in Action Appendix to Chapter 4: Applying Supply and Demand Analysis to Health Care	100 125
Chapter 5	Price Elasticity of Demand and Supply	129
Chapter 6	Consumer Choice Theory Appendix to Chapter 6: Indifference Curve Analysis	153 168
Chapter 7	Production Costs	181
PART 3	Market Structures	211
Chapter 8	Perfect Competition	212
Chapter 9	Monopoly	240
Chapter 10	Monopolistic Competition and Oligopoly	267
Chapter 11	Labor Markets	294
PART 4	Microeconomic Policy Issues	321
Chapter 12	Income Distribution, Poverty, and Discrimination	322
Chapter 13	Antitrust and Regulation	348
Chapter 14	Environmental Economics	373
PART 5	The International Economy	401
Chapter 15	International Trade and Finance	402
Chapter 16	Economies in Transition	434
Chapter 17	Growth and the Less-Developed Countries	457

Appendix A	Answers to Odd-Numbered Study Questions and Problems	481
Appendix B	Answers to Practice Quizzes	495
Appendix C	Answers to Road Map Questions	497
Glossary		498
Index		511

Contents

About the Author	iii
Preface	xvi

1

PART 1

<i>Introduction to Economics</i>	1

CHAPTER 1

<i>Introducing the Economic Way of Thinking</i>	2

The Problem of Scarcity	3

Scarce Resources and Production	3

Economics: The Study of Scarcity and Choice	5

The Methodology of Economics	6

CHECKPOINT Can You Prove There Is No Trillion-Dollar Person?	9

Hazards of the Economic Way of Thinking	9

CHECKPOINT Should Nebraska State Join a Big-Time Athletic Conference?	10

YOU'RE THE ECONOMIST Mops and Brooms, the Boston Snow Index, the Super Bowl, and Other Economic Indicators	11

Why Do Economists Disagree?	12

Careers in Economics	13

YOU'RE THE ECONOMIST Does Raising the Minimum Wage Help the Working Poor?	14

APPENDIX TO CHAPTER 1

<i>Applying Graphs to Economics</i>	21

A Direct Relationship	21

An Inverse Relationship	23

The Slope of a Straight Line	24

The Slope of a Curve	26

A Three-Variable Relationship in One Graph	27

A Helpful Study Hint for Using Graphs	29

CHAPTER 2

<i>Production Possibilities, Opportunity Cost, and Economic Growth</i>	34
Three Fundamental Economic Questions	35
Opportunity Cost	36
Marginal Analysis	37
The Production Possibilities Curve	38
The Law of Increasing Opportunity Costs	40
Sources of Economic Growth	42
YOU'RE THE ECONOMIST FedEx Wasn't an Overnight Success	45
CHECKPOINT What Does a War on Terrorism Really Mean?	45
Present Investment and the Future Production Possibilities Curve	46
GLOBAL ECONOMICS How Does Public Capital Affect a Nation's Curve?	47
PART 1 ROAD MAP	54

PART 2

<i>Microeconomic Fundamentals</i>	57

CHAPTER 3

<i>Market Demand and Supply</i>	58
The Law of Demand	59
The Distinction Between Changes in Quantity Demanded and Changes in Demand	61
Nonprice Determinants of Demand	63
CHECKPOINT Can Gasoline Become an Exception to the Law of Demand?	66
The Law of Supply	68
CHECKPOINT Can the Law of Supply Be Repealed for the Oil Market?	70
The Distinction Between Changes in Quantity Supplied and Changes in Supply	70
Nonprice Determinants of Supply	74
YOU'RE THE ECONOMIST PC Prices: How Low Can They Go?	75
GLOBAL ECONOMICS The Market Approach to Organ Shortages	78



A Market Supply and Demand Analysis	78
Rationing Function of the Price System	82
CHECKPOINT Can the Price System Eliminate Scarcity?	82
APPENDIX TO CHAPTER 3	
<i>Consumer Surplus, Producer Surplus, and Market Efficiency</i>	91
Consumer Surplus	91
Producer Surplus	92
Market Efficiency	94
CHAPTER 4	
<i>Markets in Action</i>	100
Changes in Market Equilibrium	101
CHECKPOINT Why the Higher Price for Ethanol Fuel?	104
Can the Laws of Supply and Demand Be Repealed?	105
YOU'RE THE ECONOMIST Rigging the Market for Milk	110
CHECKPOINT Is There Price-Fixing at the Ticket Window?	111
YOU'RE THE ECONOMIST Can Vouchers Fix Our Schools?	116
CHECKPOINT Should There Be a War on Drugs?	118
APPENDIX TO CHAPTER 4	
<i>Applying Supply and Demand Analysis to Health Care</i>	125
The Impact of Health Insurance	125
Shifts in the Demand for Health Care	127
Shifts in the Supply of Health Care	128
CHAPTER 5	
<i>Price Elasticity of Demand and Supply</i>	129
Price Elasticity of Demand	130
Price Elasticity of Demand Variations Along a Demand Curve	135
CHECKPOINT Will Fliers Flock to Low Summer Fares?	138
Determinants of Price Elasticity of Demand	138
CHECKPOINT Can Trade Sanctions Affect Elasticity of Demand for Cars?	139

YOU'RE THE ECONOMIST Cigarette Smoking Price Elasticity of Demand	140
Other Elasticity Measures	141
CHECKPOINT Can Honda Compete with Itself?	146
 CHAPTER 6	
<i>Consumer Choice Theory</i>	153
From Utility to the Law of Demand	154
YOU'RE THE ECONOMIST Why is Water Less Expensive than Diamonds?	156
CHECKPOINT When Dining Out, Do You Eat Smart?	159
Income and Substitution Effects and the Law of Demand	160
YOU'RE THE ECONOMIST Testing the Law of Demand with White Rats	161
CHECKPOINT Does the Substitution Effect Apply to Buying a Car?	162
 APPENDIX TO CHAPTER 6	
<i>Indifference Curve Analysis</i>	168
Constructing an Indifference Curve	168
Why Indifference Curves Are Downward-Sloping and Convex	168
The Indifference Map	170
The Budget Line	171
A Consumer Equilibrium Graph	173
Derivation of the Demand Curve	174
 CHAPTER 7	
<i>Production Costs</i>	181
Costs and Profit	182
CHECKPOINT Should the Professor Go or Stay?	184
Short-Run Production Costs	184
Short-Run Cost Formulas	187
Marginal Cost Relationships	191
CHECKPOINT Did Michael Jordan Beat the Marginal-Average Rule?	193

Long-Run Production Costs	195
Different Scales of Production	196
YOU'RE THE ECONOMIST Why is That Web Site You're Using Free?	199
PART 2 ROAD MAP	207



PART 3

Market Structures 211

CHAPTER 8

Perfect Competition 212

Perfect Competition	213
Short-Run Profit Maximization for a Perfectly Competitive Firm	215
Short-Run Loss Minimization for a Perfectly Competitive Firm	220
CHECKPOINT Should Motels Offer Rooms at the Beach for Only \$50 a Night?	222
Short-Run Supply Curves Under Perfect Competition	223
Long-Run Supply Curves Under Perfect Competition	226
CHECKPOINT Are You in Business for the Long Run?	227
Three Types of Long-Run Supply Curves	228
YOU'RE THE ECONOMIST Gators Snapping Up Profits	232

CHAPTER 9

Monopoly 240

The Monopoly Market Structure	241
GLOBAL ECONOMICS Monopolies Around the World	244
Price and Output Decisions for a Monopolist	245
YOU'RE THE ECONOMIST The Standard Oil Monopoly	253
Price Discrimination	254
CHECKPOINT Why Don't Adults Pay More for Popcorn at the Movies?	256
Comparing Monopoly and Perfect Competition	256

YOU'RE THE ECONOMIST New York Taxicabs: Where Have All the Fare Flags Gone?	259
The Case Against and for Monopoly	259
 CHAPTER 10	
<i>Monopolistic Competition and Oligopoly</i>	267
The Monopolistic Competition Market Structure	268
The Monopolistically Competitive Firm as a Price Maker	269
YOU'RE THE ECONOMIST Social Networking Sites: The New Advertising Game	272
Price and Output Decisions for a Monopolistically Competitive Firm	273
Comparing Monopolistic Competition and Perfect Competition	274
The Oligopoly Market Structure	277
Price and Output Decisions for an Oligopolist	279
GLOBAL ECONOMICS Major Cartels in Global Markets	282
YOU'RE THE ECONOMIST How Oligopolists Compete at the Final Four	285
An Evaluation of Oligopoly	286
CHECKPOINT Which Model Fits the Cereal Aisle?	286
Review of the Four Market Structures	287
 CHAPTER 11	
<i>Labor Markets</i>	294
The Labor Market Under Perfect Competition	295
Labor Unions: Employee Power	301
Union Membership Around the World	305
Employer Power	306
YOU'RE THE ECONOMIST Should College Athletes Be Paid?	310
CHECKPOINT Can the Minimum Wage Create Jobs?	311
CHECKPOINT If You Don't Like It, Mickey, Take Your Bat and Go Home	311
PART 3 ROAD MAP	317



PART 4

Microeconomic Policy Issues 321

CHAPTER 12

Income Distribution, Poverty, and Discrimination 322

The Distribution of Income 323

Global Comparisons of Income Distribution 329

Poverty 330

Antipoverty Programs 333

Social Security: Past, Present, and Future 334

Reform Proposals 336

YOU'RE THE ECONOMIST Pulling on the Strings of the Welfare Safety Net 338

CHECKPOINT Does a Negative Income Tax Discourage Work? 338

Discrimination 340

CHECKPOINT Should the Law Protect Women? 341

YOU'RE THE ECONOMIST Is Pay for Females Fair? 342

CHAPTER 13

Antitrust and Regulation 348

Antitrust 349

YOU'RE THE ECONOMIST Is Utah Pie's Slice of the Pie Too Small? 353

Key Antitrust Cases 353

CHECKPOINT Does Price-Fixing Improve Your Education? 356

Mergers and Global Antitrust Policy 358

Regulation 359

Three Cases for Government Regulation 360

YOU'RE THE ECONOMIST Who Turned Out the Lights in California? 363

CHECKPOINT Why Doesn't the Water Company Compete? 364

YOU'RE THE ECONOMIST Does Airline Deregulation Mean Friendlier Skies? 365

CHAPTER 14

<i>Environmental Economics</i>	373
Competitive Markets and Environmental Efficiency	374
Achieving Environmental Efficiency	378
GLOBAL ECONOMICS How Should Carbon Emissions Be Reduced: Cap and Trade or Carbon Taxes?	388
GLOBAL ECONOMICS Why Is the Climate Change Problem So Hard to Solve?	390
CHECKPOINT Is It Efficient to Buy Odor-Reducing Technology If You Live Next to a Hog Farm?	393
PART 4 ROAD MAP	399

PART 5

<i>The International Economy</i>	401

CHAPTER 15

<i>International Trade and Finance</i>	402
Why Nations Need Trade	403
Comparative and Absolute Advantage	406
CHECKPOINT Do Nations with an Advantage Always Trade?	408
Free Trade versus Protectionism	408
Arguments for Protection	410
Free Trade Agreements	411
GLOBAL ECONOMICS World Trade Slips on Banana Peel	412
The Balance of Payments	413
Birth of the Euro	414
CHECKPOINT Should Everyone Keep a Balance of Payments?	419
Exchange Rates	419
GLOBAL ECONOMICS Return to the Yellow Brick Road?	426

5

CHAPTER 16

<i>Economies in Transition</i>	434
Basic Types of Economic Systems	435
The “ISMS”	441
GLOBAL ECONOMICS Choosing an Economic System on Another Planet	442
CHECKPOINT To Plan or Not to Plan—That Is the Question	446
Comparing Economic Systems	447
Economies in Transition	448
GLOBAL ECONOMICS China’s Quest for Free Market Reform	450
Privatization versus Nationalization	452

CHAPTER 17

<i>Growth and the Less-Developed Countries</i>	457
Comparing Developed and Less-Developed Countries	458
Economic Growth and Development Around the World	462
CHECKPOINT Does Rapid Growth Mean a Country Is Catching Up?	464
The Helping Hand of Advanced Countries	468
GLOBAL ECONOMICS Hong Kong: A Crouching Pacific Rim Tiger	471
CHECKPOINT Is the Minimum Wage an Antipoverty Solution for Poor Countries?	472
PART 5 ROAD MAP	478

APPENDIX A: Answers to Odd-Numbered Questions and Problems	481
APPENDIX B: Answers to Practice Quizzes	495
APPENDIX C: Answers to Road Map Questions	497
GLOSSARY	498
INDEX	511

Available Versions

Conversion Table for the Four Versions of this Text

<i>Economics for Today</i>	<i>Economics for Today</i>	<i>Macroeconomics for Today</i>	<i>Microeconomics for Today</i>	<i>Survey of Economics</i>
1 Introducing the Economic Way of Thinking	X	X	X	X
2 Production Possibilities, Opportunity Cost, and Economic Growth	X	X	X	X
3 Market Supply and Demand	X	X	X	X
4 Markets in Action	X	X	X	X
5 Price Elasticity of Demand and Supply	X		X	X
6 Consumer Choice Theory	X		X	
7 Production Costs	X		X	X
8 Perfect Competition	X		X	X
9 Monopoly	X		X	X
10 Monopolistic Competition and Oligopoly	X		X	X
11 Labor Markets	X		X	X
12 Income Distribution, Poverty, and Discrimination	X		X	X
13 Antitrust and Regulation	X		X	
14 Environmental Economics	X		X	
15 Gross Domestic Product	X	X		X
16 Business Cycles and Unemployment	X	X		X
17 Inflation	X	X		X
18 The Keynesian Model	X	X		
19 The Keynesian Model in Action	X	X		
20 Aggregate Demand and Supply	X	X		X
21 Fiscal Policy	X	X		X
22 The Public Sector	X	X		X
23 Federal Deficits, Surpluses, and the National Debt	X	X		X
24 Money and the Federal Reserve System	X	X		X
25 Money Creation	X	X		X
26 Monetary Policy	X	X		X
27 The Phillips Curve and Expectations Theory	X	X		
28 International Trade and Finance	X	X	X	X
29 Economies in Transition	X	X	X	X
30 Growth and the Less-Developed Countries	X	X	X	X

Note: Chapter numbers refer to the complete book, *Economics for Today*

TEXT WITH A MISSION

The purpose of *Economics for Today*, Seventh Edition, is to teach, in an engaging style, the basic operations of the U.S. economy to students who will take a two-term economics course. Rather than taking an encyclopedic approach to economic concepts, *Economics for Today* focuses on the most important tool in economics—supply and demand analysis—and applies it to clearly explain real-world economic issues.

Every effort has been made to make *Economics for Today* the most “student friendly” text on the market. This text was written because so many others expose students to a confusing array of economic analyses that force students to simply memorize in order to pass the course. Instead, *Economics for Today* presents a straightforward and unbiased approach that effectively teaches the application of basic economic principles. After reading this text, the student should be able to say “now that economics stuff in the news makes sense.”

HOW IT FITS TOGETHER

The text presents the core principles of microeconomics, macroeconomics, and international economics. The first 14 chapters introduce the logic of economic analysis and develop the core of microeconomic analysis. Here students learn the role of demand and supply in determining prices in competitive versus monopolistic markets. This part of the book explores such issues as minimum wage laws, rent control, and pollution. The next 13 chapters develop the macroeconomics part of the text. Using the modern, yet simple, aggregate demand and aggregate supply model, the text explains measurement of and changes in the price level, national output, and employment in the economy. The study of macroeconomics also includes how the supply of money and the demand for money influence the economy. Finally, the text concludes with three chapters devoted entirely to global issues. For example, students will learn how the supply of and demand for currencies determine exchange rates and what the complications of a strong or a weak dollar are.

TEXT FLEXIBILITY

The full version of *Economics for Today* is easily adapted to an instructor’s preference for the sequencing of microeconomics and macroeconomics topics. The text can be used in a macroeconomic–microeconomic sequence by teaching

the first four chapters and then Parts 5 through 7. Next, microeconomics is covered in Parts 2 through 4. Finally, the course can be completed with Part 8, consisting of three chapters devoted to international economics.

An important design of this text is that it accommodates the two camps for teaching principles of macroeconomics: (1) those who cover both the Keynesian Cross and *AD/AS* models and (2) those who skip the Keynesian model and cover only the *AD/AS* model. For instructors who prefer the former model sequence, *Economics for Today* moves smoothly in Chapters 18–19 (8–9) from the Keynesian model (based on the Great Depression) to the *AD/AS* model in Chapter 20 (10). For instructors using the latter approach, this text is written so that instructors can skip the Keynesian model in Chapters 18–19 (8–9) and proceed from Chapter 17 (7) to Chapter 20 (10) without losing anything. For example, the spending multiplier is completely covered both in the Keynesian and *AD/AS* model chapters.

For instructors who wish to teach the self-correcting *AD/AS* model, emphasis can be placed on the appendixes to Chapters 20 (10) and 26 (16). Instructors who choose not to cover this model can simply skip these appendixes. In short, *Economics for Today* provides more comprehensive and flexible coverage of macroeconomics models than is available in other texts. Also, a customized text might meet your needs. If so, contact your South-Western/Cengage Learning sales representative for information.

HOW NOT TO STUDY ECONOMICS

To some students, studying economics is a little frightening because many chapters are full of graphs. Students often make the mistake of preparing for tests by trying to memorize the lines of graphs. When their graded tests are returned, the students using this strategy will probably exclaim, “What happened?” The answer to this query is that the students should have learned the economic concepts *first*; then they would understand the graphs as *illustrations* of these underlying concepts. Stated simply, superficial cramming for economics quizzes does not work.

For students who are anxious about using graphs, the appendix to Chapter 1 provides a brief review of graphical analysis. In addition, the *Graphing Workshop* and *Study Guide* contain step-by-step features on how to interpret graphs.

CHANGES TO THE SEVENTH EDITION

The basic layout of the seventh edition remains the same. The following are changes:

- Chapter 1 recognizes that students taking introductory college-level economics courses are considering their major. One reason to select

economics is that the average starting salary for an undergraduate economics major is higher compared to many other majors. To aid their decision, current average starting salary figures for selected majors have been provided.

- Chapter 9 on Monopoly presents a new concept, network good, which updates this chapter by linking economies of scale and monopoly power to the popular Facebook and Match.com Web sites.
- Chapter 12 on Income Distribution, Poverty, and Discrimination has been updated with the latest figures on family income distribution and poverty rates. In addition, the feature articles on Social Security and fair pay for females have been updated. These are all timely features that generate great interest for students.
- Chapter 14 on Environmental Economics is among today's highly controversial issues. This issue is addressed by new Global Economics features titled "How Should Carbon Emissions Be Reduced: Cap and Trade or Carbon Taxes?" and "Why Is the Climate Change Problem So Hard to Solve?" The Analyze the Issue sections that accompany these features give students an opportunity to participate in this important environmental debate.
- Chapter 17 on Inflation updates data on inflation and the You're the Economist feature on "How Much More Does It Cost to Laugh?" In addition, a new Checkpoint titled "What Is the Real Price of Gasoline?" is added that provides an application for adjusting the price of gasoline for inflation over time. And here students enjoy learning how to convert Babe Ruth's 1932 salary into today's dollars.
- Chapter 20(10) on Aggregate Demand and Supply has been revised to provide a unique, complete, unbiased, and realistic comparison of the Keynesian and self-correction macroeconomic models in contrast to texts that present only or primarily the self-correction model. To enhance student understanding and interest, updated actual CPI and real GDP numbers are used throughout rather than generic P_s and Q_s . For example, a new exhibit is added that explains with actual data how decreases in aggregate demand during the current recession caused a movement along the flat Keynesian range of the aggregate supply curve with the CPI constant. Here students can clearly visualize and comprehend the Keynesian argument against the classical school that prices and wages are inflexible downward.
- The appendix to Chapter 20(10) fully develops and explains the opposing self-correction model based on downward flexibility of prices and wages and a downward shifting short-run aggregate supply curve. Only by providing a complete presentation of both the Keynesian and self-correction models can the student understand the current macroeconomic public policy debate.

- Chapter 21(11) on Fiscal Policy also uses realism as its hallmark by explaining the stimulus package and the spending multiplier process with real-world updated numbers.
- Chapter 22(12) on The Public Sector highlights the important current issue of the changing economic character of the United States with global comparisons to other countries. Here, for example, updated data traces the growth of U.S. government expenditures and taxes since the Great Depression. And U.S. spending and taxation are compared to other countries. An explanation of the Value Added Tax (VAT) has been added to the You're the Economist feature discussion of the flat tax and national sales tax.
- Chapter 23(13) on Federal Deficits, Surpluses, and the National Debt focuses on the current "hot button" issue of federal deficits and the national debt using updated data and exhibits. This chapter now includes a discussion of the "PayGo" rule and a new exhibit giving a global comparison of the national debt as a percentage of GDP. The current financial crisis in Greece is included in the chapter debate over the consequences of the U.S. national debt.
- Chapter 26(16) on Monetary Policy has been updated using actual data in the model that link changes in the money supply and changes in the aggregate demand curve required to restore the economy to full employment. Students' interest is enhanced by adding a set of exhibits comparing monetary policy during the Great Depression to monetary policy during the current Great Recession.
- The final three chapters of the text are the international chapters, and each has been updated. For example, the chapter on International Trade and Finance explains the recent sharp decline in the U.S. balance of trade. The chapter on Economies in Transition contrasts privatization in Cuba, Russia, and China to recent nationalization in the United States. And the chapter on Growth and the Less-Developed Countries presents updated data used to explain, for example, the link between economic freedom and quality-of-life indicators.
- New lecture PowerPoint® slides have been developed by the author and tested in his classroom.

ALTERNATE VERSIONS OF THE BOOK

For instructors who wish to spend various amounts of time for their courses and offer different topics of this text:

- *Economics for Today*. This complete version of the book contains all 30 chapters. It is designed for two-semester introductory courses that cover both microeconomics and macroeconomics.

- *Microeconomics for Today*. This version contains 17 chapters and is designed for one-semester courses in introductory microeconomics.
- *Macroeconomics for Today*. This version contains 20 chapters and is designed for one-semester courses in introductory macroeconomics.
- *Survey of Economics*. This version of the book contains 23 chapters. It is designed for one-semester courses that cover the basics of both microeconomics and macroeconomics.

The accompanying table shows precisely which chapters are included in each book.

Instructors who wish more information about these alternative versions should contact their local South-Western/Cengage Learning representative.

MOTIVATIONAL PEDAGOGICAL FEATURES

Economics for Today strives to motivate and advance the boundaries of pedagogy with the following features:

Part Openers

Each part begins with a statement of the overall mission of the chapters in the part. In addition, there is a nutshell introduction of each chapter in relation to the part's learning objective.

Chapter Previews

Each chapter begins with a preview designed to pique the student's interest and reinforce how the chapter fits into the overall scheme of the book. Each preview appeals to the student's "Sherlock Holmes" impulses by posing several economics puzzles that can be solved by understanding the material presented in the chapter.

Margin Definitions and Flashcards

Key concepts introduced in the chapter are highlighted in bold type and then defined with the definitions again in the margins. This feature therefore serves as a quick reference. Key terms are also defined on the Tucker Web site with a Flashcard feature that is great for learning terms.



You're the Economist

Each chapter includes boxed inserts that provide the acid test of "relevance to everyday life." This feature gives the student an opportunity to encounter timely, real-world extensions of economic theory. For example, students read about

Fred Smith as he writes an economics term paper explaining his plan to create FedEx. To ensure that the student wastes no time figuring out which concepts apply to the article, applicable concepts are listed after each title. Many of these boxed features include quotes from newspaper articles over a period of years demonstrating that economic concepts remain relevant over time.

Conclusion Statements

Throughout the chapters, highlighted conclusion statements of key concepts appear at the ends of sections and tie together the material just presented. Students will be able to see quickly if they have understood the main points of the section. A summary of these conclusion statements is provided at the end of each chapter.

Global Economics

Today's economic environment is global. *Economics for Today* carefully integrates international topics throughout the text and presents the material using a highly readable and accessible approach designed for students with no training in international economics. All sections of the text that present global economics are identified by a special global icon in the text margin and in the Global Economics boxes. In addition, the final three chapters of the book are devoted entirely to international economics.



Analyze the Issue

This feature follows each *You're the Economist* and *Global Economics* feature and asks specific questions that require students to test their knowledge of how the material in the boxed insert is relevant to the applicable concept. To allow these questions to be used in classroom discussions or homework assignments, answers are provided in the Instructor's Manual rather than the text.

Checkpoint

Watch for these! Who said learning economics can't be fun? This feature is a unique approach to generating interest and critical thinking. These questions spark students to check their progress by asking challenging economics puzzles in game-like style. Students enjoy thinking through and answering the questions, and then checking the answers at the end of the chapter. Students who answer correctly earn the satisfaction of knowing they have mastered the concepts.



Illustrations

Attractive large graphical presentations with grid lines and real-world numbers are essential for any successful economics textbook. Each exhibit has been carefully analyzed to ensure that the key concepts being represented stand out clearly. Brief descriptions are included with graphs to provide guidance for students as they study the graph. When actual data are used, the Web site reference is provided so that students can easily locate the data source.

Causation Chains Game

This will be one of your favorites. The highly successful causation chains are included under many graphs throughout the text. This pedagogical device helps students visualize complex economic relationships in terms of simple box diagrams that illustrate how one change causes another change. Each exhibit having a causation chain in the text is included in the Animated Causation Chains game on the Tucker Web site (www.cengage.com/economics/tucker). This game makes it fun to learn. Arrange the blocks correctly and hear the cheers.

Key Concepts

Key concepts introduced in the chapter are listed at the end of each chapter and on the Tucker Web site (www.cengage.com/economics/tucker). As a study aid, you can use the key concepts as flashcards to test your knowledge. First state the definition and then click on the term to check for correctness.

Visual Summaries

Each chapter ends with a brief point-by-point summary of the key concepts. Many of these summarized points include miniaturized versions of the important graphs and causation chains that illustrate many of the key concepts. These are intended to serve as visual reminders for students as they finish the chapters and are also useful in reviewing and studying for quizzes and exams.

Study Questions and Problems

The end-of-chapter questions and problems offer a variety of levels ranging from straightforward recall to deeply thought-provoking applications. The answers to odd questions and problems are in the back of the text. This feature gives students immediate feedback without requiring the instructor to check their work.

End-of-Chapter Practice Quizzes

A great help before quizzes. Many instructors test students using multiple-choice questions. For this reason, the final section of each chapter provides the type of multiple-choice questions given in the instructor's Test Bank. The answers to all of these questions are given in the back of the text. In addition, students may visit the Tucker Web site (www.cengage.com/economics/tucker) and answer these questions online where an explanation of each correct answer is given.

Part Road Map

This feature concludes each part with review questions listed by chapter from the previous part. To reinforce the concepts, each set of questions relates to the interactive causation chain game. Click on the Tucker Web site (www.cengage.com/economics/tucker) and make learning fun listening to the cheers when correct and jeers for a wrong answer. Answers to the questions are in the back of the text.

Interactive Quizzes

In addition to the end-of-chapter practice quizzes, there are additional multiple-choice questions written by the author on the Tucker Web site (www.cengage.com/economics/tucker). Each quiz contains multiple questions like those found on a typical exam. Feedback is included for each answer so that you may know instantly why you have answered correctly or incorrectly. In addition, you may email yourself and/or your instructor the quiz results with a listing of correct and incorrect answers. Between this feature and the end-of-chapter practice quizzes, students are well prepared for tests.

Online Exercises

These exercises for each chapter are designed to spark students' excitement about researching on the Internet by asking them to access online economic data and then answer questions related to the content of the chapter. All Internet exercises are on the Tucker Web site (www.cengage.com/economics/tucker) with direct links to the addresses so that students will not have the tedious and error-prone task of entering long Web site addresses.

Learning Objectives

Learning objectives link sections in the text and steps to achieve learning objectives. The steps include reference to "Ask the Instructor Video Clips" and the "Graphing Workshop" available through the CourseMate Web site.

A SUPPLEMENTS PACKAGE DESIGNED FOR SUCCESS

To learn more about the supplements for *Economics for Today*, visit the Tucker Web site, www.cengage.com/economics/tucker. For additional information, contact your South-Western/Cengage sales representative.

INSTRUCTOR RESOURCES

Aplia

Aplia, www.aplia.com, has joined forces with South-Western, the leading publisher for principles of economics and finance, to create the Aplia Integrated Textbook Solution. More students are currently using an Aplia product for principles of economics than those who are using all other Web-based learning programs combined. Because the homework in Aplia is automatically graded, you can assign homework more frequently to ensure your students are putting forth full effort and getting the most out of your class.

Instructor's Manual

This manual, prepared by Douglas Copeland of Johnson County Community College, provides valuable course assistance to instructors. It includes chapter outlines, instructional objectives, critical thinking/group discussion questions, hints for effective teaching, answers to the Analyze the Issue questions, answers to even-numbered questions and problems, summary quizzes with answers, and classroom games. Instructor's Manual ISBN: 1111222452.

Test Bank

Too often, Test Banks are not written by the author and the questions do not really fit the text. Not so here. The Test Bank is prepared by the text author to match the text. The Test Bank includes over 7,000 multiple-choice, true-false, and short essay questions arranged by the order presented in the chapter and grouped with concept headings that make it easy to select questions. Most questions have been thoroughly tested in the classroom by the author and are classified by topic and degree of difficulty. Text page references help locate pages where material related to questions is explained.

Macro Test Bank ISBN: 1111222495

Micro Test Bank ISBN: 1111222509

ExamView

ExamView Computerized Testing Software contains all of the questions in the printed *Test Bank*. ExamView is an easy-to-use test creation software compatible with both Windows and Macintosh. Instructors can add or edit questions, instructions, and answers; select questions by previewing them on the screen; or select questions randomly or by number. Instructors can also create and administer quizzes online, whether over the Internet, a local area network (LAN), or a wide area network (WAN). ExamView is available on the Instructor's Resource CD ISBN: 1111222525.

PowerPoint® Lecture Slides

This state-of-the-art slide presentation developed by the text author provides instructors with visual support in the classroom for each chapter. Lecture slides contain vivid automated highlights of important concepts and exhibits. Instructors can edit the PowerPoint® presentations or create their own exciting in-class presentations. These slides are available on the Instructor's Resource CD (ISBN: 1111222525) as well as for downloading from the Tucker Web site at www.cengage.com/economics/tucker.

PowerPoint® Exhibit Slides

These slides contain the figures, charts, and tables from the text. Instructors can easily incorporate them into their own PowerPoint® presentations by downloading from the Tucker Web site at www.cengage.com/economics/tucker. They are also available on the Instructor's Resource CD ISBN: 1111222525.

Instructor's Resource CD-ROM

Get quick access to all instructor ancillaries from your desktop. This easy-to-use CD lets you review, edit, and copy exactly what you need in the format you want. This supplement contains the Instructor's Manual, Test Bank, ExamView Testing software, and the PowerPoint® Lecture and Exhibit slides. IRCD ISBN: 1111222525.

JoinIn TurningPoint CD JoinIn is a response system that allows you to transform your classroom and assess your students' progress with instant in-class quizzes and polls. Our exclusive agreement to offer TurningPoint software lets you pose book-specific questions and display students' answers seamlessly within the Microsoft PowerPoint® slides of your own lecture, in conjunction with the "clicker" hardware of your choice. Enhance how your students interact with you, your lecture, and each other. For college and university adopters only. Contact your local South-Western representative to learn more.

Complete Online Tomlinson Videos Course The Tomlinson videos are online multimedia video lecture series that provide students with instructional assistance 24/7. Students can watch these segments over and over as they prepare for class, review topics, and study for exams. Lecture notes and quizzes for each segment are also available. Professors may require students to view the videos before class to leave the class time free for activities or further explanation. www.cengage.com/economics/tomlinson

STUDENT RESOURCES

Study Guide

The Study Guide is recommended for each student using the text. It is perhaps the best way to prepare for quizzes. The Study Guide was prepared by the text author to prepare students before they take tests in class. The Study Guide contains student-friendly features such as the chapter in a nutshell, key concepts review, learning objectives, fill-in-the-blank questions, step-by-step interpretation of the graph boxes, multiple-choice questions, true-false questions, and crossword puzzles.

Full Study Guide ISBN: 1111222460

Macro Study Guide ISBN: 1111222487

Micro Study Guide ISBN: 1111222479

The Tucker CourseMate Web site

Available for purchase, the CourseMate Web site: (www.cengagebrain.com) features a content-rich, robust set of multimedia learning tools. These Web features have been specifically developed with the student in mind:

- **ABC News Videos.** This supplement consists of high-interest clips from current news events as well as historic raw footage going back forty years. Perfect for discussion starters or to enrich your lectures and spark interest in the material in the text, these brief videos provide students with a new lens through which to view the past and present, one that will greatly enhance their knowledge and understanding of significant events and open up new dimensions in learning. Clips are drawn from such programs as *World News Tonight*, *Good Morning America*, *This Week*, *Primetime Live*, *20/20*, and *Nightline*, as well as numerous ABC News specials and material from the Associated Press Television News and British Movietone News collections. Your South-Western Publishing representative will be happy to provide a complete listing of the videos and policies addressed.
- **The Graphing Workshop.** The Graphing Workshop is a one-stop learning resource for help in mastering the language of graphs, one of the more difficult aspects of an economics course for many students. It enables students to

explore important economic concepts through a unique learning system made up of tutorials, interactive drawing tools, and exercises that teach how to interpret, reproduce, and explain graphs.

- **Ask the Instructor Video Clips.** Via streaming video, difficult concepts are explained and illustrated. These video clips are extremely helpful review and clarification tools if a student has trouble understanding an in-class lecture or is a visual learner.
- **Economic Applications (*EconApps*).** EconNews Online, EconDebates, and EconData features help to deepen students' understanding of the theoretical concepts through hands-on exploration and analysis of the latest economic news stories, policy debates, and data.

FOR STUDENTS AND INSTRUCTORS

The Wall Street Journal

The *Wall Street Journal* is synonymous with the latest word on business, economics, and public policy. *Economics for Today* makes it easy for students to apply economic concepts to this authoritative publication, and for you to bring the most up-to-date, real-world events into your classroom. For a nominal additional cost, *Economics for Today* can be packaged with a card entitling students to a 15-week subscription to both the print and online versions of the *Wall Street Journal*. Instructors with at least seven students who activate their subscriptions will automatically receive their own free subscription. Contact your South-Western/Cengage Learning sales representative for package pricing and ordering information.

CENGAGE LEARNING'S GLOBAL ECONOMIC WATCH

Lessons from real life right now

The credit collapse. Tumbling markets. Bailouts and bankruptcies. Surging unemployment. Political debate. Today's financial turmoil transforms academic theory into intense real-life challenges that affect every family and business sector—making it one of the most teachable moments in modern history.

Cengage Learning's Global Economic Watch helps instructors bring these pivotal current events into the classroom—through a powerful, continuously updated online suite of content, discussion forums, testing tools, and more.

The Watch, a first-of-its-kind resource, stimulates discussion and understanding of the global downturn with easy-to-integrate teaching solutions:

- A content-rich blog of breaking news, expert analysis, and commentary—updated multiple times daily—plus links to many other blogs

- A powerful real-time database of hundreds of relevant and vetted journal, newspaper, and periodical articles, videos, and podcasts—updated four times every day
- A thorough overview and timeline of events leading up to the global economic crisis
- Discussion and testing content, PowerPoint® slides on key topics, sample syllabi, and other teaching resources
- Instructor and student forums for sharing questions, ideas, and opinions
- History is happening now. Bring it into your classroom. For more information on how you can enrich your course with The Watch, please visit www.cengage.com/thewatch.

TextChoice: Economic Issues and Activities

TextChoice is the home of Cengage Learning's online digital content. TextChoice provides the fastest, easiest way for you to create your own learning materials. South-Western's Economic Issues and Activities content database includes a wide variety of high-interest, current event/policy applications as well as classroom activities that are designed specifically to enhance introductory economics courses. Choose just one reading, or many—even add your own material—to create an accompaniment to the textbook that is perfectly customized to your course. Contact your South-Western/Cengage Learning sales representative for more information.

Tucker Web Site

The Tucker Web site at www.cengage.com/economics/tucker provides access to: Animated Causation Chains, practice quizzes, interactive quizzing, and other downloadable teaching and learning resources.

ACKNOWLEDGMENTS

A deep debt of gratitude is owed to the reviewers for their expert assistance. All comments and suggestions were carefully evaluated and served to improve the final product. To each of the reviewers of all seven editions, I give my sincerest thanks.

Jack E. Adams
*University of Arkansas-
Little Rock*

John W. Alderson, III
*East Arkansas
Community College*

Irma Alonso
*Florida International
University*

Hasaan Aly
The Ohio State University

James Q. Aylsworth
Lakeland Community College

Randy Barnes
Mirimar College

Atin Basu
Virginia Military Institute

Klaus G. Becker
Texas Tech University

Randall W. Bennett
Gonazaga University

John P. Blair
Wright State University

Orn B. Bodvarsson
St. Cloud State University

Tantatape Brahmasrene
Purdue University North Central

Joyce Bremer
Oakton Community College

Anne Bresnock
*California State University,
Pomona*

Stacey Brook
University of Sioux Falls

Stephanie Campbell
Mineral Area College

Juan Castro
ETX Baptist University

Dell Champlin
Eastern Illinois University

Doug Copeland
*Johnson County Community
College*

John P. Dahlquist
College of Alameda

James P. D'Angelo
University of Cincinnati

Jan L. Dauve
University of Missouri

Gregory J. Delemeester
Marietta College

Robert C. Dolan
University of Richmond

William Dougherty
*Carroll County Community
College*

James W. Eden
Portland Community College

Ronald Elkins
Central Washington University

Tommy Eshleman
University of Nebraska, Kearney

John L. Ewing-Smith
Burlington County College

Chris Fawson
Utah State University

Arthur A. Fleisher, III
*Metropolitan State College of
Denver*

Kaya Ford
*Northern Virginia Community
College*

Arthur Friedberg
*Mohawk Valley Community
College*

Scott Gabeheart
Mesa Community College

Linda Ghent
Eastern Illinois University

Cindy Gibson
Keuka College

J. P. Gilbert
Mira Costa College

Deborah Goldsmith
City College of San Francisco

Sanford D. Gordon
University of South Florida

Gary Green
Manatee Community College

Serge S. Grushchin
*ASA College of Advanced
Technology*

Steven Hackett
Humbolt State University

Gail A. Hawks
*Miami Dade Community
College*

Michael G. Heslop
*Northern Virginia Community
College*

Yu-Mong Hsiao
Campbell University

R. Jack Inch
Oakland Community College

Hans R. Isakson
University of Northern Iowa

Barbara H. John
University of Dayton

Petur O. Jonsson
Fayetteville State University

Paul Jorgensen
Linn-Benton Community College

Louise Keely
University of Wisconsin

Randall G. Kesselring
Arkansas State University

Harry T. Kolendrianos
Danville Community College

William F. Kordsmeier
University of Central Arkansas

Margaret Landman
Bridgewater State College

David Latzko
Pennsylvania State University, York

Ralph F. Lewis
Orange Coast College

Stephen E. Lile
Western Kentucky University

Dandan Liu
Bowling Green State University

Melody Lo
University of Southern Mississippi

Thomas Maloy
Muskegon Community College

Dayle Mandelson
University of Wisconsin-Stout

Robert A. Margo
Vanderbilt University

Melanie Marks
Longwood College

Michael Marlow
Cal Polytechnic State U-SLO

Fred May
Trident Technical College

James C. McBrearty
University of Arizona

Diana L. McCoy
Truckee Meadows Community College

Donald P. McDowell
Florida Community College

Fazlul Miah
Fayetteville State University

David S. Moewes
Concordia College

Margaret Moore
Franklin University

Marie Mora
New Mexico State University

Kevin J. Murphy
Oakland University

Jack Muryn
University of Wisconsin-Washington County

Lee Nordgren
Indiana University

Peter K. Olson
Indiana University

Patrick B. O'Neill
University of North Dakota

Jan Palmer
Ohio University

Michael L. Palmer
Maple Woods Community College

Elliott Parker
University of Nevada in Reno

Kathy Parkison
Indiana University-Kokomo

Donald W. Pearson
Eastern Michigan University

Martin Perline
Wichita State University

Elaine Peterson
California State University, Stanislaus

Maurice Pfannestiel
Wichita State University

Michael J. Pisani
Texas A&M University

L. Wayne Plumly, Jr.
Valdosta State University

Ray Polchow
*Muskingum Area Technical
College*

Renee Prim
*Central Piedmont Community
College*

Fernando Quijano
Dickinson State University

R. Larry Reynolds
Boise State University

Kathryn Roberts
Chipola Junior College

Steve Robinson
*University of North Carolina
at Wilmington*

Craig Rogers
Canisius College

Lawrence P. Schrenk
University of Baltimore

Kurt A. Schwabe
Ohio University

Lisa Simon
*California Polytechnic State
University*

Larry Singell
University of Oregon

Alden W. Smith
*Anne Arundel Community
College*

Tricia Snyder
William Patterson University

Angela M. Sparkman
Itawamba Community College

Larry Spizman
SUNY-Oswego

Rebecca Summary
*Southeast Missouri State
University*

Daniel A. Talley
Dakota State University

Daryl Thorne
Valencia Community College

Larry Towle
Eastern Nazarene College

Greg Trandel
University of Georgia

Richard Trieff
*Des Moines Area Community
College*

Tracy M. Turner
Kansas State University

Lee Van Scyok
*University of Wisconsin-
Oshkosh*

Roy van Til
University of Maine-Farmington

Darlene Voeltz
*Rochester Community and
Technical College*

Rosemary Walker
Washburn University

Harold Warren
East Tennessee State University

Leo M. Weeks
Northwestern University

Robert G. Welch
Midwestern State University

Herbert D. Werner
University of Missouri

Michael D. White
St. Cloud State University

Gwen Williams
Alvernia College

Virginia S. York
Gulf Coast Community College

Paul Young
Dodge City Community College

Michael J. Youngblood
Rock Valley College

SPECIAL THANKS

My appreciation goes to Steve Scoble, Sr. Acquisitions Editor for South-Western/Cengage Learning. My thanks also to Michael Guendelsberger, Developmental Editor, Kelly Hillerich, Content Project Manager; Allyn Bissmeyer, Editorial Assistant; and Suellen Ruttkay, Marketing Coordinator, who put all the pieces of the puzzle together and brought their creative talent to this text, and Sharon Tripp for the copyediting of the manuscript. I am also grateful to John Carey for his skillful marketing. I especially wish to express my deepest appreciation to Douglas Copeland of Johnson County Community College for preparing the Instructor's Manual. Finally, I give my sincere thanks for a job well done to the entire team at Cengage South-Western.

Introduction to Economics



© Getty Images

The first two chapters introduce you to a foundation of economic knowledge vital to understanding the other chapters in the text. In these introductory chapters, you will begin to learn a valuable reasoning approach to solving economics puzzles that economists call “the economic way of thinking.” Part 1 develops the cornerstone of this type of logical analysis by presenting basic economic models that explain such important topics as scarcity, opportunity cost, production possibilities, and economic growth.



Introducing the Economic Way of Thinking

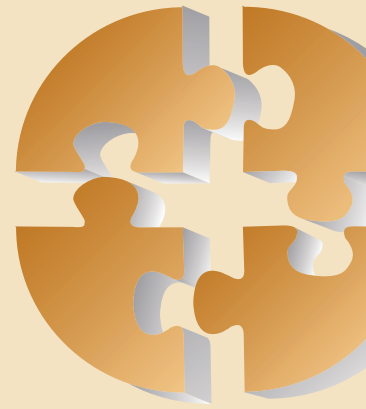
Welcome to an exciting and useful subject economists call “the economic way of thinking.” As you learn this reasoning technique, it will become infectious. You will discover that the world is full of economics problems requiring more powerful tools than just common sense. As you master the methods explained in this book, you will appreciate economics as a valuable reasoning approach to solving economics puzzles. Stated differently, the economic way of thinking is important because it provides a logical framework for organizing your thoughts and understanding an economic issue or event. Just to give a sneak preview, in later chapters you will study the perils of government price fixing for gasoline and health care. You will also find out why colleges and universities charge students different tuitions for the same education. You will investigate whether you should worry if the federal government fails to balance its budget. You will learn that the island of

Yap uses large stones with holes in the center as money. In the final chapter, you will study why some countries grow rich while others remain poor and less developed. And the list of fascinating and relevant topics continues throughout each chapter. As you read these pages, your efforts will be rewarded by an understanding of just how economic theories and policies affect our daily lives—past, present, and future.

Chapter 1 acquaints you with the foundation of the economic way of thinking. The first building blocks joined are the concepts of scarcity and choice. The next building blocks are the steps in the model-building process that economists use to study the choices people make. Then we look at some pitfalls of economic reasoning and explain why economists might disagree with one another. The chapter concludes with a discussion of why you may wish to be an economics major.

In this chapter, you will learn to solve these economics puzzles:

- Can you prove there is no person worth a trillion dollars?
- Why would you purchase more Coca-Cola when the price increases?
- How can we explain the relationship between the Super Bowl winner and changes in the stock market?



THE PROBLEM OF SCARCITY

Our world is a finite place where people, both individually and collectively, face the problem of **scarcity**. Scarcity is the condition in which human wants are forever greater than the available supply of time, goods, and resources. Because of scarcity, it is impossible to satisfy every desire. Pause for a moment to list some of your unsatisfied wants. Perhaps you would like a big home, gourmet meals, designer clothes, clean air, better health care, shelter for the homeless, more leisure time, and so on. Unfortunately, nature does not offer the Garden of Eden, where every desire is fulfilled. Instead, there are always limits on the economy's ability to satisfy unlimited wants. Alas, scarcity is pervasive, so "You can't have it all."

You may think your scarcity problem would disappear if you were rich, but wealth does not solve the problem. No matter how affluent an individual is, the wish list continues to grow. We are familiar with the "rich and famous" who never seem to have enough. Although they live well, they still desire finer homes, faster planes, and larger yachts. In short, the condition of scarcity means all individuals, whether rich or poor, are dissatisfied with their material well-being and would like more. What is true for individuals also applies to society. Even Uncle Sam can't escape the problem of scarcity because the federal government never has enough money to spend for the poor, education, highways, police, national defense, Social Security, and all the other programs it wishes to fund.

Scarcity is a fact of life throughout the world. In much of South America, Africa, and Asia, the problem of scarcity is often life threatening. On the other hand, North America, Western Europe, and some parts of Asia have achieved substantial economic growth and development. Although life is much less grueling in the more developed countries, the problem of scarcity still exists because individuals and countries never have as much of all the goods and services as they would like to have.

SCARCE RESOURCES AND PRODUCTION

Because of the economic problem of scarcity, no society has enough **resources** to produce all the goods and services necessary to satisfy all human wants. Resources are the basic categories of inputs used to produce goods and services. Resources are also called *factors of production*. Economists divide resources into three categories: *land*, *labor*, and *capital* (see Exhibit 1).

Scarcity

The condition in which human wants are forever greater than the available supply of time, goods, and resources.

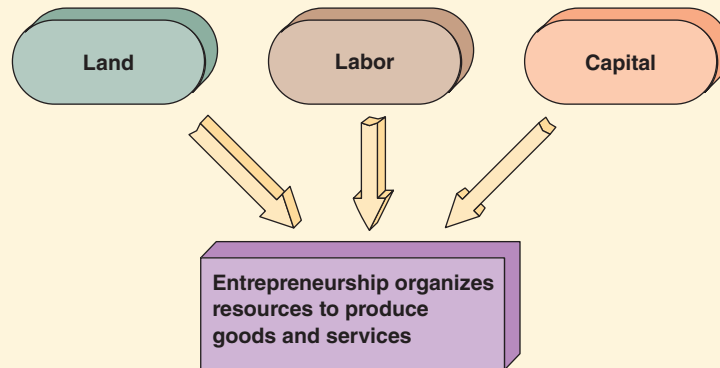
Resources

The basic categories of inputs used to produce goods and services. Resources are also called *factors of production*. Economists divide resources into three categories: land, labor, and capital.

Exhibit 1

Three Categories of Resources

Resources are the basic categories of inputs organized by entrepreneurship (a special type of labor) to produce goods and services. Economists divide resources into the three categories of land, labor, and capital.



Land

Land

A shorthand expression for any natural resource provided by nature.

Land is a shorthand expression for any natural resource provided by nature. *Land* includes those resources that are gifts of nature available for use in the production process. Farming, building factories, and constructing oil refineries would be impossible without land. Land includes anything natural above or below the ground, such as forests, gold, diamonds, oil, coal, wind, and the ocean. Two broad categories of natural resources are *renewable resources* and *nonrenewable resources*. Renewable resources are basic inputs that nature can automatically replace. Examples include lakes, crops, and clean air. Nonrenewable resources are basic inputs that nature cannot automatically replace. There is only so much coal, oil, and natural gas in the world. If these fossil fuels disappear, we must use substitutes.

Labor

Labor

The mental and physical capacity of workers to produce goods and services.

Labor is the mental and physical capacity of workers to produce goods and services. The services of farmers, assembly-line workers, lawyers, professional football players, and economists are all *labor*. The labor resource is measured both by the number of people available for work and by the skills or quality of workers. One reason nations differ in their ability to produce is that human characteristics, such as the education, experience, health, and motivation of workers, differ among nations.

Entrepreneurship

The creative ability of individuals to seek profits by taking risks and combining resources to produce innovative products.

Entrepreneurship is a special type of labor. Entrepreneurship is the creative ability of individuals to seek profits by taking risks and combining resources to produce innovative products. An *entrepreneur* is a motivated person who seeks profits by undertaking such risky activities as starting new businesses, creating new products,

or inventing new ways of accomplishing tasks. Entrepreneurship is a scarce human resource because relatively few people are willing or able to innovate and make decisions involving greater-than-normal chances for failure.

Entrepreneurs are the agents of change who bring material progress to society. The birth of the Levi Strauss Company is a classic entrepreneurial success story. In 1853, at the age of 24, Levi Strauss, who was born in Bavaria, sailed from New York to join the California Gold Rush. His intent was not to dig for gold, but to sell cloth. By the time he arrived in San Francisco, he had sold most of his cloth to other people on the ship. The only cloth he had left was a roll of canvas for tents and covered wagons. On the dock, he met a miner who wanted sturdy pants that would last while digging for gold, so Levi made a pair from the canvas. Later, a customer gave Levi the idea of using little copper rivets to strengthen the seams. Presto! Strauss knew a good thing when he saw it, so he hired workers, built factories, and became one of the largest pants makers in the world. As a reward for taking business risks, organizing production, and introducing a product, the Levi Strauss Company earned profits, and Strauss became rich and famous.

Capital

Capital is the physical plants, machinery, and equipment used to produce other goods. Capital goods are human-made goods that do not directly satisfy human wants. Before the Industrial Revolution, *capital* meant a tool, such as a hoe, an axe, or a bow and arrow. In those days, these items served as capital to build a house or provide food for the dinner table. Today, capital also consists of factories, office buildings, warehouses, robots, trucks, and distribution facilities. College buildings, the printing presses used to produce this textbook, and iPhones are also examples of capital.

The term *capital* as it is used in the study of economics can be confusing. Economists know that capital in everyday conversations means money or the money value of paper assets, such as stocks, bonds, or a deed to a house. This is actually *financial* capital. In the study of economics, capital does not refer to money assets. Instead, capital in economics means a factor of production, such as a factory or machinery. Stated simply, you must pay special attention to this point: Money is not capital and is therefore not a resource.

CONCLUSION *Financial capital by itself is not productive; instead, it is only a paper claim on economic capital.*

ECONOMICS: THE STUDY OF SCARCITY AND CHOICE

The perpetual problem of scarcity forcing people to make choices is the basis for the definition of **economics**. Economics is the study of how society chooses to allocate its scarce resources to the production of goods and services in order to satisfy

Capital

The physical plants, machinery, and equipment used to produce other goods. Capital goods are human-made goods that do not directly satisfy human wants.

Economics

The study of how society chooses to allocate its scarce resources to the production of goods and services in order to satisfy unlimited wants.

unlimited wants. You may be surprised by this definition. People often think economics means studying supply and demand, the stock market, money, and banking. In fact, there are many ways one could define *economics*, but economists accept the definition given here because it includes the link between *scarcity* and *choices*.

Society makes two kinds of choices: economywide, or macro choices, and individual, or micro, choices. The prefixes *macro* and *micro* come from the Greek words meaning “large” and “small,” respectively. Reflecting the macro and micro perspectives, economics consists of two main branches: *macroeconomics* and *microeconomics*.

Macroeconomics

The old saying “Looking at the forest rather than the trees” describes **macroeconomics**. Macroeconomics is the branch of economics that studies decision making for the economy as a whole. Macroeconomics applies an overview perspective to an economy by examining economywide variables, such as inflation, unemployment, growth of the economy, the money supply, and the national incomes of developing countries. Macroeconomic decision making considers such “big picture” policies as the effect that federal tax cuts will have on unemployment and the effect that changing the money supply will have on prices.

Macroeconomics

The branch of economics that studies decision making for the economy as a whole.

Microeconomics

Examining individual trees, leaves, and pieces of bark, rather than surveying the forest, illustrates **microeconomics**. Microeconomics is the branch of economics that studies decision making by a single individual, household, firm, industry, or level of government. Microeconomics applies a microscope to study specific parts of an economy, as one would examine cells in the body. The focus is on small economic units, such as economic decisions of particular groups of consumers and businesses. An example of microeconomic analysis would be to study economic units involved in the market for ostrich eggs. Will suppliers decide to supply more, less, or the same quantity of ostrich eggs to the market in response to price changes? Will individual consumers of these eggs decide to buy more, less, or the same quantity at a new price?

We have described macroeconomics and microeconomics as two separate branches, but they are related. Because the overall economy is the sum, or aggregation, of its parts, micro changes affect the macro economy, and macro changes produce micro changes.

Microeconomics

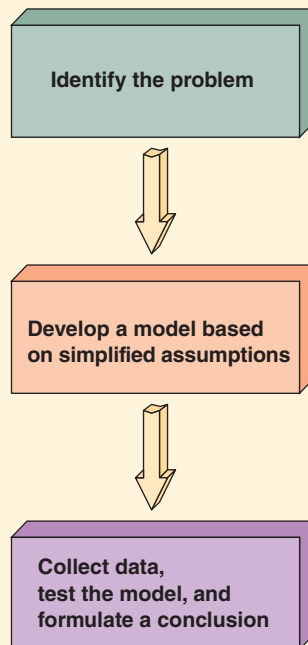
The branch of economics that studies decision making by a single individual, household, firm, industry, or level of government.

THE METHODOLOGY OF ECONOMICS

As used by other disciplines, such as criminology, biology, chemistry, and physics, economists employ a step-by-step procedure for solving problems by developing a theory, gathering data, and testing whether the data are consistent with the theory. Based on this analysis, economists formulate a conclusion. Exhibit 2 summarizes the model-building process.

*Exhibit 2***The Steps in the Model-Building Process**

The first step in developing a model is to identify the problem. The second step is to select the critical variables necessary to formulate a model that explains the problem under study. Eliminating other variables that complicate the analysis requires simplifying assumptions. In the third step, the researcher collects data and tests the model. If the evidence supports the model, the conclusion is to accept the model. If not, the model is rejected.



Problem Identification

The first step in applying the economic method is to define the issue. Suppose an economist wishes to investigate the microeconomic problem of why U.S. motorists cut back on gasoline consumption in a given year from, for example, 400 million gallons per day in May to 300 million gallons per day in December.

Model Development

The second step in our hypothetical example toward finding an explanation is for the economist to build a **model**. A model is a simplified description of reality used to understand and predict the relationship between variables. The terms

Model

A simplified description of reality used to understand and predict the relationship between variables.



A map is a model because it is an abstraction from reality.

model and *theory* are interchangeable. A model emphasizes only those variables that are most important to explaining an event. As Albert Einstein said, “Theories should be as simple as possible, but not more so.” The purpose of a model is to construct an abstraction from real-world complexities and make events understandable. Consider a model airplane that is placed in a wind tunnel to test the aerodynamics of a new design. For this purpose, the model must represent only the shapes of the wings and fuselage, but it does not need to include tiny seats, electrical wiring, or other interior design details. A highway map is another example. To find the best route to drive between two distant cities, you do not want extraneous information on the location of all roads, streets, potholes, telephone lines, trees, stoplights, schools, hospitals, and firehouses. This would be too much detail, and the complexity would make it difficult to choose the best route.

To be useful, a model requires simplified assumptions. Someone must decide, for example, whether a map will include only symbols for the major highways or the details of hiking trails through mountains. In our gasoline consumption example, several variables might be related to the quantity of gasoline consumed, including consumer incomes, the prices of substitutes for gasoline, the price of gasoline, the fuel economy of cars, and weather conditions. Because a theory focuses only on the main or critical variables, the economist must be a Sherlock Holmes and use a keen sense of observation to form a model. Using his or her expertise, the economist must select the variables that are related to gasoline consumption and reject variables that have only slight or no relationship to gasoline consumption. In this simple case, the economist removes the cloud of complexity by formulating the theory that increases in the price of gasoline *cause* the quantity of gasoline consumed to decrease during the time period.

Testing a Theory

An economic model can be stated as a verbal argument, numerical table, graph, or mathematical equation. You will soon discover that a major part of this book is devoted to building and using economic models. The purpose of an economic model is to *forecast* or *predict* the results of various changes in variables. Note that the appendix to this chapter provides a review of graphical analysis. An economic theory can be expressed in the form “If *A*, then *B*, other things held constant.” An economic model is useful only if it yields accurate predictions. When the evidence is consistent with the theory that *A* causes outcome *B*, there is confidence in the theory’s validity. When the evidence is inconsistent with the theory that *A* causes outcome *B*, the researcher rejects this theory.

In the third step, the economist gathers data to test the theory that if the price of gasoline rises, then gasoline purchases fall—all other relevant factors held constant. Suppose the investigation reveals that the price of gasoline rose sharply between September and December of the given year. The data are therefore consistent with the theory that the quantity of gasoline consumed per month falls when its price rises, assuming no other relevant factors change. Thus, the conclusion is that the theory is valid if, for example, consumer incomes or population size do not change at the same time that gasoline prices rise.

CHECKPOINT

Can You Prove There Is No Trillion-Dollar Person?

Suppose a theory says no U.S. citizen is worth \$1 trillion. You decide to test this theory and send researchers to all corners of the nation to check financial records to see whether someone qualifies by owning assets valued at \$1 trillion or more. After years of checking, the researchers return and report that not a single person is worth at least \$1 trillion. Do you conclude that the evidence proves the theory?



HAZARDS OF THE ECONOMIC WAY OF THINKING

Models help us understand and predict the impact of changes in economic variables. A model is an important tool in the economist's toolkit, but it must be handled with care. The economic way of thinking seeks to avoid reasoning mistakes. Two of the most common pitfalls to clear thinking are (1) failing to understand the *ceteris paribus* assumption and (2) confusing *association* and *causation*.

The Ceteris Paribus Assumption

As you work through a model, try to think of a host of relevant variables assumed to be “standing still,” or “held constant.” **Ceteris paribus** is a Latin phrase that means while certain variables change, “all other things remain unchanged.” In short, the ceteris paribus assumption allows us to isolate or focus attention on selected variables. In the gasoline example discussed earlier, a key simplifying assumption of the model is that changes in consumer incomes and certain other variables do not occur and complicate the analysis. The ceteris paribus assumption holds everything else constant and therefore allows us to concentrate on the relationship between two key variables: changes in the price of gasoline and the quantity of gasoline purchased per month.

Now suppose an economist examines a model explaining the relationship between the price and quantity purchased of Coca-Cola. The theory is “If the price increases, then the quantity of Coca-Cola purchased decreases, ceteris paribus.” Now assume you observe that the price of Coca-Cola increased one summer and some people actually bought more, not less. Based on this real-world observation, you declare the theory is incorrect. Think again! The economist responds that this is a reasoning pitfall because the model is valid based on the assumption of ceteris paribus, and your observation gives us no reason to reject the model. The reason the model appeared flawed is because another factor, a sharp rise in the temperature, *caused* people to buy more Coca-Cola in spite of its higher price. If the temperature and all other factors are held constant as the price of Coca-Cola rises, then people will indeed buy less Coca-Cola, as the model predicts.

Ceteris paribus

A Latin phrase that means while certain variables change, “all other things remain unchanged.”

CONCLUSION *A theory cannot be tested legitimately unless its ceteris paribus assumption is satisfied.*

Association versus Causation

Another common error in reasoning is confusing *association* (or correlation) and *causation* between variables. Stated differently, you err when you read more into a relationship between variables than is actually there. A model is valid only when a cause-and-effect relationship is stable or dependable over time, rather than being an association that occurs by chance and eventually disappears. Suppose a witch doctor performs a voodoo dance during three different months and stock market prices skyrocket during each of these months. The voodoo dance is *associated* with the increase in stock prices, but this does not mean the dance *caused* the event. Even though there is a statistical relationship between these two variables in a number of observations, eventually the voodoo dance will be performed, and stock prices will fall or remain unchanged. The reason is that there is no true systematic economic relationship between voodoo dances and stock prices.

Further investigation may reveal that stock prices actually responded to changes in interest rates during the months that the voodoo dances were performed. Changes in interest rates affect borrowing and, in turn, profits and stock prices. In contrast, there is no real economic relationship between voodoo dances and stock prices, and, therefore, the voodoo model is not valid.

CONCLUSION *The fact that one event follows another does not necessarily mean that the first event caused the second event.*



CHECKPOINT

Should Nebraska State Join a Big-Time Athletic Conference?

Nebraska State (a mythical university) stood by while Penn State, Florida State, the University of Miami, and the University of South Carolina joined big-time athletic conferences. Now Nebraska State officials are pondering whether to remain independent or to pursue membership in a conference noted for high-quality football and basketball programs. An editorial in the newspaper advocates joining and cites a study showing that universities belonging to major athletic conferences have higher graduation rates than nonmembers. Because educating its students is the number one goal of Nebraska State, will this evidence persuade Nebraska State officials to join a big-time conference?

You're The Economist

Mops and Brooms, the Boston Snow Index, the Super Bowl, and Other Economic Indicators

Applicable Concepts: association versus causation



Although the Commerce Department, the Wharton School, the Federal Reserve Board, and other organizations publish economic forecasts and data on key economic indicators, they are not without arm-chair competition. For example, the chief executive of Standex International Corporation, Daniel E. Hogan, reported that his company can predict economic downturns and recoveries from sales reports of its National Metal Industries subsidiary in Springfield, Massachusetts. National makes metal parts for about 300 U.S. manufacturers of mops and brooms. A drop in National's sales always precedes a proportional fall in consumer spending. The company's sales always pick up slightly before consumer spending does.¹

The Boston Snow Index (BSI) is the brainchild of a vice president of a New York securities firm. It predicts a rising economy for the next year if there is snow on the ground in Boston on Christmas Day. The BSI predicted correctly about 73 percent of the time over a

30-year period. However, its creator, David L. Upshaw, did not take it too seriously and views it as a spoof of other forecasters' methods.

Greeting card sales are another tried and true indicator, according to a vice president of American Greetings. Before a recession sets in, sales of higher-priced greeting cards rise. It seems that people substitute the cards for gifts, and since there is no gift, the card must be fancier.

A Super Bowl win by an NFC team predicts that in the following December the stock market will be higher than the year before. A win by an old AFL team predicts a dip in the stock market.

Several other less well-known indicators have also been proposed. For example, one economist suggested that the surliness of waiters is a countercyclical indicator. If they are nice, expect that bad times are coming, but if they are rude, expect an upturn. Waiters, on the other hand, counter that a fall in the average tip usually precedes a downturn in the economy.



© iStockphoto.com/Sean Locke

Finally, Anthony Chan, chief economist for Bank One Investment Advisors, studied marriage trends over a 34-year period. He discovered that when the number of marriages increases, the economy rises significantly, and a slowdown in marriages is followed by a decline in the economy. Chan explains that there is usually about a one-year lag between a change in the marriage rate and the economy.²

ANALYZE THE ISSUE

Which of the above indicators are examples of causation? Explain.

1. "Economic Indicators, Turtles, Butterflies, Monks, and Waiters," *The Wall Street Journal*, Aug. 27, 1979, pp. 1, 16.
2. Sandra Block, "Worried? Look at Wedding Bell Indicator," *The Charlotte Observer*, Apr. 15, 1995, p. 8A.

Throughout this book, you will study economic models or theories that include variables linked by stable cause-and-effect relationships. For example, the theory that a change in the price of a good *causes* a change in the quantity purchased is a valid microeconomic model. The theory that a change in the money supply *causes* a change in interest rates is an example of a valid macroeconomic model. The You're the Economist gives some amusing examples of the "association means causation" reasoning pitfall.

WHY DO ECONOMISTS DISAGREE?

Why might one economist say a clean environment should be our most important priority and another economist say economic growth should be our most important goal? If economists share the economic way of thinking and carefully avoid reasoning pitfalls, then why do they disagree? Why are economists known for giving advice by saying, “On the one hand, if you do this, then *A* results, and, on the other hand, doing this causes result *B*?” In fact, President Harry Truman once jokingly exclaimed, “Find me an economist with only one hand.” George Bernard Shaw offered another famous line in the same vein: “If you took all the economists in the world and laid them end to end, they would never reach a conclusion.” These famous quotes imply that economists should agree, but they ignore the fact that physicists, doctors, business executives, lawyers, and other professionals often disagree.

Economists may appear to disagree more than other professionals partly because it is more interesting to report disagreements than agreements. Actually, economists agree on a wide range of issues. Many economists, for example, agree on free trade among nations, the elimination of farm subsidies and rent ceilings, government deficit spending to recover from a recession, and many other issues. When disagreements do exist, the reason can often be explained by the difference between *positive economics* and *normative economics*.

Positive Economics

Positive economics

An analysis limited to statements that are verifiable.

Positive economics deals with facts and therefore addresses “what is” or “verifiable” questions. Positive economics is an analysis limited to statements that are verifiable. Positive statements can be proven either true or false. Often a positive statement is expressed: “If *A*, then *B*.” For example, if the national unemployment rate rises to 9 percent, then teenage unemployment exceeds 80 percent. This is a positive “if-then” prediction, which may or may not be correct. Accuracy is not the criterion for being a positive statement. The key consideration is whether the statement is *testable* and not whether it is true or false. Suppose the data show that when the nation’s overall unemployment rate is close to 9 percent, the unemployment rate for teenagers never reaches 80 percent. For example, the overall unemployment rate was 9.3 percent in 2009, and the rate for teenagers was 24.3 percent—far short of 80 percent. Based on the facts, we would conclude that this positive statement is false.

Now, we can explain one reason why economists’ forecasts can diverge. The statement “If event *A* occurs, then event *B* follows” can be thought of as a *conditional* positive statement. For example, two economists may agree that if the federal government cuts spending by 10 percent this year, prices will fall about 2 percent next year. However, their predictions about the fall in prices may differ because one economist assumes Congress will not cut spending, while the other economist assumes Congress will cut spending by 10 percent.

CONCLUSION *Economists’ forecasts can differ because, using the same methodology, economists can agree that event A causes event B, but disagree over the assumption that event A will occur.*

Normative Economics

Instead of using objective statements, an argument can be phrased subjectively. **Normative economics** attempts to determine “what should be.” Normative economics is an analysis based on value judgments. Normative statements express an individual or collective opinion on a subject and cannot be proven by facts to be true or false. Certain words or phrases, such as *good*, *bad*, *need*, *should*, and *ought to*, tell us clearly that we have entered the realm of normative economics.

The point here is that people wearing different-colored glasses see the same facts differently. Each of us has individual subjective preferences that we apply to a particular subject. An animal rights activist says that no one *should* purchase a fur coat. Or one senator argues, “We *ought to* see that every teenager who wants a job has one.” Another senator counters by saying, “Maintaining the purchasing power of the dollar is *more important* than teenage unemployment.”

CONCLUSION *When opinions or points of view are not based on facts, they are scientifically untestable.*

When considering a debate, make sure to separate the arguments into their positive and normative components. This distinction allows you to determine if you are choosing a course of action based on factual evidence or on opinion. The material presented in this textbook, like most of economics, takes pains to stay within the boundaries of positive economic analysis. In our everyday lives, however, politicians, business executives, relatives, and friends use mostly normative statements to discuss economic issues. Economists also may associate themselves with a political position and use normative arguments for or against some economic policy. When using value judgments, an economist’s normative arguments may have no greater validity than those of others. Biases or preconceptions can cloud an economist’s thinking about deficit spending or whether to increase taxes on gasoline. Like beginning economics students, economists are human.

CAREERS IN ECONOMICS

The author of this text entered college more years ago than I would like to admit. In those days, economics was not taught in high school, so I knew nothing of the subject. Like many students taking this course, I was uncertain about which major to pursue, but selected electrical engineering because I was an amateur radio operator and enjoyed building radio receivers and transmitters. My engineering curriculum required a course in economics. I signed up thinking that “econ is boring.” Instead, it was an eye-opening experience that inspired me to change my major to economics and pursue an economics teaching career.

The study of economics has attracted a number of well-known people. For example, the Rolling Stones’ Mick Jagger attended the London School of Economics, and other famous people who majored in economics include former Supreme Court Justice Sandra Day O’Connor, California Governor Arnold Schwarzenegger, and three former presidents—George H. W. Bush, Ronald Reagan, and Gerald Ford.

An economics major can choose many career paths. Most economics majors work for business firms. Because economists are trained in analyzing financial matters, they find good jobs in management, sales, or as a market analyst interpreting

Normative economics

An analysis based on value judgment.



You're The Economist Does Raising the Minimum Wage Help the Working Poor? *Applicable Concepts: positive and normative analyses*



Minimum wages exist in more than one hundred countries. In 1938, Congress enacted the federal Fair

Labor Standards Act, commonly known as the “minimum-wage law.” Today, a minimum-wage worker who works full time still earns a deplorably low annual income. One approach to help the working poor earn a living wage might be to raise the minimum wage.

The dilemma for Congress is that a higher minimum wage for the employed is enacted at the expense of jobs for unskilled workers. Opponents forecast that the increased labor cost from a large minimum-wage hike would jeopardize hundreds of thousands of unskilled jobs. For example, employers may opt to purchase more capital and less expensive labor. The fear of such sizable job losses forces Congress to perform a difficult balancing act to ensure that a minimum-wage increase is large enough to help the working poor, but not so large as to threaten their jobs.

Some politicians claim that raising the minimum wage is a way to help the working poor without cost to taxpayers. Others believe the cost is hidden in inflation and lost employment opportunities for marginal workers, such as teenagers, the elderly, and minorities. One study by economists, for example, examined sixty

years of data and concluded that minimum wage increases resulted in reduced employment and hours of work for low-skilled workers.¹

Another problem with raising the minimum wage to aid the working poor is that minimum wage is a blunt weapon for redistributing wealth. Studies show that only a small percentage of minimum-wage earners are full-time workers whose family income falls below the poverty line. This means that most increases in the minimum wage go to workers who are not poor. For example, many minimum-wage workers are students living at home or workers whose spouse earns a much higher income. To help only the working poor, some economists argue that the government should target only those who need assistance, rather than using the “shotgun” approach of raising the minimum wage.

Supporters of raising the minimum wage are not convinced by these arguments. They say it is outrageous that a worker can work full time and still live in poverty. Moreover, people on this side of the debate believe that opponents exaggerate the dangers to the economy from a higher minimum wage. For example, one could argue that a higher minimum wage will force employers to upgrade the skills and productivity of their workers. Increasing the minimum wage may

therefore be a win-win proposition, rather than a win-lose proposition. Finally, across the United States, thirty-two states and numerous localities have implemented living-wage laws. Note that we return to this issue in Chapter 4 as an application of supply and demand analysis.

ANALYZE THE ISSUE

1. Identify two positive and two normative statements given above concerning raising the minimum wage. List other minimum-wage arguments not discussed in this You're the Economist, and classify them as either positive or normative economics.
2. Give a positive and a normative argument why a business leader would oppose raising the minimum wage. Give a positive and a normative argument why a labor leader would favor raising the minimum wage.
3. Explain your position on this issue. Identify positive and normative reasons for your decision. Are there alternative ways to aid the working poor?

1. David Neumark and William Wascher, *Minimum Wages* (Cambridge, MA: The MIT Press, 2008).

economic conditions relevant to a firm's market. For those with an undergraduate degree, private sector job opportunities exist in banking, securities brokering, management consulting, computer and data processing firms, the power industry, market research, finance, health care, and many other industries. Other economics majors work for government agencies and in colleges and universities.

Government economists work for federal, state, and local governments. For example, a government economist might compile and report national statistics for economic growth or work on projects such as how to improve indexes to measure trends in consumer prices. Economists in academe not only enjoy the challenge of teaching economics, but have great freedom in selecting research projects.

Studying economics is also an essential preparation for other careers. Those preparing for law school, for example, find economics an excellent major because of its emphasis on a logical approach to problem solving. Economics is also great preparation for an MBA. In fact, students majoring in any field will benefit throughout their lives from learning how to apply the economic way of thinking to analyze real-world economic issues.

Finally, economics majors shine in salary offers upon graduation. Exhibit 3 shows average yearly salary offers for bachelor's degree candidates for January 2009.

Exhibit 3

Average Yearly Salary Offers for Selected Majors

Undergraduate major	Average offer, January 2009
Computer engineering	\$59,803
Computer science	58,419
Electrical engineering	57,404
Management information systems	52,817
Economics	50,343
Accounting	48,334
Nursing	46,655
Business administration	45,887
Mathematics	45,853
Marketing	43,334
Visual and performing arts	37,545
Political science	36,745
Environmental science	36,736
Journalism	36,333
Liberal arts and sciences	36,154
Foreign language	35,783
Psychology	35,005
Sociology	34,319
Animal science	31,349
Criminal Justice	30,570
Social work	30,025

SOURCE: National Association of Colleges and Employers, *Salary Survey*, Spring 2009.

Key Concepts

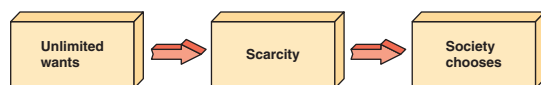
Scarcity
Resources
Land
Labor
Entrepreneurship

Capital
Economics
Macroeconomics
Microeconomics
Model

Ceteris paribus
Positive economics
Normative economics

Summary

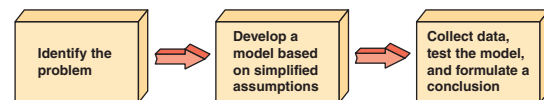
- **Scarcity** is the fundamental economic problem that human wants exceed the availability of time, goods, and resources. Individuals and society therefore can never have everything they desire.
- **Resources** are factors of production classified as land, labor, and capital. Entrepreneurship is a special type of labor. An entrepreneur seeks profits by taking risks and combining resources to produce innovative products.
- **Economics** is the study of how individuals and society choose to allocate scarce resources in order to satisfy unlimited wants. Faced with unlimited wants and scarce resources, we must make choices among alternatives.



- **Macroeconomics** applies an economywide perspective that focuses on such issues as inflation, unemployment, and the growth rate of the economy.
- **Microeconomics** examines individual decision-making units within an economy, such as a consumer's response to changes in the price

of coffee and the reasons for changes in the market price of personal computers.

- **Models** are simplified descriptions of reality used to understand and predict economic events. An economic model can be stated verbally or in a table, a graph, or an equation. If the evidence is not consistent with the model, the model is rejected.



- **Ceteris paribus** holds “all other factors unchanged” that might affect a particular relationship. If this assumption is violated, a model cannot be tested. Another reasoning pitfall is to think that *association* means *causation*.
- Use of **positive versus normative economic analysis** is a major reason for disagreements among economists. **Positive economics** uses testable statements. Often a positive argument is expressed as an *if-then* statement. **Normative economics** is based on value judgments or opinions and uses words such as *good*, *bad*, *ought to*, and *should*.

Summary of Conclusion Statements

- Financial capital by itself is not productive; instead, it is only a paper claim on economic capital.
- A theory cannot be tested legitimately unless its *ceteris paribus* assumption is satisfied.
- The fact that one event follows another does not necessarily mean that the first event caused the second event.
- Economists' forecasts can differ because, using the same methodology, economists can agree that event *A* causes event *B*, but disagree over the assumption that event *A* will occur.
- When opinions or points of view are not based on facts, they are scientifically untestable.

Study Questions and Problems

1. Explain why both nations with high living standards and nations with low living standards face the problem of scarcity. If you won \$1 million in a lottery, would you escape the scarcity problem?
2. Why isn't money considered capital in economics?
3. Computer software programs are an example of
 - a. capital.
 - b. labor.
 - c. a natural resource.
 - d. none of the above.
4. Explain the difference between macroeconomics and microeconomics. Give examples of the areas of concern to each branch of economics.
5. Which of the following are microeconomic issues? Which are macroeconomic issues?
 - a. How will an increase in the price of Coca-Cola affect the quantity of Pepsi-Cola sold?
 - b. What will cause the nation's inflation rate to fall?
 - c. How does a quota on textile imports affect the textile industry?
 - d. Does a large federal budget deficit reduce the rate of unemployment in the economy?
6. A model is defined as a
 - a. value judgment of the relationship between variables.
 - b. presentation of all relevant aspects of real-world events.
 - c. simplified description of reality used to understand the way variables are related.
 - d. data set adjusted for irrational actions of people.
7. Explain why it is important for an economic model to be an abstraction from the real world.
8. Explain the importance of the *ceteris paribus* assumption for an economic model.
9. Suppose Congress cuts spending for the military, and then unemployment rises in the U.S. defense industry. Is there causation in this situation, or are we observing an association between events?
10. Which of the following is an example of a proposition from positive economics?
 - a. If Candidate X had been elected president, taxpayers would have been treated more fairly than under President Y.
 - b. The average rate of inflation was higher during President X's presidency than during President Y's presidency.
 - c. In economic terms, President X is better than President Y.
 - d. President X's policies were more just toward poor people than President Y.
11. "The government should collect higher taxes from the rich and use the additional revenues to provide greater benefits to the poor." This statement is an illustration of a
 - a. testable statement.
 - b. basic principle of economics.

- c. statement of positive economics.
- d. statement of normative economics.

12. Analyze the positive versus normative arguments in the following case. What statements of positive economics are used to support requiring air bags? What normative reasoning is used?

Should the Government Require Air Bags?

Air bag advocates say air bags will save lives and the government should require them in all cars. Air bags

add an estimated \$600 to the cost of a car, compared to about \$100 for a set of regular seat belts. Opponents argue that air bags are electronic devices subject to failure and have produced injuries and death. For example, air bags have killed both adults and children whose heads were within the inflation zone at the time of deployment. Opponents therefore believe the government should leave the decision of whether to spend an extra \$600 or so for an air bag to the consumer. The role of the government should be limited to providing information on the risks of having versus not having air bags.

For Online Exercises, go the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Can You Prove There Is No Trillion-Dollar Person?

How can researchers ever be certain they have seen all the rich people in the United States? There is always the possibility that somewhere there is a person who qualifies. If the researchers had found

one, you could have rejected the theory. Because they did not, you cannot reject the theory. If you said that the evidence can support, but never prove, the theory, **YOU ARE CORRECT.**

Should Nebraska State Join a Big-Time Athletic Conference?

Suppose universities that belong to big-time athletic conferences do indeed have higher graduation rates than nonmembers. This is not the only possible explanation for the statistical correlation (or association) between the graduation rate and membership in a big-time athletic conference. A more plausible explanation is that improving

academic variables, such as tuition, quality of faculty, and student-faculty ratios, and not athletic conference membership, increase the graduation rate. If you said correlation does not mean causation, and therefore Nebraska State officials will not necessarily accept the graduation rate evidence, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

1. Scarcity exists
 - a. when people consume beyond their needs.
 - b. only in rich nations.
 - c. in all countries of the world.
 - d. only in poor nations.
2. Which of the following would eliminate scarcity as an economic problem?
 - a. Moderation of people's competitive instincts
 - b. Discovery of sufficiently large new energy reserves
 - c. Resumption of steady productivity growth
 - d. None of the above because scarcity cannot be eliminated

Practice Quiz Continued

3. Which of the following is *not* a resource?
 - a. Land
 - b. Labor
 - c. Money
 - d. Capital
4. Economics is the study of
 - a. how to make money.
 - b. how to operate a business.
 - c. people making choices because of the problem of scarcity.
 - d. the government decision-making process.
5. Microeconomics approaches the study of economics from the viewpoint of
 - a. individual or specific markets.
 - b. the operation of the Federal Reserve.
 - c. economywide effects.
 - d. the national economy.
6. A review of the performance of the U.S. economy during the 1990s is primarily the concern of
 - a. macroeconomics.
 - b. microeconomics.
 - c. both macroeconomics and microeconomics.
 - d. neither macroeconomics nor microeconomics.
7. An economic theory claims that a rise in gasoline prices will cause gasoline purchases to fall, *ceteris paribus*. The phrase *ceteris paribus* means that
 - a. other relevant factors like consumer incomes must be held constant.
 - b. gasoline prices must first be adjusted for inflation.
 - c. the theory is widely accepted but cannot be accurately tested.
 - d. consumers' need for gasoline remains the same regardless of price.
8. An economist notices that sunspot activity is high just prior to recessions and concludes that sunspots cause recessions. The economist has
 - a. confused association and causation.
 - b. misunderstood the *ceteris paribus* assumption.
 - c. used normative economics to answer a positive question.
 - d. built an untestable model.
9. Which of the following is a statement of positive economics?
 - a. The income tax system collects a lower percentage of the incomes of the poor
 - b. A reduction in tax rates of the rich makes the tax system more fair
 - c. Tax rates ought to be raised to finance health care
 - d. All of the above are primarily statements of positive economics
10. Which of the following is a statement of positive economics?
 - a. An unemployment rate greater than 8 percent is good because prices will fall.
 - b. An unemployment rate of 7 percent is a serious problem.
 - c. If the overall unemployment rate is 7 percent, unemployment rates among African Americans will average 15 percent.
 - d. Unemployment is a more severe problem than inflation.
11. Which of the following is a statement of normative economics?
 - a. The minimum wage is good because it raises wages for the working poor.
 - b. The minimum wage is supported by unions.
 - c. The minimum wage reduces the number of jobs for less-skilled workers.
 - d. The minimum wage encourages firms to substitute capital for labor.
12. Select the normative statement that completes the following sentence: If the minimum wage is raised rapidly, then
 - a. inflation will increase.
 - b. workers will gain their rightful share of total income.
 - c. profits will fall.
 - d. unemployment will rise.

Practice Quiz Continued

13. Computer programs, or software, are an example of
- land.
 - labor.
 - capital.
 - none of the above.
14. Which of the following would *not* be classified as a capital resource?
- The Empire State Building.
 - A Caterpillar bulldozer.
 - A Macintosh computer.
 - 100 shares of stock in General Motors.
15. A model (or theory)
- is a general statement about the causal relationship between variables based on facts.
 - helps explain and predict the relationship between variables.
 - when expressed as a downward (negatively) sloping graph implies an inverse relationship between the variables.
 - all of the above.

Applying Graphs to Economics



Economists are famous for their use of graphs. The reason is “a picture is worth a thousand words.” Graphs are used throughout this text to present economics models. By drawing a line, you can use a two-dimensional illustration to analyze the effects of a change in one variable on another. You could describe the same information using other model forms, such as verbal statements, tables, or equations, but a graph is the simplest way to present and understand the relationship between economic variables.

Don’t be worried that graphs will “throw you for a loop.” Relax! This appendix explains all the basic graphical language you will need. The following illustrates the simplest use of graphs for economic analysis.

A DIRECT RELATIONSHIP

Basic economic analysis typically concerns the relationship between two variables, both having positive values. Hence, we can confine our graphs to the upper-right (northeast) quadrant of the coordinate number system. In Exhibit A-1, notice that the scales on the horizontal axis (x -axis) and the vertical axis (y -axis) do not necessarily measure the same numerical values.

The horizontal axis in Exhibit A-1 measures annual income, and the vertical axis shows the amount spent per year for a personal computer (PC). In the absence of any established traditions, we could decide to measure income on the vertical axis and expenditure on the horizontal axis. The intersection of the horizontal and vertical axes is the *origin*, and the point at which both income and expenditure are zero. In Exhibit A-1, each point is a coordinate that matches the dollar value of income and the corresponding expenditure for a PC. For example, point A on the graph shows that people with an annual income of \$10,000 spent \$1,000 per year for a PC. Other incomes are associated with different expenditure levels. For example, at \$30,000 per year (point C), \$3,000 will be spent annually for a PC.

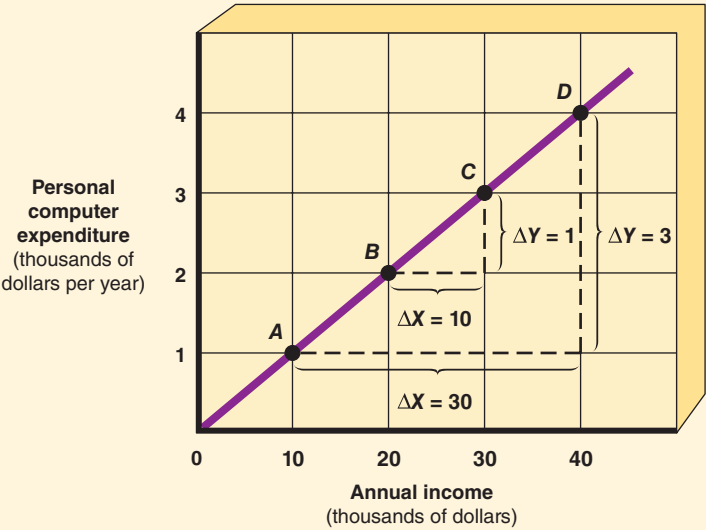
The straight line in Exhibit A-1 allows us to determine the direction of change in PC expenditure as annual income changes. This relationship is *positive* because PC expenditure, measured along the vertical axis, and annual income, measured along the horizontal axis, move in the same direction. PC expenditure increases as annual income increases. As income declines, so does the amount spent on a PC. Thus, the straight line representing the relationship between income and PC expenditure is a **direct relationship**. A direct relationship is a positive association between two variables. When one variable

Direct relationship

A positive association between two variables. When one variable increases, the other variable increases, and when one variable decreases, the other variable decreases.

Exhibit A-1 A Direct Relationship between Variables

The line with a positive slope shows that the expenditure per year for a personal computer has a direct relationship to annual income, *ceteris paribus*. As annual income increases along the horizontal axis, the amount spent on a PC also increases, as measured by the vertical axis. Along the line, each 10-unit increase in annual income results in a 1-unit increase in expenditure for a PC. Because the slope is constant along a straight line, we can measure the same slope between any two points. Between points B and C or between points A and D, the slope = $\Delta Y/\Delta X = +3/+30 = +1/+10 = 1/10$.



Expenditure for a Personal Computer at Different Annual Incomes

Point	Personal computer expenditure (thousands of dollars per year)	Annual income (thousands of dollars)
A	\$1	\$10
B	2	20
C	3	30
D	4	40

increases, the other variable increases, and when one variable decreases, the other variable decreases. In short, both variables change in the *same* direction.

Finally, an important point to remember: A two-variable graph, like any model, isolates the relationship between two variables and holds all other variables constant under the *ceteris paribus* assumption. In Exhibit A-1, for example, such factors as the prices of PCs and education are held constant by assumption. In Chapter 3, you will learn that allowing variables not shown in the graph to change can shift the position of the curve.

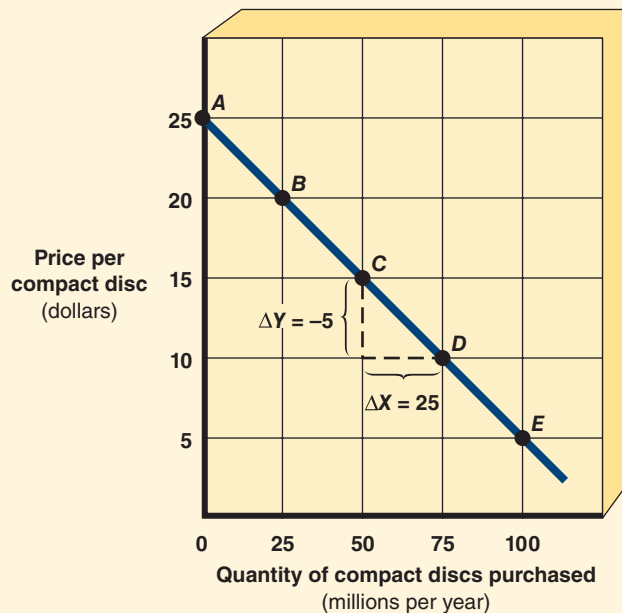
AN INVERSE RELATIONSHIP

Now consider the relationship between the price of compact discs (CDs) and the quantity consumers will buy per year, shown in Exhibit A-2. These data indicate a *negative* relationship between the price and quantity variables. When the price is low, consumers purchase a greater quantity of CDs than when the price is high.

Exhibit A-2

An Inverse Relationship between Variables

The line with a negative slope shows an inverse relationship between the price per compact disc and the quantity of CDs consumers purchase, *ceteris paribus*. As the price of a CD rises, the quantity of CDs purchased falls. A lower price for CDs is associated with more CDs purchased by consumers. Along the line, with each \$5 decrease in the price of CDs, consumers increase the quantity purchased by 25 units. The slope = $\Delta Y / \Delta X = -5 / +25 = -1/5$.



The Quantity of Compact Discs Consumers Purchase at Different Prices

Point	Price per compact disc	Quantity of compact discs purchased (millions per year)
A	\$25	0
B	20	25
C	15	50
D	10	75
E	5	100

Inverse relationship

A negative association between two variables. When one variable increases, the other decreases, and when one variable decreases, the other variable increases.

In Exhibit A-2, there is an **inverse relationship** between the price per CD and the quantity consumers buy. An inverse relationship is a negative association between two variables. When one variable increases, the other variable decreases, and when one variable decreases, the other variable increases. Stated simply, the variables move in *opposite* directions.

The line drawn in Exhibit A-2 is an inverse relationship. By long-established tradition, economists put price on the vertical axis and quantity on the horizontal axis. In Chapter 3, we will study in more detail the relationship between price and quantity called the *law of demand*.

In addition to observing the inverse relationship (slope), you must interpret the *intercept* at point A in the exhibit. The intercept in this case means that at a price of \$25 no consumer is willing to buy a single CD.

Slope

The ratio of the change in the variable on the vertical axis (the rise or fall) to the change in the variable on the horizontal axis (the run).

THE SLOPE OF A STRAIGHT LINE

Plotting numbers gives a clear visual expression of the relationship between two variables, but it is also important to know how much one variable changes as another variable changes. To find out, we calculate the **slope**. The slope is the ratio of the change in the variable on the vertical axis (the rise or fall) to the change in the variable on the horizontal axis (the run). Algebraically, if Y is on the vertical axis and X is on the horizontal axis, the slope is expressed as follows (the delta symbol, Δ, means “change in”):

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in vertical axis}}{\text{change in horizontal axis}} = \frac{\Delta Y}{\Delta X}$$

Consider the slope between points B and C in Exhibit A-1. The change in expenditure for a PC, Y, is equal to +1 (from \$2,000 to \$3,000 per year), and the change in annual income, X, is equal to +10 (from \$20,000 to \$30,000 per year). The slope is therefore +1/+10. The sign is positive because computer expenditure is directly, or positively, related to annual income. The steeper the line, the greater the slope because the ratio of ΔY to ΔX rises. Conversely, the flatter the line, the smaller the slope. Exhibit A-1 also illustrates that the slope of a straight line is constant. That is, the slope between any two points along the line, such as between points A and D, is equal to +3/+30 = 1/10.

What does the slope of 1/10 mean? It tells you that a \$1,000 increase (decrease) in PC expenditure each year occurs for each \$10,000 increase (decrease) in annual income. The line plotted in Exhibit A-1 has a *positive slope*, and we describe the line as “upward sloping.”

On the other hand, the line in Exhibit A-2 has a *negative slope*. The change in Y between points C and D is equal to −5 (from \$15 down to \$10), and the change in X is equal to +25 (from 50 million up to 75 million CDs purchased per year). The slope is therefore −5/+25 = −1/5, and this line is described as “downward sloping.”

What does this slope of −1/5 mean? It means that raising (lowering) the price per CD by \$1 decreases (increases) the quantity of CDs purchased by 5 million per year.

Suppose we calculate the slope between any two points on a flat line—say, points *B* and *C* in Exhibit A-3. In this case, there is no change in *Y* (expenditure for toothpaste) as *X* (annual income) increases. Consumers spend \$20 per year on toothpaste regardless of annual income. It follows that $\Delta Y = 0$ for any ΔX , so the slope is equal to 0. The two variables along a flat line (horizontal or vertical) have an **independent relationship**. An independent relationship is a zero association between two variables. When one variable changes, the other variable remains unchanged.

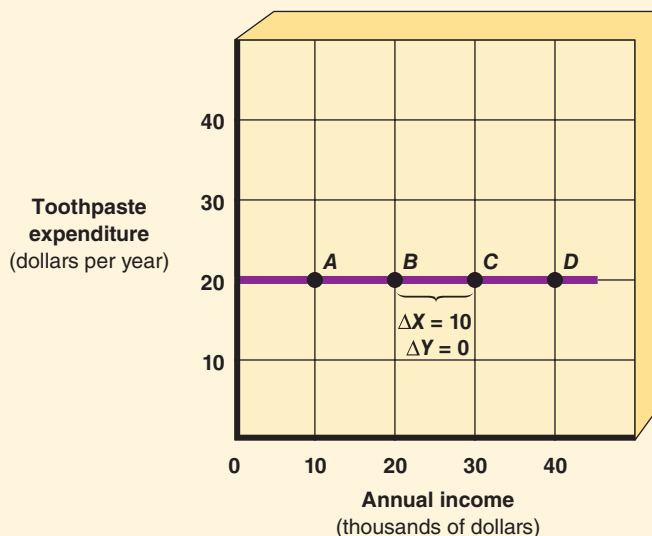
Independent relationship

A zero association between two variables. When one variable changes, the other variable remains unchanged.

Exhibit A-3

An Independent Relationship between Variables

The flat line with a zero slope shows that the expenditure per year for toothpaste is unrelated to annual income. As annual income increases along the horizontal axis, the amount spent each year for toothpaste remains unchanged at 20 units. If annual income increases 10 units, the corresponding change in expenditure is zero. The slope = $\Delta Y / \Delta X = 0 / +10 = 0$.



Expenditure for Toothpaste at Different Annual Incomes

Point	Toothpaste expenditure (dollars per year)	Annual income (thousands of dollars)
A	\$20	\$10
B	20	20
C	20	30
D	20	40

THE SLOPE OF A CURVE

The slope of a curve changes from one point to another. Suppose the relationship between the expenditure for a PC per year and annual income is not a straight line, but an upward-sloping curve, as drawn in Exhibit A-4. This means the slope of the curve is *positive* as we move along the curve. To calculate the slope of a given point on the curve requires two steps. For example, at point A, the first step is to draw a tangent line that just touches the curve at this point without crossing it. The second step is to determine the slope of the tangent line. In Exhibit A-4, the slope of the tangent line, and therefore the slope of the curve at point A, is $+2/+30 = 1/15$. What does this slope of $1/15$ mean? It means that at point A there will be a \$1,000 increase (decrease) in PC expenditure each year for each \$15,000 increase (decrease) in annual income.

Now consider that the relationship between the price per CD and the quantity demanded by consumers per year is the downward-sloping curve shown in Exhibit A-5. In this case, the slope of the curve is *negative* as we move along the curve. To calculate the slope at point A, draw a line tangent to the curve at point A. Thus, the slope of the curve at point A is $-10/+50 = -1/+5 = -1/5$.

Exhibit A-4

The Slope of an Upward-Sloping Curve

The slope of a curve at any given point, such as point A, is equal to the slope of the straight line drawn tangent to the curve at that point. The tangent line just touches the curve at point A without crossing it. The slope of the upward-sloping curve at point A is $+2/+30 = +1/+15 = 1/15$.

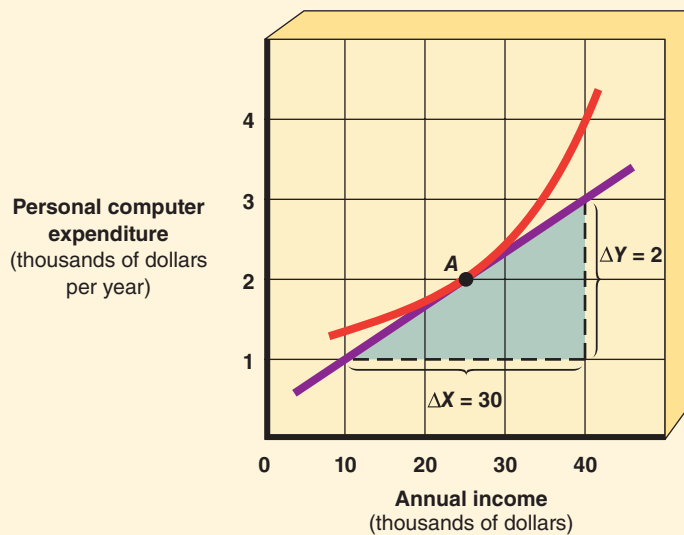
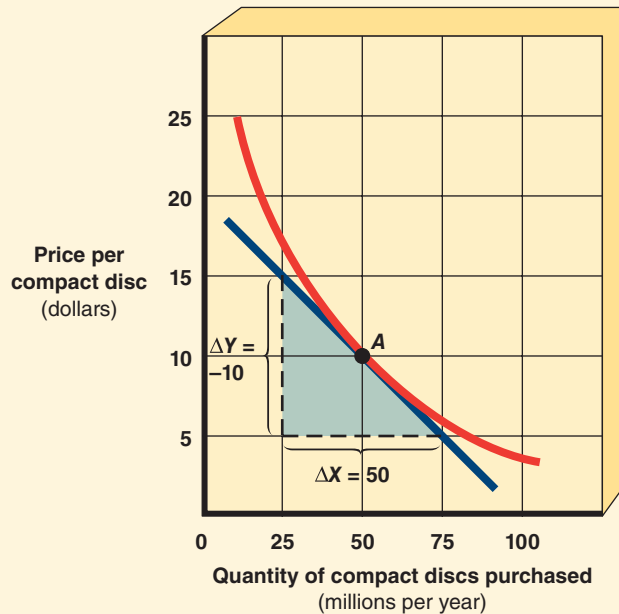


Exhibit A-5**The Slope of a Downward-Sloping Curve**

In this exhibit, the negative slope changes as one moves from point to point along the curve. The slope at any given point, such as point A, can be determined by the slope of the straight line tangent to that point. The slope of the downward-sloping curve at point A is $-10/+50 = -1/+5 = -1/5$.



A THREE-VARIABLE RELATIONSHIP IN ONE GRAPH

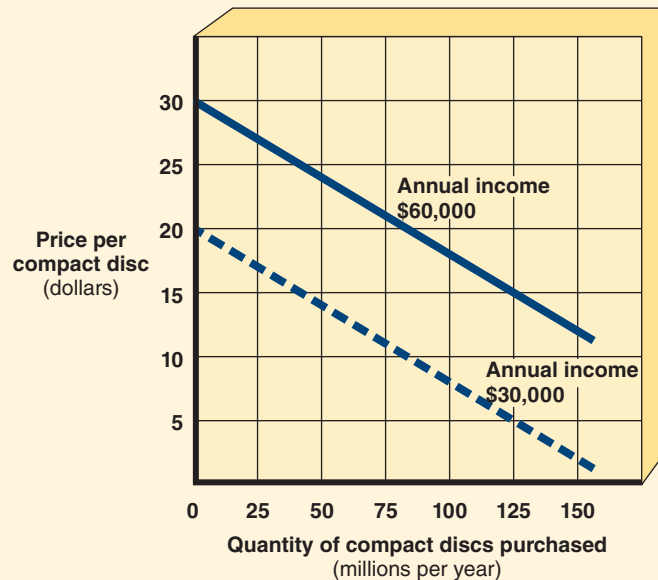
The two-variable relationships drawn so far conform to a two-dimensional flat piece of paper. For example, the vertical axis measures the price per CD variable, and the horizontal axis measures the quantity of CDs purchased variable. All other factors, such as consumer income, that may affect the relationship between the price and quantity variables are held constant by the *ceteris paribus* assumption. But reality is frequently not so accommodating. Often a model must take into account the impact of changes in a third variable (consumer income) drawn on a two-dimensional piece of graph paper.

Economists' favorite method of depicting a three-variable relationship is shown in Exhibit A-6. As explained earlier, the cause-and-effect relationship between price and quantity of CDs determines the downward-sloping curve. A change in the price per CD causes a movement downward along either of the two separate curves.

Exhibit A-6

Changes in Price, Quantity, and Income in Two Dimensions

Economists use a multicurve graph to represent a three-variable relationship in a two-dimensional graph. A decrease in the price per CD causes a movement downward along each curve. As the annual income of consumers rises, there is a shift rightward in the position of the demand curve.



As the price falls, consumers increase the quantity of CDs demanded. The location of each curve on the graph, however, depends on the annual income of consumers. As the annual income variable increases from \$30,000 to \$60,000 and consumers can afford to pay more, the price-quantity demanded curve shifts rightward. Conversely, as the annual income variable decreases and consumers have less to spend, the price-quantity demanded curve shifts leftward.

This is an extremely important concept that you must understand: Throughout this book, you must distinguish between *movements along* and *shifts in* a curve. Here's how to tell the difference. A change in one of the variables shown on either of the coordinate axes of the graph causes *movement along* a curve. On the other hand, a change in a variable not shown on one of the coordinate axes of the graph causes a *shift in* a curve's position on the graph.

CONCLUSION A shift in a curve occurs only when the *ceteris paribus* assumption is relaxed and a third variable not shown on either axis of the graph is allowed to change.

A HELPFUL STUDY HINT FOR USING GRAPHS

To some students, studying economics is a little frightening because many chapters are full of graphs. An often-repeated mistake is to prepare for tests by trying to memorize the lines of graphs. When their graded tests are returned, the students using this strategy will probably exclaim, “What happened?” The answer is that if you learn the economic concepts first, then you will understand the graphs as illustrations of these underlying concepts. Stated simply, superficial cramming for economics quizzes does not work. For students who are anxious about using graphs, in addition to the brief review of graphical analysis in this appendix, the Graphing Workshop on the CourseMate link of the Tucker Web site and the Study Guide contain step-by-step features on how to interpret graphs.

Key Concepts

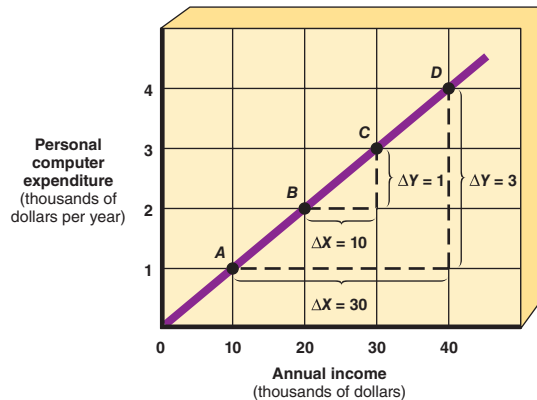
Direct relationship
Inverse relationship

Slope
Independent relationship

Summary

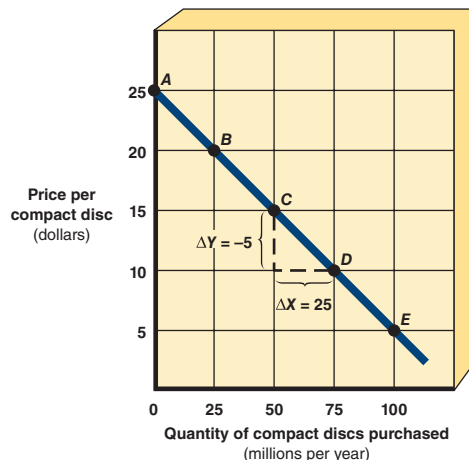
- **Graphs** provide a means to clearly show economic relationships in two-dimensional space. Economic analysis is often concerned with two variables confined to the upper-right (northeast) quadrant of the coordinate number system.
- A **direct relationship** occurs when two variables change in the *same* direction.

Direct Relationship



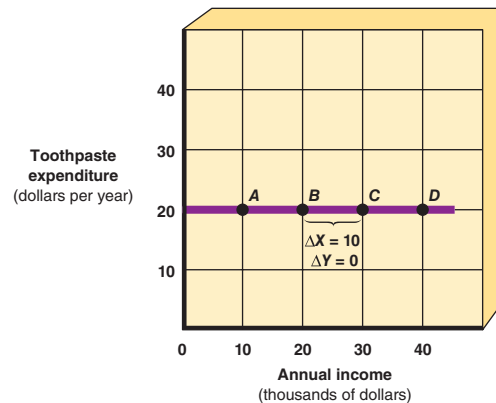
- An **inverse relationship** occurs when two variables change in *opposite* directions.

Inverse Relationship



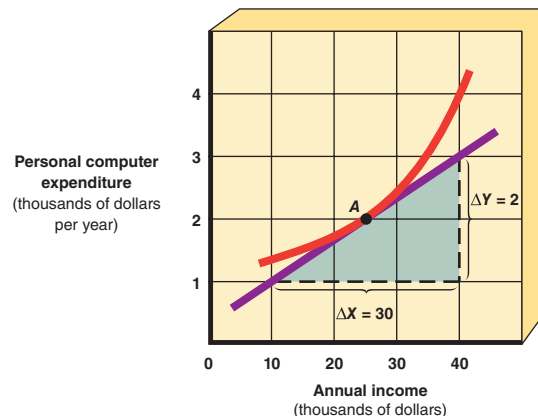
- An **independent relationship** occurs when two variables are unrelated.

Independent Relationship

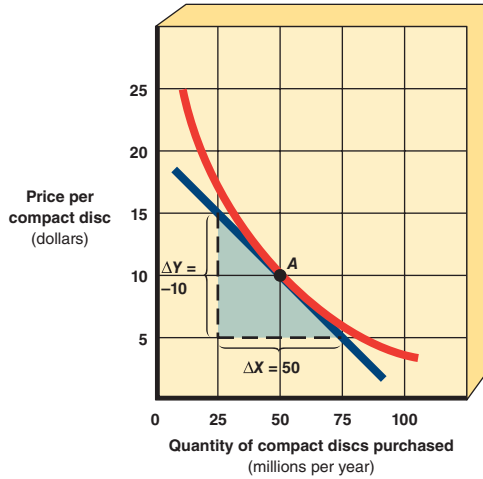


- **Slope** is the ratio of the vertical change (the rise or fall) to the horizontal change (the run). The slope of an *upward-sloping* line is *positive*, and the slope of a *downward-sloping* line is *negative*.

Positive Slope of an Upward-Sloping Curve



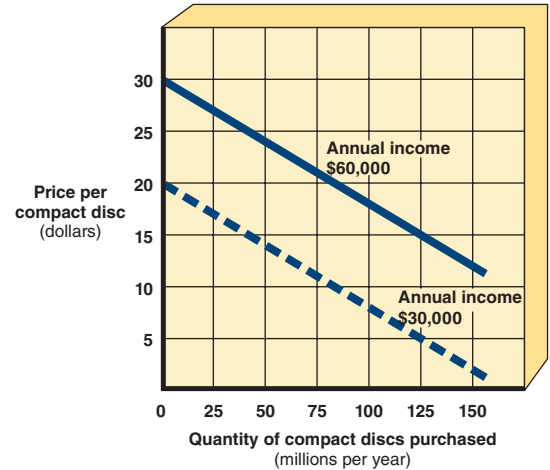
Negative Slope of a Downward-Sloping Curve



- A *three-variable relationship* is depicted by a graph showing a shift in a curve when the *ceteris paribus* assumption is relaxed and a

third variable (such as annual income) not on either axis of the graph is allowed to change.

Three-Variable Relationship



Summary of Conclusion Statement

- A shift in a curve occurs only when the *ceteris paribus* assumption is relaxed and a third variable not shown on either axis of the graph is allowed to change.

Study Questions and Problems

1. Draw a graph without specific data for the expected relationship between the following variables
 - a. The probability of living and age
 - b. Annual income and years of education
 - c. Inches of snow and sales of bathing suits
 - d. The number of football games won and the athletic budget

In each case, state whether the expected relationship is *direct* or *inverse*. Explain an additional factor that would be included in the *ceteris paribus* assumption because it might change and influence your theory.

2. Assume a research firm collects survey sales data that reveal the relationship between the

possible selling prices of hamburgers and the quantity of hamburgers consumers would purchase per year at alternative prices. The report states that if the price of a hamburger is \$4, 20,000 will be bought. However, at a price of \$3, 40,000 hamburgers will be bought. At \$2, 60,000 hamburgers will be bought, and at \$1, 80,000 hamburgers will be purchased.

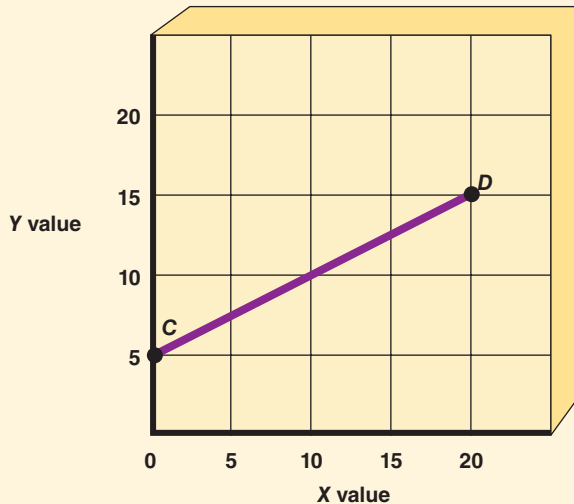
Based on these data, describe the relevant relationship between the price of a hamburger and the quantity consumers are willing to purchase, using a verbal statement, a numerical table, and a graph. Which model do you prefer and why?

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

Exhibit A-7

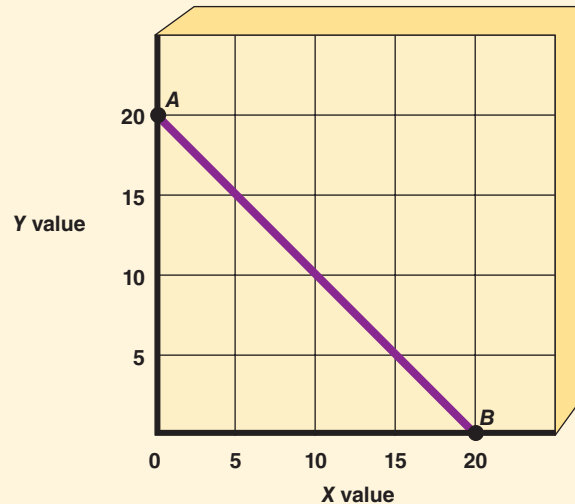
Straight Line



1. Straight line CD in Exhibit A-7 shows that
 - a. increasing the value of X will increase the value of Y .
 - b. decreasing the value of X will decrease the value of Y .
 - c. there is a direct relationship between X and Y .
 - d. all of the above are true.
2. In Exhibit A-7, the slope of straight line CD is
 - a. 3.
 - b. 1.
 - c. -1 .
 - d. $1/2$.
3. In Exhibit A-7, the slope of straight line CD is
 - a. positive.
 - b. zero.
 - c. negative.
 - d. variable.

Exhibit A-8

Straight Line



4. Straight line AB in Exhibit A-8 shows that
 - a. increasing the value of X reduces the value of Y .
 - b. decreasing the value of X increases the value of Y .
 - c. there is an inverse relationship between X and Y .
 - d. all of the above are true.
5. As shown in Exhibit A-8, the slope of straight line AB
 - a. decreases with increases in X .
 - b. increases with increases in X .
 - c. increases with decreases in X .
 - d. remains constant with changes in X .
6. In Exhibit A-8, the slope of straight line AB is
 - a. 3.
 - b. 1.

Practice Quiz Continued

- c. -1 .
 - d. -5 .
7. A shift in a curve represents a change in
- a. the variable on the horizontal axis.
 - b. the variable on the vertical axis.
 - c. a third variable that is not on either axis.
 - d. any variable that is relevant to the relationship being graphed.
8. A change in a third variable *not* on either axis of a graph is illustrated by a
- a. horizontal or vertical line.
 - b. movement along a curve.
 - c. shift of a curve.
 - d. point of intersection.
9. What is used to illustrate an independent relationship between two variables?
- a. An upward-sloping curve
 - b. A downward-sloping curve
 - c. A hill-shaped curve
 - d. A horizontal or vertical line
10. When an inverse relationship is graphed, the resulting line or curve is
- a. horizontal.
 - b. vertical.
 - c. upward sloping.
 - d. downward sloping.
11. Which of the following pairs is the *most* likely to exhibit an inverse relationship?
- a. The amount of time you study and your grade point average
 - b. People's annual income and their expenditure on personal computers
 - c. Baseball players' salaries and their batting averages
 - d. The price of a concert and the number of tickets people purchase
12. Which of the following pairs is the *most* likely to exhibit a direct relationship?
- a. The price of gasoline and the amount of gasoline that people purchase
 - b. Cholesterol levels and the likelihood of developing heart disease
 - c. Outdoor temperature and heating oil sales
 - d. Annual income and weekly pawn shop visits



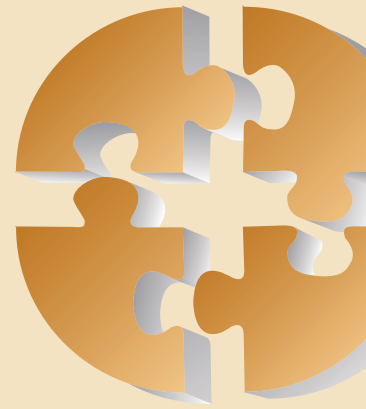
Production Possibilities, Opportunity Cost, and Economic Growth

This chapter continues building on the foundation laid in the preceding chapter. Having learned that *scarcity* forces *choices*, here you will study the choices people make in more detail. This chapter begins by examining the three basic choices: *What*, *How*, and *For Whom* to produce. The process of answering these basic questions introduces two other key building blocks in the economic way of thinking: *opportunity cost* and *marginal analysis*. Once you understand these important concepts stated in words, it will be easier to interpret our first formal economic model, the *production possibilities curve*. This model illustrates how

economists use graphs as a powerful tool to supplement words and develop an understanding of basic economic principles. You will discover that the production possibilities model teaches many of the most important concepts in economics, including scarcity, the law of increasing opportunity costs, efficiency, investment, and economic growth. For example, the chapter concludes by using the production possibilities curve to explain why underdeveloped countries do not achieve economic growth and thereby improve their standard of living.

In this chapter, you will learn to solve these economics puzzles:

- Why do so few rock stars and movie stars go to college?
- Why would you spend an extra hour reading this text rather than going to a movie or sleeping?
- Why are investment and economic growth so important?



THREE FUNDAMENTAL ECONOMIC QUESTIONS

Whether rich or poor, every nation must answer the same three fundamental economic questions: (1) *What* products will be produced? (2) *How* will they be produced? (3) *For Whom* will they be produced? Later, the chapter on economies in transition introduces various types of economic systems and describes how each deals with these three economic choices.

What to Produce?

Should society devote its limited resources to producing more health care and fewer military goods? Should society produce more iPods and fewer CDs? Should more capital goods be produced instead of consumer goods, or should small hybrid cars and fewer SUVs be produced? The problem of scarcity restricts our ability to produce everything we want during a given period, so the choice to produce “more” of one good requires producing “less” of another good.

How to Produce?

After deciding which products to make, the second question for society to decide is how to mix technology and scarce resources in order to produce these goods. For instance, a towel can be sewn primarily by hand (labor), partially by hand and partially by machine (labor and capital), or primarily by machine (capital). In short, the *How* question asks whether a production technique will be more or less capital-intensive.

Education plays an important role in answering the *How* question. Education improves the ability of workers to perform their work. Variation in the quality and quantity of education among nations is one reason economies differ in their capacities to apply resources and technology to answer the *How* question. For example, the United States is striving to catch up with Japan in the use of robotics. Answering the question *How do we improve our robotics?* requires engineers and employees with the proper training in the installation and operation of robots.

For Whom to Produce?

Once the *What* and *How* questions are resolved, the third question is *For Whom*. Among all those desiring the produced goods, who actually receives them? Who is fed well? Who drives a Mercedes? Who receives organ transplants? Should economics professors earn a salary of \$1 million a year and others pay higher taxes to support economists? The *For Whom* question means that society must have a method to decide who will be “rich and famous” and who will be “poor and unknown.”

OPPORTUNITY COST

Because of scarcity, the three basic questions cannot be answered without sacrifice or cost. But what does the term *cost* really mean? The common response would be to say that the purchase price is the cost. A movie ticket *costs* \$8, or a shirt *costs* \$50. Applying the economic way of thinking, however, *cost* is defined differently. A well-known phrase from Nobel Prize-winning economist Milton Friedman says, “There is no such thing as a free lunch.” This expression captures the links among the concepts of scarcity, choice, and cost. Because of scarcity, people must make choices, and each choice incurs a cost (sacrifice). Once one option is chosen, another option is given up. The money you spend on a movie ticket cannot also buy a DVD. A business may purchase a new textile machine to manufacture towels, but this same money cannot be used to buy a new recreation facility for employees.

The DVD and recreation facility examples illustrate that the true cost of these decisions is the **opportunity cost** of a choice, not the purchase price. Opportunity cost is the best alternative sacrificed for a chosen alternative. Stated differently, it is the cost of not choosing the next best alternative. This principle states that some highly valued opportunity must be forgone in all economic decisions. The actual good or use of time given up for the chosen good or use of time measures the opportunity cost. We may omit the word *opportunity* before the word *cost*, but the concept remains the same. Exhibit 1 illustrates the causation chain linking scarcity, choice, and opportunity cost.

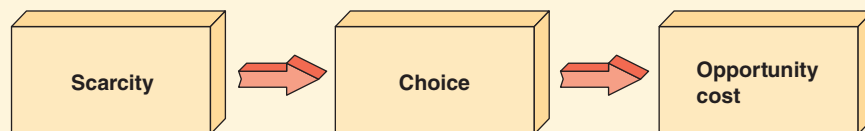
Opportunity cost

The best alternative sacrificed for a chosen alternative.

Exhibit 1

The Links between Scarcity, Choice, and Opportunity Cost

Scarcity means no society has enough resources to produce all the goods and services necessary to satisfy all human wants. As a result, society is always confronted with the problem of making choices. This concept is captured in Milton Friedman’s famous phrase, “There is no such thing as a free lunch.” This means that each decision has a sacrifice in terms of an alternative not chosen.



Examples are endless, but let's consider a few. Suppose your economics professor decides to become a rock star in the Rolling in Dough band. Now all his or her working hours are devoted to creating hit music, and the opportunity cost is the educational services no longer provided. Now a personal example: The opportunity cost of dating a famous model or movie star (name your favorite) might be the loss of your current girlfriend or boyfriend. Opportunity cost also applies to national economic decisions. Suppose the federal government decides to spend tax revenues on a space station. The opportunity cost depends on the next best program *not* funded. Assume roads and bridges are the highest-valued projects not built as a result of the decision to construct the space station. Then the opportunity cost of the decision to devote resources to the space station is the forgone roads and bridges and not the money actually spent to build the space station.

To personalize the relationship between time and opportunity cost, ask yourself what you would be doing if you were not reading this book. Your answer might be watching television or sleeping. If sleeping is your choice, the opportunity cost of studying this text is the sleep you sacrifice. Rock stars and movie stars, on the other hand, must forfeit a large amount of income to attend college. Now you know why you see so few of these stars in class.

Decisions often involve sacrifice of *both* goods and time. Suppose you decide to see a movie at a theater located 15 minutes from campus. If you had not spent the money at the movie theater, you could have purchased a DVD and watched a movie at home. And the time spent traveling to and from the movie and sitting through it could have been devoted to studying for your economics exam. The opportunity cost of the movie consists of giving up (1) a DVD and (2) study time needed to score higher on the economics exam.

MARGINAL ANALYSIS

At the heart of many important decision-making techniques used throughout this text is **marginal analysis**. Marginal analysis examines the effects of additions to or subtractions from a current situation. This is a very valuable tool in the economic-way-of-thinking toolkit because it considers the “marginal” effects of change. The rational decision maker decides on an option only if the marginal benefit exceeds the marginal cost. For example, you must decide how to use your scarce time. Should you devote an extra hour to reading this book, going to a movie, watching television, talking on the phone, or sleeping? Which of your many options do you choose? The answer depends on marginal analysis. If you decide the benefit of a higher grade in economics exceeds the opportunity cost of, say, sleep, then you allocate the extra hour to studying economics. Excellent choice!

Businesses use marginal analysis. Hotels, for example, rent space to student groups for dances and other events. Assume you are the hotel manager and a student group offers to pay \$400 to use the ballroom for a party. To decide whether to accept the offer requires marginal analysis. The marginal benefit of renting otherwise vacant space is \$400, and the marginal cost is \$300 for extra electricity and cleaning services. Since the marginal benefit exceeds the marginal cost, the manager sensibly accepts the offer.

Marginal analysis

An examination of the effects of additions to or subtractions from a current situation.

Similarly, farmers use marginal analysis. For example, a farmer must decide whether to add fertilizer when planting corn. Using marginal analysis, the farmer estimates that the corn revenue yield will be about \$75 per acre without fertilizer and about \$100 per acre using fertilizer. If the cost of fertilizer is \$20 per acre, marginal analysis tells the farmer to fertilize. The addition of fertilizer will increase profit by \$5 per acre because fertilizing adds \$25 to the value of each acre at a cost of \$20 per acre.

Marginal analysis is an important concept when the government considers changes in various programs. For example, as demonstrated in the next section, it is useful to know that an increase in the production of military goods will result in an opportunity cost of fewer consumer goods produced.

THE PRODUCTION POSSIBILITIES CURVE

The economic problem of scarcity means that society's capacity to produce combinations of goods is constrained by its limited resources. This condition can be represented in a model called the **production possibilities curve**. The production possibilities curve shows the maximum combinations of two outputs that an economy can produce in a given period of time with its available resources and technology. Three basic assumptions underlie the production possibilities curve model:

1. **Fixed Resources.** The quantities and qualities of all resource inputs remain unchanged during the time period. But the “rules of the game” do allow an economy to shift any resource from the production of one output to the production of another output. For example, an economy might shift workers from producing consumer goods to producing capital goods. Although the number of workers remains unchanged, this transfer of labor will produce fewer consumer goods and more capital goods.
2. **Fully Employed Resources.** The economy operates with all its factors of production fully employed and producing the greatest output possible without waste or mismanagement.
3. **Technology Unchanged.** Holding existing **technology** fixed creates limits, or constraints, on the amounts and types of goods any economy can produce. Technology is the body of knowledge applied to how goods are produced.

Exhibit 2 shows a hypothetical economy that has the capacity to manufacture any combination of military goods (“guns”) and consumer goods (“butter”) per year along its production possibilities curve (PPC), including points A, B, C, and D. For example, if this economy uses all its resources to make military goods, it can produce a *maximum* of 160 billion units of military goods and zero units of consumer goods (combination A). Another possibility is for the economy to use all its resources to produce a *maximum* of 100 billion units of consumer goods and zero units of military goods (point D). Between the extremes of points A and D lie other production possibilities for combinations of military and consumer goods. If combination B is chosen, the economy will produce 140 billion units of military goods and 40 billion units of consumer goods. Another possibility (point C) is to produce 80 billion units of military goods and 80 billion units of consumer goods.

Production possibilities curve

A curve that shows the maximum combinations of two outputs an economy can produce in a given period of time with its available resources and technology.

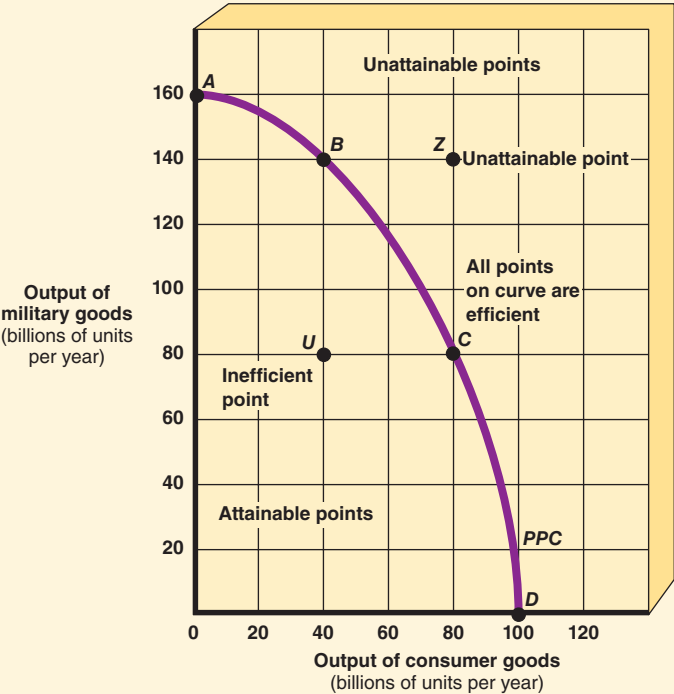
Technology

The body of knowledge applied to how goods are produced.

Exhibit 2

The Production Possibilities Curve for Military Goods and Consumer Goods

All points along the production possibilities curve (PPC) are maximum possible combinations of military goods and consumer goods. One possibility, point A, would be to produce 160 billion units of military goods and zero units of consumer goods each year. At the other extreme, point D, the economy uses all its resources to produce 100 billion units of consumer goods and zero units of military goods each year. Points B and C are obtained by using some resources to produce each of the two outputs. If the economy fails to utilize its resources fully, the result is the inefficient point U. Point Z lies beyond the economy’s present production capabilities and is unattainable.



Production Possibilities Schedule for Military and Consumer Goods per Year

Output (billions of units per year)	Production possibilities			
	A	B	C	D
Military goods	160	140	80	0
Consumer goods	0	40	80	100

What happens if the economy does not use all its resources to their capacity? For example, some workers may not find work, or plants and equipment may be idle for any number of reasons. The result is that our hypothetical economy fails to reach any of the combinations along the *PPC*. In Exhibit 2, point *U* illustrates an *inefficient* output level for any economy operating without all its resources fully employed. At point *U*, our model economy is producing 80 billion units of military goods and 40 billion units of consumer goods per year. Such an economy is underproducing because it could satisfy more of society's wants if it were producing at some point along *PPC*.

Even if an economy fully employs all its resources, it is impossible to produce certain output quantities. Any point outside the production possibilities curve is *unattainable* because it is beyond the economy's present production capabilities. Point *Z*, for example, represents an unattainable output of 140 billion units of military goods and 80 billion units of consumer goods. Society would prefer this combination to any combination along, or inside, the *PPC*, but the economy cannot reach this point with its existing resources and technology.

CONCLUSION *Scarcity limits an economy to points on or below its production possibilities curve.*

Because all the points along the curve are *maximum* output levels with the given resources and technology, they are all called *efficient* points. A movement between any two efficient points on the curve means that *more* of one product is produced only by producing *less* of the other product. In Exhibit 2, moving from point *A* to point *B* produces 40 billion additional units of consumer goods per year, but only at a cost of sacrificing 20 billion units of military goods. Thus, a movement between any two efficient points graphically illustrates that "There is no such thing as a free lunch."

CONCLUSION *The production possibilities curve consists of all efficient output combinations at which an economy can produce more of one good only by producing less of the other good.*

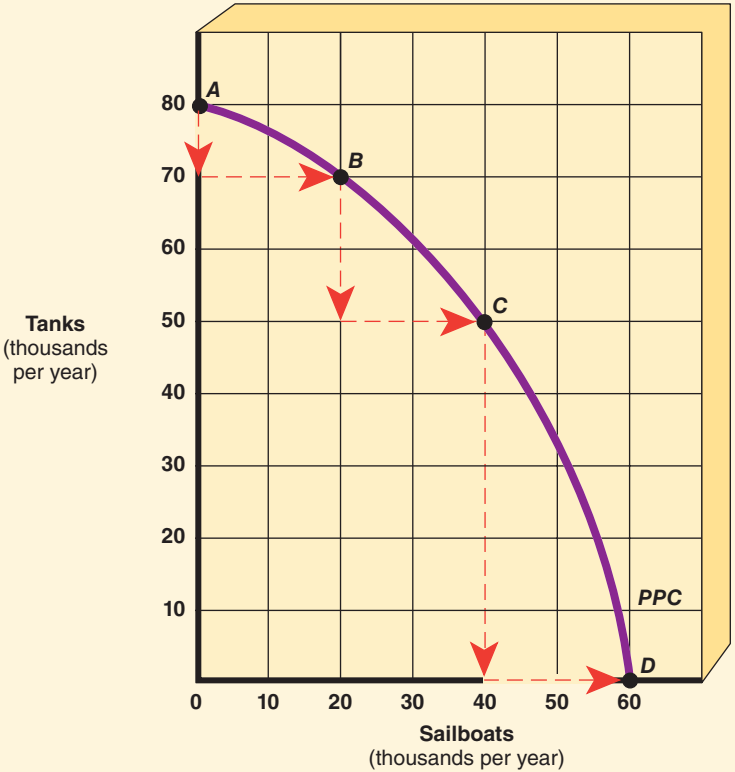
THE LAW OF INCREASING OPPORTUNITY COSTS

Why is the production possibilities curve shaped the way it is? Exhibit 3 will help us answer this question. It presents a production possibilities curve for a hypothetical economy that must choose between producing tanks and producing sailboats. Consider expanding the production of sailboats in 20,000-unit increments. Moving from point *A* to point *B*, the *opportunity cost* is 10,000 tanks; between point *B* and point *C*, the *opportunity cost* is 20,000 tanks; and the *opportunity cost* of producing at point *D*, rather than point *C*, is 50,000 tanks.

Exhibit 3

The Law of Increasing Opportunity Costs

A hypothetical economy produces equal increments of 20,000 sailboats per year as we move from point *A* through point *D* on the production possibilities curve (*PPC*). If the economy moves from point *A* to point *B*, the opportunity cost of 20,000 sailboats is a reduction in tank output of 10,000 per year. This opportunity cost rises to 20,000 tanks if the economy moves from point *B* to point *C*. Finally, production at point *D*, rather than point *C*, results in an opportunity cost of 50,000 tanks per year. The opportunity cost rises because workers are not equally suited to making tanks and sailboats.



Production Possibilities Schedule for Tanks and Sailboats per Year

Output (thousands per year)	Production possibilities			
	A	B	C	D
Tanks	80	70	50	0
Sailboats	0	20	40	60

Law of increasing opportunity costs

The principle that the opportunity cost increases as production of one output expands.

Exhibit 3 illustrates the **law of increasing opportunity costs**, which states that the opportunity cost increases as production of one output expands. Holding the stock of resources and technology constant (*ceteris paribus*), the law of increasing opportunity costs causes the production possibilities curve to display a *bowed-out* shape.

Why must our hypothetical economy sacrifice larger and larger amounts of tank output in order to produce each additional 20,000 sailboats? The reason is that all workers are not equally suited to producing one good, compared to another good. Expanding the output of sailboats requires the use of workers who are less suited to producing sailboats than producing tanks. Suppose our hypothetical economy produces no sailboats (point *A*) and then decides to produce them. At first, the least-skilled tank workers are transferred to making sailboats, and 10,000 tanks are sacrificed at point *B*. As the economy moves from point *B* to point *C*, more highly skilled tank makers become sailboat makers, and the opportunity cost rises to 20,000 tanks. Finally, the economy can decide to move from point *C* to point *D*, and the opportunity cost increases even more, to 50,000 tanks. Now the remaining tank workers, who are superb tank makers, but poor sailboat makers, must adapt to the techniques of sailboat production.

Finally, it should be noted that the production possibilities curve model could assume that resources can be substituted and the opportunity cost remains constant. In this case, the production possibilities curve would be a straight line, which is the model employed in the chapter on international trade and finance.

CONCLUSION *The lack of interchangeability between workers is the cause of increasing opportunity costs and the bowed-out shape of the production possibilities curve.*

SOURCES OF ECONOMIC GROWTH

Economic growth

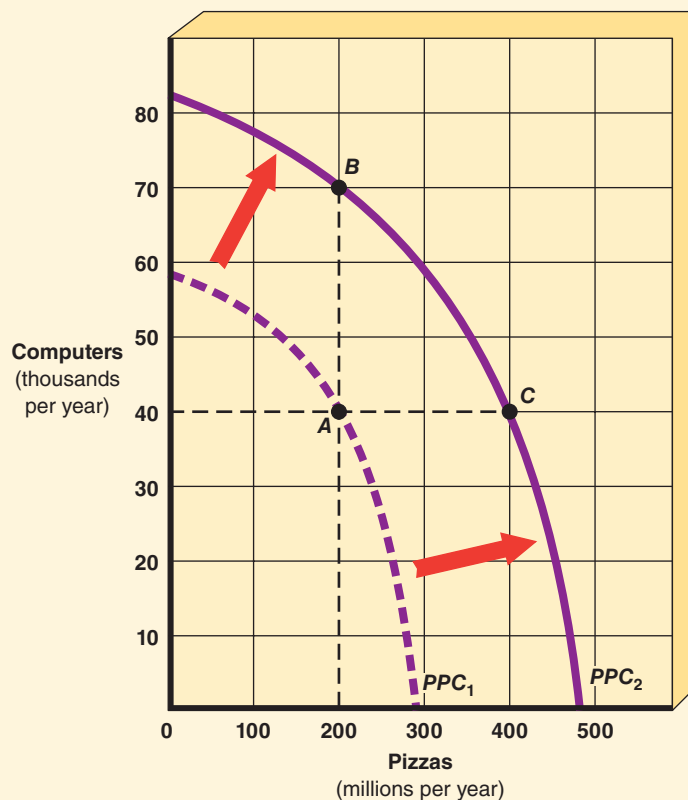
The ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve.

The economy's production capacity is not permanently fixed. If either the resource base increases or technology advances, the economy experiences **economic growth**, and the production possibilities curve shifts outward. Economic growth is the ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve. Exhibit 4 illustrates the importance of an outward shift. (Note the causation chain, which is often used in this text to focus on a model's cause-and-effect relationship.) At point *A* on PPC_1 , a hypothetical full-employment economy produces 40,000 computers and 200 million pizzas per year. If the curve shifts outward to the new curve PPC_2 , the economy can expand its full-employment output options. One option is to produce at point *B* and increase computer output to 70,000 per year. Another possibility is to increase pizza output to 400 million per year. Yet another choice is to produce more of both at some point between points *B* and *C*.

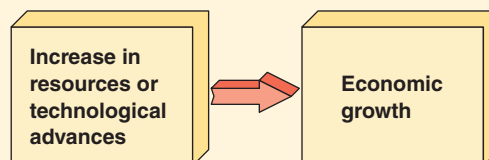
Exhibit 4

An Outward Shift of the Production Possibilities Curve for Computers and Pizzas

The economy begins with the capacity to produce combinations along the first production possibilities curve PPC_1 . Growth in the resource base or technological advances can shift the production possibilities curve outward from PPC_1 to PPC_2 . Points along PPC_2 represent new production possibilities that were previously impossible. This outward shift permits the economy to produce greater quantities of output. Instead of producing combination A, the economy can produce, for example, more computers at point B or more pizzas at point C. If the economy produces at a point between B and C, more of both pizzas and computers can be produced, compared to point A.



CAUSATION CHAIN



Changes in Resources

One way to accelerate economic growth is to gain additional resources. Any increase in resources—for example, more natural resources, a “baby boom,” or more factories—will shift the production possibilities curve outward. In Exhibit 4, assume curve PPC_1 represents Japan’s production possibilities for clothing and food in a given year. Suddenly, Japan discovers within its borders new sources of labor and other resources. As a result of the new resources, Japan will have an expanded capacity to produce any combination along an expanded curve, such as curve PPC_2 .

Reductions in resources will cause the production possibilities curve to shift inward. Assume curve PPC_2 describes Japan’s economy before World War II and the destruction of its factors of production during the war caused Japan’s curve to shift leftward to curve PPC_1 . Over the years, Japan trained its workforce, built new factories and equipment, and used new technology to shift its curve outward and surpass its original production capacity at curve PPC_2 .

Technological Change

Another way to achieve economic growth is through research and development of new technologies. The knowledge of how to transform a stone into a wheel vastly improved the prehistoric standard of living. Technological change also makes it possible to shift the production possibilities curve outward by producing more from the same resources base. One source of technological change is *invention*. Computer chips, satellites, and the Internet are all examples of technological advances resulting from the use of science and engineering knowledge.

Technological change also results from the innovations of entrepreneurship, introduced in the previous chapter. Innovation involves creating and developing new products or productive processes. Seeking profits, entrepreneurs create new, better, or less expensive products. This requires organizing an improved mix of resources, which expands the production possibilities curve.

One entrepreneur, Henry Ford, changed auto industry technology by pioneering the use of the assembly line for making cars. Another entrepreneur, Chester Carlson, a law student, became so frustrated copying documents that he worked on his own to develop photocopying. After years of disappointment, a small firm named Xerox Corporation accepted Carlson’s invention and transformed a good idea into a revolutionary product. These, and a myriad of other business success stories, illustrate that entrepreneurs are important because they transform their new ideas into production and practical use.

The phrase “new economy” refers to economic growth resulting from technological advances that make businesses and workers more productive. Success stories in the new economy are endless. The dizzying array of technological changes marches on cutting costs, boosting productivity and profits. Dairy farmers, for example, use new computer technology to milk their cows 24/7. New technology is even saving tropical fish at pet stores. Computer-controlled monitors that track water temperatures, acidity, and chlorine levels are resulting in fewer fish deaths per store. Such widespread technological gains mean real progress in the way we work and live.

It can be argued that there is nothing really “new” in the new economy concept. Throughout history, technological advances have fostered economic growth by increasing our nation’s productive power. Today, the Internet and computers are “new” technologies, but railroads, electricity, and automobiles, for example, were also “new” technologies in their time.



You're The Economist FedEx Wasn't an Overnight Success

Applicable Concept: entrepreneurship



Frederick W. Smith is a classic entrepreneurial success story. Young Fred went to Yale University, had a good new idea, secured venture capital, worked like crazy, made a fortune, and the Smithsonian Institution rendered its ultimate accolade. It snapped up an early Federal Express jet for its collection, displaying it for a time in the Air and Space Museum in Washington, D.C., not far from the Wright brothers' first airplane.

Smith's saga began with a college economics term paper that spelled out a nationwide overnight parcel delivery system that would be guaranteed to "absolutely, positively" beat the pants off the U.S. Postal Service. People, he said, would pay much more if their packages would arrive at their destination the next morning. To accomplish his plan, planes would converge nightly on Memphis, Tennessee, carrying packages

accepted at any location throughout the nation. Smith chose this city for its central U.S. location and because its airport has little bad weather to cause landing delays. In the morning hours, all items would be unloaded, sorted, and rerouted to other airports, where vans would battle rush-hour traffic to make deliveries before the noon deadline.

Smith's college term paper got a C grade. Perhaps the professor thought the idea was too risky, and lots of others certainly agreed. In 1969, after college and a tour as a Marine pilot in Vietnam, the 24-year-old Smith began pitching his parcel delivery plan to mostly skeptical financiers. Nevertheless, with \$4 million of his family's money, he persuaded a few venture capitalists to put up \$80 million. At this time, this was the largest venture capital package ever assembled. In 1973, delivery service began with 33 jets connecting

25 cities, but on the first night only 86 packages showed up.

It was years before Smith looked like a genius. The company posted a \$27 million loss the first year, turned the corner in 1976, and then took off, helped by a 1981 decision to add letters to its basic package delivery service. Today, Smith's basic strategy hasn't changed, but the scale of the operation has exploded. FedEx is the world's largest express transportation company, serving over 200 countries.

ANALYZE THE ISSUE

Draw a production possibilities curve for an economy producing only pizzas and computers. Explain how Fred Smith and other entrepreneurs affect the curve.

CHECKPOINT

What Does a War on Terrorism Really Mean?

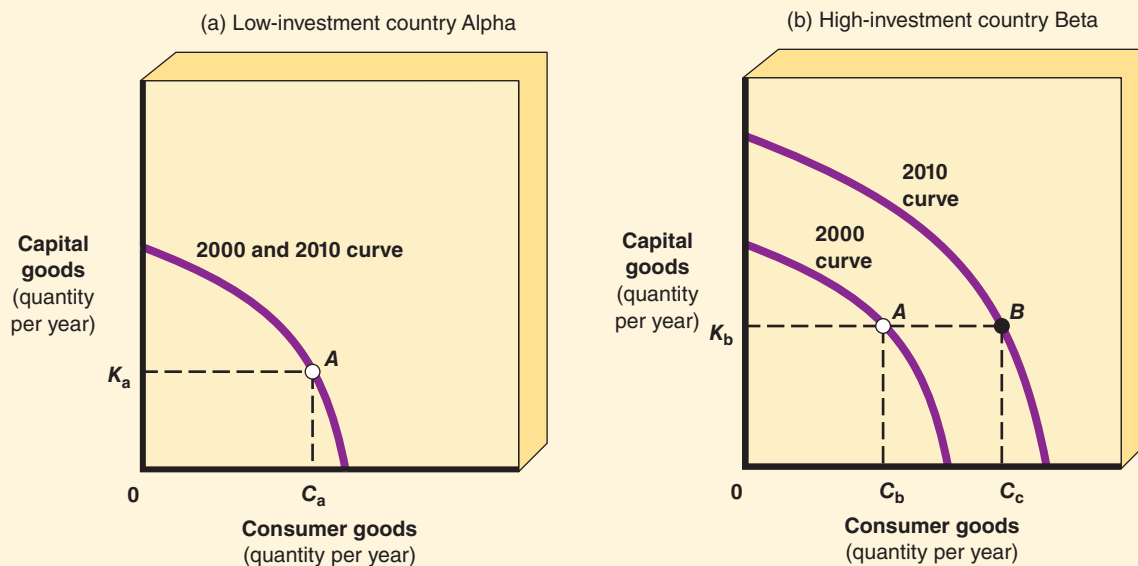
With the disappearance of the former Soviet Union and the end of the Cold War, the United States became the world's only superpower and no longer engaged in an intense competition to build up its military. As a result, in the 1990s Congress and the White House had the opportunity to reduce the military's share of the budget and spend more funds for nondefense goods. This situation was referred to as the "peace dividend." Now consider that the need to combat terrorism diverts resources back to military and security output. Does the peace dividend or a reversal to more military spending represent a possible shift of the production possibilities curve or a movement along it?



Exhibit 5

Alpha's and Beta's Present and Future Production Possibilities Curves

In part (a), each year Alpha produces only enough capital (K_a) to replace existing capital being worn out. Without greater capital and assuming other resources remain fixed, Alpha is unable to shift its production possibilities curve outward. In part (b), each year Beta produces K_b capital, which is more than the amount required to replenish its depreciated capital. In 2010, this expanded capital provides Beta with the extra production capacity to shift its production possibilities curve to the right (outward). If Beta chooses point B on its curve, it has the production capacity to increase the amount of consumer goods from C_b to C_c without producing fewer capital goods.



PRESENT INVESTMENT AND THE FUTURE PRODUCTION POSSIBILITIES CURVE

When the decision for an economy involves choosing between capital goods and consumer goods, the output combination for the present period can determine future production capacity.

Exhibit 5 compares two countries producing different combinations of capital and consumer goods. Part (a) shows the production possibilities curve for the low-investment economy of Alpha. This economy was producing combination A in 2000, which is an output of C_a of consumer goods and an output of K_a of capital goods per year. Let's assume K_a is just enough capital output to replace the capital being worn out each year (depreciation). As a result, Alpha fails to accumulate the net gain of factories and equipment required to expand its production possibilities curve outward in future years.¹ Why wouldn't Alpha simply move up along its

1. Recall from the Appendix to Chapter 1 that a third variable can affect the variables measured on the vertical and horizontal axes. In this case, the third variable is the quantity of capital worn out per year.



Global
Economics

Global Economics

How Does Public Capital Affect a Nation's Curve? *Applicable Concept: economic growth*

© iStockphoto.com/Robert Hackett



The discussion of low-investment country Alpha versus high-investment country Beta explained that sacrificing production of consumer goods for

an increase in capital goods output can result in economic growth and a higher standard of living. Stated differently, there was a long-run benefit from the accumulation of capital that offset the short-run opportunity cost in terms of consumer goods. Here the analysis was in terms of investment in private capital such as factories, machines, and inventories. However, public or government capital can also influence the production of both capital goods and consumption goods. For example, the government provides infrastructure such as roads, schools, bridges, ports, dams, and sanitation that makes the accumulation process for private capital more efficient, and in turn, an economy grows at a greater rate.

Using data from 21 high-investment countries, a recent study by economists investigated how government investment policy affected the productivity of new private capital goods.¹ Countries included in the research were, for example, Canada, Japan, New Zealand, Spain, and the United States. A key finding was that a 1 percent increase in public investment

increased the productivity of private investment by 27 percent. As a result, public capital caused the stock of private capital to rise more quickly over time.

Finally, economic growth and development is a major goal of countries throughout the world, and there are numerous factors that cause some countries to experience greater economic growth compared to other countries. Note that this topic is discussed in more depth in the last chapter of the text.

ANALYZE THE ISSUE

Construct a production possibilities curve for a hypothetical country. Put public capital goods per year on the vertical axis and consumer goods per year on the horizontal axis. Not shown directly in your graph, assume that this country produces just enough private capital per year to replace its depreciated capital. Assume further that this country is without public capital and is operating at point A where consumer goods are at a maximum. Based on the above research and using a production possibilities curve, show and explain what happens to this country's private capital, production possibilities curve, and standard of living if it increases its output of public capital.

1. Stuart Fowler and Bichaka Fayissa, "Public Capital Spending Shocks and the Price of Investment: Evidence from a Panel of Countries," The 2007 Missouri Economics Conference, <http://www.mtsu.edu/~sfowler/research/fs1.pdf>.

production curve by shifting more resources to capital goods production? The problem is that sacrificing consumer goods for capital formation causes the standard of living to fall.

Comparing Alpha to Beta illustrates the importance of being able to do more than just replace worn-out capital. Beta operated in 2000 at point A in part (b), which is an output of C_b of consumer goods and K_b of capital goods. Assuming K_b is more than enough to replenish worn-out capital, Beta is a high-investment economy, adding to its capital stock and creating extra production capacity. This process of accumulating capital (*capital formation*) is **investment**. Investment is the accumulation of capital, such as factories, machines, and inventories, used to produce goods

Investment

The accumulation of capital, such as factories, machines, and inventories, that is used to produce goods and services.

and services. Newly built factories and machines in the present provide an economy with the capacity to expand its production options in the future. For example, the outward shift of its curve allows Beta to produce C_c consumer goods at point B in 2010. This means Beta will be able to improve its standard of living by producing $C_c - C_b$ extra consumer goods, while Alpha's standard of living remains unchanged because the production of consumer goods remains unchanged.

CONCLUSION *A nation can accelerate economic growth by increasing its production of capital goods in excess of the capital being worn out in the production process.*

Key Concepts

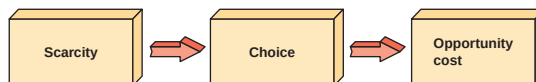
What, How, and For Whom
questions
Opportunity cost
Marginal analysis

Production possibilities curve
Technology
Law of increasing
opportunity costs

Economic growth
Investment

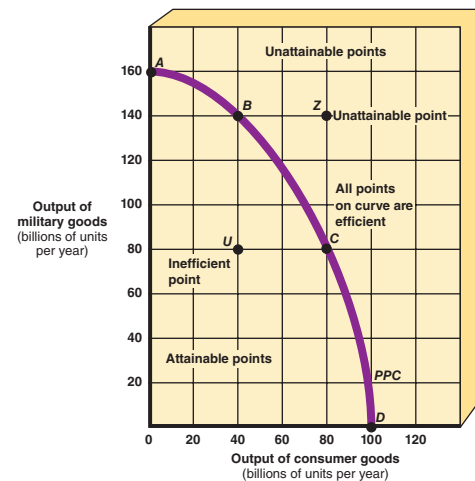
Summary

- *Three fundamental economic questions* facing any economy are *What, How, and For Whom* to produce goods. The *What* question asks exactly which goods are to be produced and in what quantities. The *How* question requires society to decide the resource mix used to produce goods. The *For Whom* problem concerns the division of output among society's citizens.
- **Opportunity cost** is the best alternative forgone for a chosen option. This means no decision can be made without cost.



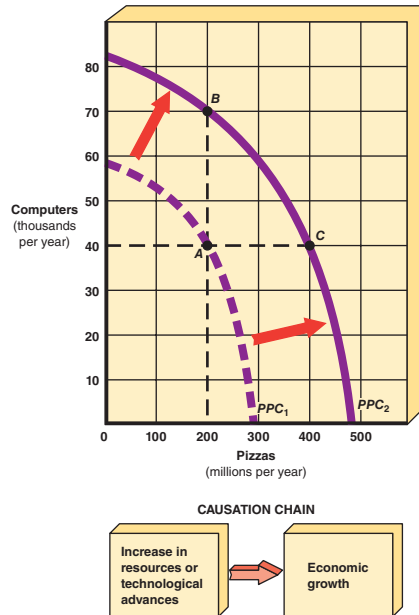
- **Marginal analysis** examines the impact of changes from a current situation and is a technique used extensively in economics. The basic approach is to compare the additional benefits of a change with the additional costs of the change.
- A **production possibilities curve** illustrates an economy's capacity to produce goods, subject to the constraint of scarcity. The production possibilities curve is a graph of the maximum possible combinations of two outputs that can be produced in a given period of time, subject to three conditions: (1) All resources are fully employed. (2) The resource base is not allowed to vary during the time period. (3) **Technology**, which is the body of knowledge applied to the production of goods, remains constant. **Inefficient** production occurs at any point inside the production possibilities curve. All points along the curve are **efficient** points because each point represents a maximum output possibility.

Production Possibilities Curve



- The **law of increasing opportunity costs** states that the opportunity cost increases as the production of an output expands. The explanation for this law is that the suitability of resources declines sharply as greater amounts are transferred from producing one output to producing another output.
- **Economic growth** is represented by the production possibilities curve shifting outward as the result of an increase in resources or an advance in technology.

Economic Growth



- **Investment** means that an economy is producing and accumulating capital. Investment consists of factories, machines, and inventories (capital) produced in the present that are used to shift the production possibilities curve outward in the future.

Summary of Conclusion Statements

- Scarcity limits an economy to points on or below its production possibilities curve.
- The production possibilities curve consists of all efficient output combinations at which an economy can produce more of one good only by producing less of the other good.
- The lack of perfect interchangeability between workers is the cause of increasing opportunity costs and the bowed-out shape of the production possibilities curve.
- A nation can accelerate economic growth by increasing its production of capital goods in excess of the capital being worn out in the production process.

Study Questions and Problems

1. Explain why scarcity forces individuals and society to incur opportunity costs. Give specific examples.
2. Suppose a retailer promotes its store by advertising a drawing for a “free car.” Is this car *free* because the winner pays *zero* for it?
3. Explain verbally the statement “There is no such thing as a free lunch” in relation to scarce resources.
4. Which of the following decisions has the greater opportunity cost? Why?
 - a. A decision to use an undeveloped lot in Tokyo’s financial district for an apartment building.
 - b. A decision to use a square mile in the desert for a gas station.
5. Attending college is expensive, time consuming, and it requires effort. So why do people decide to attend college?

6. The following is a set of hypothetical production possibilities for a nation.

Combination	Automobiles (thousands)	Beef (thousands of tons)
A	0	10
B	2	9
C	4	7
D	6	4
E	8	0

- Plot these production possibilities data. What is the opportunity cost of the first 2,000 automobiles produced? Between which points is the opportunity cost per thousand automobiles highest? Between which points is the opportunity cost per thousand tons of beef highest?
 - Label a point *F* inside the curve. Why is this an inefficient point? Label a point *G* outside the curve. Why is this point unattainable? Why are points *A* through *E* all efficient points?
 - Does this production possibilities curve reflect the law of increasing opportunity costs? Explain.
 - What assumptions could be changed to shift the production possibilities curve?
7. The following table shows the production possibilities for pies and flowerboxes. Fill in the opportunity cost (pies forgone) of producing the first through the fifth flowerbox.

Combination	Pies	Flowerboxes	Opportunity cost
A	30	0	_____
B	26	1	_____
C	21	2	_____
D	15	3	_____
E	8	4	_____
F	0	5	_____

8. Why does a production possibilities curve have a bowed-out shape?

9. Interpret the phrases “There is no such thing as a free lunch” and “A free lunch is possible” in terms of the production possibilities curve.

10. Suppose, unfortunately, your mathematics and economics professors have decided to give tests two days from now and you can spend a total of only twelve hours studying for both exams. After some thought, you conclude that dividing your study time equally between each subject will give you an expected grade of C in each course. For each additional three hours of study time for one of the subjects, your grade will increase one letter for that subject, and your grade will fall one letter for the other subject.

- Construct a table for the production possibilities and corresponding number of hours of study in this case.
- Plot these production possibilities data in a graph.
- Does this production possibilities curve reflect the law of increasing opportunity costs? Explain.

11. Draw a production possibilities curve for a hypothetical economy producing capital goods and consumer goods. Suppose a major technological breakthrough occurs in the capital goods industry and the new technology is widely adopted only in this industry. Draw the new production possibilities curve. Now assume that a technological advance occurs in consumer goods production, but not in capital goods production. Draw the new production possibilities curve.

12. The present choice between investing in capital goods and producing consumer goods now affects the ability of an economy to produce in the future. Explain.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWER

What Does a War on Terrorism Really Mean?

A “peace dividend” suggests resources are allocated away from military production and used for greater nonmilitary production. The war on terrorism arguably shifts resources in the opposite direction.

If you said that this phrase represents a movement along the production possibilities curve, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- Which of the following decisions must be made by all economies?
 - How much to produce? When to produce? How much does it cost?
 - What is the price? Who will produce it? Who will consume it?
 - What to produce? How to produce it? For whom to produce?
 - None of the above.
- A student who has one evening to prepare for two exams on the following day has the following two alternatives:

Possibility	Score in Economics	Score in Accounting
A	95	80
B	80	90

The opportunity cost of receiving a 90, rather than an 80, on the accounting exam is represented by how many points on the economics exam?

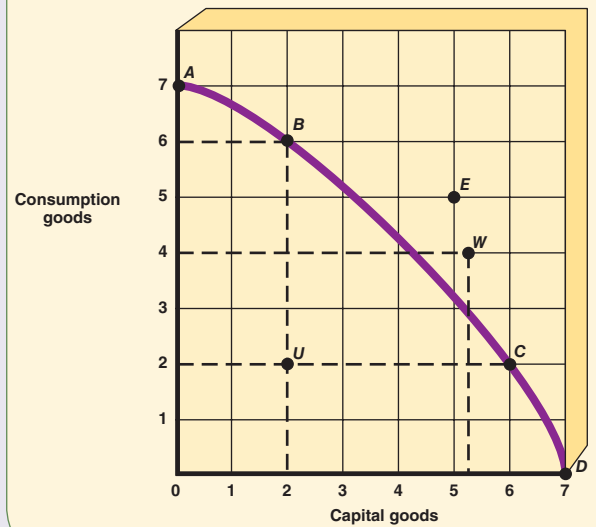
- 15 points
 - 80 points
 - 90 points
 - 10 points
- Opportunity cost is the
 - purchase price of a good or service.
 - value of leisure time plus out-of-pocket costs.
 - best option given up as a result of choosing an alternative.
 - undesirable sacrifice required to purchase a good.
 - On a production possibilities curve, the opportunity cost of good X in terms of good Y is represented by
 - the distance to the curve from the vertical axis.
 - the distance to the curve from the horizontal axis.
 - the movement along the curve.
 - all of the above.
 - If a farmer adds 1 pound of fertilizer per acre, the value of the resulting crops rises from \$80 to \$100 per acre. According to marginal analysis, the farmer should add fertilizer if it costs less than
 - \$12.50 per pound.
 - \$20 per pound.
 - \$80 per pound.
 - \$100 per pound.
 - On a production possibilities curve, a change from economic inefficiency to economic efficiency is obtained by
 - movement along the curve.
 - movement from a point outside the curve to a point on the curve.
 - movement from a point inside the curve to a point on the curve.
 - a change in the slope of the curve.

Practice Quiz Continued

7. Any point inside the production possibilities curve is a (an)
 - a. efficient point.
 - b. unfeasible point.
 - c. inefficient point.
 - d. maximum output combination.
8. Using a production possibilities curve, unemployment is represented by a point located
 - a. near the middle of the curve.
 - b. at the top corner of the curve.
 - c. at the bottom corner of the curve.
 - d. outside the curve.
 - e. inside the curve.
9. Along a production possibilities curve, an increase in the production of one good can be accomplished only by
 - a. decreasing the production of another good.
 - b. increasing the production of another good.
 - c. holding constant the production of another good.
 - d. producing at a point on a corner of the curve.
10. Education and training that improve the skill of the labor force are represented on the production possibilities curve by a (an)
 - a. movement along the curve.
 - b. inward shift of the curve.
 - c. outward shift of the curve.
 - d. movement toward the curve from an exterior point.
11. A nation can accelerate its economic growth by
 - a. reducing the number of immigrants allowed into the country.
 - b. adding to its stock of capital.
 - c. printing more money.
 - d. imposing tariffs and quotas on imported goods.
12. From the information in Exhibit 6, which of the following points on the production possibilities curve are attainable with the resources and technology currently available?
 - a. A, B, C, E, U
 - b. A, B, C, D, W
 - c. E, U, W
 - d. B, C, D, U
 - e. A, B, C, E

Exhibit 6

Production Possibilities Curve



13. In Exhibit 6, which of the following points on the production possibilities curve are efficient production points?
 - a. A, B, C, U
 - b. A, B, C, D, U
 - c. E, U, W
 - d. B, C, D, U
 - e. A, B, C, D
14. In Exhibit 6, to move from U to B, the opportunity cost
 - a. would be 4 units of consumption goods.
 - b. would be 2 units of capital goods.
 - c. would be zero.
 - d. would be 5 units of capital goods.
 - e. cannot be estimated.
15. In Exhibit 6, which of the following points on the production possibilities curve are full-employment production points?
 - a. A, B, C, D
 - b. A, B, C, D, U
 - c. E, U, W
 - d. B, C, D, U
 - e. A, B, C, U

Road Map Introduction to Economics

part 1

This road map feature helps you tie material in the part together as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The key concept in each question is given for emphasis, and each question or set of questions concludes with an interactive game to reinforce the concepts. Click on the Tucker Web site at www.cengage.com/economics/tucker, select the chapter, and play the visual causation chain game designed to make learning fun. Enjoy the cheers when correct and suffer the jeers if you miss. The correct answers to the multiple-choice questions are given in Appendix C of the text.

Chapter 1. Introducing the Economic Way of Thinking

1. Key Concept: Scarcity

Economists believe that scarcity forces everyone to

- satisfy all their wants.
- abandon consumer sovereignty.
- lie about their wants.
- create unlimited resources.
- make choices.

2. Key Concept: Economics

The subject of economics is primarily the study of

- the government decision-making process.
- how to operate a business successfully.
- decision making because of the problem of scarcity.
- how to make money in the stock market.



Causation Chain Game

The Relationship Between Scarcity and Decision Making

3. Key Concept: Model

When building a model, an economist must

- adjust for exceptional situations.
- provide a complete description of reality.
- make simplifying assumptions.
- develop a set of behavioral equations.

4. Key Concept: *Ceteris paribus*

If the price of a textbook rises and then students purchase fewer textbooks, an economic model can show a cause-and-effect relationship only if which of the following conditions hold?

- Students' incomes fall.
- Tuition decreases.

- c. The number of students increases.
- d. Everything else is constant.
- e. The bookstore no longer accepts used book trade-ins.

5. Key Concept: Association vs. causation

Someone notices that sunspot activity is high just prior to recessions and concludes that sunspots cause recessions. This person has

- a. confused association and causation.
- b. misunderstood the ceteris paribus assumption.
- c. used normative economics to answer a positive question.
- d. built an untestable model.



Causation Chain Game

The Steps in the Model-Building Process—Exhibit 2

Chapter 2. Production Possibilities, Opportunity Cost, and Economic Growth

6. Key Concept: Production possibilities curve

Which of the following is *not true* about a production possibilities curve?

The curve

- a. indicates the combinations of goods and services that can be produced with a given technology.
- b. indicates the efficient production points.
- c. indicates the non-efficient production points.
- d. indicates the feasible (attainable) and non-feasible production points.
- e. indicates which production point will be chosen.

7. Key Concept: Production possibilities curve

Which of the following is *true* about the production possibilities curve when a technological progress occurs?

- a. Shifts inward to the left.
- b. Becomes flatter on one end and steeper at the other end.
- c. Becomes steeper.
- d. Shifts outward to the right.
- e. Does not change.

8. Key Concept: Shifting the production possibilities curve

An outward shift of an economy's production possibilities curve is caused by

- a. entrepreneurship.
- b. an increase in labor.
- c. an advance in technology.
- d. all of the above.

9. Key Concept: Shifting the production possibilities curve

Which would be *least likely* to cause the production possibilities curve to shift to the right?

- a. An increase in the labor force
- b. Improved methods of production

- c. An increase in the education and training of the labor force
- d. A decrease in unemployment

10. Key Concept: Investment

A nation can accelerate its economic growth by

- a. reducing the number of immigrants allowed into the country.
- b. adding to its stock of capital.
- c. printing more money.
- d. imposing tariffs and quotas on imported goods.



Causation Chain Game

Economic Growth and Technology—Exhibit 4

Microeconomic Fundamentals



© Getty Images

In order to study the microeconomy, the chapters in Part 2 build on the basic concepts learned in Part 1. Chapters 3 and 4 explain the market demand and supply model, which has a wide range of real-world applications. Chapter 5 takes a closer look at movements along the demand curve introduced in Chapter 3. Chapter 6 returns to the law of demand and explores in more detail exactly why consumers make their choices among goods and services. Part 2 concludes in Chapter 7 with an extension of the concept of supply that explains how various costs of production change as output varies.



Market Demand and Supply

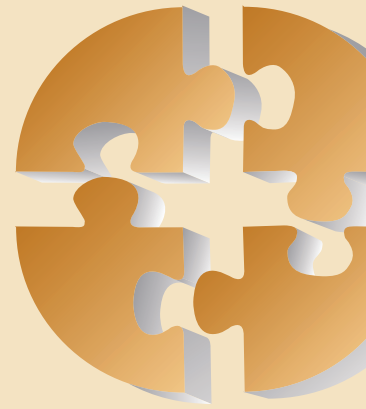
A cornerstone of the U.S. economy is the use of markets to answer the basic economic questions discussed in the previous chapter. Consider baseball cards, DVDs, physical fitness, gasoline, soft drinks, alligators, and sneakers. In a *market economy*, each is bought and sold by individuals coming together as buyers and sellers in markets. This chapter is extremely important because it introduces basic supply and demand analysis. This technique will prove to be valuable because it is applicable to a multitude of real-world choices of buyers and sellers facing the problem

of scarcity. For example, the Global Economics feature asks you to consider the highly controversial issue of international trade in human organs.

Demand represents the choice-making behavior of consumers, while supply represents the choices of producers. The chapter begins by looking closely at demand and then supply. Finally, it combines these forces to see how prices and quantities are determined in the marketplace. Market demand and supply analysis is the basic tool of microeconomic analysis.

In this chapter, you will learn to solve these economics puzzles:

- What is the difference between a “change in quantity demanded” and a “change in demand”?
- Can Congress repeal the law of supply to control oil prices?
- Does the price system eliminate scarcity?



THE LAW OF DEMAND

Economics might be referred to as “graphs and laughs” because economists are so fond of using graphs to illustrate demand, supply, and many other economic concepts. Unfortunately, some students taking economics courses say they miss the laughs.

Exhibit 1 reveals an important “law” in economics called the **law of demand**. The law of demand states there is an inverse relationship between the price of a good and the quantity buyers are willing to purchase in a defined time period, *ceteris paribus*. The law of demand makes good sense. At a “sale,” consumers buy more when the price of merchandise is cut.

In Exhibit 1, the *demand curve* is formed by the line connecting the possible price and quantity purchased responses of an individual consumer. The demand curve therefore allows you to find the quantity demanded by a buyer at any possible selling price by moving along the curve. For example, Bob, a sophomore at Marketplace College, loves watching movies on DVDs. Bob’s demand curve shows that at a price of \$15 per DVD his quantity demanded is 6 DVDs purchased annually (point B). At the lower price of \$10, Bob’s quantity demanded increases to 10 DVDs per year (point C). Following this procedure, other price and quantity possibilities for Bob are read along the demand curve.

Note that until we know the actual price determined by both demand and supply, we do not know how many DVDs Bob will actually purchase annually. The demand curve is simply a summary of Bob’s buying intentions. Once we know the market price, a quick look at the demand curve tells us how many DVDs Bob will buy.

CONCLUSION *Demand is a curve or schedule showing the various quantities of a product consumers are willing to purchase at possible prices during a specified period of time, ceteris paribus.*

Market Demand

To make the transition from an *individual* demand curve to a *market* demand curve, we total, or sum, the individual demand schedules. Suppose the owner of Zap Mart, a small retail chain of stores serving a few states, tries to decide what to charge for DVDs

Law of demand

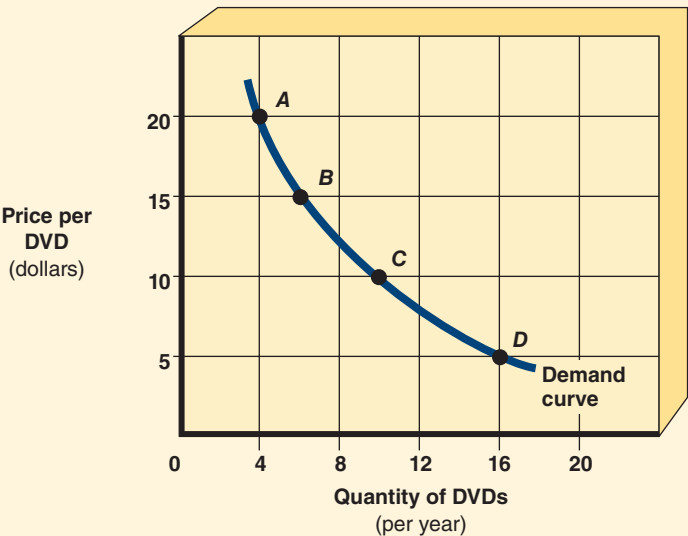
The principle that there is an inverse relationship between the price of a good and the quantity buyers are willing to purchase in a defined time period, *ceteris paribus*.

Demand

A curve or schedule showing the various quantities of a product consumers are willing to purchase at possible prices during a specified period of time, *ceteris paribus*.

Exhibit 1 An Individual Buyer's Demand Curve for DVDs

Bob's demand curve shows how many DVDs he is willing to purchase at different possible prices. As the price of DVDs declines, the quantity demanded increases, and Bob purchases more DVDs. The inverse relationship between price and quantity demanded conforms to the law of demand.



An Individual Buyer's Demand Schedule for DVDs

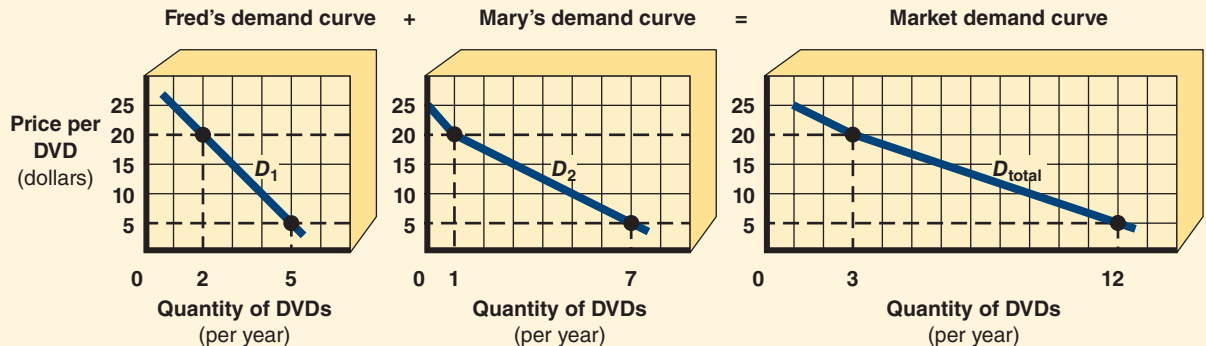
Point	Price per DVD	Quantity demanded (per year)
A	\$20	4
B	15	6
C	10	10
D	5	16

and hires a consumer research firm. For simplicity, we assume Fred and Mary are the only two buyers in Zap Mart's market, and they are sent a questionnaire that asks how many DVDs each would be willing to purchase at several possible prices. Exhibit 2 reports their price–quantity demanded responses in tabular and graphical form.

The market demand curve, D_{total} , in Exhibit 2 is derived by summing *horizontally* the two individual demand curves, D_1 and D_2 , for each possible price. At a price of \$20, for example, we sum Fred's 2 DVDs demanded per year and Mary's 1 DVD demanded per year to find that the total quantity demanded at \$20 is 3 DVDs per year. Repeating the same process for other prices generates the market demand curve, D_{total} . For example, at a price of \$5, the total quantity demanded is 12 DVDs.

*Exhibit 2***The Market Demand Curve for DVDs**

Individual demand curves differ for consumers Fred and Mary. Assuming they are the only buyers in the market, the market demand curve, D_{total} , is derived by summing horizontally the individual demand curves, D_1 and D_2 .

**Market Demand Schedule for DVDs**

Price per DVD	Quantity demanded per year			
	Fred	+	Mary	= Total demand
\$25	1		0	1
20	2		1	3
15	3		3	6
10	4		5	9
5	5		7	12

THE DISTINCTION BETWEEN CHANGES IN QUANTITY DEMANDED AND CHANGES IN DEMAND

Price is not the only variable that determines how much of a good or service consumers will buy. Recall from Exhibit A-6 of Appendix 1 that the price and quantity variables in our model are subject to the *ceteris paribus* assumption. If we relax this assumption and allow other variables held constant to change, a

Change in quantity demanded

A movement between points along a stationary demand curve, *ceteris paribus*.

variety of factors can influence the position of the demand curve. Because these factors are not the price of the good itself, these variables are called *nonprice determinants*, or simply, *demand shifters*. The major nonprice determinants include (1) the number of buyers; (2) tastes and preferences; (3) income; (4) expectations of future changes in prices, income, and availability of goods; and (5) prices of related goods.

Before discussing these nonprice determinants of demand, we must pause to explain an important and possibly confusing distinction in terminology. We have been referring to a **change in quantity demanded**, which results solely from a change in the price. A change in quantity demanded is a movement between points along a stationary demand curve, *ceteris paribus*. In Exhibit 3(a), at the price of \$15, the quantity demanded is 20 million DVDs per year. This is shown as point *A* on the demand curve, *D*. At a lower price of, say, \$10, the quantity demanded increases to 30 million DVDs per year, shown as point *B*. Verbally, we describe the impact of the price decrease as an increase in the quantity demanded of 10 million DVDs per year. We show this relationship on the demand curve as a movement down along the curve from point *A* to point *B*.

CONCLUSION *Under the law of demand, any decrease in price along the vertical axis will cause an increase in quantity demanded, measured along the horizontal axis.*

Change in demand

An increase or a decrease in the quantity demanded at each possible price. An increase in demand is a rightward shift in the entire demand curve. A decrease in demand is a leftward shift in the entire demand curve.

A **change in demand** is an increase (rightward shift) or a decrease (leftward shift) in the quantity demanded at each possible price. If *ceteris paribus* no longer applies and if one of the five nonprice factors changes, the location of the demand curve shifts.

CONCLUSION *Changes in nonprice determinants can produce only a shift in the demand curve and not a movement along the demand curve, which is caused by a change in the price.*

Comparing parts (a) and (b) of Exhibit 3 is helpful in distinguishing between a change in quantity demanded and a change in demand. In part (b), suppose the market demand curve for DVDs is initially at D_1 and there is a shift to the right (an increase in demand) from D_1 to D_2 . This means that at *all* possible prices consumers wish to purchase a larger quantity than before the shift occurred. At \$15 per DVD, for example, 30 million DVDs (point *B*) will be purchased each year, rather than 20 million DVDs (point *A*).

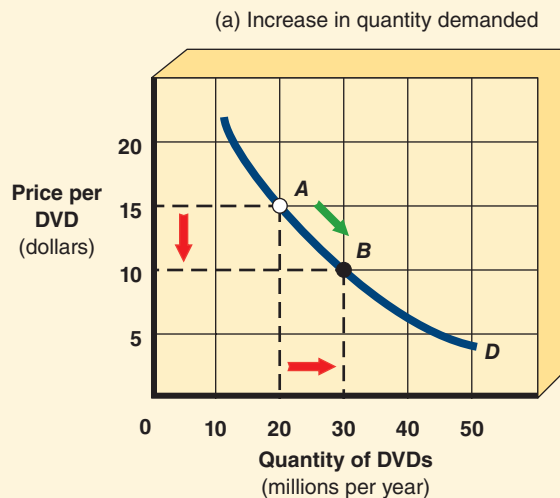
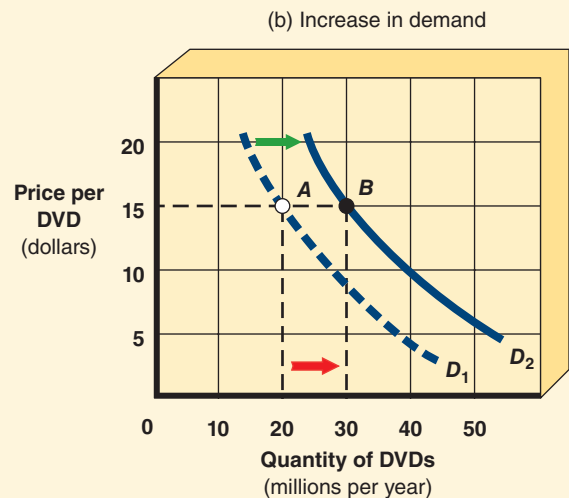
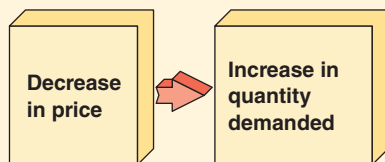
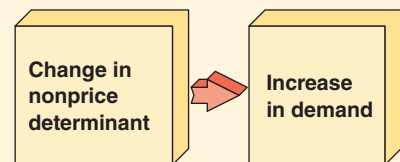
Now suppose a change in some nonprice factor causes demand curve D_1 to shift leftward (a decrease in demand). The interpretation in this case is that at *all* possible prices consumers will buy a smaller quantity than before the shift occurred.

Exhibit 4 summarizes the terminology for the effects of changes in price and nonprice determinants on the demand curve.

*Exhibit 3***Movement along a Demand Curve versus a Shift in Demand**

Part (a) shows the demand curve, D , for DVDs per year. If the price is \$15 at point A , the quantity demanded by consumers is 20 million DVDs. If the price decreases to \$10 at point B , the quantity demanded increases from 20 million to 30 million DVDs.

Part (b) illustrates an increase in demand. A change in some nonprice determinant can cause an increase in demand from D_1 to D_2 . At a price of \$15 on D_1 (point A), 20 million DVDs is the quantity demanded per year. At this same price on D_2 (point B), the quantity demanded increases to 30 million.

**CAUSATION CHAIN****CAUSATION CHAIN**

NONPRICE DETERMINANTS OF DEMAND

Distinguishing between a change in quantity demanded and a change in demand requires some patience and practice. The following discussion of specific changes in nonprice factors or demand shifters will clarify how each nonprice variable affects demand.

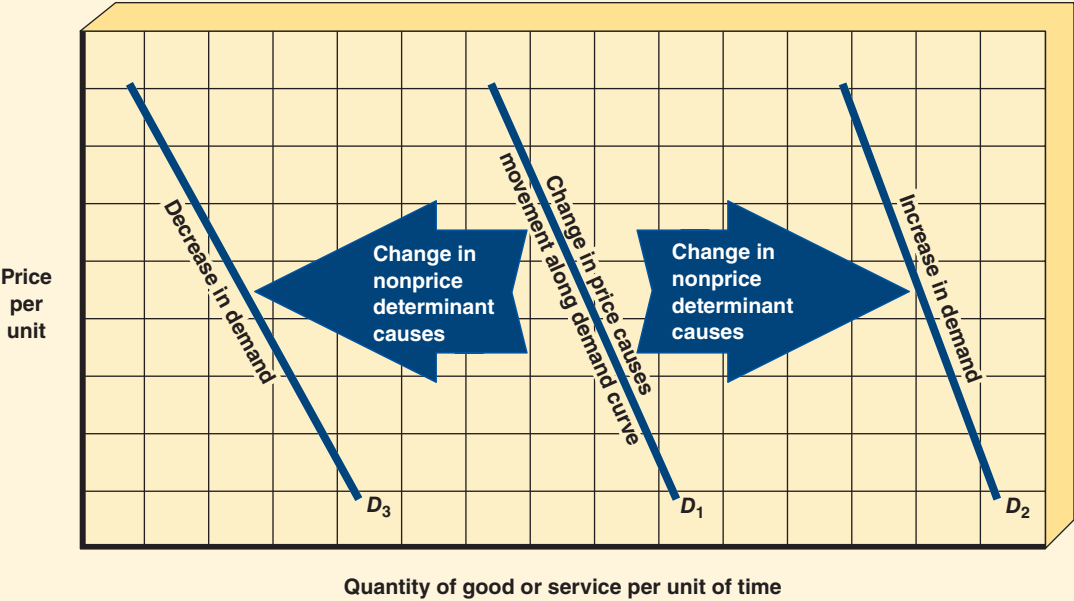
Number of Buyers

Look back at Exhibit 2, and imagine the impact of adding more individual demand curves to the individual demand curves of Fred and Mary. At all possible prices, there is extra quantity demanded by the new customers, and the market demand curve for DVDs shifts rightward (an increase in demand). Population growth

Exhibit 4

Terminology for Changes in Price and Nonprice Determinants of Demand

Caution! It is important to distinguish between a change in quantity demanded, which is a movement along a demand curve (D_1) caused by a change in price, and a change in demand, which is a shift in the demand curve. An increase in demand (shift to D_2) or decrease in demand (shift to D_3) is not caused by a change in price. Instead, a shift is caused by a change in one of the nonprice determinants.



Change	Effect	Terminology
Price increases	Upward movement along the demand curve	Decrease in the quantity demanded
Price decreases	Downward movement along the demand curve	Increase in the quantity demanded
Nonprice determinant	Leftward or rightward shift in the demand curve	Decrease or increase in demand

therefore tends to increase the number of buyers, which shifts the market demand curve for a good or service rightward. Conversely, a population decline shifts most market demand curves leftward (a decrease in demand).

The number of buyers can be specified to include both foreign and domestic buyers. Suppose the market demand curve D_1 in Exhibit 3(b) is for DVDs purchased in the United States by customers at home and abroad. Also assume Japan restricts the import of DVDs into Japan. What would be the effect of Japan removing this trade restriction? The answer is that the demand curve shifts rightward from D_1 to

D_2 when Japanese consumers add their individual demand curves to the U.S. market demand for DVDs.

Tastes and Preferences

A favorable or unfavorable change in consumer tastes or preferences means more or less of a product is demanded at each possible price. Fads, fashions, advertising, and new products can influence consumer preferences to buy a particular good or service. Beanie Babies, for example, became the rage in the 1990s, and the demand curve for these products shifted to the right. When people tire of a product, the demand curve will shift leftward. The physical fitness trend has increased the demand for health clubs and exercise equipment. On the other hand, have you noticed many stores selling hula hoops? Advertising can also influence consumers' taste for a product. As a result, consumers are more likely to buy more at every price, and the demand curve for the product will shift to the right. Concern for global climate change has increased the demand for hybrid cars and recycling.

Income

Most students are all too familiar with how changes in income affect demand. There are two possible categories for the relationship between changes in income and changes in demand: (1) **normal goods** and (2) **inferior goods**.

A normal good is any good for which there is a direct relationship between changes in income and its demand curve. For many goods and services, an increase in income causes buyers to purchase more at any possible price. As buyers receive higher incomes, the demand curve shifts rightward for such *normal goods* as cars, steaks, vintage wine, cleaning services, and DVDs. A decline in income has the opposite effect, and the demand curve shifts leftward.

An inferior good is any good for which there is an inverse relationship between changes in income and its demand curve. A rise in income can result in reduced purchases of a good or service at any possible price. This might happen with such *inferior* goods as generic brands, Spam, discount clothing, and used cars. Instead of buying these inferior goods, higher incomes allow consumers to buy brand-name products, steaks, designer clothes, or new cars. Conversely, a fall in income causes the demand curve for inferior goods to shift rightward.

Normal good

Any good for which there is a direct relationship between changes in income and its demand curve.

Inferior good

Any good for which there is an inverse relationship between changes in income and its demand curve.

Expectations of Buyers

What is the effect on demand in the present when consumers anticipate future changes in prices, incomes, or availability? What happens when a war breaks out in the Middle East? Expectations that there will be a shortage of gasoline induce consumers to say “fill-’er-up” at every opportunity, and demand increases. Suppose students learn that the prices of the textbooks for several courses they plan to take next semester will double soon. Their likely response is to buy now, which causes an increase in the demand curve for these textbooks. Another example is a change in the weather, which can indirectly cause expectations to shift demand for some products. Suppose a hailstorm destroys a substantial portion of the peach crop.

Consumers reason that the reduction in available supply will soon drive up prices, and they dash to stock up before it is too late. This change in expectations causes the demand curve for peaches to increase. Prior to Hurricane Katrina hitting New Orleans, sales of batteries and flashlights soared.

Prices of Related Goods

Possibly the most confusing nonprice factor is the influence of other prices on the demand for a particular good or service. The term *nonprice* seems to forbid any shift in demand resulting from a change in the price of *any* product. This confusion exists when one fails to distinguish between changes in quantity demanded and changes in demand. Remember that *ceteris paribus* holds all prices of other goods constant. Therefore, movement along a demand curve occurs solely in response to changes in the price of a product, that is, its “own” price. When we draw the demand curve for Coca-Cola, for example, we assume the prices of Pepsi-Cola and other colas remain unchanged. What happens if we relax the *ceteris paribus* assumption and the price of Pepsi rises? Many Pepsi buyers switch to Coca-Cola, and the demand curve for Coca-Cola shifts rightward (an increase in demand). Coca-Cola and Pepsi-Cola are one type of related goods called **substitute goods**. A substitute good competes with another good for consumer purchases. As a result, there is a direct relationship between a price change for one good and the demand for its “competitor” good. Other examples of substitutes include margarine and butter, domestic cars and foreign cars, email and the U.S. Postal Service, and Internet movie downloads and DVDs.

DVDs and DVD players illustrate a second type of related goods called **complementary goods**. A complementary good is jointly consumed with another good. As a result, there is an inverse relationship between a price change for one good and the demand for its “go together” good. Although buying a DVD and buying a DVD player can be separate decisions, these two purchases are related. The more DVD players consumers buy, the greater the demand for DVDs. What happens when the price of DVD players falls sharply? The market demand curve for DVDs shifts rightward (an increase in demand) because new owners of players add their individual demand curves to those of persons already owning players and buying DVDs. Conversely, a sharp rise in the price of Hewlett-Packard (HP) Deskjet color printers would decrease the demand for color ink cartridges.

Exhibit 5 summarizes the relationship between changes in the nonprice determinants of demand and the demand curve, accompanied by examples for each type of nonprice factor change.

Substitute good

A good that competes with another good for consumer purchases. As a result, there is a direct relationship between a price change for one good and the demand for its “competitor” good.

Complementary good

A good that is jointly consumed with another good. As a result, there is an inverse relationship between a price change for one good and the demand for its “go together” good.

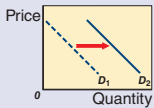
CHECKPOINT

Can Gasoline Become an Exception to the Law of Demand?

Suppose war in the Middle East threatened oil supplies and gasoline prices began rising. Consumers feared future oil shortages, and so they rushed to fill up their gas tanks. In this case, as the price of gas increased, consumers bought more, not less. Is this an exception to the law of demand?

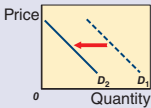
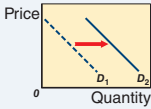
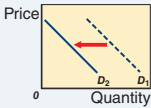
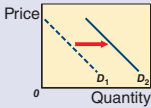
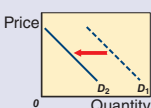


*Exhibit 5***Summary of the Impact of Changes in Nonprice Determinants of Demand on the Demand Curve**

Nonprice Determinant of Demand	Relationship to Changes in Demand Curve	Shift in the Demand Curve	Examples
1. Number of buyers	Direct		- Immigration from Mexico increases the demand for Mexican food products in grocery stores. - A decline in the birthrate reduces the demand for baby clothes.
2. Tastes and preferences	Direct		- For no apparent reason, consumers want Beanie Babies and demand increases. - After a while, the fad dies and demand declines.
3. Income			
a. Normal goods	Direct		- Consumers' incomes increase, and the demand for steaks increases. - A decline in income decreases the demand for air travel.
b. Inferior goods	Inverse		- Consumers' incomes increase, and the demand for hamburger decreases. - A decline in income increases the demand for bus service.
4. Expectations of buyers	Direct		Consumers expect that gasoline will be in short supply next month and that prices will rise sharply. Consequently, consumers fill the tanks in their cars this month, and there is an increase in demand for gasoline.

Continued

Continued from previous page

Nonprice Determinant of Demand	Relationship to Changes in Demand Curve	Shift in the Demand Curve	Examples
			Months later consumers expect the price of gasoline to fall soon, and the demand for gasoline decreases.
5. Prices of related Goods			
a. Substitute goods	Direct	 	- A reduction in the price of tea decreases the demand for coffee. - An increase in the price of airfares causes higher demand for train transportation.
b. Complementary goods	Inverse	 	- A decline in the price of cellular service increases the demand for cell phones. - A higher price for peanut butter decreases the demand for jelly.

Law of supply

The principle that there is a direct relationship between the price of a good and the quantity sellers are willing to offer for sale in a defined time period, *ceteris paribus*.

Supply

A curve or schedule showing the various quantities of a product sellers are willing to produce and offer for sale at possible prices during a specified period of time, *ceteris paribus*.

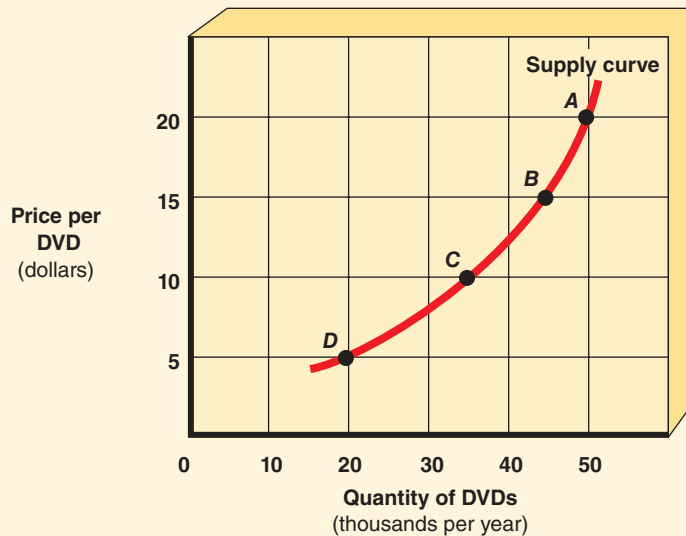
THE LAW OF SUPPLY

In everyday conversations, the term *supply* refers to a specific quantity. A “limited supply” of golf clubs at a sporting goods store means there are only so many for sale and that’s all. This interpretation of supply is *not* the economist’s definition. To economists, supply is the relationship between ranges of possible prices and quantities supplied, which is stated as the **law of supply**. The law of supply states there is a direct relationship between the price of a good and the quantity sellers are willing to offer for sale in a defined time period, *ceteris paribus*. Interpreting the individual *supply curve* for Entertain City shown in Exhibit 6 is basically the same as interpreting Bob’s demand curve shown in Exhibit 1. Each point on the curve represents a quantity supplied (measured along the horizontal axis) at a particular price (measured along the vertical axis). For example, at a price of \$10 per disc (point C), the quantity supplied by the seller, Entertain City, is 35,000 DVDs per year. At the higher price of \$15, the quantity supplied increases to 45,000 DVDs per year (point B).

CONCLUSION *Supply is a curve or schedule showing the various quantities of a product sellers are willing to produce and offer for sale at possible prices during a specified period of time, ceteris paribus.*

Exhibit 6**An Individual Seller's Supply Curve for DVDs**

The supply curve for an individual seller, such as Entertain City, shows the quantity of DVDs offered for sale at different possible prices. As the price of DVDs rises, a retail store has an incentive to increase the quantity of DVDs supplied per year. The direct relationship between price and quantity supplied conforms to the law of supply.

**An Individual Seller's Supply Schedule for DVDs**

Point	Price per DVD	Quantity supplied (thousands per year)
A	\$20	50
B	15	45
C	10	35
D	5	20

Why are sellers willing to sell more at a higher price? Suppose Farmer Brown is trying to decide whether to devote more of his land, labor, and barn space to the production of soybeans. Recall from Chapter 2 the production possibilities curve and the concept of increasing opportunity cost developed in Exhibit 3. If Farmer Brown devotes few of his resources to producing soybeans, the opportunity cost of, say, producing milk is small. But increasing soybean production means a higher opportunity cost, measured by the quantity of milk not produced. The logical question is: What would induce Farmer Brown to produce more soybeans for sale

and overcome the higher opportunity cost of producing less milk? You guessed it! There must be the *incentive* of a higher price for soybeans.

CONCLUSION *Only at a higher price will it be profitable for sellers to incur the higher opportunity cost associated with producing and supplying a larger quantity.*



CHECKPOINT

Can the Law of Supply Be Repealed for the Oil Market?

The United States experienced two oil shocks during the 1970s in the aftermath of Middle East tensions. Congress said no to high oil prices by passing a law prohibiting prices above a legal limit. Supporters of such price controls said this was a way to ensure adequate supply without allowing oil producers to earn excess profits. Did price controls increase, decrease, or have no effect on U.S. oil production during the 1970s?

Market Supply

To construct a *market* supply curve, we follow the same procedure used to derive a market demand curve. That is, we *horizontally* sum all the quantities supplied at various prices that might prevail in the market.

Let's assume Entertain City and High Vibes Company are the only two firms selling DVDs in a given market. As you can see in Exhibit 7, the market supply curve, S_{total} , slopes upward to the right. At a price of \$25, Entertain City will supply 25,000 DVDs per year, and High Vibes will supply 35,000 DVDs per year. Thus, summing the two individual supply curves, S_1 and S_2 , *horizontally*, the total of 60,000 DVDs is plotted at this price on the market supply curve, S_{total} . Similar calculations at other prices along the price axis generate a market supply curve, telling us the total amount of DVDs these businesses offer for sale at different selling prices.

Change in quantity supplied

A movement between points along a stationary supply curve, *ceteris paribus*.

Change in supply

An increase or a decrease in the quantity supplied at each possible price. An increase in supply is a rightward shift in the entire supply curve. A decrease in supply is a leftward shift in the entire supply curve.

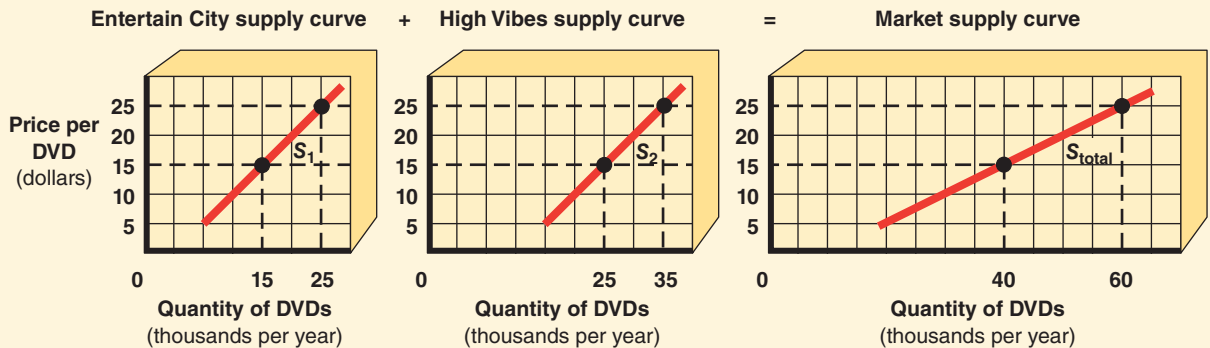
THE DISTINCTION BETWEEN CHANGES IN QUANTITY SUPPLIED AND CHANGES IN SUPPLY

As in demand theory, the price of a product is not the only factor that influences how much sellers offer for sale. Once we relax the *ceteris paribus* assumption, there are six principal *nonprice determinants* (or simply, *supply shifters*) that can shift the supply curve's position: (1) the number of sellers, (2) technology, (3) resource prices, (4) taxes and subsidies, (5) expectations, and (6) prices of other goods. We will discuss these nonprice determinants in more detail momentarily, but first we must distinguish between a **change in quantity supplied** and a **change in supply**.

Exhibit 7

The Market Supply Curve for DVDs

Entertain City and High Vibes are two individual businesses selling DVDs. If these are the only two firms in the DVD market, the market supply curve, S_{total} , can be derived by summing horizontally the individual supply curves, S_1 and S_2 .



The Market Supply Schedule for DVDs

Price per DVD	Quantity supplied per year			Total supply
	Entertain City	+ High Vibes	=	
\$25	25	35	=	60
20	20	30	=	50
15	15	25	=	40
10	10	20	=	30
5	5	15	=	20

A change in quantity supplied is a movement between points along a stationary supply curve, *ceteris paribus*. In Exhibit 8(a), at the price of \$10, the quantity supplied is 30 million DVDs per year (point A). At the higher price of \$15, sellers offer a larger “quantity supplied” of 40 million DVDs per year (point B). Economists describe the effect of the rise in price as an increase in the quantity supplied of 10 million DVDs per year.

CONCLUSION *Under the law of supply, any increase in price along the vertical axis will cause an increase in the quantity supplied, measured along the horizontal axis.*

A change in supply is an increase (rightward shift) or a decrease (leftward shift) in the quantity supplied at each possible price. If *ceteris paribus* no longer applies and if one of the six nonprice factors changes, the impact is to alter the supply curve's location.

CONCLUSION *Changes in nonprice determinants can produce only a shift in the supply curve and not a movement along the supply curve.*

In Exhibit 8(b), the rightward shift (an increase in supply) from S_1 to S_2 means that at all possible prices sellers offer a greater quantity for sale. At \$15 per DVD, for instance, sellers provide 40 million for sale annually (point B), rather than 30 million (point A).

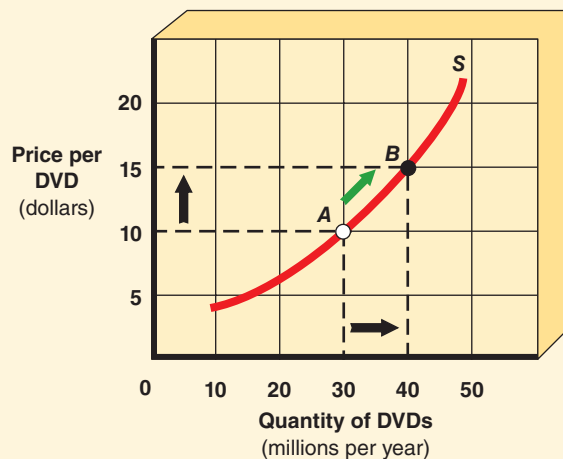
Exhibit 8

Movement along a Supply Curve versus a Shift in Supply

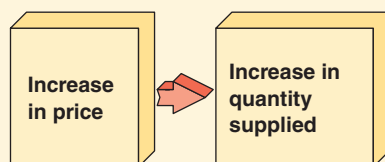
Part (a) presents the market supply curve, S , for DVDs per year. If the price is \$10 at point A, the quantity supplied by firms will be 30 million DVDs. If the price increases to \$15 at point B, the quantity supplied will increase from 30 million to 40 million DVDs.

Part (b) illustrates an increase in supply. A change in some nonprice determinant can cause an increase in supply from S_1 to S_2 . At a price of \$15 on S_1 (point A), the quantity supplied per year is 30 million DVDs. At this price on S_2 (point B), the quantity supplied increases to 40 million.

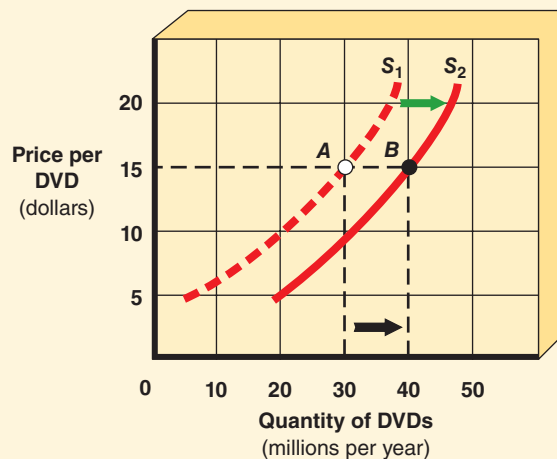
(a) Increase in quantity supplied



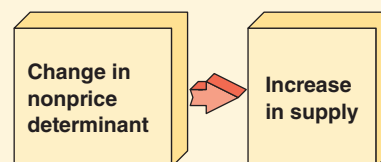
CAUSATION CHAIN



(b) Increase in supply



CAUSATION CHAIN



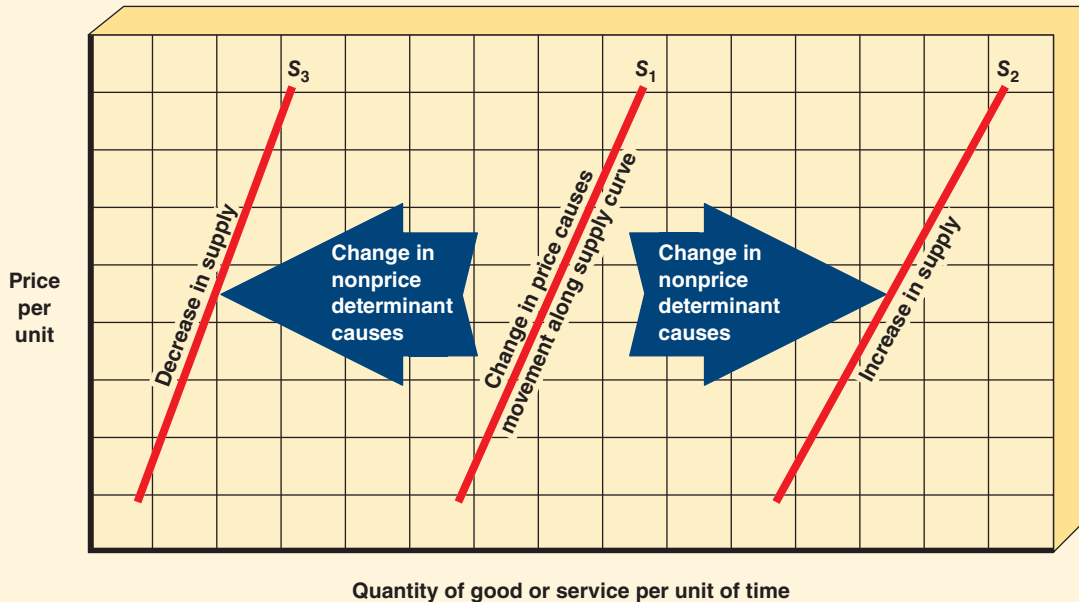
Another case is that some nonprice factor changes and causes a leftward shift (a decrease in supply) from supply curve S_1 . As a result, a smaller quantity will be offered for sale at any price.

Exhibit 9 summarizes the terminology for the effects of changes in price and nonprice determinants on the supply curve.

Exhibit 9

Terminology for Changes in Price and Nonprice Determinants of Supply

Caution! As with demand curves, you must distinguish between a change in quantity supplied, which is a movement along a supply curve (S_1) in response to a change in price, and a shift in the supply curve. An increase in supply (shift to S_2) or decrease in supply (shift to S_3) is caused by a change in some nonprice determinant and not by a change in the price.



Change	Effect	Terminology
Price increases	Upward movement along the supply curve	Increase in the quantity supplied
Price decreases	Downward movement along the supply curve	Decrease in the quantity supplied
Nonprice determinant	Leftward or rightward shift in the supply curve	Decrease or increase in supply

NONPRICE DETERMINANTS OF SUPPLY

Now we turn to how each of the six basic nonprice factors affects supply.

Number of Sellers

What happens when a severe drought destroys wheat or a frost ruins the orange crop? The damaging effect of the weather may force orange growers out of business, and supply decreases. When the government eases restrictions on hunting alligators, the number of alligator hunters increases, and the supply curve for alligator meat and skins increases. Internationally, the United States may decide to lower trade barriers on textile imports, and this action increases supply by allowing new foreign firms to add their individual supply curves to the U.S. market supply curve for textiles. Conversely, higher U.S. trade barriers on textile imports shift the U.S. market supply curve for textiles leftward.

Technology

Never has society experienced such an explosion of new production techniques. Throughout the world, new and more efficient technology is making it possible to manufacture more products at any possible selling price. New, more powerful computers reduce production costs and increase the supply of all sorts of goods and services. For example, computers are now milking cows. Computers admit the cows into the milking area and then activate lasers to guide milking cups into place. Dairy farmers no longer must wake up at 5:30 a.m., and cows get milked whenever they fancy, day or night. As this technology spreads across the United States, it will be possible to offer more milk for sale at each possible price, and the entire supply curve for milk shifts to the right.

Resource Prices

Natural resources, labor, capital, and entrepreneurship are all required to produce products, and the prices of these resources affect supply. Suppose many firms are competing for computer programmers to design their software, and the salaries of these highly skilled workers increase. This increase in the price of labor adds to the cost of production. As a result, the supply of computer software decreases because sellers must charge more than before for any quantity supplied. Any reduction in production cost caused by a decline in the price of resources will have an opposite effect and increase supply.

Taxes and Subsidies

Certain taxes, such as sales taxes, have the same effect on supply as an increase in the price of a resource. The impact of an increase in the sales tax is similar to a rise in the salaries of computer programmers. The higher sales tax imposes an additional production cost on, for example, DVDs, and the supply curve shifts leftward. Conversely, a payment from the government for each DVD produced (an unlikely



You're The Economist PC Prices: How Low Can They Go?

Applicable Concepts: nonprice determinants of demand and supply



Radio was in existence for 38 years before 50 million people tuned in. Television took 13 years to reach that benchmark. Sixteen years after the first PC kit came out, 50 million people were using one. Once opened to the public, the Internet crossed that line in four years.¹

An Associated Press article reported in 1998:

Personal computers, which tumbled below the \$1,000-price barrier just 18 months ago, now are breaking through the \$400 price mark—putting them within reach of the average U.S. family. The plunge in PC prices reflects declining wholesale prices for computer parts, such as micro-processors, memory chips, and hard drives. “We’ve seen a massive transformation in the PC business,” said Andrew Peck, an analyst with Cowen & Co., based in Boston. Today’s computers costing below \$1,000 are equal or greater in power than PCs costing \$1,500 and more just a few years ago—working well for word processing, spreadsheet applications, and Internet access, the most popular computer uses.²

In 1999, a *Wall Street Journal* article reported that PC makers and distributors were bypassing their industry’s time-honored sales channels. PC makers such as Compaq and Hewlett-Packard are now using the Internet to sell directly to consumers. In doing so, they are following the successful strategy of Dell, which for years has bypassed storefront retailers and the PC distributors who traditionally keep them stocked, going instead straight to the consumer with catalogs, an 800 number, and Web sites.³

In 2001, a *New York Times* article described a computer price war:

We reached a situation where the market was saturated in 2000. People who needed computers had them. Vendors are living on sales of replacements, at least in the United States. But that doesn’t give you the kind of growth these companies were used to. In the past, most price cuts came from falling prices for processors and other components. In addition, manufacturers have been narrowing profit margins for the last couple years. But when demand dried up

last fall, the more aggressive manufacturers decided to try to gain market share by cutting prices to the bone. This is an all-out battle for market share.⁴

In 2006, an analyst in *USA Today* observed that users could pick up good deals on desktop and notebook PCs following computer chip price cuts. Chipmakers Intel and AMD reduced the cost of computer chips in a price war. This article concluded that prices were falling at the right time and users will get good specification for their investment.⁵ And in 2009, Dell, Gateway, and Asus sold computers for less than \$300 that outperformed most middle-of-the-road PCs from only a few years previously.

ANALYZE THE ISSUE

Identify changes in quantity demanded, changes in demand, changes in quantity supplied, and changes in supply described in the article. For any change in demand or supply, also identify the nonprice determinant causing the change.

1. The Emerging Digital Economy (U.S. Department of Commerce, 1998), Chap. 1, p. 1.
2. David E. Kalish, “PC Prices Fall Below \$400, Luring Bargain-Hunters,” *Associated Press/Charlotte Observer*, Aug. 25, 1998, p. 3D.
3. George Anders, “Online Web Seller Asks: How Low Can PC Prices Go?” *The Wall Street Journal*, Jan. 19, 1999, p. B1.
4. Barnaby J. Feder, “Five Questions for Martin Reynolds: A Computer Price War Leaves Buyers Smiling,” *New York Times*, May 13, 2001.
5. Michelle Kessler, “School Shoppers See PC Prices Fall,” *USA Today*, Aug. 14, 2006, p. B1.

subsidy) would have the same effect as lower prices for resources or a technological advance. That is, the supply curve for DVDs shifts rightward.

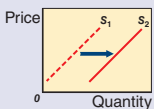
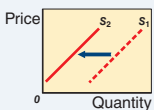
Expectations of Producers

Expectations affect both current demand and current supply. Suppose a war in the Middle East causes oil producers to believe that oil prices will rise dramatically. Their initial response could be to hold back a portion of the oil in their storage tanks so they can sell more and make greater profits later when oil prices rise. One approach used by the major oil companies might be to limit the amount of gasoline delivered to independent distributors. This response by the oil industry shifts the current supply curve to the left. Now suppose farmers anticipate the price of wheat will soon fall sharply. The reaction is to sell their inventories stored in silos today before the price declines tomorrow. Such a response shifts the supply curve for wheat to the right.

Prices of Other Goods the Firm Could Produce

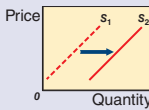
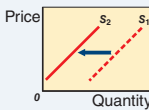
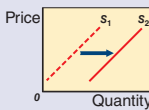
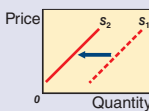
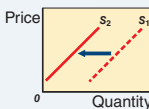
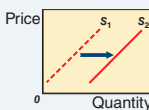
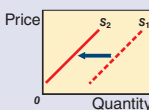
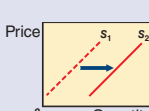
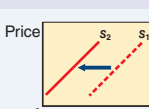
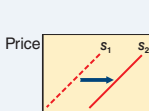
Businesses are always considering shifting resources from producing one good to producing another good. A rise in the price of one product relative to the prices of other products signals to suppliers that switching production to the product with the higher relative price yields higher profit. Suppose the price of corn rises because of government incentives to grow corn for ethanol, while the price of wheat remains the same; then many farmers will divert more of their land to corn and less to wheat. The result is an increase in the supply of corn and a decrease in the supply of wheat. This happens because the opportunity cost of growing corn, measured in forgone corn profits, increases.

Exhibit 10 summarizes the relationship between changes in the nonprice determinants of supply and the supply curve, accompanied by examples for each type of nonprice factor change.

Exhibit 10 Summary of the Impact of Changes in Nonprice Determinants of Supply on the Supply Curve			
Nonprice Determinant of Supply	Relationship to Changes in Supply Curve	Shift in the Supply Curve	Examples
1. Number of sellers	Direct		• The United States lowers trade restrictions on foreign textiles, and the supply of textiles in the United States increases.
			• A severe drought destroys the orange crop, and the supply of oranges decreases.

Continued

Continued from previous page

Nonprice Determinant of Supply	Relationship to Changes in Supply Curve	Shift in the Supply Curve	Examples
2. Technology	Direct		New methods of producing automobiles reduce production costs, and the supply of automobiles increases.
			Technology is destroyed in war, and production costs increase; the result is a decrease in the supply of good X.
3. Resource prices	Direct		A decline in the price of computer chips increases the supply of computers.
			An increase in the cost of farm equipment decreases the supply of soybeans.
4. Taxes and subsidies	Inverse and direct		An increase in the per-pack tax on cigarettes reduces the supply of cigarettes.
			Government payments to ethanol refineries based on the number of gallons produced increases the supply of ethanol.
5. Expectations	Inverse		Oil companies anticipate a substantial rise in future oil prices, and this expectation causes these companies to decrease their current supply of oil.
			Farmers expect the future price of wheat to decline, so they increase the present supply of wheat.
6. Prices of other goods and services	Inverse		A rise in the price of brand-name drugs causes drug companies to decrease the supply of generic drugs.
			A decline in the price of tomatoes causes farmers to increase the supply of cucumbers.

Global Economics

The Market Approach to Organ Shortages

Applicable Concept: price system

There is a global market in human organs in spite of attempts to prevent these transactions. For example, China banned organ sales in 2006, and India did the same in 1994.

The National Transplant Organ Act of 1984 made sale of organs illegal in the United States. Economist James R. Rinehart wrote the following on this subject:

If you were in charge of a kidney transplant program with more potential recipients than donors, how would you allocate the organs under your control? Life and death decisions cannot be avoided. Some individuals are not going to get kidneys regardless of how the organs are distributed because there simply are not enough to go around. Persons who run such programs are influenced in a variety of ways. It would be difficult not to favor friends, relatives, influential people, and those who are championed by the press. Dr. John la Puma,

at the Center for Clinical Medical Ethics, University of Chicago, suggested that we use a lottery system for selecting transplant patients. He feels that the present rationing system is unfair.

The selection process frequently takes the form of having the patient wait at home until a suitable donor is found. What this means is that, at any given point in time, many potential recipients are just waiting for an organ to be made available. In essence, the organs are rationed to those who are able to survive the wait. In many situations, patients are simply screened out because they are not considered to be suitable candidates for a transplant. For instance, patients with heart disease and overt psychosis often are excluded. Others with end-stage liver disorders are denied new organs on the grounds that the habits that produced the disease may remain to jeopardize recovery. . . .

A MARKET SUPPLY AND DEMAND ANALYSIS

Market

Any arrangement in which buyers and sellers interact to determine the price and quantity of goods and services exchanged.

Surplus

A market condition existing at any price where the quantity supplied is greater than the quantity demanded.

A drumroll please! Buyer and seller actors are on center stage to perform a balancing act in a **market**. A market is any arrangement in which buyers and sellers interact to determine the price and quantity of goods and services exchanged. Let's consider the retail market for sneakers. Exhibit 11 displays hypothetical market demand and supply data for this product. Notice in column 1 of the exhibit that price serves as a common variable for both supply and demand relationships. Columns 2 and 3 list the quantity demanded and the quantity supplied for pairs of sneakers per year.

The important question for market supply and demand analysis is: Which selling price and quantity will prevail in the market? Let's start by asking what will happen if retail stores supply 75,000 pairs of sneakers and charge \$105 a pair. At this relatively high price for sneakers, consumers are willing and able to purchase only 25,000 pairs. As a result, 50,000 pairs of sneakers remain as unsold inventory on the shelves of sellers (column 4), and the market condition is a **surplus** (column 5). A surplus is a market condition existing at any price where the quantity supplied is greater than the quantity demanded.

How will retailers react to a surplus? Competition forces sellers to bid down their selling price to attract more sales (column 6). If they cut the selling price to \$90, there will still be a surplus of 40,000 pairs of sneakers, and pressure on sellers

*Under the present arrangements, owners receive no monetary compensation; therefore, suppliers are willing to supply fewer organs than potential recipients want. Compensating a supplier monetarily would encourage more people to offer their organs for sale. It also would be an excellent incentive for us to take better care of our organs. After all, who would want an enlarged liver or a weak heart. . .?*¹

The following excerpt from a newspaper article illustrates the controversy:

*Mickey Mantle's temporary deliverance from death, thanks to a liver transplant, illustrated how the organ-donations system is heavily weighted against poor potential recipients who cannot pass what University of Pennsylvania medical ethicist Arthur Caplan calls the "wallet biopsy." . . . Thus, affluent patients like Mickey Mantle may get evaluated and listed simultaneously in different regions to increase their odds of finding a donor. The New Yorker found his organ donor in Texas' Region 4. Such a system is not only highly unfair, but it leads to other kinds of abuses.*²

Based on altruism, the organ donor distribution system continues to result in shortages. In 2009, the United Network for Organ Sharing (UNOS) reported that there were over 100,000 patients waiting on the list for organs. To address the shortage of organ donation, some European countries such as Spain, Belgium, and Austria have implemented an "opt-out" organ donation system. In the "opt-out" system, people are automatically considered to be organ donors unless they officially declare that they do not wish to be donors.

ANALYZE THE ISSUE

1. Draw supply and demand curves for the U.S. organ market and compare the U.S. market to the market in a country where selling organs is legal.
2. What are some arguments against using the price system to allocate organs?
3. Should foreigners have the right to buy U.S. organs and U.S. citizens have the right to buy foreign organs?

1. James R. Rinehart, "The Market Approach to Organ Shortages," *Journal of Health Care Marketing* 8, no. 1 (March 1988): 72–75.
 2. Carl Senna, "The Wallet Biopsy," *Providence Journal*, June 13, 1995, p. B-7.

to cut their selling price will continue. If the price falls to \$75, there will still be an unwanted surplus of 20,000 pairs of sneakers remaining as inventory, and pressure to charge a lower price will persist.

Exhibit 11		Demand, Supply, and Equilibrium for Sneakers (pairs per year)			
(1) Price per pair	(2) Quantity demanded	(3) Quantity supplied	(4) Difference (3) – (2)	(5) Market condition	(6) Pressure on price
\$105	25,000	75,000	+50,000	Surplus	Downward
90	30,000	70,000	+40,000	Surplus	Downward
75	40,000	60,000	+20,000	Surplus	Downward
60	50,000	50,000	0	Equilibrium	Stationary
45	60,000	35,000	–25,000	Shortage	Upward
30	80,000	20,000	–60,000	Shortage	Upward
15	100,000	5,000	–95,000	Shortage	Upward

Shortage

A market condition existing at any price where the quantity supplied is less than the quantity demanded.

Now let's assume sellers slash the price of sneakers to \$15 per pair. This price is very attractive to consumers, and the quantity demanded is 100,000 pairs of sneakers each year. However, sellers are willing and able to provide only 5,000 pairs at this price. The good news is that some consumers buy these 5,000 pairs of sneakers at \$15. The bad news is that potential buyers are willing to purchase 95,000 more pairs at that price but cannot, because the shoes are not on the shelves for sale. This out-of-stock condition signals the existence of a **shortage**. A shortage is a market condition existing at any price where the quantity supplied is less than the quantity demanded.

In the case of a shortage, unsatisfied consumers compete to obtain the product by bidding to pay a higher price. Because sellers are seeking the higher profits that higher prices make possible, they gladly respond by setting a higher price of, say, \$30 and increasing the quantity supplied to 20,000 pairs annually. At the price of \$30, the shortage persists because the quantity demanded still exceeds the quantity supplied. Thus, a price of \$30 will also be temporary because the unfulfilled quantity demanded provides an incentive for sellers to raise their selling price further and offer more sneakers for sale. Suppose the price of sneakers rises to \$45 a pair. At this price, the shortage falls to 25,000 pairs, and the market still gives sellers the message to move upward along their market supply curve and sell for a higher price.

Equilibrium Price and Quantity

Equilibrium

A market condition that occurs at any price and quantity where the quantity demanded and the quantity supplied are equal.

Assuming sellers are free to sell their products at any price, trial and error will make all possible price-quantity combinations unstable except at **equilibrium**. Equilibrium occurs at any price and quantity where the quantity demanded and the quantity supplied are equal. Economists also refer to *equilibrium* as *market clearing*.

In Exhibit 11, \$60 is the *equilibrium* price, and 50,000 pairs of sneakers is the *equilibrium* quantity per year. Equilibrium means that the forces of supply and demand are “in balance” or “at risk” and there is no reason for price or quantity to change, *ceteris paribus*. In short, all prices and quantities except a unique equilibrium price and quantity are temporary. Once the price of sneakers is \$60, this price will not change unless a nonprice factor changes demand or supply.

English economist Alfred Marshall (1842–1924) compared supply and demand to a pair of scissor blades. He wrote, “We might as reasonably dispute whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper, as whether value is governed by utility [demand] or cost of production [supply].”¹ Joining market supply and market demand in Exhibit 12 allows us to clearly see the “two blades,” that is, the demand curve, *D*, and the supply curve, *S*. We can measure the amount of any surplus or shortage by the horizontal distance between the demand and supply curves. At any price *above* equilibrium—say, \$90—there is an *excess quantity supplied* (surplus) of 40,000 pairs of sneakers. For any price *below* equilibrium—\$30, for example—the horizontal distance between the curves tells us there is an *excess quantity demanded* (shortage) of 60,000 pairs. When the price per pair is \$60, the market supply curve and the market demand curve intersect at point *E*, and the quantity demanded equals the quantity supplied at 50,000 pairs per year.

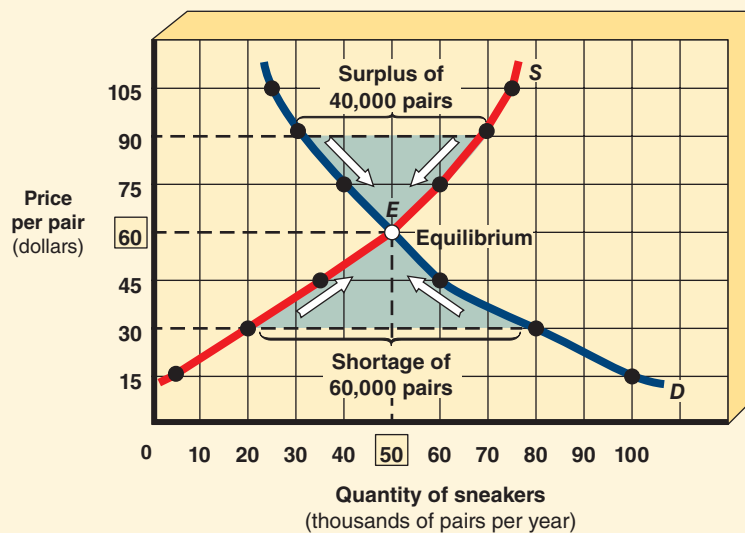
CONCLUSION *Graphically, the intersection of the supply curve and the demand curve is the market equilibrium price-quantity point. When all other nonprice factors are held constant, this is the only stable coordinate on the graph.*

1. Alfred Marshall, *Principles of Economics*, 8th ed. (New York: Macmillan, 1982), p. 348.

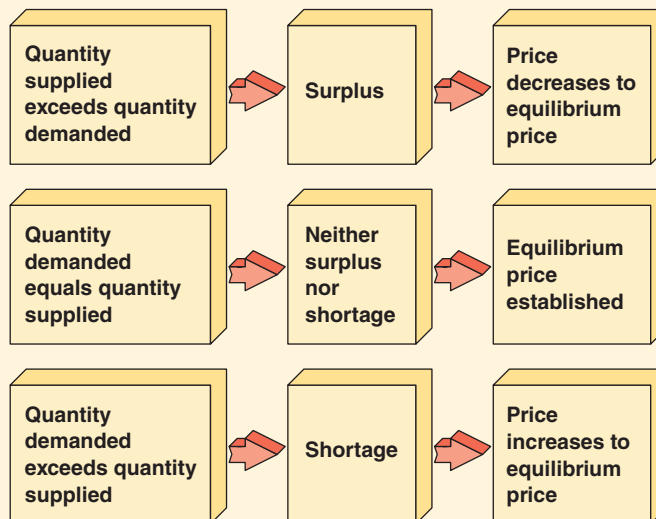
Exhibit 12

The Supply and Demand for Sneakers

The supply and demand curves represent a market for sneakers. The intersection of the demand curve, D , and the supply curve, S , at point E indicates the equilibrium price of \$60 and the equilibrium quantity of 50,000 pairs bought and sold per year. At any price above \$60, a surplus prevails, and pressure exists to push the price downward. At \$90, for example, the excess quantity supplied of 40,000 pairs remains unsold. At any price below \$60, a shortage provides pressure to push the price upward. At \$30, for example, the excess quantity demanded of 60,000 pairs encourages consumers to bid up the price.



CAUSATION CHAINS



RATIONING FUNCTION OF THE PRICE SYSTEM

Price system

A mechanism that uses the forces of supply and demand to create an equilibrium through rising and falling prices.

Our analysis leads to an important conclusion. The predictable or stable outcome in the sneakers example is that the price will eventually come to rest at \$60 per pair. All other factors held constant, the price may be above or below \$60, but the forces of surplus or shortage guarantee that any price other than the equilibrium price is temporary. This is the theory of how the **price system** operates, and it is the cornerstone of microeconomic analysis. The price system is a mechanism that uses the forces of supply and demand to create an equilibrium through rising and falling prices. Stated simply, price plays a *rationing* role. The price system is important because it is a mechanism for distributing scarce goods and services. At the equilibrium price of \$60, only those consumers willing to pay \$60 per pair get sneakers, and there are no shoes for buyers unwilling to pay that price.



CHECKPOINT

Can the Price System Eliminate Scarcity?

You visit Cuba and observe that at “official” prices there is a constant shortage of consumer goods in government stores. People explain that in Cuba scarcity is caused by low prices combined with low production quotas set by the government. Many Cuban citizens say that the condition of scarcity would be eliminated if the government would allow markets to respond to supply and demand. Can the price system eliminate scarcity?

Key Concepts

Law of demand
Demand
Change in quantity demanded
Change in demand
Normal good

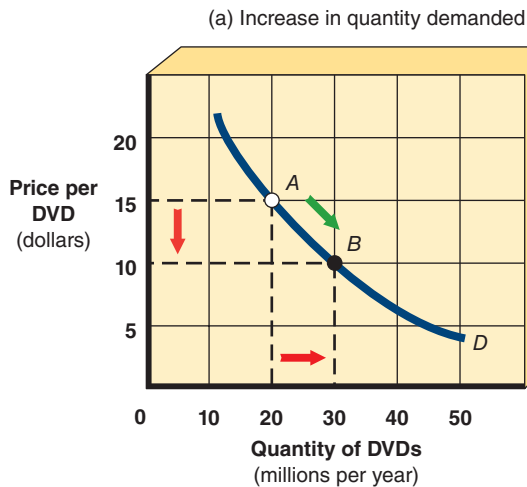
Inferior good
Substitute good
Complementary good
Law of supply
Supply
Change in quantity supplied

Change in supply
Market
Surplus
Shortage
Equilibrium
Price system

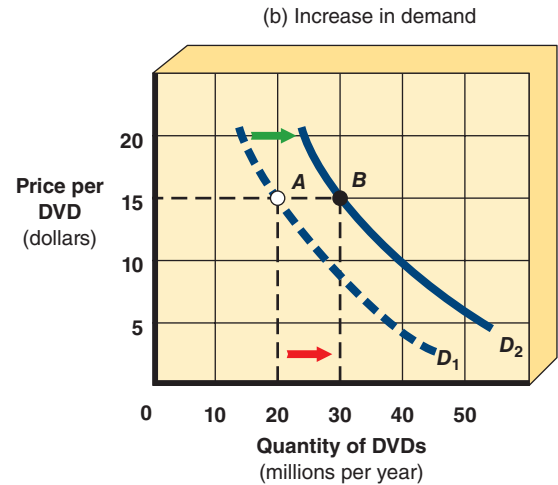
Summary

- The *law of demand* states there is an inverse relationship between the price and the quantity demanded, *ceteris paribus*. A market demand curve is the horizontal summation of individual demand curves.
- A *change in quantity demanded* is a movement along a stationary demand curve caused by a change in price. When any of the nonprice determinants of demand changes, the demand curve responds by shifting. An *increase in demand* (rightward shift) or a *decrease in demand* (leftward shift) is caused by a change in one of the nonprice determinants.

Change in Quantity Demanded



Change in Demand

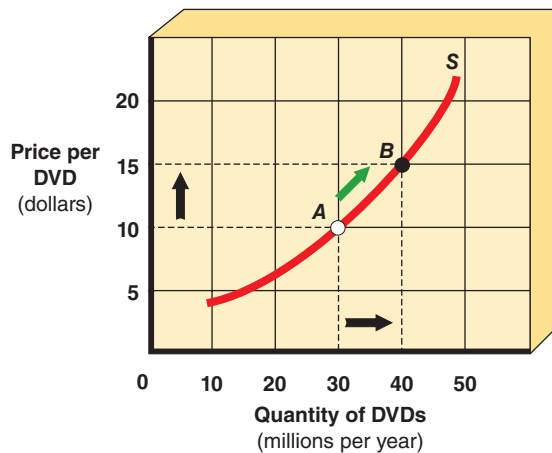


- Nonprice determinants of demand* are as follows:
 - Number of buyers
 - Tastes and preferences
 - Income (normal and inferior goods)
 - Expectations of future price and income changes
 - Prices of related goods (substitutes and complements)
- The *law of supply* states there is a direct relationship between the price and the quantity supplied, *ceteris paribus*. The market supply curve is the horizontal summation of individual supply curves.

- A *change in quantity supplied* is a movement along a stationary supply curve caused by a change in price. When any of the nonprice determinants of supply changes, the supply curve responds by shifting. An *increase in supply* (rightward shift) or a *decrease in supply* (leftward shift) is caused by a change in one of the nonprice determinants.

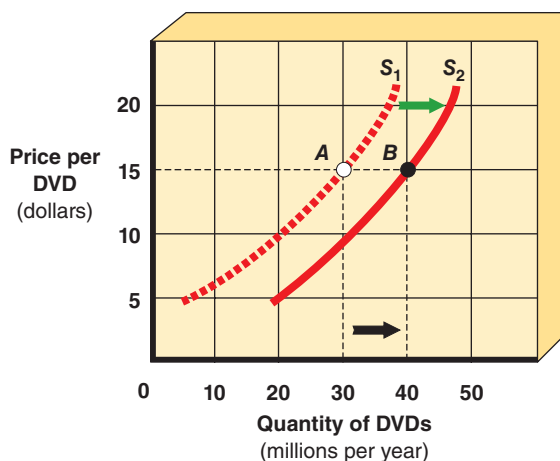
Change in Quantity Supplied

(a) Increase in quantity supplied



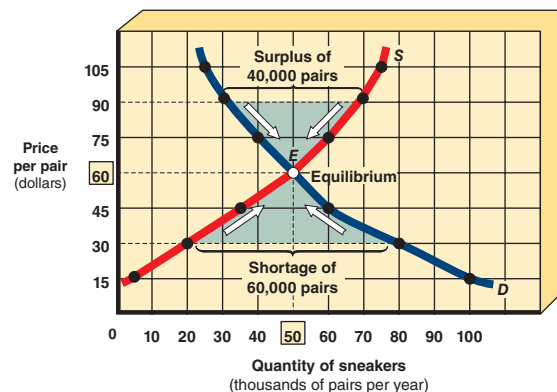
Change in Supply

(b) Increase in supply



- *Nonprice determinants of supply* are as follows:
 - a. Number of sellers
 - b. Technology
 - c. Resource prices
 - d. Taxes and subsidies
 - e. Expectations of future price changes
 - f. Prices of other goods and services
- A *surplus* or *shortage* exists at any price where the quantity demanded and the quantity supplied are not equal. When the price of a good is higher than the equilibrium price, there is an excess quantity supplied, or a *surplus*. When the price is less than the equilibrium price, there is an excess quantity demanded, or a *shortage*.
- *Equilibrium* is the unique price and quantity established at the intersection of the supply and demand curves. Only at equilibrium does quantity demanded equal quantity supplied.

Equilibrium



- The *price system* is the supply and demand mechanism that establishes equilibrium through the ability of prices to rise and fall.

Summary of Conclusion Statements

- Demand is a curve or schedule showing the various quantities of a product consumers are willing to purchase at possible prices during a specified period of time, *ceteris paribus*.
- Under the law of demand, any decrease in price along the vertical axis will cause an increase in quantity demanded, measured along the horizontal axis.
- Changes in nonprice determinants can produce only a shift in the demand curve and not a movement along the demand curve, which is caused by a change in price.
- Supply is a curve or schedule showing the various quantities of a product sellers are willing to produce and offer for sale at possible prices during a specified period of time, *ceteris paribus*.
- Only at a higher price will it be profitable for sellers to incur the higher opportunity cost associated with producing and supplying a larger quantity.
- Under the law of supply, any increase in price along the vertical axis will cause an increase in quantity supplied, measured along the horizontal axis.
- Changes in nonprice determinants can only produce a shift in the supply curve and not a movement along the supply curve.
- Graphically, the intersection of the supply curve and the demand curve is the market equilibrium price-quantity point. When all other nonprice factors are held constant, this is the only stable coordinate on the graph.

Study Questions and Problems

1. Some people will pay a higher price for brand-name goods. For example, some people buy Rolls Royces and Rolex watches to impress others. Does knowingly paying higher prices for certain items just to be a “snob” violate the law of demand?
2. Draw graphs to illustrate the difference between a decrease in the quantity demanded and a decrease in demand for Mickey Mantle baseball cards. Give a possible reason for change in each graph.
3. Suppose oil prices rise sharply for years as a result of a war in the Persian Gulf region. What happens and why to the demand for
 - a. cars.
 - b. home insulation.
 - c. coal.
 - d. tires.
4. Draw graphs to illustrate the difference between a decrease in quantity supplied and a decrease in supply for condominiums. Give a possible reason for change in each graph.
5. Use supply and demand analysis to explain why the quantity of word processing software exchanged increases from one year to the next.
6. Predict the direction of change for either supply or demand in the following situations:
 - a. Several new companies enter the cell phone industry.
 - b. Consumers suddenly decide SUVs are unfashionable.
 - c. The U.S. Surgeon General issues a report stating that tomatoes prevent colds.
 - d. Frost threatens to damage the coffee crop, and consumers expect the price to rise sharply in the future.
 - e. The price of tea falls. What is the effect on the coffee market?
 - f. The price of sugar rises. What is the effect on the coffee market?
 - g. Tobacco lobbyists convince Congress to remove the tax paid by sellers on each carton of cigarettes sold.

- h. A new type of robot is invented that will pick peaches.
 - i. A computer game company anticipates that the future price of its games will fall much lower than the current price.
7. Explain the effect of the following situations:
- a. Population growth surges rapidly.
 - b. The prices of resources used in the production of good X increase.
 - c. The government is paying a \$1-per-unit subsidy for each unit of a good produced.
 - d. The incomes of consumers of normal good X increase.
 - e. The incomes of consumers of inferior good Y decrease.
 - f. Farmers are deciding what crop to plant and learn that the price of corn has fallen relative to the price of cotton.
8. Explain why the market price may not be the same as the equilibrium price.
9. If a new breakthrough in manufacturing technology reduces the cost of producing DVD players by half, what will happen to the
- a. supply of DVD players?
 - b. demand for DVD players?
 - c. equilibrium price and quantity of DVD players?
 - d. demand for DVDs?
10. The U.S. Postal Service is facing increased competition from firms providing over-night delivery of packages and letters. Additional competition has emerged because communications can be sent by email, fax machines, and text messaging. What will be the effect of this competition on the market demand for mail delivered by the post office?
11. There is a shortage of college basketball and football tickets for some games, and a surplus occurs for other games. Why do shortages and surpluses exist for different games?
12. Explain the statement “People respond to incentives and disincentives” in relation to the demand curve and supply curve for good X.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

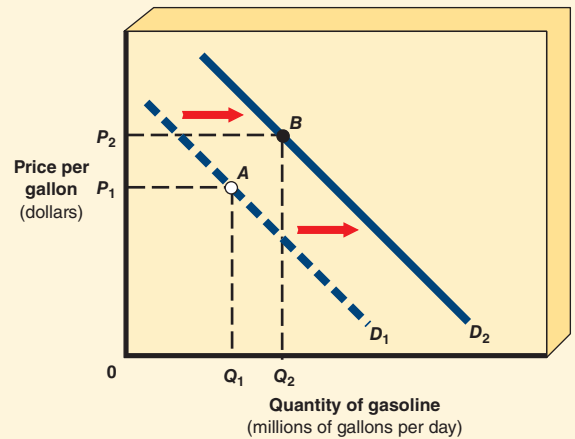
CHECKPOINT ANSWERS

Can Gasoline Become an Exception to the Law of Demand?

As the price of gasoline began to rise, the expectation of still higher prices caused buyers to buy more now, and therefore, demand increased. As shown in Exhibit 13, suppose the price per gallon of gasoline was initially at P_1 and the quantity demanded was Q_1 on demand curve D_1 (point A). Then the war in the Middle East caused the demand curve to shift rightward to D_2 . Along the new demand curve, D_2 , consumers increased their quantity demanded to Q_2 at the higher price of P_2 per gallon of gasoline (point B).

The expectation of rising gasoline prices in the future caused “an increase in demand,” rather than “an increase in quantity demanded” in response to a higher price. If you said there are no exceptions to the law of demand, **YOU ARE CORRECT.**

Exhibit 13



Can the Law of Supply Be Repealed for the Oil Market?

There is not a single quantity of oil—say, 3 million barrels—for sale in the world on a given day. The supply curve for oil is not vertical. As the law of supply states, higher oil prices will cause greater quantities of oil to be offered for sale. At lower prices, oil producers have less incentive to drill deeper for oil that is more expensive to discover.

The government cannot repeal the law of supply. Price controls discourage producers from oil exploration and production, which causes a reduction in the quantity supplied. If you said U.S. oil production decreased in the 1970s when the government put a lid on oil prices, **YOU ARE CORRECT.**

Can the Price System Eliminate Scarcity?

Recall from Chapter 1 that scarcity is the condition in which human wants are forever greater than the resources available to satisfy those wants. Using markets free from government interference will not solve the scarcity problem. Scarcity exists at any price for a good or service. This means scarcity

occurs at any disequilibrium price at which a shortage or surplus exists, and scarcity remains at any equilibrium price at which no shortage or surplus exists.

Although the price system can eliminate shortages (or surpluses), if you said it cannot eliminate scarcity, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

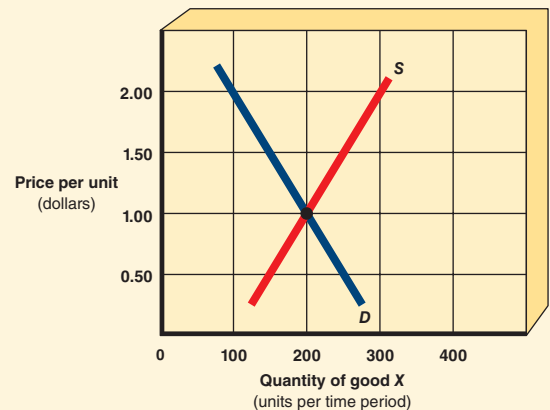
1. If the demand curve for good X is downward sloping, an increase in the price will result in
 - a. an increase in the demand for good X.
 - b. a decrease in the demand for good X.
 - c. no change in the quantity demanded for good X.
 - d. a larger quantity demanded for good X.
 - e. a smaller quantity demanded for good X.
2. The law of demand states that the quantity demanded of a good changes, other things being equal, when
 - a. the price of the good changes.
 - b. consumer income changes.
 - c. the prices of other goods change.
 - d. a change occurs in the quantities of other goods purchased.
3. Which of the following is the result of a decrease in the price of tea, other things being equal?
 - a. A leftward shift in the demand curve for tea
 - b. A downward movement along the demand curve for tea
 - c. A rightward shift in the demand curve for tea
 - d. An upward movement along the demand curve for tea
4. Which of the following will cause a movement along the demand curve for good X?
 - a. A change in the price of a close substitute
 - b. A change in the price of good X
 - c. A change in consumer tastes and preferences for good X
 - d. A change in consumer income
5. Assuming beef and pork are substitutes, a decrease in the price of pork will cause the demand curve for beef to
 - a. shift to the left as consumers switch from beef to pork.
 - b. shift to the right as consumers switch from beef to pork.
 - c. remain unchanged, because beef and pork are sold in separate markets.
 - d. none of the above.
6. Assuming coffee and tea are substitutes, a decrease in the price of coffee, other things being equal, results in a (an)
 - a. downward movement along the demand curve for tea.
 - b. leftward shift in the demand curve for tea.
 - c. upward movement along the demand curve for tea.
 - d. rightward shift in the demand curve for tea.
7. Assuming steak and potatoes are complements, a decrease in the price of steak will
 - a. decrease the demand for steak.
 - b. increase the demand for steak.
 - c. increase the demand for potatoes.
 - d. decrease the demand for potatoes.
8. Assuming steak is a normal good, a decrease in consumer income, other things being equal, will
 - a. cause a downward movement along the demand curve for steak.
 - b. shift the demand curve for steak to the left.
 - c. cause an upward movement along the demand curve for steak.
 - d. shift the demand curve for steak to the right.
9. An increase in consumer income, other things being equal, will
 - a. shift the supply curve for a normal good to the right.
 - b. cause an upward movement along the demand curve for an inferior good.
 - c. shift the demand curve for an inferior good to the left.
 - d. cause a downward movement along the supply curve for a normal good.
10. Yesterday seller A supplied 400 units of good X at \$10 per unit. Today seller A supplies the same quantity of units at \$5 per unit. Based on this evidence, seller A has experienced a (an)
 - a. decrease in supply.
 - b. increase in supply.
 - c. increase in the quantity supplied.

Practice Quiz Continued

- d. decrease in the quantity supplied.
 - e. increase in demand.
11. An improvement in technology causes a (an)
 - a. leftward shift of the supply curve.
 - b. upward movement along the supply curve.
 - c. firm to supply a larger quantity at any given price.
 - d. downward movement along the supply curve.
 12. Suppose autoworkers receive a substantial wage increase. Other things being equal, the price of autos will rise because of a (an)
 - a. increase in the demand for autos.
 - b. rightward shift of the supply curve for autos.
 - c. leftward shift of the supply curve for autos.
 - d. reduction in the demand for autos.
 13. Assuming soybeans and tobacco can be grown on the same land, an increase in the price of tobacco, other things being equal, causes a (an)
 - a. upward movement along the supply curve for soybeans.
 - b. downward movement along the supply curve for soybeans.
 - c. rightward shift in the supply curve for soybeans.
 - d. leftward shift in the supply curve for soybeans.
 14. If Q_d = quantity demanded and Q_s = quantity supplied at a given price, a shortage in the market results when
 - a. Q_s is greater than Q_d .
 - b. Q_s equals Q_d .
 - c. Q_d is less than or equal to Q_s .
 - d. Q_d is greater than Q_s .
 15. Assume that the equilibrium price for a good is \$10. If the market price is \$5, a
 - a. shortage will cause the price to remain at \$5.
 - b. surplus will cause the price to remain at \$5.
 - c. shortage will cause the price to rise toward \$10.
 - d. surplus will cause the price to rise toward \$10.
 16. In the market shown in Exhibit 14, the equilibrium price and quantity of good X are
 - a. \$0.50, 200.
 - b. \$1.50, 300.
 - c. \$2.00, 100.
 - d. \$1.00, 200.
 17. In Exhibit 14, at a price of \$2.00, the market for good X will experience a
 - a. shortage of 150 units.
 - b. surplus of 100 units.
 - c. shortage of 100 units.
 - d. surplus of 200 units.
 18. In Exhibit 14, if the price of good X moves from \$1.00 to \$2.00, the new market condition will put
 - a. upward pressure on price.
 - b. no pressure on price to change.
 - c. downward pressure on price.
 - d. no pressure on quantity to change.

Exhibit 14

Supply and Demand Curves



Practice Quiz Continued

19. In Exhibit 14, if the market price of good X is initially \$0.50, a movement toward equilibrium requires
- no change, because an equilibrium already exists.
 - the price to fall below \$0.50 and both the quantity supplied and the quantity demanded to rise.
 - the price to remain the same, but the supply curve to shift to the left.
 - the price to rise above \$0.50, the quantity supplied to rise, and the quantity demanded to fall.
20. In Exhibit 14, if the market price of good X is initially \$1.50, a movement toward equilibrium requires
- no change, because an equilibrium already exists.
 - the price to fall below \$1.50 and both the quantity supplied and the quantity demanded to fall.
 - the price to remain the same, but the supply curve to shift to the left.
 - the price to fall below \$1.50, the quantity supplied to fall, and the quantity demanded to rise.

Consumer Surplus, Producer Surplus, and Market Efficiency



This chapter explained how the market forces of demand and supply establish the equilibrium price and output. Here it will be demonstrated that the equilibrium price and quantity determined in a competitive market are desirable because the result is *market efficiency*. To understand this concept, we use the area between the market price and the demand and supply curves to measure gains or losses from market transactions for consumers and producers.

Consumer Surplus

Consider the market demand curve shown in Exhibit A-1(a). The height of this demand curve shows the maximum willingness of consumers to purchase ground beef at various prices per pound. At a price of \$4.00 (point X) no one will purchase ground beef. But if the price drops to \$3.50 at point A, consumers will purchase one million pounds of ground beef per year. Moving downward along the demand curve to point B, consumers will purchase an additional million pounds of ground beef per year at a lower price of \$3.00 per pound. If the price continues to drop to \$2.50 per pound at point C and lower, consumers are willing to purchase more pounds of ground beef consistent with the law of demand.

Assuming the market equilibrium price for ground beef is \$2.00 per pound, we can use the demand curve to measure the net benefit, or *consumer surplus*, in this market. **Consumer surplus** is the value of the difference between the price consumers are willing to pay for a product on the demand curve and the price actually paid for it. At point A, consumers are willing to pay \$3.50 per pound, but they actually pay the equilibrium price of \$2.00. Thus, consumers earn a surplus of \$1.50 ($\$3.50 - \$2.00$) per pound multiplied by one million pounds purchased, which is a \$15 million consumer surplus. This value is represented by the shaded vertical rectangle formed at point A on the demand curve. At point B, consumers who purchase an additional million pounds of ground beef at \$3.00 per pound receive a lower extra consumer surplus than at point A, represented by a rectangle of lower height. At point C, the marginal consumer surplus continues to fall until at equilibrium point E, where there is no consumer surplus.

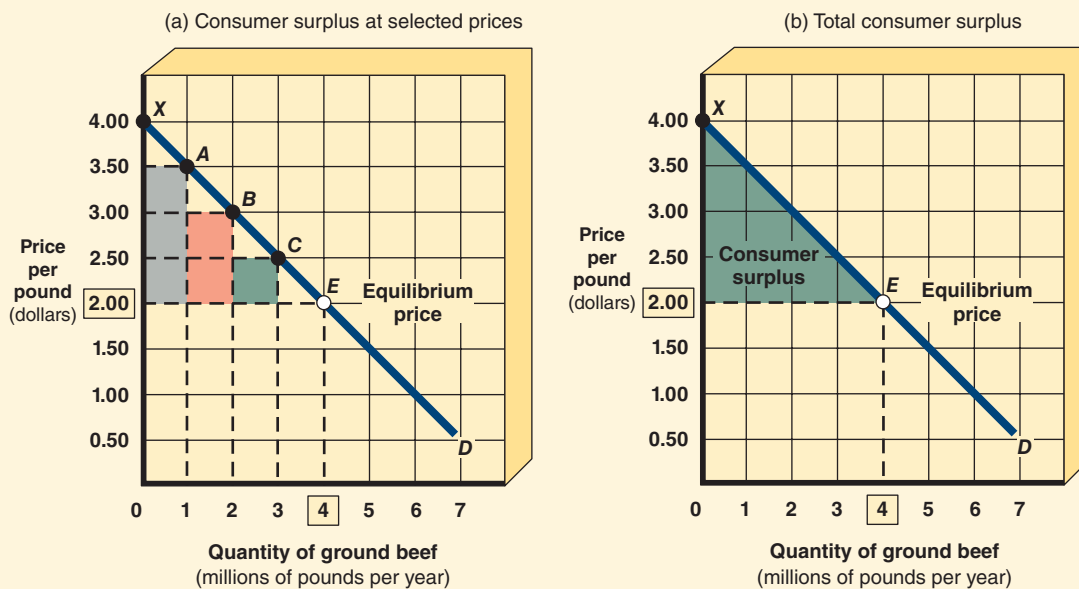
The total value of consumer surplus can be interpreted from the explanation given above. As shown in Exhibit A-1(b), begin at point X and instead of selected prices, now imagine offering ground beef to consumers at each possible price

Consumer surplus

The value of the difference between the price consumers are willing to pay for a product on the demand curve and the price actually paid for it.

Exhibit A-1 Market Demand Curve and Consumer Surplus

As illustrated in part (a), consumers are willing at point A on the market demand curve to pay \$3.50 per pound to purchase one million pounds of ground beef per year. Since the equilibrium price is \$2.00, this means they receive a consumer surplus of \$1.50 for each pound of ground beef and the vertical shaded rectangular area is the consumer surplus earned only at point A. Others who pay less at points B, C, and E receive less consumer surplus and the height of the corresponding rectangles falls at each of these prices. In part (b), moving downward along all possible prices on the demand curve yields the green shaded triangle, which is equal to total consumer surplus (net benefit).



downward along the demand curve until the equilibrium price of \$2.00 is reached at point E. The result is that the entire green triangular area between the demand curve and the horizontal line at the equilibrium price represents total consumer surplus. Note that a rise in the equilibrium price decreases total consumer surplus and a fall in the equilibrium price increases total consumer surplus.

CONCLUSION *Total consumer surplus measured in dollars is represented by the total area under the market demand curve and above the equilibrium price.*

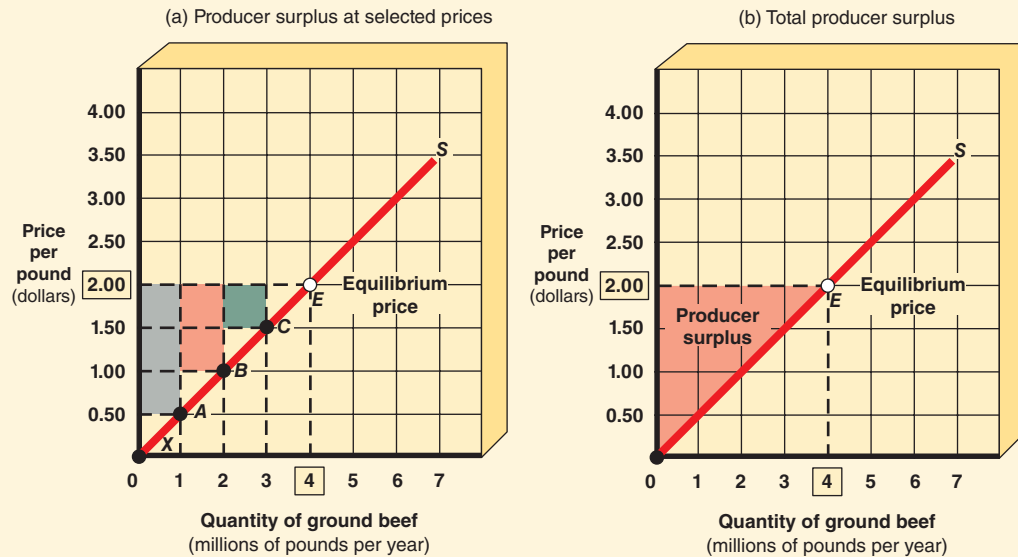
Producer Surplus

Similar to the concept of consumer surplus, the height of the market supply curve in Exhibit A-2(a) shows the producers' minimum willingness to accept payment for ground beef offered for sale at various prices per pound. At point X, firms offer

Exhibit A-2

Market Supply Curve and Producer Surplus

In part (a), firms are willing at \$0.50 (point A) to supply one million pounds of ground beef per year. Because \$2.00 is the equilibrium price, the sellers earn a producer surplus of \$1.50 per pound of ground beef sold. The first vertical shaded rectangle is the producer surplus earned only at point A. At points B, C, and E, sellers receive less producer surplus at each of these higher prices and the sizes of the rectangles fall. In part (b), moving upward along all possible selling prices on the supply curve yields the red-shaded triangle that is equal to total producer surplus (net benefit).



no ground beef for sale at a price of zero and they divert their resources to an alternate use. At a price of \$0.50 per pound (point A), the supply curve tells us that one million pounds will be offered for sale. Moving upward along the supply curve to point B, firms will offer an additional million pounds of ground beef for sale at the higher price of \$1.00 per pound. If the price rises to \$1.50 at point C and higher, firms allocate more resources to ground beef production and another million pounds will be supplied along the supply curve.

Again we will assume the equilibrium price is \$2.00 per pound, and the supply curve can be used to measure the net benefit, or *producer surplus*. **Producer surplus** is the value of the difference between the actual selling price of a product and the price producers are willing to sell it for on the supply curve. Now assume the first million pounds of ground beef is sold at point A on the supply curve. In this case, producer surplus is the difference between the equilibrium selling price of \$2.00 and the \$0.50 price that is the minimum price that producers will accept to supply this quantity of ground beef. Thus, producer surplus is equal to \$1.50 ($\$2.00 - \$0.50$) per pound multiplied by one million pounds sold, which is \$1.5 million producer surplus. This value is represented by the vertical shaded rectangle formed at point A on the supply curve. The second million pounds of ground beef offered for sale at point B also generates a producer surplus because the selling price of \$2.00

Producer surplus

The value of the difference between the actual selling price of a product and the price producers are willing to sell it for on the supply curve.

exceeds the \$1.00 price at which firms are willing to supply this additional quantity of ground beef. Note that producer surplus is lower at point *B* compared to point *A*, and marginal producer surplus continues to fall at point *C* until it reaches zero at the equilibrium point *E*.

The total value of producer surplus is represented in Exhibit A-2(b). Start at point *X*, where none of the product will be supplied at the price of zero. Now consider the quantities of ground beef producers are willing to offer for sale at each possible price upward along the supply curve until the equilibrium price of \$2.00 is reached at point *E*. The result is that the entire red triangular area between the horizontal line at the equilibrium price and the supply curve represents total producer surplus.

CONCLUSION *Total producer surplus measured in dollars is represented by the total area under the equilibrium price and above the supply curve.*

Market Efficiency

In this section, the equilibrium price and quantity will be shown to achieve market efficiency because at any other market price the total net benefits to consumers and producers will be less. Stated differently, competitive markets are efficient when they maximize the sum of consumer and producer surplus. The analysis continues in Exhibit A-3(a), which combines parts (b) from the two previous exhibits. The green triangle represents consumer surplus earned in excess of the \$2.00 equilibrium price consumers pay for ground beef. The red triangle represents producer surplus producers receive by selling ground beef at \$2.00 per pound in excess of the minimum price at which they are willing to supply it. The total net benefit (total surplus) is therefore the entire triangular area consisting of both the green consumer surplus and red producer surplus triangles.

Now consider in Exhibit A-3(b) the consequences to market efficiency of producers devoting fewer resources to ground beef production and only 2 million pounds being bought and sold per year compared with 4 million pounds at the equilibrium price of \$2.00. The result is a deadweight loss. **Deadweight loss** is the net loss of consumer and producer surplus from underproduction or overproduction of a product. In Exhibit A-3(b), the deadweight loss is equal to the gray triangle *ABE*, which represents the total surplus of green and red triangles in part (a) that is not obtained because the market is operating below equilibrium point *E*.

Exhibit A-3(c) illustrates that a deadweight loss of consumer and producer surplus can also result from overproduction. Now suppose more resources are devoted to production and 6 million pounds of ground beef are bought and sold at the equilibrium price. However, from the producers' side of the market, the equilibrium selling price is only \$2.00 and below any possible selling price on the supply curve between points *E* and *C*. Therefore, firms have a net loss for each pound sold, represented by the area under the supply curve and bounded below by the horizontal equilibrium price line. Similarly, consumers pay the equilibrium price of \$2.00, but this price exceeds any price consumers are willing to pay between points *E* and *D* on the demand curve. This means consumers experience a total net benefit loss for each pound purchased, represented by the rectangular area between

Deadweight loss

The net loss of consumer and producer surplus for underproduction or overproduction of a product.

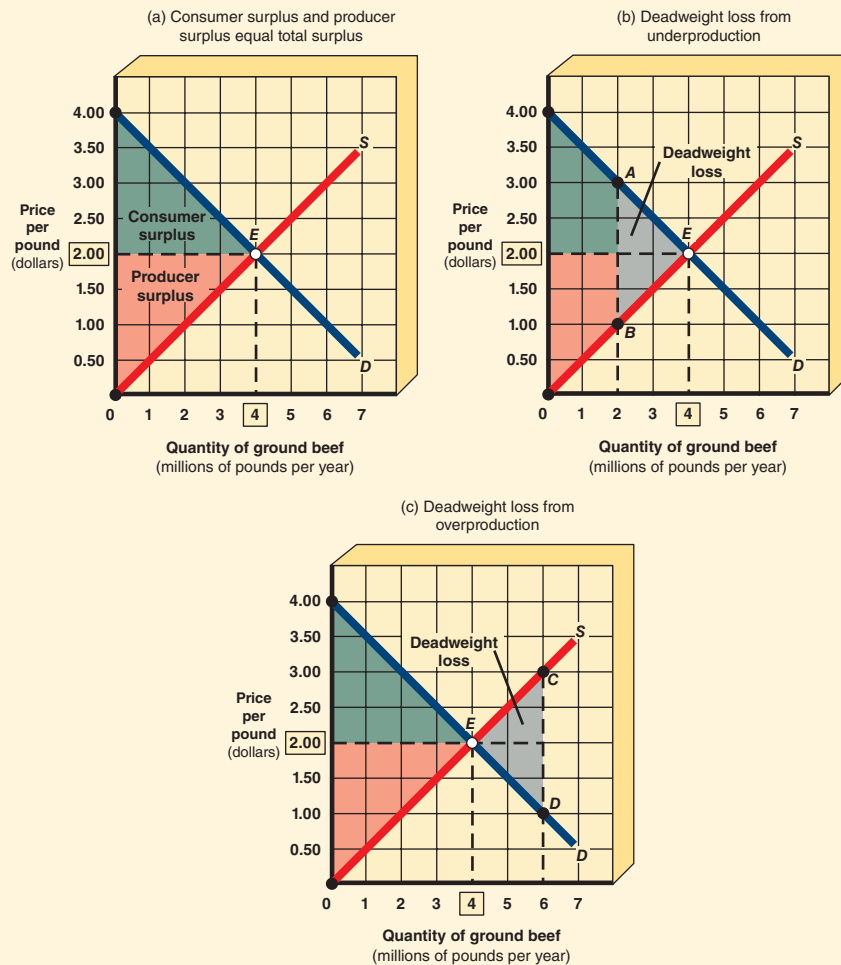
Exhibit A-3

Comparison of Market Efficiency and Deadweight Loss

In part (a), the green triangle represents consumer surplus and the red triangle represents producer surplus. The total net benefit, or total surplus, is the entire triangle consisting of the consumer and producer surplus triangles.

In part (b), too few resources are used to produce 2 million pounds of ground beef compared to 4 million pounds at equilibrium point *E*. The market is inefficient because the deadweight loss gray triangle *ABE* is no longer earned by either consumers or producers.

As shown in part (c), overproduction at the equilibrium price of \$2.00 can also be inefficient. If 6 million pounds of ground beef are offered for sale, too many resources are devoted to this product and a deadweight loss of area *EDC* occurs.



the horizontal equilibrium price line above and the demand curve below. The total net loss of consumer and producer surplus (deadweight loss) is equal to the gray-shaded area *EDC*.

CONCLUSION *The total dollar value of potential benefits not achieved is the deadweight loss resulting from too few or too many resources used in a given market.*

Looking ahead, the conclusion drawn from this appendix is that market equilibrium is efficient, but this conclusion is not always the case. In the next chapter, the topic of *market failure* will be discussed, in which market equilibrium under certain conditions can result in too few or too many resources being used to produce goods and services. For example, the absence of a competitive market, existence of pollution, or vaccinations to prevent a disease can establish equilibrium conditions with misallocations of resources. In these cases, government intervention may be preferable in order to achieve optimal allocation of resources. In other cases, such as the government imposing price ceilings and price floors, the result of government intervention is a market that is no longer efficient.

Key Concepts

Consumer surplus

Producer surplus

Deadweight loss

Summary

- **Consumer surplus** measures the value between the price consumers are willing to pay for a product along the demand curve and the price they actually pay.
- **Producer surplus** measures the value between the actual selling price of a product and the price along the supply curve at which sellers are willing to sell the product. Total surplus is the sum of consumer surplus and producer surplus.
- **Deadweight loss** is the result of a market that operates in disequilibrium. It is the net loss of both consumer and producer surplus resulting from underproduction or overproduction of a product.

Summary of Conclusion Statements

- Total consumer surplus measured in dollars is represented by the total area under the market demand curve and above the equilibrium price.
- Total producer surplus measured in dollars is represented by the total area under the equilibrium price and above the supply curve.
- The total dollar value of potential benefits not achieved is the deadweight loss resulting from too few or too many resources used in a given market.

Study Questions and Problems

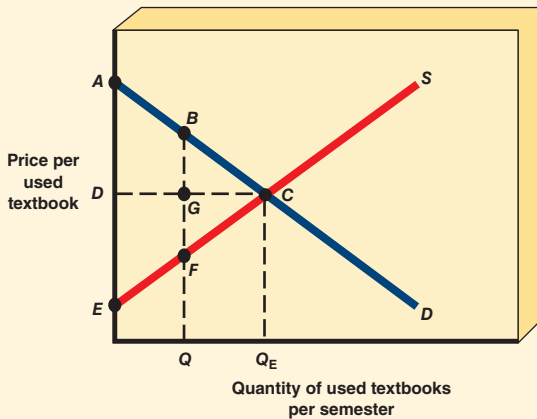
1. Consider the market for used textbooks. Use Exhibit A-4 to calculate the total consumer surplus.
2. Consider the market for used textbooks. Use Exhibit A-5 to calculate the total producer surplus.

<i>Exhibit A-4</i> Used Textbook Market		
Potential buyer	Willingness to pay	Market price
Brad	\$60	\$30
Juan	45	30
Sue	35	30
Jamie	25	30
Frank	10	30

<i>Exhibit A-5</i> Used Textbook Market		
Potential buyer	Willingness to pay	Market price
Forest	\$60	\$30
Betty	45	30
Alan	35	30
Paul	25	30
Alice	10	30

Exhibit A-6

Used Textbook Market



- Using Exhibits A-4 and A-5 above, calculate the total surplus. Now calculate the effect on consumer surplus, producer surplus, and total surplus of a fall in the equilibrium price of textbooks from \$30 to \$15 each. Explain the meaning of your calculations.
- Using Exhibit A-6, and assuming the market is in equilibrium at Q_E , identify areas ACD , DCE , and ACE . Now explain the result of underproduction at Q in terms of areas BCG , GCF , and BCF .

Practice Quiz

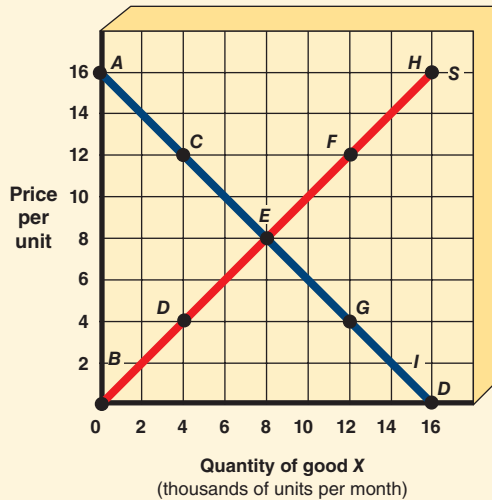
For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- If Bill is willing to pay \$10 for one good X, \$8 for a second, and \$6 for a third, and the market price is \$5, then Bill's consumer surplus is
 - \$24.
 - \$18.
 - \$9.
 - \$6.
- Suppose Gizmo Inc. is willing to sell one gizmo for \$10, a second gizmo for \$12, a third for \$14, and a fourth for \$20, and the market price is \$20. What is Gizmo Inc.'s producer surplus?
 - \$56.
 - \$24.
 - \$20.
 - \$10.
- In an efficient market, deadweight loss is
 - maximum.
 - minimum.
 - constant.
 - zero.
- Deadweight loss results from
 - equilibrium.
 - underproduction.
 - overproduction.
 - none of the above are correct.
 - Either (b) or (c).
- Total surplus equals
 - consumer surplus + producer surplus – deadweight loss.
 - consumer surplus – producer surplus – deadweight loss.
 - consumer surplus – producer surplus + deadweight loss.
 - consumer surplus + producer surplus.
- Which of the following statements is *correct*?
 - Total surplus is the sum of consumer and producer surplus.
 - Deadweight loss is the net loss of both consumer and producer surplus.
 - Deadweight loss is a measure of market inefficiency.
 - All of the above.

Practice Quiz Continued

Exhibit A-7

Demand and Supply Curves for Good X



7. In Exhibit A-7, suppose firms devote resources sufficient to produce 4,000 units of good X per month. The result is a deadweight loss of triangle:
 - a. *ABE*.
 - b. *CDE*.
 - c. *EGE*.
 - d. *EDE*.
8. Suppose in Exhibit A-7 that exchange in the market for good X yields triangle *ABE*. This means that which of the following conditions exists in the market?
 - a. Only consumer surplus
 - b. Only producer surplus
 - c. Deadweight loss
 - d. Maximum consumer plus producer surplus
9. As shown in Exhibit A-7, assume that the quantity of good X exchanged results in triangle *EIH*. This would be caused by _____ resources being used by producers to produce good X.
 - a. too many
 - b. too few
 - c. an optimal amount of
 - d. asymmetric
10. As shown in Exhibit A-7, assume that the quantity of good X exchanged results in triangle *CDE*. This would be caused by _____ resources being used by producers to produce good X.
 - a. too many
 - b. too few
 - c. an optimal amount of
 - d. asymmetric



Markets in Action

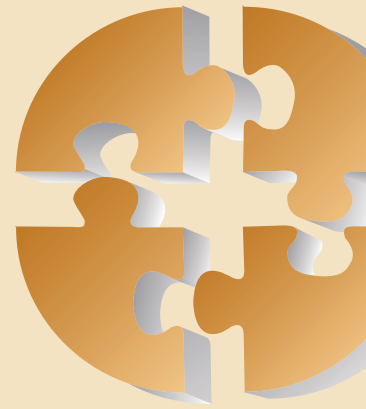
Once you understand how buyers and sellers respond to changes in equilibrium prices, you are progressing well in your quest to understand the economic way of thinking. This chapter begins by showing that changes in supply and demand influence the equilibrium price and quantity of goods and services exchanged around you every day. For example, you will study the impact of changes in supply and demand curves on the markets for Caribbean cruises, new homes, and AIDS vaccinations. Then you will see why the laws of supply and demand cannot be repealed. Using market supply and demand analysis, you will learn that government policies to control markets

have predictable consequences. For example, you will understand what happens when the government limits the maximum rent landlords can charge and who benefits and who loses from the federal minimum-wage law.

In this chapter, you will also study situations in which the market mechanism fails. Have you visited a city and lamented the smog that blankets the beautiful surroundings? Or have you ever wanted to swim or fish in a stream, but could not because of industrial waste? These are obvious cases in which market-system magic failed and the government must consider cures to reach socially desirable results.

In this chapter, you will learn to solve these economics puzzles:

- How can a spotted owl affect the price of homes?
- How do demand and supply affect the price of ethanol fuel?
- Why might government warehouses overflow with cheese and milk?
- What do ticket scalping and rent controls have in common?



CHANGES IN MARKET EQUILIBRIUM

Using market supply and demand analysis is like putting on glasses if you are nearsighted. Suddenly, the fuzzy world around you comes into clear focus. In the following examples, you will open your eyes and see that economic theory has something important to say about so many things in the real world.

Changes in Demand

The Caribbean cruise market shown in Exhibit 1(a) assumes market supply, S , is constant and market demand increases from D_1 to D_2 . Why has the demand curve shifted rightward in the figure? We will assume the popularity of cruises to these vacation islands has suddenly risen sharply due to extensive advertising that influenced tastes and preferences. Given supply curve S and demand curve D_1 , the initial equilibrium price is \$600 per cruise, and the initial equilibrium quantity is 8,000 cruises per year, shown as point E_1 . After the impact of advertising, the new equilibrium point, E_2 , becomes 12,000 cruises per year at a price of \$900 each. Thus, the increase in demand causes both the equilibrium price and the equilibrium quantity to increase.

It is important to understand the force that caused the equilibrium to shift from E_1 to E_2 . When demand initially increased from D_1 to D_2 , there was a temporary shortage of 8,000 cruises at \$600 per cruise. Firms in the cruise business responded to the excess demand by hiring more workers, offering more cruises to the Caribbean, and raising the price. The cruise lines therefore move upward along the supply curve (increasing quantity supplied, but not changing supply). During some period of trial and error, Caribbean cruise sellers increase their price and quantity supplied until a shortage no longer exists at point E_2 . Therefore, the increase in demand causes both the equilibrium price and the equilibrium quantity to increase.

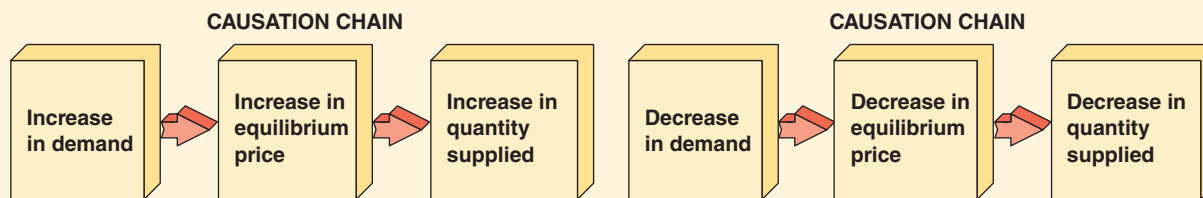
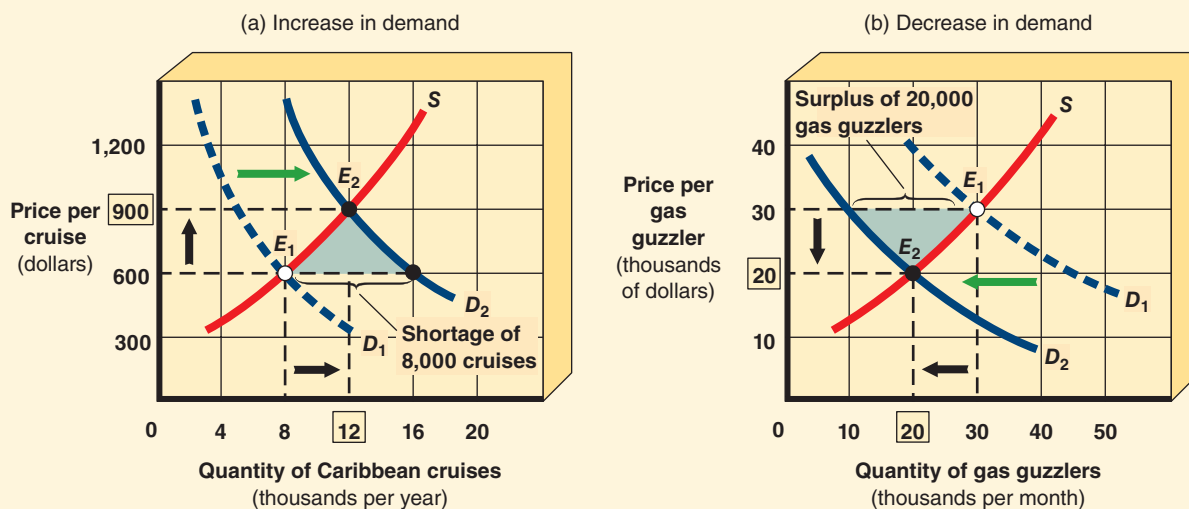
What will happen to the demand for gas-guzzling automobiles (for example, SUVs) if the price of gasoline triples? Because gasoline and automobiles are complements, a rise in the price of gasoline decreases the demand for gas guzzlers from D_1 to D_2 in Exhibit 1(b). At the initial equilibrium price of \$30,000 per gas guzzler (E_1), the quantity supplied now exceeds the quantity demanded by 20,000 automobiles per month. This unwanted inventory forces automakers to reduce the price and quantity supplied. As a result of this movement downward on the supply curve, market equilibrium changes from E_1 to E_2 . The equilibrium price falls from

Exhibit 1

The Effects of Shifts in Demand on Market Equilibrium

In Part (a), demand for Caribbean cruises increases because of extensive advertising, and the demand curve shifts rightward from D_1 to D_2 . This shift in demand causes a temporary shortage of 8,000 cruises per year at the initial equilibrium of E_1 . This disequilibrium condition encourages firms in the cruise business to move upward along the supply curve to a new equilibrium at E_2 .

Part (b) illustrates a decrease in the demand for gas-guzzling automobiles (SUVs) caused by a sharp rise in the price of gasoline (a complement). This leftward shift in demand from D_1 to D_2 results in a temporary surplus of 20,000 gas guzzlers per month at the initial equilibrium of E_1 . This disequilibrium condition forces sellers of these cars to move downward along the supply curve to a new equilibrium at E_2 .



\$30,000 to \$20,000, and the equilibrium quantity falls from 30,000 to 20,000 gas guzzlers per month.

Changes in Supply

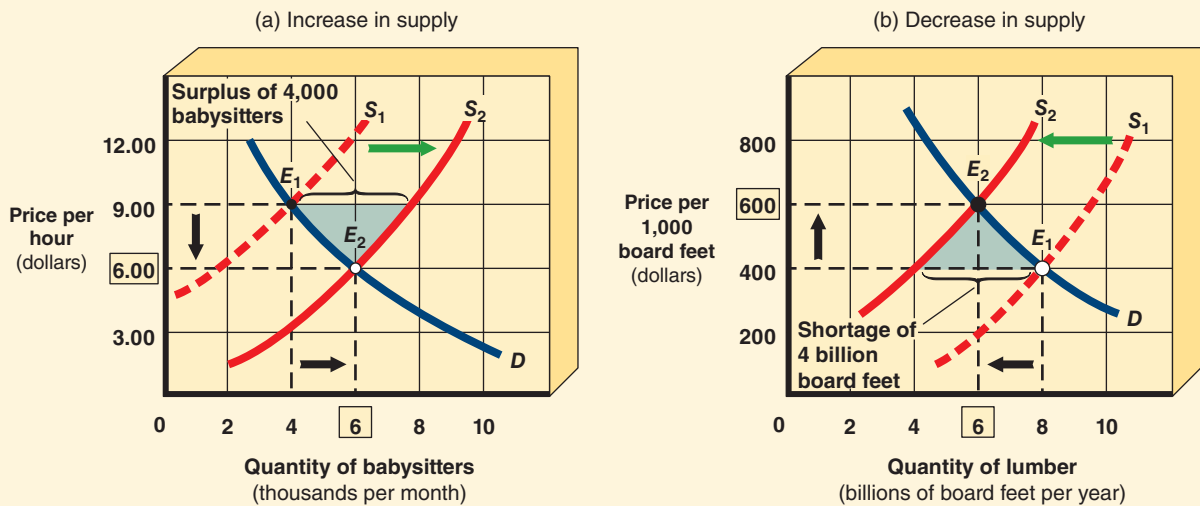
Now reverse the analysis by assuming demand remains constant and allow some nonprice determinant to shift the supply curve. In Exhibit 2(a), begin at point E_1 in a market for babysitting services at an equilibrium price of \$9 per hour and

Exhibit 2

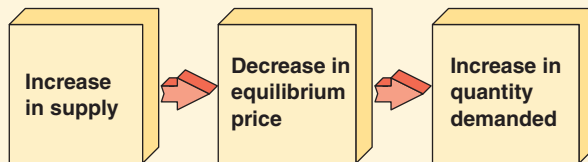
The Effects of Shifts in Supply on Market Equilibrium

In Part (a), begin at equilibrium E_1 in the market for babysitters, and assume an increase in the number of babysitters shifts the supply curve rightward from S_1 to S_2 . This shift in supply causes a temporary surplus of 4,000 unemployed babysitters per month. This disequilibrium condition causes a movement downward along the demand curve to a new equilibrium at E_2 . At E_2 , the equilibrium price declines, and the equilibrium quantity rises.

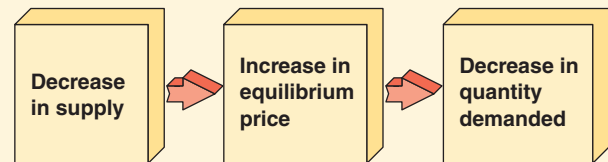
In Part (b), steps to protect the environment cause the supply curve for lumber to shift leftward from S_1 to S_2 . This shift in supply results in a temporary shortage of 4 billion board feet per year. Customer bidding for the available lumber raises the price. As a result, the market moves upward along the demand curve to a new equilibrium at E_2 , and the quantity demanded falls.



CAUSATION CHAIN



CAUSATION CHAIN



4,000 babysitters hired per month. Then assume there is a population shift and the number of people available to babysit rises. This increase in the number of sellers shifts the market supply curve rightward from S_1 to S_2 , and creates a temporary surplus of 4,000 babysitters at point E_1 who offer their services but are not hired. The unemployed babysitters respond by reducing the price and the number of babysitters available for hire, which is a movement downward along S_2 . As the price falls, buyers move down along their demand curve and hire more babysitters per month. When the price falls to \$6 per hour, the market is in equilibrium again at point E_2 , instead of E_1 , and consumers hire 6,000 babysitters per month.

*Exhibit 3***Effect of Shifts in Demand or Supply on Market Equilibrium**

Change	Effect on equilibrium price	Effect on equilibrium quantity
Demand increases	Increases	Increases
Demand decreases	Decreases	Decreases
Supply increases	Decreases	Increases
Supply decreases	Increases	Decreases

Exhibit 2(b) illustrates the market for lumber. Suppose this market is at equilibrium at point E_1 , where the going price is \$400 per thousand board feet, and 8 billion board feet are bought and sold per year. Now suppose a new Endangered Species Act is passed, and the federal government sets aside huge forest resources to protect the spotted owl and other wildlife. This means the market supply curve shifts leftward from S_1 to S_2 , and a temporary shortage of 4 billion board feet of lumber exists at point E_1 . Suppliers respond by hiking their price from \$400 to \$600 per thousand board feet, and a new equilibrium is established at E_2 , where the quantity is 6 billion board feet per year. This higher cost of lumber, in turn, raises the price of a new 1,800-square-foot home by \$4,000, compared to the price of an identical home the previous year.

Exhibit 3 gives a concise summary of the impact of changes in demand or supply on market equilibrium.

CHECKPOINT*Why the Higher Price for Ethanol Fuel?*

Suppose more consumers purchased ethanol fuel for their cars, and at the same time, producers switched over to ethanol fuel production. Within a year period, the price of ethanol fuel shot up \$2.00 per gallon. During this year period, which increased more—demand, supply, or neither?

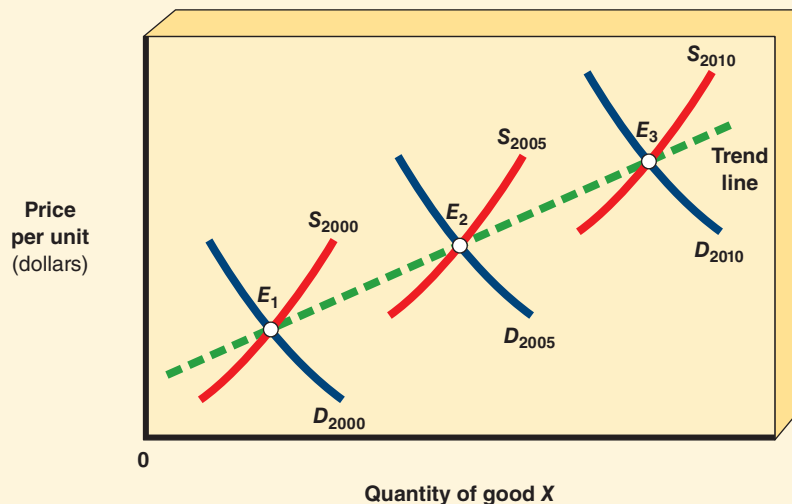
Trend of Equilibrium Prices over Time

Basic demand and supply analysis allows us to explain a trend in prices over a number of years. Exhibit 4 shows the effect of changes in nonprice determinants that increase both the demand and supply curves for good X between 2000, 2005, and 2010. A line connects the equilibrium prices for each year in order to summarize the trend of equilibrium price and quantity changes over this time period. In this case, the observed prices trace an upward-sloping trend line.

Exhibit 4

Trend of Equilibrium Prices over Time

Nonprice determinants of demand and supply for good X have caused both the demand and supply curves to shift rightward between 2000 and 2010. As a result, the equilibrium price and quantity in this example rise along the upward-sloping trend line connecting each observed equilibrium price.



CAN THE LAWS OF SUPPLY AND DEMAND BE REPEALED?

The government intervenes in some markets with the objective of preventing prices from rising to the equilibrium price. In other markets, the government's goal is to intervene and maintain a price higher than the equilibrium price. Market supply and demand analysis is a valuable tool for understanding what happens when the government fixes prices. There are two types of price controls: *price ceilings* and *price floors*.

Price Ceilings

Case 1: Rent Controls What happens if the government prevents the price system from setting a market price “too high” by mandating a **price ceiling**? A price ceiling is a legally established maximum price a seller can charge. Rent controls are an example of the imposition of a price ceiling in the market for rental units. New York City, Washington, D.C., Los Angeles, San Francisco, and other communities in the United States have some form of rent control. Since World War I, rent controls have been widely used in Europe. The rationale for rent controls is to provide an “essential service” that would otherwise be unaffordable by many people at the equilibrium rental price. Let's see why most economists believe that rent controls are counterproductive.

Price ceiling

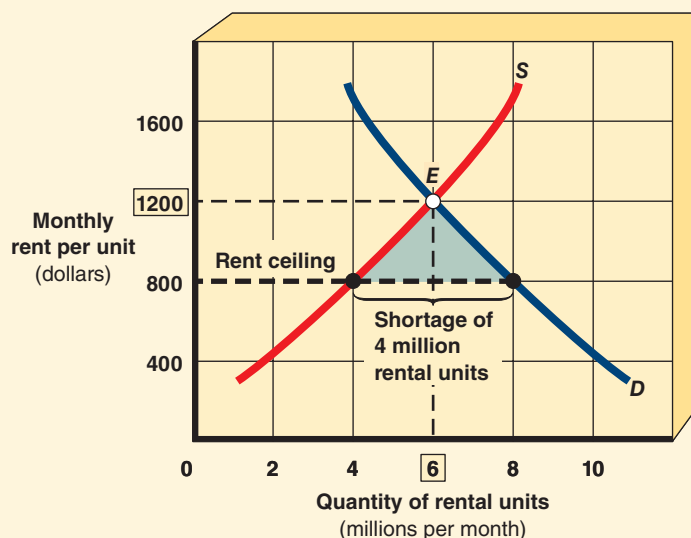
A legally established maximum price a seller can charge.

Exhibit 5 is a supply and demand diagram for the quantity of rental units demanded and supplied per month in a hypothetical city. We begin the analysis by assuming no rent controls exist and equilibrium is at point *E*, with a monthly rent of \$1,200 per month and 6 million units occupied. Next, assume the city council imposes a rent control (ceiling price) that by law forbids any landlord from renting a unit for more than \$800 per month. What does market supply and demand theory predict will happen? At the low rent ceiling of \$800, the quantity demanded of rental units will be 8 million, but the quantity supplied will be only 4 million. Consequently, the price ceiling creates a persistent market shortage of 4 million rental units because suppliers cannot raise the rental price without being subjected to legal penalties.

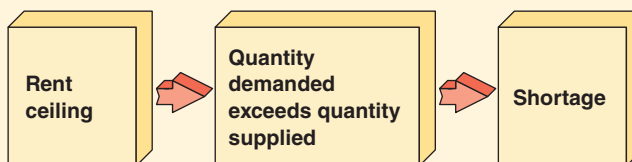
Exhibit 5

Rent Control Results in a Shortage of Rental Units

If no rent controls exist, the equilibrium rent for a hypothetical apartment is \$1,200 per month at point *E*. However, if the government imposes a rent ceiling of \$800 per month, a shortage of 4 million rental units occurs. Because rent cannot rise by law, one outcome is that consumers must search for available units instead of paying a higher rent. Other outcomes include a black market, bribes, discrimination, and other illegal methods of dealing with a shortage of 4 million rental units per month.



CAUSATION CHAIN



Note that a rent ceiling at or above \$1,200 per month would have no effect. If the ceiling is set at the equilibrium rent of \$1,200, the quantity of rental units demanded and the quantity of rental units supplied are equal regardless of the rent control. If the rent ceiling is set above the equilibrium rent, the quantity of rental units supplied exceeds the quantity of rental units demanded, and this surplus will cause the market to adjust to the equilibrium rent of \$1,200.

What is the impact of rent controls on consumers? First, as a substitute for paying higher prices, consumers must spend more time on waiting lists and searching for housing. This means consumers incur an *opportunity cost* added to the \$800 rent set by the government. Second, an illegal market, or *black market*, can arise because of the excess quantity demanded. Because the price of rental units is artificially low, the profit motive encourages tenants to risk breaking the law by subletting their unit to the highest bidder over \$800 per month.

From the seller's perspective, rent control encourages two undesirable effects. First, faced with a mandated low rent, landlords may cut maintenance expenses, and housing deterioration will reduce the stock of rental units in the long run. Second, landlords may use discriminatory practices to replace the price system. Once owners realize there is an excess quantity demanded for rentals at the controlled price, they may resort to preferences based on pet ownership or family size to determine how to allocate scarce rental space.

Case 2: Gasoline Price Ceiling The government placed ceilings on most nonfarm prices during World War II and, to a lesser extent, during the Korean War. In 1971, President Nixon “froze” virtually all wages, prices, and rents for 90 days in an attempt to control inflation. As a result of an oil embargo in late 1973, the government imposed a price ceiling of 55 cents per gallon of gasoline. To deal with the shortage, nonprice rationing schemes were introduced in 1974. Some states used a first-come, first-served system, while other states allowed consumers with even-numbered license plates to buy gas on even-numbered days and those with odd-numbered license plates to buy on odd-numbered days. Gas stations were required to close on Friday night and not open until Monday morning. Regardless of the scheme, long waiting lines for gasoline formed, just as the supply and demand model predicts. Finally, in the past, legally imposed price ceilings have been placed on such items as natural gas shipped in interstate commerce and on interest rates for loans. Maximum interest rate laws are called *usury laws*, and state governments have adopted these ceilings in the past to regulate home mortgages and other types of loans. Internationally, as discussed later in the chapter on economies in transition, price ceilings on food and rent were common in the former Soviet Union. Soviet sociologists estimated that members of a typical urban household spent a combined total of 40 hours per week standing in lines to obtain various goods and services.

Price Floors

The other side of the price-control coin is a **price floor** set by government because it fears that the price system might establish a price viewed as “too low.” A price floor is a legally established minimum price a seller can be paid. We now turn to two examples of price floors. The first is the minimum wage, and the second is agricultural price supports.

Price floor

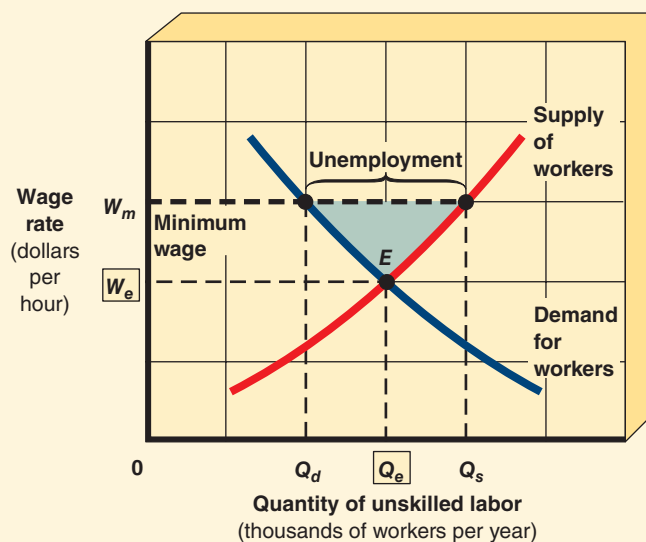
A legally established minimum price a seller can be paid.

Case 1: The Minimum-Wage Law In the first chapter, the second You're the Economist applied *normative* and *positive* reasoning to the issue of the minimum wage. Now you are prepared to apply market supply and demand analysis (positive reasoning) to this debate. Begin by noting that the demand for unskilled labor is the downward-sloping curve shown in Exhibit 6. The wage rate on the vertical axis is the price of unskilled labor, and the amount of unskilled labor employers are willing to hire varies inversely with the wage rate. At a higher wage rate, businesses will hire fewer workers. At a lower wage rate, they will employ a larger quantity of workers.

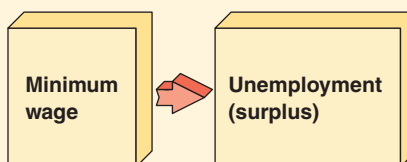
Exhibit 6

A Minimum Wage Results in a Surplus of Labor

When the federal or state government sets a wage-rate floor above the equilibrium wage, a surplus of unskilled labor develops. The supply curve is the number of workers offering their labor services per year at possible wage rates. The demand curve is the number of workers employers are willing and able to hire at various wage rates. Equilibrium wage, W_e , will result if the price system is allowed to operate without government interference. At the minimum wage of W_m , there is a surplus of unemployed workers, $Q_s - Q_d$.



CAUSATION CHAIN



On the supply side, the wage rate determines the number of unskilled workers willing and able to work per year. At higher wages, workers will give up leisure or schooling to work, and at lower wages, fewer workers will be available for hire. The upward-sloping curve in Exhibit 6 is the supply of labor.

Assuming the freedom to bargain, the price system will establish an equilibrium wage rate of W_e and an equilibrium quantity of labor employed of Q_e . But suppose the government enacts a minimum wage, W_m , which is a price floor above the equilibrium wage, W_e . The intent of the legislation is to “wave a carrot” in front of people who will not work at W_e and to make lower-paid workers better off with a higher wage rate. But consider the undesirable consequences. One result of an artificially high minimum wage is that the number of workers willing to offer their labor increases upward along the supply curve to Q_s , but there are fewer jobs because the number of workers firms are willing to hire decreases to Q_d on the demand curve. The predicted outcome is a labor surplus of unskilled workers, $Q_s - Q_d$, who are unemployed. Moreover, employers are encouraged to substitute machines and skilled labor for the unskilled labor previously employed at equilibrium wage W_e . The minimum wage is therefore considered counterproductive because employers lay off the lowest-skilled workers, who ironically are the type of workers minimum wage legislation intends to help. Also, loss of minimum wage jobs represents a loss of entry-level jobs to those who seek to enter the workforce.

Supporters of the minimum wage are quick to point out that those employed (Q_d) are better off. Even though the minimum wage causes a reduction in employment, some economists argue that a more equal or fairer income distribution is worth the loss of some jobs. Moreover, the shape of the labor demand curve may be much more vertical than shown in Exhibit 6. If this is the case, the unemployment effect of a rise in the minimum wage would be small. In addition, they claim opponents ignore the possibility that unskilled workers lack bargaining power versus employers.

Finally, a minimum wage set at or below the equilibrium wage rate is ineffective. If the minimum wage is set at the equilibrium wage rate of W_e , the quantity of labor demanded and the quantity of labor supplied are equal regardless of the minimum wage. If the minimum wage is set below the equilibrium wage, the forces of supply and demand for labor establish the equilibrium wage regardless of the minimum wage rate.

Case 2: Agricultural Price Supports A farm price support is a well-known example of a price floor, which results in government purchases of surplus food and in higher food prices. Agricultural price support programs began in the 1930s as a means of raising the income of farmers, who were suffering from low market prices during the Great Depression. Under these programs, the government guarantees a minimum price above the equilibrium price and agrees to purchase any quantity the farmer is unable to sell at the legal price.

A few of the crops that have received price supports are corn, peanuts, soybeans, wheat, cotton, rice, tobacco, and dairy products. As predicted by market supply and demand analysis, a price support above the equilibrium price causes surpluses. Government warehouses therefore often overflow with such perishable products as butter, cheese, and dry milk purchased with taxpayers’ money. The following You’re the

You're The Economist Rigging the Market for Milk

Applicable Concept: price supports



Each year the milk industry faces an important question: What does the federal government plan to do about its dairy price support program, which has helped boost farmers' income since 1949? Under the price support program, the federal government agrees to buy storable milk products, such as cheese, butter, and dry milk. If the farmers cannot sell all their products to consumers at a price exceeding the price support level, the federal government will purchase any unsold grade A milk production. Although state-run dairy commissions set their own minimum prices for milk, state price supports closely follow federal levels and are kept within 3 percent of levels in bordering states to reduce interstate milk price competition.

Members of Congress who advocate changes in the price support programs worry that milk surpluses are costing taxpayers too much. Each year the federal government pays billions of dollars to dairy farmers for milk products held in storage at a huge cost. Moreover, the problem is getting worse because the federal government encourages dairy farmers to use ultramodern farming techniques to increase the production per cow. Another concern is that the biggest government price support checks go to the largest

farmers, while the number of dairy farmers continues to decline.

Congress is constantly seeking a solution to the milk price support problem. The following are some of the ideas that have been considered:

1. Freeze the current price support level. This prospect dismays farmers, who are subject to increasing expenses for feed, electricity, and other resources.
2. Eliminate the price supports gradually in yearly increments over the next five years. This would subject the milk market to the price fluctuations of the free market, and farmers would suffer some bad years from low milk prices.
3. Have the Department of Agriculture charge dairy farmers a tax of 50 cents for every 100 pounds of milk they produce. The farmers oppose this approach because it would discourage production and run small farmers out of business.
4. Have the federal government implement a "whole herd buy-out" program. The problem is that using taxpayers' money to get farmers out of the dairy business pushes up milk product prices and rewards dairy farmers who own a lot of cows. Besides, what does the government do with the cows after it purchases them?



© Image copyright Matthew Jacques, 2009. Used under license from Shutterstock.com

Finally, opponents of the dairy price support program argue that the market for milk is inherently a competitive industry and that consumers and taxpayers would be better served without government price supports for milk.

ANALYZE THE ISSUE

1. Draw a supply and demand graph to illustrate the problem described in the case study, and prescribe your own solution.
2. Which proposal do you think best serves the interests of small dairy farmers? Why?
3. Which proposal do you think best serves the interests of consumers? Why?
4. Which proposal do you think best serves the interest of a member of Congress? Why?

Economist on the dairy industry examines one of the best-known examples of U.S. government interference with agricultural market prices.

CONCLUSION *A price ceiling or price floor prevents market adjustment in which competition among buyers and sellers bids the price upward or downward to the equilibrium price.*

CHECKPOINT

Is There Price-Fixing at the Ticket Window?

At sold-out concerts, sports contests, and other events, some ticket holders try to resell their tickets for more than they paid—a practice known as scalping. For scalping to occur, must the original ticket price be legally set by a price floor, at the equilibrium price, or by a price ceiling?



Market Failure

In this chapter and the previous chapter, you have gained an understanding of how markets operate. Through the price system, society coordinates economic activity, but markets are not always “Prince Charmings” that achieve *market efficiency* without a misallocation of resources. It is now time to step back with a critical eye and consider markets that become “ugly frogs” by allocating resources inefficiently. **Market failure** occurs when market equilibrium results in too few or too many resources being used in the production of a good or service. In this section, you will study four important cases of market failure: lack of competition, externalities, public goods, and income inequality. Market failure is discussed in more detail in the chapter on environmental economics, except for the macroeconomics version of the text.

Market failure

A situation in which market equilibrium results in too few or too many resources used in the production of a good or service. This inefficiency may justify government intervention.

Lack of Competition

There must be competition among both producers and consumers for markets to function properly. But what happens if the producers fail to compete? In *The Wealth of Nations*, Adam Smith stated, “People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some diversion to raise prices.”¹ This famous quotation clearly underscores the fact that in the real world businesses seek ways to replace consumer sovereignty with “big business sovereignty.” What happens when a few firms rig the market and they become the market’s boss? By restricting supply through artificial limits on the output of a good, firms can enjoy higher prices and profits. As a result, firms may waste resources and retard technology and innovation.



Library of Congress

Adam Smith (1723–1790). The father of modern economics, who wrote *The Wealth of Nations*, published in 1776.

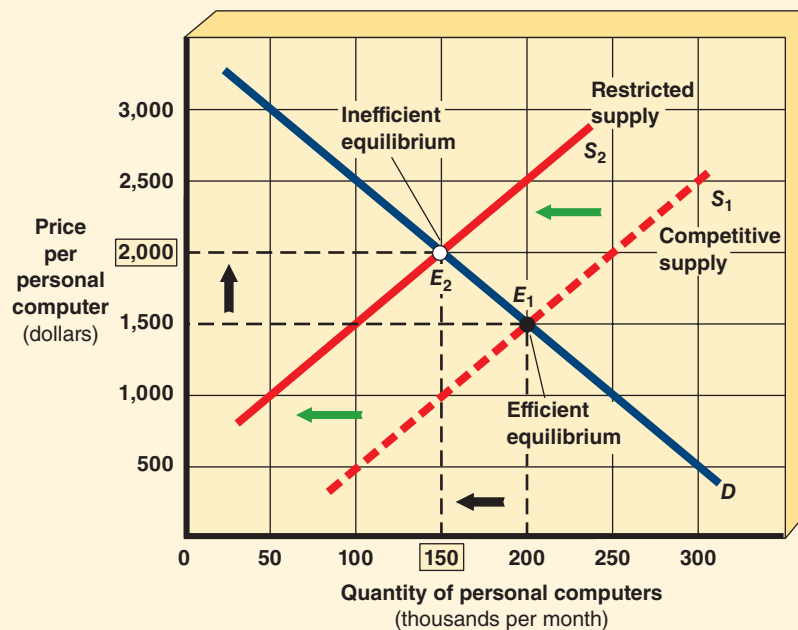
1. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776; reprint, New York: Random House, The Modern Library, 1937), p. 128.

Exhibit 7 illustrates how IBM, Apple, Gateway, Dell, and other suppliers of personal computers (PCs) could benefit from rigging the market. Without collusive action, the competitive price for PCs is \$1,500, the quantity of 200,000 per month is sold, and efficient equilibrium prevails at point E_1 . It is in the best interest of sellers, however, to take steps that would make PCs artificially scarce and raise the price. Graphically, the sellers wish to shift the competitive supply curve, S_1 , leftward to the restricted supply curve, S_2 . This could happen for a number of reasons, including an agreement among sellers to restrict supply (collusion) and government action. For example, the sellers could lobby the government to pass a law allowing an association of PC suppliers to set production quotas. The proponents might argue this action raises prices and, in turn, profits. Higher profits enable the industry to invest in new capital and become more competitive in world markets.

Exhibit 7

Rigging the PC Market

At efficient equilibrium point E_1 , sellers compete. As a result, the price charged per PC is \$1,500, and the quantity of PCs exchanged is 200,000. Suppose suppliers use collusion, government intervention, or other means to restrict the supply of this product. The decrease in supply from S_1 to S_2 establishes inefficient market equilibrium E_2 . At E_2 , firms charge the higher price of \$2,000, and the equilibrium quantity of PCs falls to 150,000. Thus, the outcome of restricted supply is that the market fails because firms use too few resources to produce PCs at an artificially higher price.



Opponents of artificially restricted supply argue that, although the producers benefit, the lack of competition means the economy loses. The result of restricting supply is that the efficient equilibrium point, E_1 , changes to the inefficient equilibrium point, E_2 . At point E_2 , the higher price of \$2,000 is charged, and the lower equilibrium quantity means that firms devote too few resources to producing PCs and charge an artificially high price. Note that under U.S. antitrust laws, the Justice Department is responsible for prosecuting firms that collude to restrict supply to force higher prices.

Externalities

Even when markets are competitive, some markets may still fail because they suffer from the presence of side effects economists call **externalities**. An externality is a cost or benefit imposed on people other than the consumers and producers of a good or service. Externalities are also called *spillover effects* or *neighborhood effects*. People other than consumers and producers who are affected by these side effects of market exchanges are called *third parties*. Externalities may be either negative or positive; that is, they may be detrimental or beneficial. Suppose you are trying to study and your roommate is listening to Steel Porcupines at full blast on the stereo. The action of your roommate is imposing an unwanted *external cost* or *negative externality* on you and other third parties who are trying to study or sleep. Externalities can also result in an *external benefit* or *positive externality* to nonparticipating parties. When a community proudly displays its neat lawns, gorgeous flowers, and freshly painted homes, visitors are third parties who did none of the work, but enjoy the benefit of the pleasant scenery.

Externality

A cost or benefit imposed on people other than the consumers and producers of a good or service.

A Graphical Analysis of Pollution Exhibit 8 provides a graphical analysis of two markets that fail to include externalities in their market prices unless the government takes corrective action. Exhibit 8(a) shows a market for steel in which steel firms burn high-sulfur coal and pollute the environment. Demand curve D and supply curve S_1 establish the inefficient equilibrium, E_1 , in the steel market. Not included in S_1 are the *external costs* to the public because the steel firms are not paying for the damage from smoke emissions. If steel firms discharge smoke and ash into the atmosphere, foul air reduces property values, raises health care costs, and, in general, erodes the quality of life. Because supply curve S_1 does not include these external costs, they are also not included in the price of steel, P_1 . In short, the absence of the cost of pollution in the price of steel means the firms produce more steel and pollution than is socially desirable.

S_2 is the supply curve that would exist if the external costs of respiratory illnesses, dirty homes, and other undesirable side effects were included. Once S_2 includes the charges for environmental damage, the equilibrium price rises to P_2 , and the equilibrium quantity becomes Q_2 . At the efficient equilibrium point, E_2 , the steel market achieves allocative efficiency. At E_2 , steel firms are paying the full cost and using fewer resources to produce the lower quantity of steel at Q_2 .

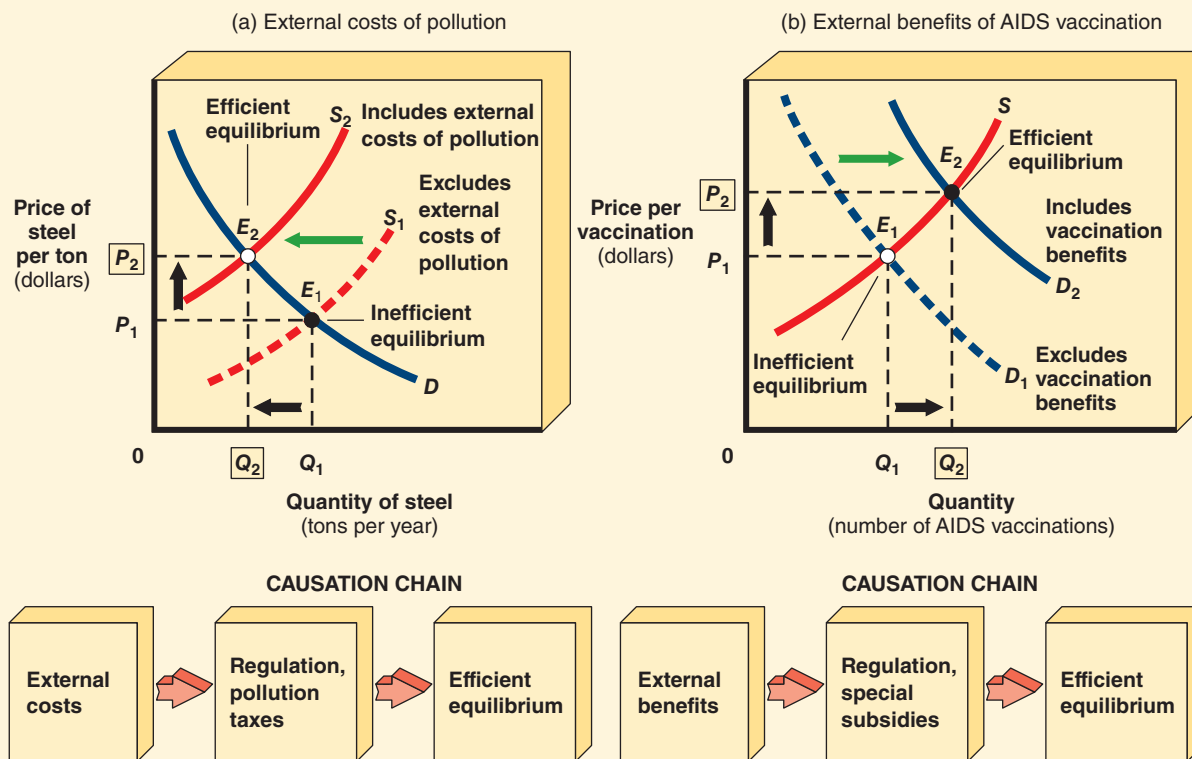
CONCLUSION *When the supply curve fails to include external costs, the equilibrium price is artificially low, and the equilibrium quantity is artificially high.*

Exhibit 8

Externalities in the Steel and AIDS Vaccination Markets

In part (a), resources are overallocated at inefficient market equilibrium E_1 because steel firms do not include the cost per ton of pollution in the cost per ton of steel. Supply curve S_2 includes the external costs of pollution. If firms are required to purchase equipment to remove the pollution or to pay a tax on pollution, the economy achieves the efficient equilibrium of E_2 .

Part (b) demonstrates that external benefits cause an underallocation of resources. The efficient output at equilibrium point E_2 is obtained if people are required to purchase AIDS shots or if the government pays a subsidy equal to the external benefit per shot.



Regulation and pollution taxes are two ways society can correct the market failure of pollution:

1. **Regulation.** Legislation can set standards that force firms to clean up their emissions as a condition of remaining in business. This means firms must buy, install, and maintain pollution-control equipment. When the extra cost of the pollution equipment is added to the production cost per ton of steel, the initial supply curve, S_1 , shifts leftward to supply curve S_2 . This means regulation has forced the market equilibrium to change from E_1 to E_2 . At point E_2 , the firms use fewer resources to produce Q_2 compared to Q_1 output of steel per year, and, therefore, the firms operate efficiently.
2. **Pollution Taxes.** Another approach would be for the government to levy a tax per ton of steel equal to the external cost imposed on society when the firm

emits pollution into the air. This action inhibits production by imposing an additional production cost per ton of steel from the pollution taxes and shifts the supply curve leftward from S_1 to S_2 . Again, the objective is to change the equilibrium from E_1 to E_2 and eliminate the overuse of resources devoted to steel production and its pollution. The tax revenue could be used to compensate those damaged by the pollution.

A Graphical Analysis of AIDS Vaccinations As explained above, the supply curve can understate the *external costs* of a product. Now you will see that the demand curve can understate the *external benefits* of a product. Suppose a vaccination is discovered that prevents AIDS. Exhibit 8(b) illustrates the market for immunization against AIDS. Demand curve D_1 reflects the price consumers would pay for shots to receive the benefit of a reduced probability of infection by AIDS. Supply curve S shows the quantities of shots suppliers offer for sale at different prices. At equilibrium point E_1 , the market fails to achieve an efficient allocation of resources. The reason is that when buyers are vaccinated, other people who do not purchase AIDS shots (called *free riders*) also benefit because this disease is less likely to spread. Once demand curve D_2 includes external benefits to nonconsumers of AIDS vaccinations (increase in the number of buyers), the efficient equilibrium of E_2 is established. At Q_2 , sellers devote greater resources to AIDS vaccinations, and the underallocation of resources is eliminated.

How can society prevent the market failure of AIDS vaccinations? Two approaches follow:

1. **Regulation.** The government can boost consumption and shift the demand curve rightward by requiring all citizens to purchase AIDS shots each year. This approach to capturing external benefits in market demand explains why all school-age children must have polio and other shots before entering school.
2. **Special Subsidies.** Another possible solution would be for the government to increase consumer income by paying consumers for each AIDS vaccination. This would mean the government pays each citizen a dollar payment equal to the amount of external benefits per shot purchased. Because the subsidy amount is payable at any price along the demand curve, the demand curve shifts rightward until the efficient equilibrium price and quantity are reached.

CONCLUSION *When externalities are present, market failure gives incorrect price and quantity signals, and as a result, resources are misallocated. External costs cause the market to overallocate resources, and external benefits cause the market to underallocate resources.*

Public Goods

Private goods are produced through the price system. In contrast, national defense is an example of a **public good** provided by the government because of its special characteristics. A public good is a good or service that, once produced, has two properties: (1) users collectively consume benefits, and (2) there is no way to bar people who do not pay (free riders) from consuming the good or service.

Public good

A good or service with two properties: (1) users collectively consume benefits, and (2) there is no way to bar people who do not pay (free riders) from consuming the good or service.

You're The Economist Can Vouchers Fix Our Schools?

Applicable Concepts: public goods versus private goods



In their book, *Free to Choose*, published in 1980, economists Milton Friedman and his wife

Rose Friedman proposed a voucher plan for schools.¹ The objective of their proposal was to retain government financing, but give parents greater freedom to choose the schools their children attend. The Friedmans pointed out that under the current system parents face a strong incentive not to remove their children from the public schools. This is because, if parents decide to withdraw their children from a public school and send them to a private school, they must pay private tuition in addition to the taxes that finance children enrolled in the public schools.

To remove the financial penalty that limits the freedom of

parents to choose schools, the government could give parents a voucher, which is a piece of paper redeemable for a sum of money payable to any approved school. For example, if the government spends \$8,000 per year to educate a student, then the voucher could be for this amount. The voucher plan embodies exactly the same principle as the GI Bill that provides educational benefits to military veterans. The veteran receives a voucher good only for educational expenses and is completely free to choose the school where it is used, provided the school satisfies certain standards.

The Friedmans argue that parents could, and should, be permitted to use the vouchers not only at private schools but also at other public schools—and not only at schools in their own district, city,

or state, but at any school that is willing to accept their child. That would give every parent a greater opportunity to choose and at the same time would require public schools to charge tuition. The tuition would be competitive because public schools must compete for students both with other public schools and with private schools. It is important to note that this plan relieves no one of the burden of taxation to pay for schooling. It simply gives parents a wider choice as to which competing schools their children attend, given the amount of funding per student that the community has obligated itself to provide. The plan also does not affect the present standards imposed on private schools to ensure that students attending them satisfy the compulsory attendance laws.

1. Milton Friedman and Rose Friedman, *Free to Choose: A Personal Statement* (New York: Harcourt Brace Jovanovich, 1980), pp. 160–161.

To see why the marketplace fails, imagine that Patriot Missiles Inc. offers to sell missile defense systems to people who want private protection against attacks from incoming missiles. First, once the system is operational, everyone in the defense area benefits from increased safety. Second, the *nonexclusive* nature of a public good means it is impossible or very costly for any owner of a Patriot missile defense system to prevent nonowners, the free riders, from reaping the benefits of its protection.

Given the two properties of a public good, why would any private individual purchase a Patriot missile defense system? Why not take a free ride and wait until someone else buys a missile system? Thus, each person wants a Patriot system, but does not want to bear the cost of the system when everyone shares in the benefits. As a result, the market fails to provide Patriot missile defense systems, and everyone hopes no missile attacks occur before someone finally decides to purchase one. Government can solve this public goods problem by producing Patriot missiles and taxing the public to pay. Unlike a private citizen, the government can use force to collect payments and prevent the free-rider problem. Other examples of

In 1990, Milwaukee began an experiment with school vouchers. The program gave selected children from low-income families taxpayer-funded vouchers to allow them to attend private schools. There has been a continuing heated debate among parents, politicians, and educators over the results. In 1998, Wisconsin's highest court ruled in a 4–2 decision that Milwaukee could use public money for vouchers for students who attend religious schools without violating the constitutional separation of church and state.

A 2002 article in *USA Today* reported:

Opponents of vouchers have repeatedly argued that they would damage the public schools, draining them of resources and better students. A recent study of the Milwaukee voucher program by Caroline Hoxby, a Harvard economist, suggests just the opposite. She

wrote that “schools that faced the most potential competition from vouchers had the best productivity response.” No doubt, the nation’s experience with vouchers is limited, yet the evidence cited in a recent Brookings Institution report shows that they do seem to benefit African-American youngsters.²

The controversy continues: For example, in a 2002 landmark case, the U.S. Supreme Court ruled that government vouchers for private or parochial schools are constitutional. In 2003, however, a Denver judge struck down Colorado’s new school voucher law, ruling that it violated the state’s constitution by stripping local school boards of their control over education. And in 2006, the Florida Supreme Court ruled that Florida’s voucher program for students in the lowest-rated public schools was unconstitutional. Finally, in the 2008–2009

school year, over 20 percent of Milwaukee students received publicly funded vouchers to attend private schools.³

ANALYZE THE ISSUE

1. In recent years, school choice has been a hotly debated issue. Explain whether education is a public good. If education is not a public good, why should the government provide it?
2. The Friedmans present a very one-sided view of the benefits of a voucher system. Other economists disagree about the potential effectiveness of vouchers. Do you support a voucher system for education? Explain your reasoning.

2. Robert J. Bresler, “Vouchers and the Constitution,” *USA Today*, May 2002, p. 15.

3. Data available at <http://dpi.state.wi.us/sms/geninfo.html>.

public goods include global agreements to reduce emissions, the judicial system, the national emergency warning system, air traffic control, prisons, and traffic lights.

CONCLUSION *If public goods are available only in the marketplace, people wait for someone else to pay, and the result is an underproduction or zero production of public goods.*

Income Inequality

In the cases of insufficient competition, externalities, and public goods, the marketplace allocates too few or too many resources to producing output. The market may also result in a very unequal distribution of income, thereby raising a very

controversial issue. Under the impersonal price system, movie stars earn huge incomes for acting in movies, while homeless people roam the streets penniless. The controversy is therefore over how equal the distribution of income should be and how much government intervention is required to achieve this goal. Some people wish to remove most inequality of income. Others argue for the government to provide a “safety net” minimum income level for all citizens. Still others see high income as an incentive and a “fair” reward for productive resources.

To create a more equal distribution of income, the government uses various programs to transfer money from people with high incomes to those with low incomes. Unemployment compensation and food stamps are examples of such programs. The federal minimum wage is another example of a government attempt to raise the earnings of low-income workers.



CHECKPOINT

Should There Be a War on Drugs?

The U.S. government fights the use of drugs, such as marijuana and cocaine, in a variety of ways, including spraying crops with poisonous chemicals; imposing jail sentences for dealers and users; and confiscating drug-transporting cars, boats, and planes. Which market failure motivates the government to interfere with the market for drugs: lack of competition, externalities, public goods, or income inequality?

Key Concepts

Price ceiling
Price floor

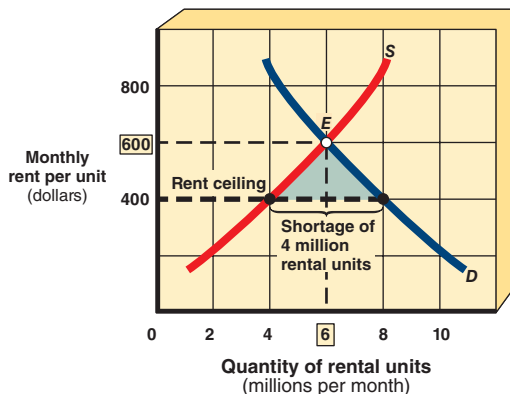
Market failure
Externality

Public good

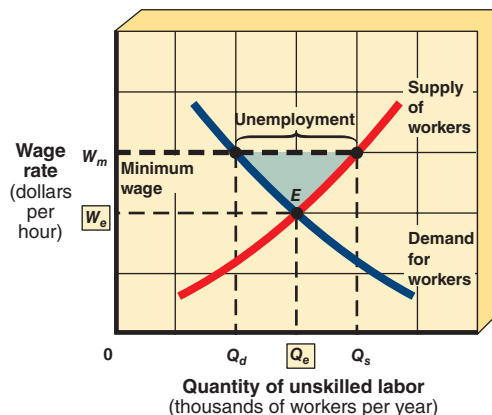
Summary

- **Price ceilings** and **price floors** are maximum and minimum prices enacted by law, rather than allowing the forces of supply and demand to determine prices. A **price ceiling** is a maximum price mandated by government, and a **price floor**, or **support price** for agricultural products, is a minimum legal price. If a price ceiling is set below the equilibrium price, a shortage will persist. If a price floor is set above the equilibrium price, a surplus will persist.
- **Market failure** occurs when the market mechanism does not achieve an efficient allocation of resources. Sources of market failure include lack of competition, externalities, public goods, and income inequality. Although controversial, government intervention is a possible way to correct market failure.
- An **externality** is a cost or benefit of a good imposed on people who are not buyers or sellers of that good. Pollution is an example of an **external cost**, which means too many resources are used to produce the product responsible for the pollution. Two basic approaches to solve this market failure are regulation and pollution taxes. Vaccinations provide **external benefits**, which means sellers devote too few resources to produce this product. Two basic solutions to this type of market failure are laws to require consumption of shots and special subsidies.

Price Ceiling

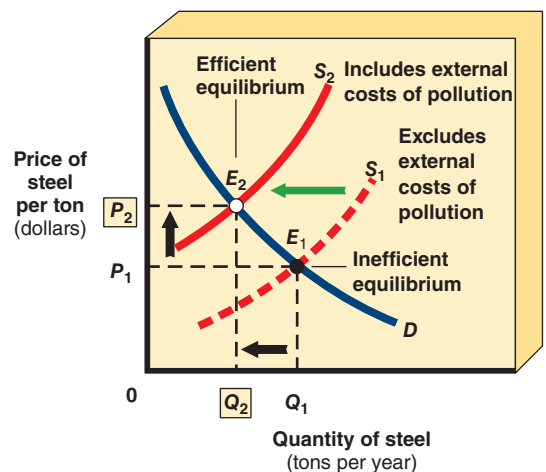


Price Floor

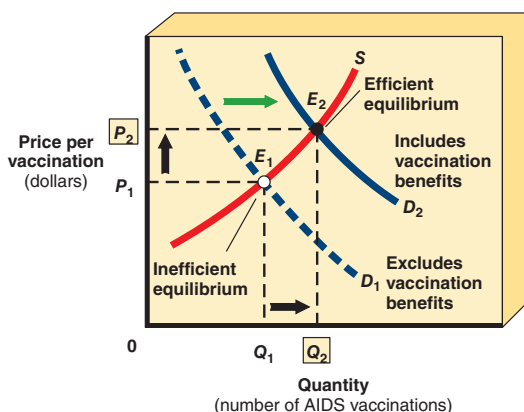


Externalities

(a) External costs of pollution



(b) External benefits of AIDS vaccination



- **Public goods** are goods that are consumed by all people in a society regardless of whether they pay or not. National defense, air traffic control, and other public goods can benefit many individuals simultaneously and are provided by the government.

Summary of Conclusion Statements

- A price ceiling or price floor prevents market adjustment in which competition among buyers and sellers bids the price upward or downward to the equilibrium price.
- When the supply curve fails to include external costs, the equilibrium price is artificially low, and the equilibrium quantity is artificially high.
- When externalities are present, market failure gives incorrect price and quantity signals, and as a result, resources are misallocated. External costs cause the market to overallocate resources, and external benefits cause the market to underallocate resources.
- If public goods are available only in the marketplace, people wait for someone else to pay, and the result is an underproduction or zero production of public goods.

Study Questions and Problems

1. Market researchers have studied the market for milk, and their estimates for the supply of and the demand for milk per month are as follows:

Price per gallon	Quantity demanded (millions of gallons)	Quantity supplied (millions of gallons)
\$10.00	100	500
8.00	200	400
6.00	300	300
4.00	400	200
2.00	500	100

- a. Using the above data, graph the demand for and the supply of milk. Identify the equilibrium point as E , and use dotted lines to connect E to the equilibrium price

- on the price axis and the equilibrium quantity on the quantity axis.
- b. Suppose the government enacts a milk price support of \$8 per gallon. Indicate this action on your graph, and explain the effect on the milk market. Why would the government establish such a price support?
- c. Now assume the government decides to set a price ceiling of \$4 per gallon. Show and explain how this legal price affects your graph of the milk market. What objective could the government be trying to achieve by establishing such a price ceiling?

2. Use a graph to show the impact on the price of Japanese cars sold in the United States if

- the United States imposes import quotas on Japanese cars. Now draw another graph to show how the change in the price of Japanese cars affects the price of American-made cars in the United States. Explain the market outcome in each graph and the link between the two graphs.
- Using market supply and demand analysis, explain why labor union leaders are strong advocates of raising the minimum wage above the equilibrium wage.
 - What are the advantages and disadvantages of the price system?
 - Suppose a market is in equilibrium and both demand and supply curves increase. What happens to the equilibrium price if demand increases more than supply?
 - Consider this statement: "Government involvement in markets is inherently inefficient." Do you agree or disagree? Explain.
 - Suppose coal-burning firms are emitting excessive pollution into the air. Suggest two ways the government can deal with this market failure.
 - Explain the impact of external costs and external benefits on resource allocation.
 - Why are public goods not produced in sufficient quantities by private markets?
 - Which of the following are public goods?
 - Air bags
 - Pencils
 - Cycle helmets
 - City streetlights
 - Contact lenses

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Why the Higher Price for Ethanol Fuel?

As shown in Exhibit 9, an increase in demand leads to higher ethanol prices, while an increase in supply leads to lower prices. Because the overall direction of price in the ethanol market was up, the demand increase must have been larger than the supply increase. If you said demand increased by more than supply because consumers reacted more quickly than producers, **YOU ARE CORRECT.**

Is There Price-Fixing at the Ticket Window?

Scalpers are evidence of a shortage whereby buyers are unable to find tickets at the official price. As shown in Exhibit 10, scalpers (often illegally) profit from the shortage by selling tickets above the official price. Shortages result when prices are restricted below equilibrium, as is the case when there is a price ceiling. If you said scalping occurs when there is a price ceiling because scalpers charge more than the official maximum price, **YOU ARE CORRECT.**

Exhibit 9

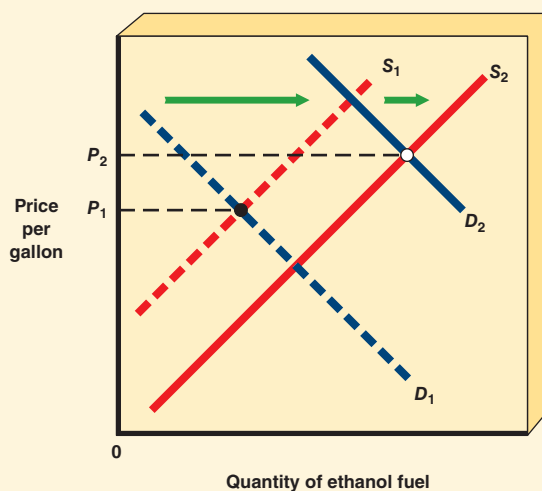
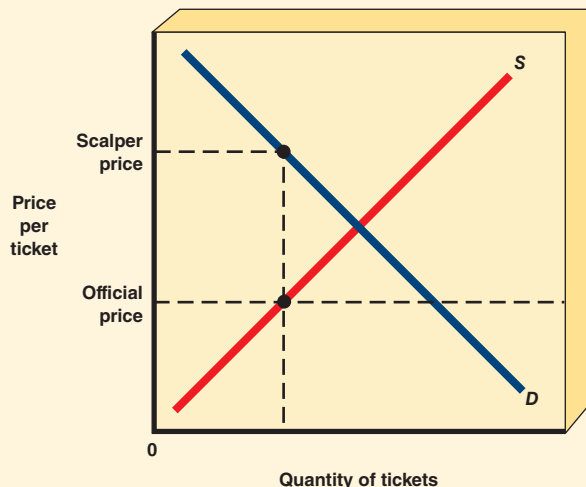


Exhibit 10

*Should There Be a War on Drugs?*

Drug use often affects not only the person using the drugs, but other members of society as well. For example, higher crime rates are largely attributable to increased drug usage, and AIDS is often spread when users inject drugs with nonsterile needles. When one person's actions affect others not involved in the decision to buy or sell, the market fails to operate efficiently. If you said the market failure motivating government intervention in the drug market is externalities because drug users impose costs on nonusers, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

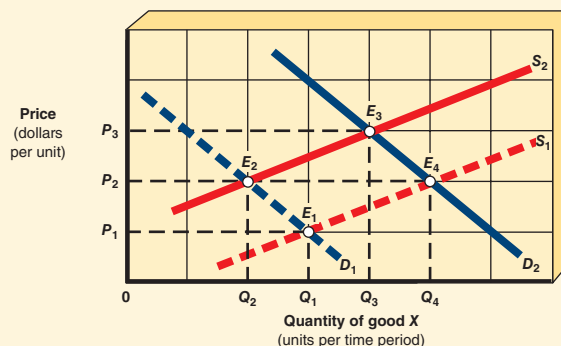
- Suppose prices for new homes have risen, yet the number of homes sold has also risen. We can conclude that
 - the demand for new homes has risen.
 - the law of demand has been violated.
 - new firms have entered the construction industry.
 - construction firms must be facing higher costs.
- Which of the following statements is *true*?
 - An increase in demand, with no change in supply, will increase the equilibrium price and quantity.
 - An increase in supply, with no change in demand, will decrease the equilibrium price and the equilibrium quantity.
 - A decrease in supply, with no change in demand, will decrease the equilibrium price and increase the equilibrium quantity.
 - All of the above are true.
- Consider the market for chicken. An increase in the price of beef will
 - decrease the demand for chicken, resulting in a lower price and a smaller amount of chicken purchased in the market.
 - decrease the supply of chicken, resulting in a higher price and a smaller amount of chicken purchased in the market.
 - increase the demand for chicken, resulting in a higher price and a greater amount of chicken purchased in the market.
 - increase the supply of chicken, resulting in a lower price and a greater amount of chicken purchased in the market.

Practice Quiz Continued

4. An increase in consumers' incomes increases the demand for oranges. As a result of the adjustment to a new equilibrium, there is a (an)
 - a. leftward shift of the supply curve.
 - b. downward movement along the supply curve.
 - c. rightward shift of the supply curve.
 - d. upward movement along the supply curve.
5. An increase in the wage paid to grape pickers will cause the
 - a. demand curve for grapes to shift to the right, resulting in higher prices for grapes.
 - b. demand curve for grapes to shift to the left, resulting in lower prices for grapes.
 - c. supply curve for grapes to shift to the left, resulting in lower prices for grapes.
 - d. supply curve for grapes to shift to the left, resulting in higher prices for grapes.
6. If the federal government wants to raise the price of cheese, it will
 - a. take cheese from government storage and sell it.
 - b. encourage farmers to research ways to produce more cheese.
 - c. subsidize purchases of farm equipment.
 - d. encourage farmers to produce less cheese.
7. Which of the following is *least* likely to result from rent controls set below the equilibrium price for rental housing?
 - a. Shortages and black markets will result.
 - b. The existing rental housing will deteriorate.
 - c. The supply of rental housing will increase rapidly.
 - d. People will demand more apartments than are available.
8. Suppose the equilibrium price set by supply and demand is lower than the price ceiling set by the government. The eventual result will be
 - a. a shortage.
 - b. that quantity demanded is equal to quantity supplied.
 - c. a surplus.
 - d. a black market.
9. A good that provides external benefits to society has
 - a. too few resources devoted to its production.
 - b. too many resources devoted to its production.
 - c. the optimal resources devoted to its production.
 - d. not provided profits to producers of the good.
10. Pollution from cars is an example of
 - a. a harmful opportunity cost.
 - b. a negative externality.
 - c. a production dislocation.
 - d. none of the above.
11. Which of the following is the *best* example of a public good?
 - a. Pencils
 - b. Education
 - c. Defense
 - d. Trucks
12. A public good may be defined as any good or service that
 - a. allows users to collectively consume benefits.
 - b. must be distributed to all citizens in equal shares.
 - c. is never produced by government.
 - d. is described by answers (a) and (c) above.
13. In Exhibit 11, which of the following might cause a shift from S_1 to S_2 ?
 - a. A decrease in input prices
 - b. An improvement in technology
 - c. An increase in input prices
 - d. An increase in consumer income

Exhibit 11

Supply and Demand Curves



Practice Quiz Continued

14. In Exhibit 11, an increase in supply would cause a move from which equilibrium point to another, other things being equal?
- a. E_1 to E_2
 - b. E_1 to E_3
 - c. E_4 to E_1
 - d. E_3 to E_4
15. Beginning from an equilibrium at point E_1 in Exhibit 11, an increase in demand for good X, other things being equal, would move the equilibrium point to
- a. E_1 (no change).
 - b. E_2 .
 - c. E_3 .
 - d. E_4 .

Applying Supply and Demand Analysis to Health Care



One out of every seven dollars spent in the United States is spent for health care services. This is a greater percentage than in any other industrialized country. And in 2010, historic health care legislation was enacted to dramatically reform the U.S. system.¹ The topic of health care arouses deep emotions and generates intense media coverage. How can we understand many of the important health care issues? One approach is to listen to the normative statements made by politicians and other concerned citizens. Another approach is to use supply and demand theory to analyze the issue. Here again the objective is to bring textbook theory to life and use it to provide you with a deeper understanding of third-party health service markets.

THE IMPACT OF HEALTH INSURANCE

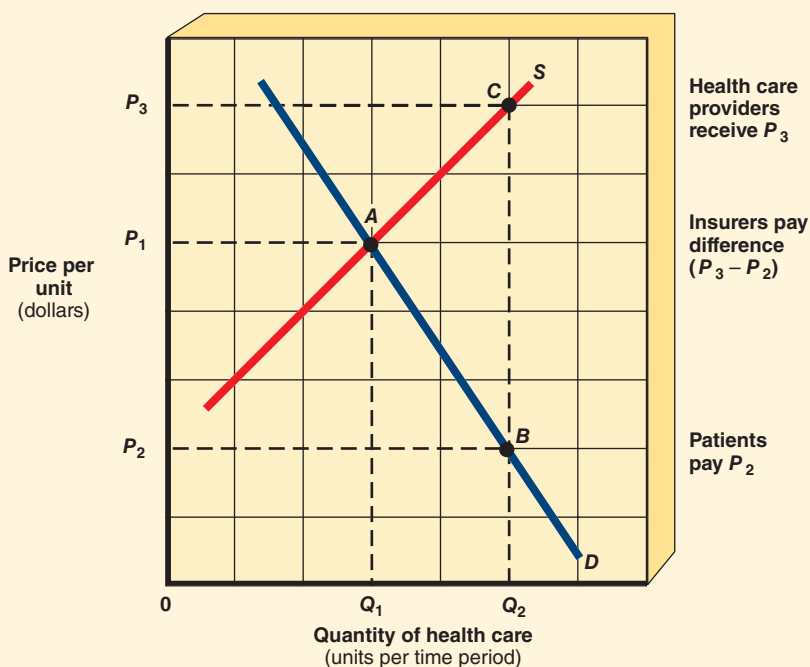
There is a downward-sloping demand curve for health care services just as there is for other goods and services. Following the same law of demand that applies to cars, clothing, entertainment, and other goods and services, movements along the demand curve for health care occur because consumers respond to changes in the price of health care. As shown in Exhibit A-1, we assume that health care, including doctor visits, medicine, hospital bills, and other medical services, can be measured in units of health care. Without health insurance, consumers buy Q_1 units of health care services per year at a price of P_1 per unit. Assuming supply curve S represents the quantity supplied, the market is in equilibrium at point A . At this point, the total cost of health care can be computed by the price of health care (P_1) times the quantity demanded (Q_1) or represented geometrically by the rectangle OP_1AQ_1 .

Analysis of the demand curve for health care is complicated by the way health care is financed. About 80 percent of all health care is paid for by *third parties*, including private insurance companies and government programs, such as Medicare and Medicaid. The price of health care services therefore depends on the *copayment rate*, which is the percentage of the cost of services consumers pay out-of-pocket. To understand the impact, it is more realistic to assume consumers are insured and extend the analysis represented in Exhibit A-1. Because patients pay only 20 percent of the bill, the quantity of health care demanded in the figure increases to Q_2 at

1. U.S. Census Bureau, *Statistical Abstract of the United States, 2010*, <http://www.census.gov/compendia/statab/>, Table 1301.

*Exhibit A-1***The Impact of Insurance on the Health Care Market**

Without health insurance, the market is in equilibrium at point *A*, with a price of P_1 and a quantity demanded of Q_1 . Total spending is OP_1AQ_1 . With copayment health insurance, consumers pay the lower price of P_2 , and the quantity demanded increases to Q_2 . Total health care costs rise to OP_3CQ_2 , with OP_2BQ_2 paid by consumers and P_2P_3CB paid by insurers. As a result, the quantity supplied increases from point *A* to point *C*, where it equals the quantity demanded of Q_2 .



a lower price of P_2 . At point *B* on the demand curve, insured consumers pay an amount equal to rectangle OP_2BQ_2 , and insurers pay an amount represented by rectangle P_2P_3CB . Health care providers respond by increasing the quantity supplied from point *A* to point *C* on the supply curve *S*, where the quantity supplied equals the quantity demanded of Q_2 . The reason that there is no shortage in the health care market is that the combined payments from the insured consumers and insurers equal the total payment required for the movement upward along the supply curve. Stated in terms of rectangles, the total health care payment of OP_3CQ_2 equals OP_2BQ_2 paid by consumers plus P_2P_3CB paid by insurers.

CONCLUSION *Compared to a health care market without insurance, the quantity demanded, the quantity supplied, and the total cost of health care are increased by copayment health care insurance.*

Finally, note that Exhibit A-1 represents an overall or general model of the health care market. Individual health care markets are subject to *market failure*. For example, there would be a lack of competition if hospitals, doctors, health maintenance organizations (HMOs), or drug companies conspired to fix prices. Externalities provide another source of market failure, as illustrated previously for vaccinations in Exhibit 8(b). We are also concerned that health care be distributed in a fair way. This concern explains why the government Medicare and Medicaid programs help the elderly and poor afford health care.

SHIFTS IN THE DEMAND FOR HEALTH CARE

While changes in the price of health care cause movements along the demand curve, other factors can cause the demand curve to shift. The following are some of the nonprice determinants that can change the demand for health care.

Number of Buyers

As the population increases, the demand for health care increases. In addition to the total number of people, the distribution of older people in the population is important. As more people move into the 65-and-older age group, the demand for health care services becomes greater because older people have more frequent and prolonged spells of illness. An increase in substance abuse involving alcohol, tobacco, or drugs also increases the demand for health care. For example, if the percentage of babies born into drug-prone families increases, the demand for health care will shift rightward.

Tastes and Preferences

Changes in consumer attitudes toward health care can also change demand. For example, television, movies, magazines, and advertising may be responsible for changes in people's preferences for cosmetic surgery. Moreover, medical science has improved so much that we believe there must be a cure for most ailments. As a result, consumers are willing to buy larger quantities of medical services at each possible price.

Doctors also influence consumer preferences by prescribing treatment. It is often argued that some doctors guard against malpractice suits or boost their incomes by ordering more tests or office visits than are really needed. Some estimates suggest that fraud and abuse account for about 10 percent of total health care spending. These studies reveal that as many as one-third of some procedures are inappropriate.

Income

Health care is a normal good. Rising inflation-adjusted incomes of consumers in the United States cause the demand curve for health care services to shift to the right. On the other hand, if real median family income remains unchanged, there is no influence on the demand curve.

Prices of Substitutes

The prices of medical goods and services that are substitutes can change and, in turn, influence the demand for other medical services. For example, treatment of a back problem by a chiropractor is an alternative for many of the treatments provided by orthopedic doctors. If the price of orthopedic therapy rises, then some people will switch to treatment by a chiropractor. As a result, the demand curve for chiropractic therapy shifts rightward.

SHIFTS IN THE SUPPLY OF HEALTH CARE

Changes in the following nonprice factors change the supply of health care.

Number of Sellers

Sellers of health care include hospitals, nursing homes, physicians in private practice, HMOs, drug companies, chiropractors, psychologists, and a host of other suppliers. To ensure the quality and safety of health care, virtually every facet of the industry is regulated and licensed by the government or controlled by the American Medical Association (AMA). The AMA limits the number of persons practicing medicine primarily through medical school accreditation and licensing requirements. The federal Food and Drug Administration (FDA) requires testing that delays the introduction of new drugs. Tighter restrictions on the number of sellers shift the health care supply curve leftward, and reduced restrictions shift the supply curve rightward.

Resource Prices

An increase in the costs of resources underlying the supply of health care shifts the supply curve leftward. By far the single most important factor behind increasing health care spending has been technological change. New diagnostic, surgical, and therapeutic equipment is used extensively in the health care industry, and the result is higher costs. Wages, salaries, and other costs, such as the costs of malpractice suits, also influence the supply curve. If hospitals, for example, are paying higher prices for inputs used to produce health care, the supply curve shifts to the left because the same quantities may be supplied only at higher prices.

Price Elasticity of Demand and Supply



Suppose you are the manager of the Steel Porcupines rock group. You are considering raising your ticket price, and you wonder how the fans will react. You have studied economics and know the law of demand. When the price of a ticket rises, the quantity demanded goes down, *ceteris paribus*. So you really need to know how many tickets fans will purchase if the band boosts the ticket price. If the lawn seating ticket price for a Steel Porcupines concert is \$25, you will sell 20,000 tickets. At \$30 per ticket, only 10,000 tickets will be sold. Thus, a \$5 increase per ticket cuts the number of tickets sold in half.

Which ticket price should you choose? Is it better to charge a higher ticket price and sell fewer tickets or to charge a lower ticket price and sell more tickets? The answer depends on changes in

total revenue, or sales, as we move upward along points on the Steel Porcupines' demand curve. At \$30 per ticket, sales will be \$300,000. If you charge \$25, the group will take in \$500,000 for a concert. Okay, you say, what happens at \$20 per ticket?

This chapter teaches you to calculate the percentage change in the quantity demanded when the price changes by a given percentage. Then you will see how this relates to total revenue. This knowledge of the sensitivity of demand is vital for pricing and targeting markets for goods and services. Next, you will see how changes in consumer income and the prices of related goods affect percentage changes in the quantity demanded. The chapter concludes by relating the concept of price elasticity to supply and the impact of taxation.



In this chapter, you will learn to solve these economics puzzles:

- Can total revenue from a Steel Porcupines concert remain unchanged regardless of changes in the ticket price?
- How sensitive is the quantity of cigarettes demanded to changes in the price of cigarettes?
- What would happen to the sales of Mercedes, BMWs, and Jaguars in the United States if Congress prohibited sales of luxury Japanese cars in this country?

PRICE ELASTICITY OF DEMAND

In Chapter 3, when you studied the demand curve, the focus was on the law of demand. This law states there is an inverse relationship between the price and the quantity demanded of a good or service. In this chapter, the emphasis is on measuring the *relative size* of changes in the price and the quantity demanded. Now we ask: By *what percentage* does the quantity demanded rise when the price falls by, say, 10 percent?

The Price Elasticity of Demand Midpoints Formula

Economists use a **price elasticity of demand** formula to measure the degree of consumer responsiveness, or sensitivity, to a change in price. Price elasticity of demand is the ratio of the percentage change in the quantity demanded of a product to a percentage change in its price. Suppose a university's enrollment drops by 20 percent because tuition rises by 10 percent. Therefore, the price elasticity of demand is 2 ($-20 \text{ percent} / +10 \text{ percent}$). The number 2 means that the quantity demanded (enrollment) changes 2 percent for each 1 percent change in price (tuition). Note there should be a minus sign in front of the 2 because, under the law of demand, price and quantity move in *opposite* directions. However, economists drop the minus sign because we know from the law of demand that quantity demanded and price are inversely related.

The number 2 is an *elasticity coefficient*, which economists use to measure the degree of elasticity. The elasticity formula is

$$E_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

where E_d is the elasticity of demand coefficient. Here you must take care. *There is a problem using this formula.* Let's return to the rock group example from the chapter preview. Suppose Steel Porcupines raises its ticket price from \$25 to \$30 and the number of seats sold falls from 20,000 to 10,000. We can compute the elasticity coefficient as

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{10,000 - 20,000}{20,000}}{\frac{30 - 25}{25}} = \frac{50\%}{20\%} = 2.5$$

Price elasticity of demand

The ratio of the percentage change in the quantity demanded of a product to a percentage change in its price.

Now consider the elasticity coefficient computed between these same points on Steel Porcupines' demand curve when the price is lowered. Starting at \$30 per ticket and lowering the ticket price to \$25 causes the number of seats sold to rise from 10,000 to 20,000. In this case, the rock group computes a much different elasticity coefficient, as:

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{20,000 - 10,000}{10,000}}{\frac{25 - 30}{30}} = \frac{100\%}{17\%} = 5.9$$

There is a reason for the different elasticity coefficients between the same two points on a demand curve (2.5 if price is raised, 5.9 if price is cut). The natural approach is to select the initial point as the base and then compute a percentage change. But price elasticity of demand involves changes between two possible initial base points (P_1, Q_1 or P_2, Q_2). Economists solve this problem of different base points by using the *midpoints* as the base points of changes in prices and quantities demanded. The *midpoints formula* for price elasticity of demand is

$$E_d = \frac{\text{change in quantity}}{\text{sum of quantities}/2} \div \frac{\text{change in price}}{\text{sum of prices}/2}$$

which can be expressed as

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{P_2 - P_1}{P_1 + P_2}}$$

where Q_1 represents the first quantity demanded, Q_2 represents the second quantity demanded, and P_1 and P_2 are the first and second prices. Expressed this way, we divide the change in quantity demanded by the *average* quantity demanded. Then this value is divided by the change in the price divided by the *average* price.¹

It does not matter if Q_1 or P_1 is the first or second number in each term because we are finding averages. Also note that you can drop the 2 as a divisor of both the $(Q_1 + Q_2)$ and $(P_1 + P_2)$ terms because the 2s in the numerator and the denominator cancel out. Now we can use the midpoints formula to calculate the price elasticity of demand of 3.7 regardless of whether Steel Porcupines raises the ticket price from \$25 to \$30 or lowers it from \$30 to \$25.

$$E_d = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{P_2 - P_1}{P_1 + P_2}} = \frac{\frac{10,000 - 20,000}{20,000 + 10,000}}{\frac{30 - 25}{25 + 30}} = \frac{33\%}{9\%} = 3.7$$

and

$$E_d = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{P_2 - P_1}{P_1 + P_2}} = \frac{\frac{20,000 - 10,000}{10,000 + 20,000}}{\frac{25 - 30}{30 + 25}} = \frac{33\%}{9\%} = 3.7$$

1. The midpoints formula is also commonly called the *arc elasticity formula*.

Exhibit 1

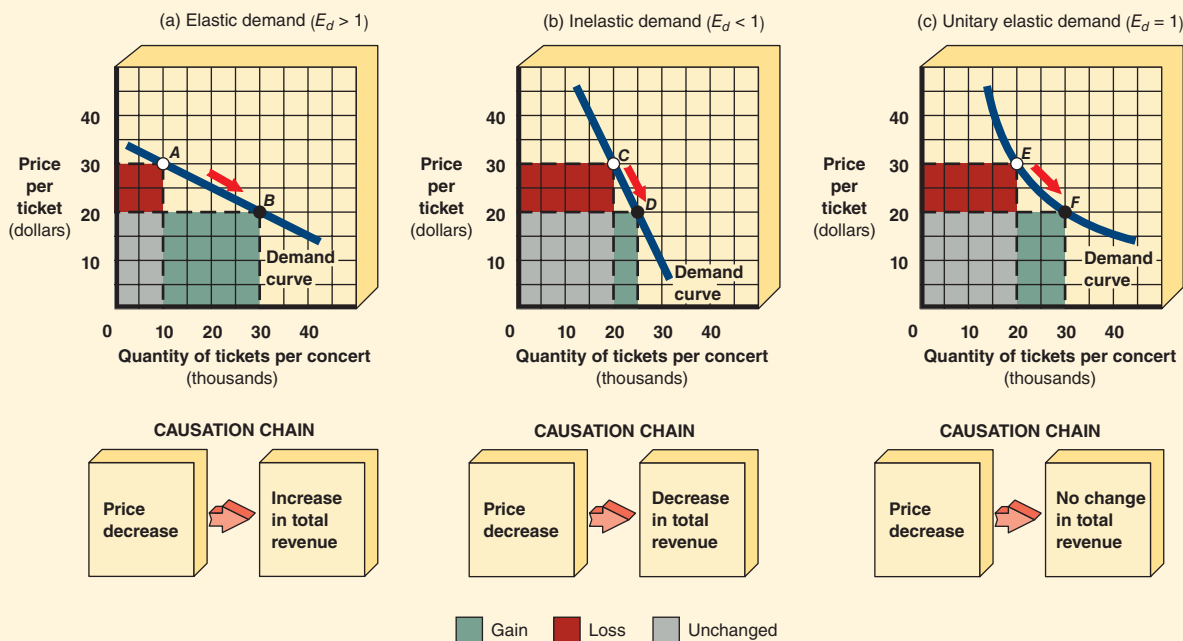
The Impact of a Decrease in Price on Total Revenue

These three different demand curve graphs show the relationship between a decrease in concert ticket price and a change in total revenue.

In part (a), the demand curve is elastic between points A and B. The percentage change in quantity demanded is greater than the percentage change in price, $E_d > 1$. As the ticket price falls from \$30 to \$20, total revenue increases from \$300,000 to \$600,000.

Part (b) shows a case in which the demand curve is inelastic between points C and D. The percentage change in quantity demanded is less than the percentage change in price, $E_d < 1$. As the ticket price decreases over the same range, total revenue falls from \$600,000 to \$500,000.

Part (c) shows a unitary elastic demand curve. The percentage change in quantity demanded equals the percentage change in price between points E and F, $E_d = 1$. As the concert ticket price decreases, total revenue remains unchanged at \$600,000.



The Total Revenue Test of Price Elasticity of Demand

As reflected in the midpoints formula, the *responsiveness* of the quantity demanded to a change in price determines the value of the elasticity coefficient. There are three possibilities: (1) the numerator is greater than the denominator, (2) the numerator is less than the denominator, and (3) the numerator equals the denominator. Exhibit 1 presents three cases that the Steel Porcupines rock band may confront.

Elastic Demand ($E_d > 1$)

Suppose the Steel Porcupines' demand curve is as depicted in Exhibit 1(a). Using the above midpoints formula, which drops the 2 as a divisor, if the group lowers its ticket price from \$30 to \$20, the quantity demanded increases from 10,000 to 30,000. Using the midpoints formula, this means that a 20 percent reduction in ticket price brings a 50 percent increase in quantity demanded. Thus, $E_d = 2.5$, and demand is elastic. **Elastic demand** is a condition in which the percentage change in quantity demanded is greater than the percentage change in price. Demand is elastic when the elasticity coefficient is greater than 1. Because the percentage change in quantity demanded is greater than the percentage change in price, the drop in price causes **total revenue (TR)** to rise. Total revenue is the total number of dollars a firm earns from the sale of a good or service, which is equal to its price multiplied by the quantity demanded. Perhaps the simplest way to tell whether demand is elastic, unitary elastic, or inelastic is to observe the response of total revenue as the price of a product changes. For example, in Exhibit 1(a), the total revenue at \$30 is \$300,000. The total revenue at \$20 is \$600,000. Compare the shaded rectangles under the demand curve, representing total revenue at each price. The gray area is an amount of total revenue unaffected by the price change. Note that the green shaded area gained at \$20 per ticket (\$400,000) is greater than the red shaded area lost at \$30 per ticket (\$100,000). This net gain of \$300,000 causes the total revenue to increase by this amount when Steel Porcupines lowers the ticket price from \$30 to \$20.

Elastic demand

A condition in which the percentage change in quantity demanded is greater than the percentage change in price.

Total revenue

The total number of dollars a firm earns from the sale of a good or service, which is equal to its price multiplied by the quantity demanded.

Inelastic Demand ($E_d < 1$)

The demand curve in Exhibit 1(b) is inelastic. The quantity demanded is less responsive to a change in price. Here a fall in Steel Porcupines' ticket price from \$30 to \$20 causes the quantity demanded to increase by just 5,000 tickets (20,000 to 25,000 tickets). Using the midpoints formula, a 20 percent fall in the ticket price causes an 11 percent rise in the quantity demanded. This means $E_d = 0.55$ and demand is inelastic. **Inelastic demand** is a condition in which the percentage change in quantity demanded is less than the percentage change in price. Demand is inelastic when the elasticity coefficient is less than 1. When demand is inelastic, the drop in price causes total revenue to fall from \$600,000 to \$500,000. Note the net change in the shaded rectangles.

Inelastic demand

A condition in which the percentage change in quantity demanded is less than the percentage change in price.

Unitary Elastic Demand ($E_d = 1$)

An interesting case exists when a demand curve is neither elastic nor inelastic. Exhibit 1(c) shows a demand curve for which any percentage change in price along the curve causes an exact proportional change in quantity demanded. When this situation occurs, the total amount of money spent on a good or service does not vary with changes in price. If Steel Porcupines drops the ticket price from \$30 to \$20, the quantity demanded rises from 20,000 to 30,000. Therefore, using the midpoints formula, a 20 percent decrease in price brings about a 20 percent increase in quantity demanded. If this is the case, demand is unitary elastic ($E_d = 1$), and the total revenue remains unchanged at \$600,000. **Unitary elastic demand** is defined as a condition in which the percentage change in quantity demanded is equal to the percentage

Unitary elastic demand

A condition in which the percentage change in quantity demanded is equal to the percentage change in price.

change in price. Because the percentage change in price equals the percentage change in quantity, total revenue does not change regardless of changes in price.

Perfectly elastic demand

A condition in which a small percentage change in price brings about an infinite percentage change in quantity demanded.

Perfectly Elastic Demand ($E_d = \infty$)

Two extreme cases are shown in Exhibit 2. These represent the limits between which the three demand curves explained above fall. Suppose for the sake of argument that a demand curve is perfectly horizontal, as shown in Exhibit 2(a). At a price of \$20, buyers are willing to buy as many tickets as the Steel Porcupines band is willing to offer for sale. At higher prices, buyers buy nothing. For example, at \$20.01 per ticket or higher, buyers will buy zero tickets. If so, $E_d = \infty$, and demand is perfectly elastic. **Perfectly elastic demand** is a condition in which a small percentage change in price brings about an infinite percentage change in quantity demanded.

Exhibit 2

Perfectly Elastic and Perfectly Inelastic Demand

Here two extreme demand curves for Steel Porcupines concert tickets are presented. Part (a) shows a demand curve that is a horizontal line. Such a demand curve is perfectly elastic. At \$20 per ticket, the Steel Porcupines can sell as many concert tickets as it wishes. At any price above \$20, the quantity demanded falls from an infinite number to zero.

Part (b) shows a demand curve that is a vertical line. This demand curve is perfectly inelastic. No matter what the ticket price, the quantity demanded remains unchanged at 20,000 tickets.

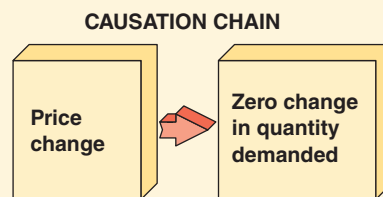
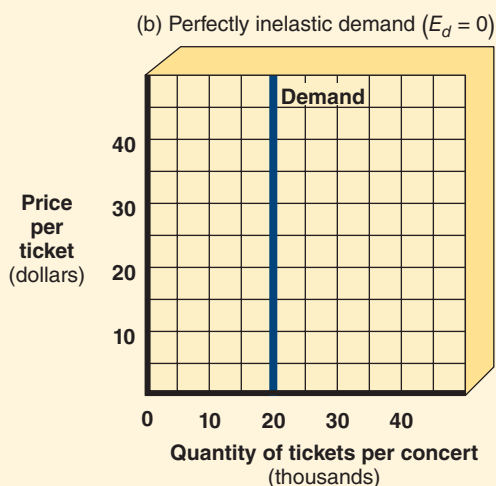
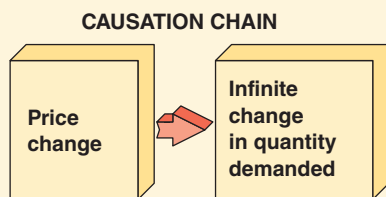
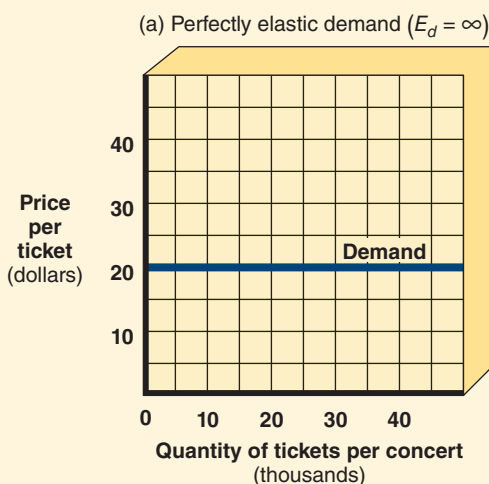
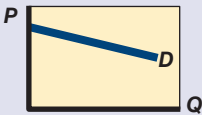
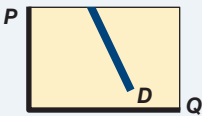
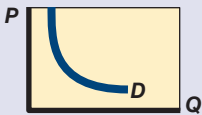
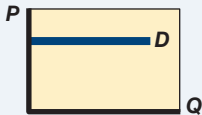
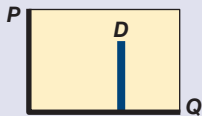


Exhibit 3

Price Elasticity of Demand Terminology

Elasticity coefficient	Definition	Demand	Graph
$E_d > 1$	Percentage change in quantity demanded is greater than the percentage change in price	Elastic	
$E_d < 1$	Percentage change in quantity demanded is less than the percentage change in price	Inelastic	
$E_d = 1$	Percentage change in quantity demanded is equal to the percentage change in price	Unitary elastic	
$E_d = \infty$	Percentage change in quantity demanded is infinite in relation to the percentage change in price	Perfectly elastic	
$E_d = 0$	Quantity demanded does not change as the price changes	Perfectly inelastic	

Perfectly Inelastic Demand ($E_d = 0$)

Exhibit 2(b) shows the other extreme case, which is a perfectly vertical demand curve. No matter how high or low the Steel Porcupines’ ticket price is, the quantity demanded is 20,000 tickets. Such a demand curve is perfectly inelastic, and $E_d = 0$. **Perfectly inelastic demand** is a condition in which the quantity demanded does not change as the price changes.

Exhibit 3 summarizes the ranges for price elasticity of demand.

Perfectly inelastic demand

A condition in which the quantity demanded does not change as the price changes.

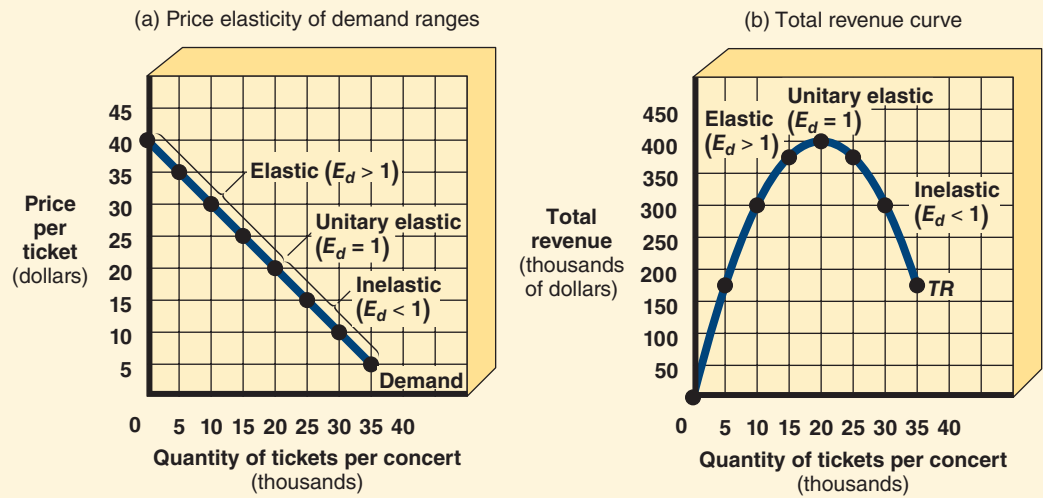
PRICE ELASTICITY OF DEMAND
VARIATIONS ALONG A DEMAND CURVE

The price elasticity of demand for a downward-sloping straight-line demand curve varies as we move along the curve. Look at Exhibit 4, which shows a linear demand curve in part (a) and the corresponding total revenue curve in part (b). Begin at \$40 on the demand curve and move down to \$35, to \$30, to \$25, and so on. The table

Exhibit 4

The Variation in Elasticity and Total Revenue along a Hypothetical Demand Curve

Part (a) shows a straight-line demand curve and its three elasticity ranges. In the \$40–\$20 price range, demand is elastic. As price decreases in this range, total revenue increases. At \$20, demand is unitary elastic, and total revenue is at its maximum. In the \$20–\$5 price range, demand is inelastic. As price decreases in this range, total revenue decreases. The total revenue (TR) curve is plotted in part (b) to trace its relationship to price elasticity.



Calculation of Total Revenue and Elasticity along a Hypothetical Demand Curve

Price	Quantity	Total Revenue (thousands of dollars)	Elasticity Coefficient (E_d)	Price Elasticity of Demand
\$40	0	\$ 0		
35	5	175	15.00	Elastic
30	10	300	4.33	Elastic
25	15	375	2.20	Elastic
20	20	400	1.29	Elastic
15	25	375	1.00	Unitary elastic
10	30	300	0.78	Inelastic
5	35	175	0.45	Inelastic
	40	0	0.23	Inelastic

in Exhibit 4 lists variations in the total revenue and the elasticity coefficient (E_d) at different ticket prices. As we move down the upper segment of the demand curve, price elasticity of demand falls, and total revenue rises. For example, measured over the price range of \$35 to \$30, the price elasticity of demand is 4.33, so this segment of demand is elastic ($E_d > 1$). Between these two prices, total revenue increases from \$175,000 to \$300,000. At \$20, price elasticity is unitary elastic ($E_d = 1$), and total revenue is maximized at \$400,000. As we move down the lower segment of the demand curve, price elasticity of demand falls below a value of 1.0, and total revenue falls. Over the price range of \$15 to \$10, for example, the price elasticity of demand is 0.45, and, therefore, this segment of demand is inelastic ($E_d < 1$). Between these two prices, total revenue decreases from \$375,000 to \$300,000.

CONCLUSION *The price elasticity coefficient of demand applies only to a specific range of prices.*

It is no coincidence that the demand curve in Exhibit 4(a) has elastic, unitary elastic, and inelastic segments. In fact, *any downward-sloping straight-line demand curve has ranges of all three of these types of price elasticity of demand.* As we move downward, first, there is an elastic range; second, a unitary elastic range; and, third, an inelastic range. Why? Recall that price elasticity of demand is a ratio of percentage changes. At the upper end of the demand curve, quantities demanded are lower, and prices are higher. A change of 1 unit in quantity demanded is a large percentage change. On the other hand, a \$1 price change is a relatively small percentage change. At the lower end of the curve, the situation reverses. A 1-unit change in quantity demanded is a small percentage change. A \$1 price change is a relatively larger percentage change. Now pause and refer back to parts (a) and (b) of Exhibit 1. If we examine changes in price along the entire length of these demand curves, we will find elastic, unitary elastic, and inelastic segments.

Exhibit 5 summarizes the relationships between elasticity, price change, and total revenue.

<i>Exhibit 5</i>		Relationships among Elasticity, Price Change, and Total Revenue	
Price elasticity of demand	Elasticity coefficient	Price	Total revenue
Elastic	$E_d > 1$	↑	↓
Elastic	$E_d > 1$	↓	↑
Unitary elastic	$E_d = 1$	↑↓	No change
Inelastic	$E_d < 1$	↑	↑
Inelastic	$E_d < 1$	↓	↓



CHECKPOINT

Will Fliers Flock to Low Summer Fares?

US Airways is concerned over low sales and announces special cuts in its fares this summer. The New York to Los Angeles fare, for example, is reduced from \$500 to \$420. Does US Airways think demand is elastic, unitary elastic, or inelastic?

DETERMINANTS OF PRICE ELASTICITY OF DEMAND

Economists have estimated price elasticity of demand for various goods and services. Exhibit 6 presents some of these estimates, and as you can see, the elasticity coefficients vary a great deal. For example, the demand for automobiles and for chinaware is elastic. On the other hand, the demand for jewelry and watches and for theater and opera tickets is inelastic. The demand for tires and tubes is approximately unitary elastic. Why do the price elasticities of demand for these products vary so much? The following factors cause these differences.

Exhibit 6

Estimated Price Elasticities of Demand

Item	Elasticity coefficient	
	Short run	Long run
Automobiles	1.87	2.24
Chinaware	1.54	2.55
Movies	0.87	3.67
Tires and tubes	0.86	1.19
Commuter rail fares	0.62	1.59
Jewelry and watches	0.41	0.67
Medical care	0.31	0.92
Housing	0.30	1.88
Gasoline	0.20	0.70
Theater and opera tickets	0.18	0.31
Foreign travel	0.14	1.77
Air travel	0.10	2.40

SOURCES: Robert Archibald and Robert Gillingham, "An Analysis of the Short-Run Consumer Demand for Gasoline Using Household Survey Data," *Review of Economics and Statistics* 62 (November 1980): 622–628; Hendrik S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States: Analyses and Projections* (Cambridge, MA: Harvard University Press, 1970, pp. 56–149); Richard Voith, "The Long-Run Elasticity of Demand for Commuter Rail Transportation," *Journal of Urban Economics* 30 (November 1991): 360–372.

Availability of Substitutes

By far the most important influence on price elasticity of demand is the availability of substitutes. Demand is more elastic for a good or service with close substitutes. If the price of cars rises, consumers can switch to buses, trains, bicycles, and walking. The more public transportation is available, the more responsive quantity demanded is to a change in the price of cars. When consumers have limited alternatives, the demand for a good or service is more price inelastic. If the price of tobacco rises, people addicted to it have few substitutes because not smoking is unappealing to most users.

CONCLUSION *The price elasticity coefficient of demand is directly related to the availability of good substitutes for a product.*

Price elasticity also depends on the market used to measure demand. For example, studies show the price elasticity of Chevrolets is greater than that of automobiles in general. Chevrolets compete with other cars sold by GM, Ford, Chrysler, Toyota, and other automakers and with buses and trains—all of which are substitutes for Chevrolets. But using the broad class of cars eliminates these specific types of cars as competitors. Instead, substitutes for automobiles include buses and trains, which are also substitutes for Chevrolets. In short, there are more close substitutes for Chevrolets than there are for all cars.

CHECKPOINT

Can Trade Sanctions Affect Elasticity of Demand for Cars?

Assume Congress prohibits the sale of Japanese luxury cars, such as Lexus, Acura, and Infiniti, in the United States. How would this affect the price elasticity of demand for Mercedes, BMWs, and Jaguars in the United States?



Share of Budget Spent on the Product

When the price of salt changes, consumers pay little attention. Why should they notice? The price of salt or matches can double, and this purchase will remain a small percentage of one's budget. If, however, college tuition, the price of dinners at restaurants, or housing prices double, people will look for alternatives. These goods and services account for a large part of people's budgets.

CONCLUSION *The price elasticity coefficient of demand is directly related to the percentage of one's budget spent for a good or service.*

Adjustment to a Price Change over Time

Exhibit 6 separates the elasticity coefficients into short-run and long-run categories. As time passes, buyers can respond fully to a change in the price of a product by finding more substitutes. Consider the demand for gasoline. In the short run, people

You're The Economist

Cigarette Smoking Price Elasticity of Demand

Applicable Concept: price elasticity of demand



Tobacco use is one of the chief preventable causes of death in the world. Since 1964, health warnings have been mandated in the United States on tobacco advertising, including billboards and printed advertising. In 1971, television advertising was prohibited. Most states have banned smoking in state buildings, and the federal government has restricted smoking in federal offices and military facilities. In 1998, the Senate engaged in heated debate over proposed legislation to curb smoking by teenagers. This bill would have raised the price of cigarettes by \$1.10 a pack over five years, and the tobacco industry would have paid \$369 billion over the next 25 years. Opponents argued that this price increase would be a massive tax on low-income Americans that would generate huge revenues to finance additional government programs and spending. Proponents countered that the bill was not about taxes. Instead, the bill was an attack on the death march of Americans who die early from tobacco-related diseases. Ultimately, the Senate was so divided on the issue that it was impossible, at least for that year, to pass a tobacco bill.

Estimates of the price elasticity of demand for cigarettes in the United States and other high-income countries fall in the inelastic range of 0.62. This means that if prices rise by 10 percent, cigarette consumption will fall by about 6 percent.¹ Moreover, estimates of the price elasticity of demand range significantly across states from 2.00 (Kentucky) to 0.09 (Mississippi).² The price elasticity of demand for cigarettes also appears to vary by education. Less-educated adults are more responsive to price changes than better-educated adults. This finding supports the theory that less-educated people are more present-oriented, or “myopic,” than people with more education. Thus, less-educated individuals tend to be more influenced by current changes in the price of a pack of cigarettes.³ Another study in 2000 confirmed that education has strong negative effects on the quantity of cigarettes smoked, especially for high-income individuals. The presence of young children reduces smoking, with the effect most pronounced for women.⁴

A study published in *Health Economics* estimated the relationship between cigarette



© Image copyright kudrik, 2009. Used under license from Shutterstock.com

smoking and price for 34,145 respondents, aged 15–29 years. The price elasticity of smoking was inelastic and varied inversely with age: 0.83 for ages 15–17, 0.52 for ages 18–20, 0.37 for ages 21–23, 0.20 for ages 24–26, and 0.09 for ages 27–29. Thus, younger people were more likely to reduce the number of cigarettes smoked in response to increased prices.⁵

ANALYZE THE ISSUE

According to the above discussion, what factors influence the price elasticity of demand for cigarettes? What other factors not mentioned in the article might also influence the price elasticity of demand for cigarettes?

1. Jon P. Nelson, “Cigarette Demand, Structural Change, and Advertising Bans: International Evidence, 1970–1995,” *Contribution to Economic Analysis and Policy* 2, no. 1 (2003): article 10.
2. Craig A. Gallet, “Health Information and Cigarette Consumption: Supply and Spatial Consideration,” *Empirica* 33, no. 1 (March 2006): 35–47.
3. Frank Chaloupka et al., “Tax, Price and Cigarette Smoking,” *Tobacco Control* 11, no. 1 (March 2002): 62–73.
4. Joni Hersch, “Gender, Income Levels, and the Demand for Cigarettes,” *Journal of Risk and Uncertainty* 21, no. 2–3 (November 2000): 263–282.
5. Jeffrey E. Harris and Sandra W. Chan, “The Continuum of Addiction: Cigarette Smoking in Relation to Price among Americans Aged 15–29,” *Health Economics* 8, no. 1 (February 1999): 81–86.

find it hard to cut back the amount they buy when the price rises sharply. They are accustomed to driving back and forth to work alone in their cars. The typical short-run response is to cut luxury travel and reduce speed on trips. If high prices persist over time, car buyers will find ways to cut back. They can buy cars with better fuel economy (more miles per gallon), form car pools, and ride buses or commuter trains. This explains why the short-run elasticity coefficient of gasoline in the exhibit is more inelastic at 0.2 than the long-run elasticity coefficient of 0.7.

CONCLUSION *In general, the price elasticity coefficient of demand is higher the longer a price change persists.*

OTHER ELASTICITY MEASURES

The elasticity concept has other applications beyond calculating the price elasticity of demand. Broadly defined, it is a technique for measuring the response of one variable to changes in some other variable.

Income Elasticity of Demand

Recall from Chapter 3 that an increase in income can increase demand (shift the demand curve rightward) for a normal good or service and decrease demand (shift the demand curve leftward) for an inferior good or service. To measure exactly how consumption responds to changes in income, economists calculate the **income elasticity of demand**. Income elasticity of demand is the ratio of the percentage change in the quantity demanded of a good or service to a given percentage change in income. We use a midpoints formula similar to the one we used for calculating price elasticity of demand:

$$E_I = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

$$E_I = \frac{\% \Delta Q}{\% \Delta I} = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{I_2 - I_1}{I_1 + I_2}}$$

Where E_I is the income elasticity of demand coefficient, Q_1 and Q_2 represent quantities demanded before and after the income change, and I_1 and I_2 represent income before and after the income change.

For a *normal* good or service, the income elasticity of demand is *positive*, $E_I > 0$. Recall that for this type of good demand and income move in the same direction. Thus, the variables in the numerator and denominator change in the same direction. For an *inferior* good or service, the reverse is true, and the income elasticity of demand is *negative*, $E_I < 0$.

Why is the income elasticity coefficient important? Returning to our rock group example, the Steel Porcupines band needs to know the impact of a recession on ticket sales. During a downturn when consumers' incomes fall, if a rock concert is a *normal good*, the quantity of ticket sales falls. Conversely, if a rock concert is an *inferior good*, the quantity of ticket sales rises. To illustrate, suppose consumers'

Income elasticity of demand

The ratio of the percentage change in the quantity demanded of a good or service to a given percentage change in income.

incomes increase from \$1,000 to \$1,250 per month. As a result, the quantity of tickets demanded increases from 10,000 to 15,000. Based on these data, is a rock concert a normal or an inferior good? We compute as follows:

$$E_1 = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{I_2 - I_1}{I_1 + I_2}} = \frac{\frac{15,000 - 10,000}{10,000 + 15,000}}{\frac{1,250 - 1,000}{1,250 + 1,000}} = \frac{0.20}{0.11} = 1.8$$

The computed income elasticity of demand coefficient of 1.8 summarizes the relationship between changes in rock concert ticket purchases and changes in income. First, E_1 is a positive number; therefore, a rock concert is a normal good because people buy more when their incomes rise. Second, ticket purchases are very responsive to changes in income. When income rises by 11 percent, ticket sales increase by more (20 percent).

Exhibit 7 lists estimated income elasticity of demand for selected products.

Cross-Elasticity of Demand

In Chapter 3, we learned that a change in the price of one good, say, Y, can cause the consumption of another good, say, X, to change (see prices of related goods in Exhibit 5 in Chapter 3). In Exhibit 1(b) in Chapter 4, for example, a sharp rise in the price of gasoline (a complement) causes the number of gas guzzlers purchased to decline. This responsiveness of the quantity demanded to changes in the price of some other good is estimated by the **cross-elasticity of demand**. Cross-elasticity of demand is the ratio of the percentage change in the quantity demanded of a good or service to a given percentage change in the price of another good or service. Again,

Cross-elasticity of demand

The ratio of the percentage change in the quantity demanded of a good or service to a given percentage change in the price of another good or service.

Exhibit 7 Estimated Income Elasticities of Demand		
Item	Elasticity coefficient	
	Short run	Long run
Potatoes	N.A.	0.81
Furniture	2.60	0.53
Dental services	0.38	1.00
Automobiles	5.50	1.07
Physician services	0.28	1.15
Clothing	0.95	1.17
Shoes	0.90	1.50
Gasoline and oil	0.55	1.36
Jewelry and watches	1.00	1.60
Toilet articles	0.25	3.74

SOURCES: Hendrik S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States: Analyses and Projections* (Cambridge, MA: Harvard University Press, 1970); Dale M. Helen, "The Structure of Food Demand: Interrelatedness and Duality," *American Journal of Agricultural Economics* 64, no. 2 (May 1982): 213–221.

we use the midpoints formula as follows to compute the cross-elasticity coefficient of demand:

$$E_c = \frac{\text{percentage change in quantity demanded of one good}}{\text{percentage change in price of another good}}$$

$$E_c = \frac{\% \Delta Q_X}{\% \Delta P_Y} = \frac{\frac{Q_{X_2} - Q_{X_1}}{Q_{X_1} + Q_{X_2}}}{\frac{P_{Y_2} - P_{Y_1}}{P_{Y_1} + P_{Y_2}}}$$

where E_c is the cross-elasticity coefficient, Q_1 and Q_2 represent quantities before and after the price of another good or service changes, and P_1 and P_2 represent the price of another good or service before and after the price change.

The cross-elasticity coefficient reveals whether a good or service is a *substitute* or a *complement*. For example, suppose Coke increases its price 10 percent, which causes consumers to buy 5 percent more Pepsi. The cross-elasticity of demand for Pepsi is a *positive* 0.50 (+5 percent/+10 percent). Since $E_c > 0$, Coke and Pepsi are *substitutes* because the numerator and denominator variables change in the same direction. The larger the positive coefficient, the greater the substitutability between the two goods.

Now suppose there is a 50 percent increase in the price of motor oil and the quantity demanded of gasoline decreases by 10 percent. The cross-elasticity of demand for gasoline is a *negative* 0.20 (−10 percent/+50 percent). Since $E_c < 0$, these two goods are complements. The larger the negative coefficient, the greater the complementary relationship between the two goods. The variables in the numerator and denominator change in opposite directions.

Price Elasticity of Supply

The **price elasticity of supply** closely follows the price elasticity of demand concept. Price elasticity of supply is the ratio of the percentage change in the quantity supplied of a product to the percentage change in its price. This elasticity coefficient is calculated using the following formula:

$$E_s = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}}$$

where E_s is the price elasticity of supply coefficient. Since price and quantity supplied change in the same direction, the elasticity coefficient is a positive value. Economists use terminology corresponding to that for the elasticity of demand. Supply is *elastic* when $E_s > 1$, *unit elastic* when $E_s = 1$, *inelastic* when $E_s < 1$, *perfectly elastic* when $E_s = \infty$, and *perfectly inelastic* when $E_s = 0$. Exhibit 8 shows three of these cases.

In Chapter 8, we will explain why the time period of analysis is a primary determinant of the shape of the supply curve. More specifically, it will be shown that price elasticity of supply is greater in the long run than in the short run. Thus, the long-run supply curve will be flatter.

Exhibit 9 gives a summary of the three elasticity concepts presented in this section.

Price elasticity of supply

The ratio of the percentage change in the quantity supplied of a product to the percentage change in its price.

Exhibit 8 Price Elasticity of Supply

This figure shows three supply curves. As shown in part (a), a small change in price changes the quantity supplied by an infinite amount: $E_s = \infty$. Part (b) shows the quantity supplied is unaffected by a change in price: $E_s = 0$, and supply is perfectly inelastic. In part (c), the percentage change in quantity supplied is equal to the percentage change in price: $E_s = 1$.

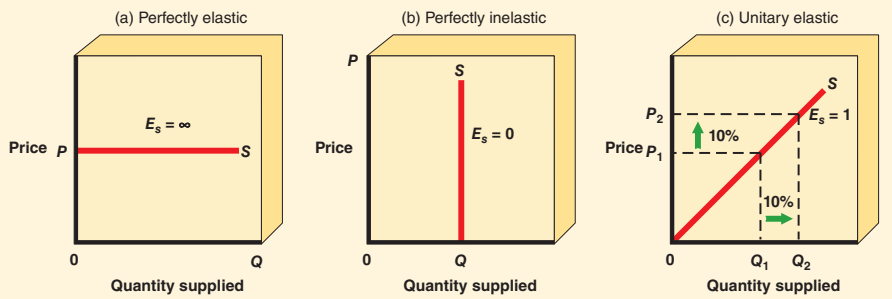


Exhibit 9 Summary of Other Elasticity Concepts

Type	Definition	Elasticity coefficient possibilities	Terminology
Income elasticity of demand	$\frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$	$E_I > 0$	Normal good
		$E_I < 0$	Inferior good
		$E_I > 1$	Income elastic
		$E_I < 1$	Income inelastic
		$E_I = 1$	Income unitary elastic
Cross-elasticity of demand	$\frac{\text{Percentage change in quantity demanded of one good}}{\text{Percentage change in price of another good}}$	$E_C < 0$	Complements
		$E_C > 0$	Substitutes
Price elasticity of supply	$\frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$	$E_S > 1$	Elastic
		$E_S = 1$	Unitary elastic
		$E_S < 1$	Inelastic
		$E_S = \infty$	Perfectly elastic
		$E_S = 0$	Perfectly inelastic

Price Elasticity and the Impact of Taxation

Who pays a tax levied on sellers of goods such as gasoline, cigarettes, and alcoholic beverages? One way to answer this question is to say that if the government places a tax on, say, gasoline, the gasoline companies pay the tax. They collect the tax when they sell gas and write the checks to the government for the tax. But this is not the

whole story. Instead of looking simply at who writes the checks, economists use the elasticity concept to analyze who “really” pays a tax. **Tax incidence** is the share of a tax ultimately paid by consumers and sellers. In this section, we show that even though taxes are collected from sellers, buyers do not escape a share of the tax burden. The tax incidence depends on the price elasticities of demand and supply. Let’s look at two examples.

Suppose the federal government decides to raise the gasoline tax \$0.50 per gallon. Exhibit 10 shows the impact of the tax on different demand curves. At E_1 in

Tax incidence

The share of a tax ultimately paid by consumers and sellers.

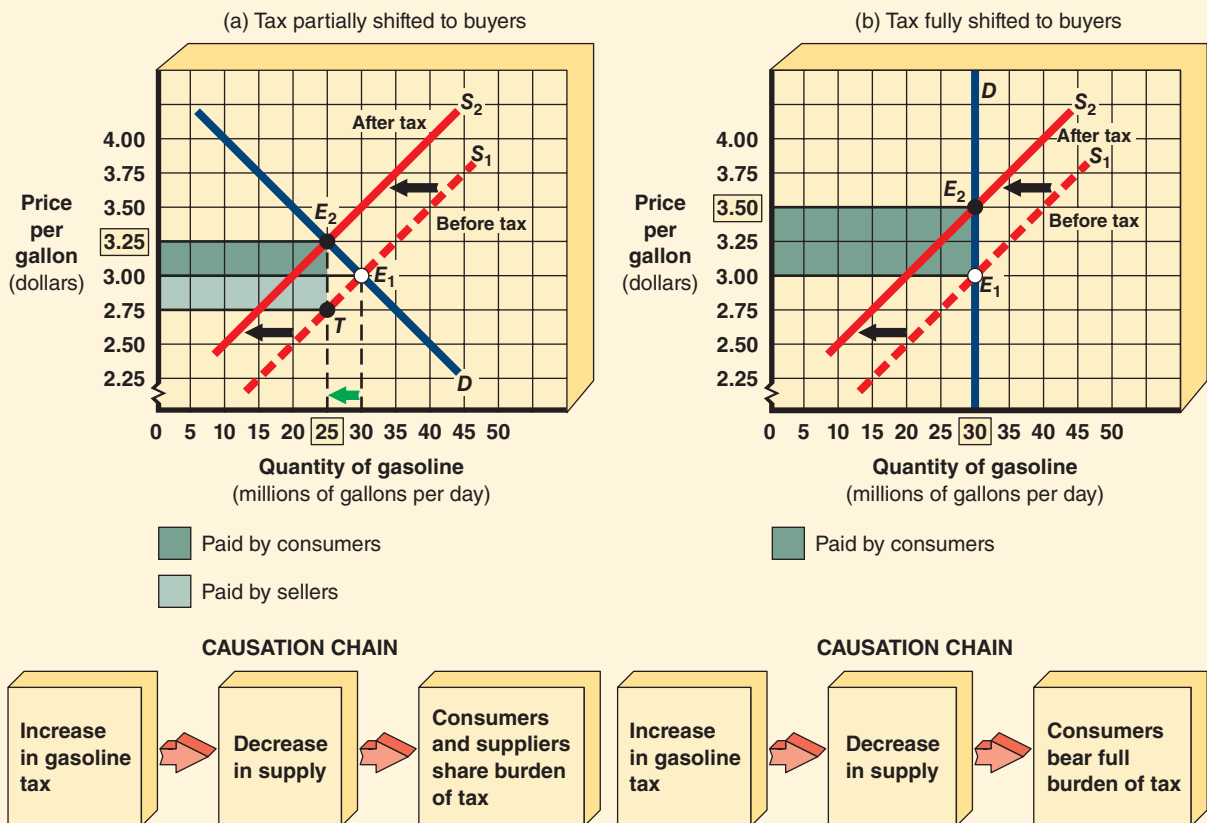
Exhibit 10

The Tax Incidence of a Tax on Gasoline

In parts (a) and (b), S_1 is the supply curve before the imposition of a tax of \$0.50 per gallon on gasoline. The demand curve is not affected by this tax collected from the sellers. The initial equilibrium is E_1 . Before the tax, the price is \$3.00 per gallon, and 30 million gallons are bought and sold.

In part (a), the equilibrium price rises to \$3.25 per gallon at E_2 as a result of the tax. After the tax is paid, sellers receive only \$2.75 per gallon (point T) instead of the \$3.00 they received before the tax. Thus, buyers pay \$0.25 of the tax per gallon, and sellers bear the remaining \$0.25. The shaded area is the total tax collected.

As shown in part (b), a tax collected from sellers can be fully shifted to buyers in the unlikely case that demand is perfectly inelastic. Since the quantity of gasoline purchased is unresponsive to a change in price, sellers receive \$3.00 per gallon before and after they pay the tax.



part (a), the equilibrium price before the tax is \$3.00 per gallon and the equilibrium quantity is 30 million gallons per day. The effect of the tax is to shift the supply curve leftward from S_1 to S_2 . From the sellers' viewpoint, the cost of each gallon of gasoline increases \$0.50 per gallon at any possible selling price. The effect is exactly the same as if the price of crude oil or any resource used to produce gasoline increased.

Sellers would like consumers to pay the entire amount of the tax. This would occur if consumers would pay \$3.50 per gallon for the same 30 million gallons per day they purchased before the tax. But the leftward shift in supply establishes a new equilibrium at E_2 . The new equilibrium price is \$3.25 per gallon, and the equilibrium quantity falls to 25 million gallons per day. At E_2 , the entire shaded area represents the tax revenue. The government collects \$12.5 million per day, which equals the \$0.50 per gallon tax times the 25 million gallons sold each day. The vertical line between points E_2 and T represents the \$0.50 tax per gallon. Since consumers now pay \$3.25 instead of \$3.00 per gallon, they pay one-half of the tax. The sellers pay the remaining half of the tax. Now the sellers send \$0.50 to Uncle Sam and keep \$2.75 compared to the \$3.00 per gallon they kept before the tax.

CONCLUSION *If the demand curve slopes downward and the supply curve slopes upward, sellers cannot raise the price by the full amount of the tax.*

Part (b) of Exhibit 10 is a special case in which the market price increases by the full amount of the tax per gallon. Here the demand for gasoline is perfectly inelastic. In this case, buyers do not decrease the quantity demanded in response to the decrease in supply caused by the tax. The quantity demanded is 30 million gallons per day before and after the tax. The price, however, increases from E_1 to E_2 by exactly the amount of tax per unit from \$3.00 to \$3.50 per gallon, and therefore consumers pay the entire burden of the tax. After paying the tax, sellers receive a net price of \$3.00 per gallon. The total tax revenue collected by the government is the shaded area. Each day \$15 million is collected, which equals the \$0.50 per gallon tax multiplied by 30 million gallons sold each day.

CONCLUSION *In the case where demand is perfectly inelastic, sellers can raise the price by the full amount of a tax.*



CHECKPOINT

Can Honda Compete with Itself?

When Honda introduced the Acura to compete with European luxury cars, there was a danger that the new line would take sales away from Honda's Accord. To make Acura more competitive with other luxury cars, suppose Honda cuts the price of Acura while keeping the price of Accord unchanged. If Honda's fear comes true, will it find a negative cross-elasticity of demand, a negative income elasticity of demand, or a positive cross-elasticity of demand?

Key Concepts

Price elasticity of demand
Elastic demand
Total revenue
Inelastic demand

Unitary elastic demand
Perfectly elastic demand
Perfectly inelastic demand
Income elasticity of demand

Cross-elasticity of demand
Price elasticity of supply
Tax incidence

Summary

- Price elasticity of demand** is a measure of the responsiveness of the quantity demanded to a change in price. Specifically, price elasticity of demand is the ratio of the percentage change in quantity demanded to the percentage change in price.

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{Q_2 - Q_1}{Q_1 + Q_2}}{\frac{P_2 - P_1}{P_1 + P_2}}$$

- Elastic demand** occurs where there is a change of more than 1 percent in quantity demanded in response to a 1 percent change in price. Demand is elastic when the elasticity coefficient is greater than 1 and *total revenue* (price times quantity) varies inversely with the direction of the price change.

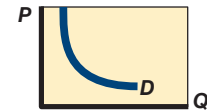


- Inelastic demand** occurs where there is a change of less than 1 percent in quantity demanded in response to a 1 percent change in price. Demand is inelastic when the elasticity coefficient is less than 1 and total revenue varies directly with the direction of the price change.



- Unitary elastic demand** occurs where there is a 1 percent change in quantity demanded in response to a 1 percent change in price. Demand is unitary elastic when the elasticity

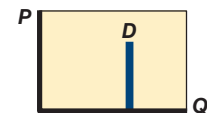
coefficient equals 1 and total revenue remains constant as the price changes.



- Perfectly elastic demand** occurs when the quantity demanded declines to zero for even the slightest rise or fall in price. This is an extreme case in which the demand curve is horizontal and the elasticity coefficient equals infinity.



- Perfectly inelastic demand** occurs when the quantity demanded does not change in response to price changes. This is an extreme case in which the demand curve is vertical and the elasticity coefficient equals zero.



- Determinants of price elasticity of demand** include (a) the availability of substitutes, (b) the percentage of one's budget spent on the product, and (c) the length of time allowed for adjustment. Each of these factors is directly related to the elasticity coefficient.
- Income elasticity of demand** is the percentage change in quantity demanded divided by the percentage change in income. For a *normal* good or service, income elasticity of demand

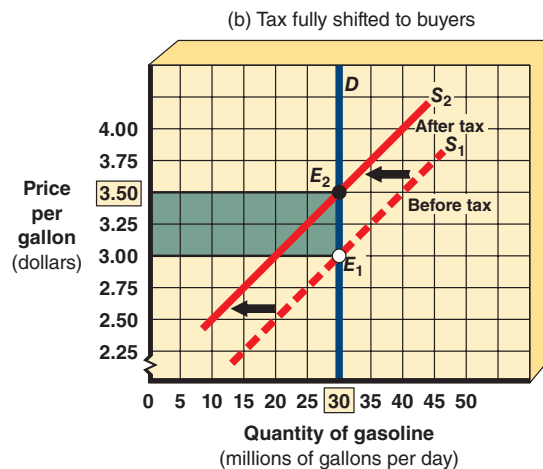
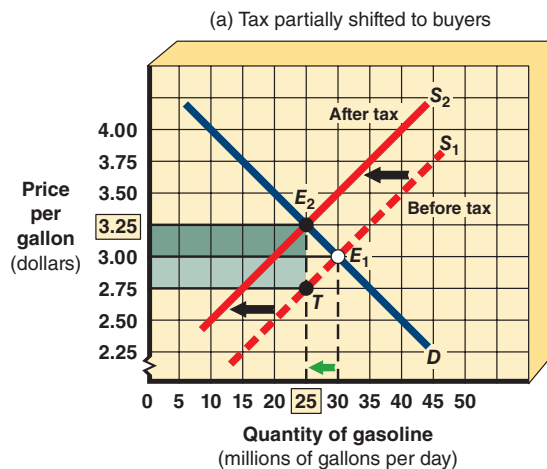
is positive. For an *inferior* good or service, income elasticity of demand is negative.

- **Cross-elasticity of demand** is the percentage change in the quantity demanded of one product caused by a change in the price of another product. When the cross-elasticity of demand is negative, the two products are complements.
- **Price elasticity of supply** is a measure of the responsiveness of the quantity supplied to a change in price. Price elasticity of supply is

the ratio of the percentage change in quantity supplied to the percentage change in price.

- **Tax incidence** is the share of a tax ultimately paid by buyers and sellers. Facing a downward-sloping demand curve and an upward-sloping supply curve, sellers cannot raise the price by the full amount of the tax. If the demand curve is vertical, sellers will raise the price by the full amount of the tax.

Tax Incidence of Gasoline Tax



Summary of Conclusion Statements

- The price elasticity coefficient of demand applies only to a specific range of prices.
- The price elasticity coefficient of demand is directly related to the availability of good substitutes for a product.
- The price elasticity coefficient of demand is directly related to the percentage of one's budget spent for a good or service.
- In general, the price elasticity coefficient of demand is higher the longer a price change persists.
- If the demand curve slopes downward and the supply curve slopes upward, sellers cannot raise the price by the full amount of the tax.
- In the case where demand is perfectly inelastic, sellers can raise the price by the full amount of a tax.

Study Questions and Problems

1. If the price of a good or service increases and the total revenue received by the seller declines, is the demand for this good over this segment of the demand curve elastic or inelastic? Explain.
2. Suppose the price elasticity of demand for farm products is inelastic. If the federal government wants to follow a policy of increasing income for farmers, what type of programs will the government enact?
3. Suppose the price elasticity of demand for used cars is estimated to be 3. What does this mean? What will be the effect on the quantity demanded for used cars if the price rises by 10 percent?
4. Consider the following demand schedule:

Price	Quantity demanded	Elasticity coefficient
\$25	20	
20	40	_____
15	60	_____
10	80	_____
5	100	_____

What is the price elasticity of demand between

- a. $P = \$25$ and $P = \$20$?
 - b. $P = \$20$ and $P = \$15$?
 - c. $P = \$15$ and $P = \$10$?
 - d. $P = \$10$ and $P = \$5$?
5. Suppose a university raises its tuition from \$3,000 to \$3,500. As a result, student enrollment falls from 5,000 to 4,500. Calculate the price elasticity of demand. Is demand elastic, unitary elastic, or inelastic?
 6. Will each of the following changes in price cause total revenue to increase, decrease, or remain unchanged?
 - a. Price falls, and demand is elastic.
 - b. Price rises, and demand is elastic.
 - c. Price falls, and demand is unitary elastic.
 - d. Price rises, and demand is unitary elastic.
 - e. Price falls, and demand is inelastic.
 - f. Price rises, and demand is inelastic.
 7. Suppose a movie theater raises the price of popcorn 10 percent, but customers do not buy any less popcorn. What does this tell you about the price elasticity of demand? What will happen to total revenue as a result of the price increase?
 8. Charles loves Mello Yello and will spend \$10 per week on the product no matter what the price. What is his price elasticity of demand for Mello Yello?
 9. Which of the following pairs of goods has the higher price elasticity of demand?
 - a. Oranges or Sunkist oranges
 - b. Cars or salt
 - c. Foreign travel in the short run or foreign travel in the long run
 10. The Energizer Bunny that “keeps going and going” has been a very successful ad campaign for batteries. Explain the relationship between this slogan and the firm’s price elasticity of demand and total revenue.
 11. Suppose the income elasticity of demand for furniture is 3.0 and the income elasticity of demand for physician services is 0.3. Compare the impact on furniture and physician services of a recession that reduces consumers’ incomes by 10 percent.
 12. How might you determine whether Nikes and Reeboks are in competition with each other?
 13. Assume the cross-elasticity of demand for car tires with respect to the price of cars is -2 . What does this tell you about the relationship between car tires and cars when the price of cars rises by 10 percent?
 14. Consider the following supply schedule:

Price	Quantity demanded	Elasticity coefficient
\$10	50	
8	40	_____
6	30	_____
4	20	_____
2	10	_____
0	0	_____

What is the price elasticity of supply between

- $P = \$10$ and $P = \$8$?
- $P = \$8$ and $P = \$6$?
- $P = \$6$ and $P = \$4$?
- $P = \$4$ and $P = \$2$?
- $P = \$2$ and $P = \$0$?

15. Why would consumers prefer that the government tax products with elastic, rather than inelastic, demand?

16. Opponents of increasing the tax on gasoline argue that the big oil companies just pass the tax along to the consumers. Do you agree or disagree? Explain your answer.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Will Fliers Flock to Low Summer Fares?

US Airways must believe the quantity of airline tickets demanded during the summer is quite responsive to a price cut. For total revenue to rise with a price cut, the quantity demanded must increase by a larger percentage than the percentage

decrease in the price. For this to occur, the price elasticity of demand must exceed 1. If you said US Airways believes demand is elastic, **YOU ARE CORRECT.**

Can Trade Sanctions Affect Elasticity of Demand for Cars?

Because substitutes (Japanese luxury cars) are no longer available to U.S. consumers, the quantity demanded of Mercedes, BMWs, and Jaguars in the United States would be less responsive to changes

in the prices for these cars. If you said the price elasticity of demand for Mercedes, BMWs, and Jaguars would become less elastic, **YOU ARE CORRECT.**

Can Honda Compete with Itself?

Determining the effect of cutting the Acura's price on sales of Accords calls for cross-elasticity. Once the price of Acura is cut, Honda would calculate the change in the quantity of Accords demanded. If Acura's decrease in price causes people to buy

fewer Accords, Honda is indeed competing with itself. If you said a positive cross-elasticity of demand indicates the two goods are substitutes, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- If an increase in bus fares in Charlotte, North Carolina reduces the total revenue of the public transit system, this is evidence that demand is
 - price elastic.
 - price inelastic.

- unitary elastic.
- perfectly elastic.

- Which of the following will result in an increase in total revenue?
 - Price increases when demand is elastic.
 - Price decreases when demand is elastic.
 - Price increases when demand is unitary elastic.
 - Price decreases when demand is inelastic.

Practice Quiz Continued

3. You are on a committee that is considering ways to raise money for your city's symphony program. You would recommend increasing the price of symphony tickets only if you thought the demand curve for these tickets was
 - a. inelastic.
 - b. elastic.
 - c. unitary elastic.
 - d. perfectly elastic.
4. The price elasticity of demand for a horizontal demand curve is
 - a. perfectly elastic.
 - b. perfectly inelastic.
 - c. unitary elastic.
 - d. inelastic.
 - e. elastic.
5. Suppose the quantity of steak purchased by the Jones family is 110 pounds per year when the price is \$2.10 per pound and 90 pounds per year when the price is \$3.90 per pound. The price elasticity of demand coefficient for this family is
 - a. 0.33.
 - b. 0.50.
 - c. 1.00.
 - d. 2.00.
6. If a 5 percent reduction in the price of a good produces a 3 percent increase in the quantity demanded, the price elasticity of demand over this range of the demand curve is
 - a. elastic.
 - b. perfectly elastic.
 - c. unitary elastic.
 - d. inelastic.
 - e. perfectly inelastic.
7. A manufacturer of Beanie Babies hires an economist to study the price elasticity of demand for this product. The economist estimates that the price elasticity of demand coefficient for a range of prices close to the selling price is greater than 1. The relationship between changes in price and quantity demanded for this segment of the demand curve is
 - a. elastic.
 - b. inelastic.
 - c. perfectly elastic.
 - d. perfectly inelastic.
 - e. unitary elastic.
8. A downward-sloping straight-line demand curve will have a
 - a. higher price elasticity of demand coefficient along the top of the demand curve.
 - b. lower price elasticity coefficient along the top of the demand curve.
 - c. constant price elasticity of demand coefficient throughout the length of the demand curve.
 - d. positive slope.
9. The price elasticity of demand coefficient for a good will be lower
 - a. if there are few or no substitutes available.
 - b. if a small portion of the budget will be spent on the good.
 - c. in the short run than in the long run.
 - d. if all of the above are true.
10. The income elasticity of demand for shoes is estimated to be 1.50. We can conclude that shoes
 - a. have a relatively steep demand curve.
 - b. have a relatively flat demand curve.
 - c. are a normal good.
 - d. are an inferior good.
11. To determine whether two goods are substitutes or complements, an economist would estimate the
 - a. price elasticity of demand.
 - b. income elasticity of demand.
 - c. cross-elasticity of demand.
 - d. price elasticity of supply.
12. If the government wanted to raise tax revenue and shift most of the tax burden to the sellers, it would impose a tax on a good with a
 - a. steep (inelastic) demand curve and a steep (inelastic) supply curve.
 - b. steep (inelastic) demand curve and a flat (elastic) supply curve.
 - c. flat (perfectly elastic) demand curve and a steep (inelastic) supply curve.
 - d. flat (perfectly elastic) demand curve and a flat (elastic) supply curve.

Practice Quiz Continued

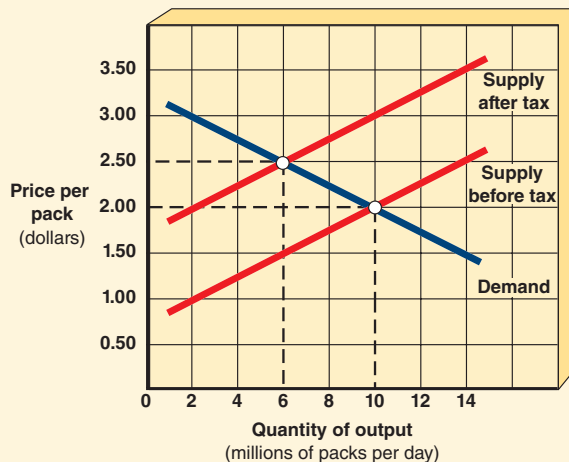
13. As shown in Exhibit 11, assume the government places a \$1 per pack sales tax on cigarettes. The percentage of the burden of taxation paid by consumers of a pack of cigarettes is
- zero.
 - 25 percent.
 - 50 percent.
 - 100 percent.

14. As shown in Exhibit 11, assume the government places a \$1 per pack sales tax on cigarettes. The percentage of the burden of taxation paid by tobacco sellers is:
- zero.
 - 50 percent.
 - 75 percent.
 - 100 percent.

15. As shown in Exhibit 11, the \$1 per pack sales tax on cigarettes raises tax revenue per day totaling:
- \$5 million.
 - \$6 million.
 - \$10 million.
 - \$15 million.

Exhibit 11

Supply and Demand Curves for Cigarettes



Consumer Choice Theory



This chapter expands our understanding of demand by investigating more deeply *why* people buy goods and services. In Chapter 3, the law of demand rested on a foundation of common sense and everyday observation. When the price of a Big Mac falls, people *do* buy more, and a price rise causes people to buy less. But there is more to the story.

The focus of this chapter is the logic of consumer behavior. Why does a consumer buy one bundle of goods rather than another? Suppose

someone asked why you bought a milkshake and french fries rather than a Coke and a hot dog. You would probably answer that given the money you had to spend, the Coke and hot dog would have given you less satisfaction. In this chapter, you will transform this simple explanation into consumer choice theory and then connect this theory to the law of demand. The chapter ends with another way to explain the demand curve, which involves effects related to income and the prices of other goods.



In this chapter, you will learn to solve these economics puzzles:

- Under what conditions might you be willing to pay \$10,000 for a gallon of water and 1 cent for a one-carat diamond?
- When ordering Big Macs, milkshakes, pizza, and other goods, how can you obtain the highest possible satisfaction?
- Do white rats obey the law of demand?

FROM UTILITY TO THE LAW OF DEMAND

Utility

The satisfaction, or pleasure, that people receive from consuming a good or service.

The basis of the law of demand is self-interested behavior. Consumers spend their limited budget to satisfy some want, such as listening to a compact disc or driving a new car. The motivation to consume goods and services is to gain **utility**. Utility is the satisfaction, or pleasure, that people receive from consuming a good or service. Utility is want-satisfying power “in the eye of the beholder.” Just as wants differ among people, utility received from consumption varies from person to person. Fred’s utility from consuming a BMW will probably differ from Maria’s utility. In spite of the subjective nature of utility, this section develops in steps the derivation of a demand curve based on the utility concept.

Total utility

The amount of satisfaction received from all the units of a good or service consumed.

Total Utility and Marginal Utility

Actual measurement of utility is impossible because only you know the satisfaction from consuming, say, four Big Macs in one day. But suppose we could gauge your **total utility** of consuming four Big Macs in a day. Total utility is the amount of satisfaction received from all the units of a good or service consumed. That is, the utility of the first unit consumed added to that of the second unit, and so on. What units can be used to measure total utility? Economists use a mythical unit called a *util*, which allows us to quantify our thinking about consumer behavior.

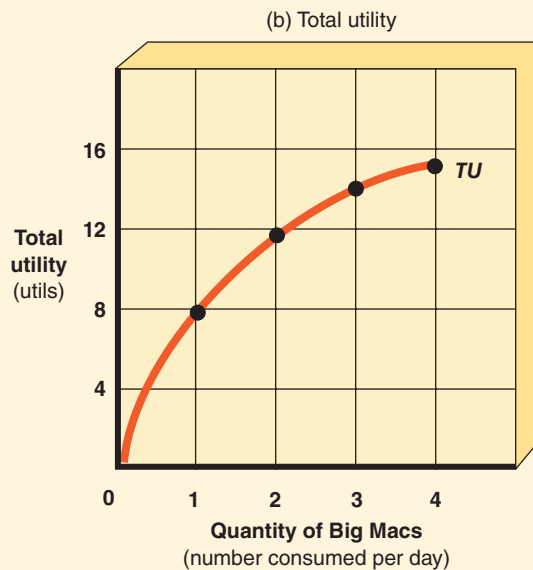
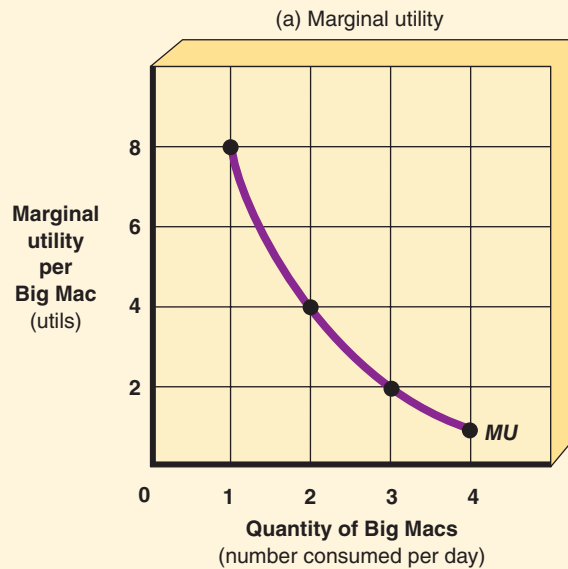
No one has invented a “utility meter,” but assume we could connect such a meter to your brain. Like taking your temperature, we could read the **marginal utility** each time you eat a Big Mac. Marginal utility is the change in total utility from one additional unit of a good or service. Instead of the total pleasure from eating *X* number of Big Macs, the question is how much *extra* satisfaction the first, second, or third Big Mac gives you. For example, Exhibit 1(a) shows your marginal utility data for eating four Big Macs in a day. You munch down the first Big Mac. Ah, the util meter hits an 8. You grab another Big Mac and eat it a little more slowly. The util meter hits 4 this time. You’re starting to feel full, but you eat a third Big Mac. This one gets a 2. Even though you are pretty full, there is room for one more. You eat the fourth Big Mac very slowly, and it gives you less satisfaction than any of the previous burgers. Your utility meter reads 1. This trend

Marginal utility

The change in total utility from one additional unit of a good or service.

*Exhibit 1***Diminishing Marginal Utility and Total Utility Curves for Consuming Big Macs**

Part (a) shows that, as more Big Macs are consumed per day, the utility from each additional Big Mac declines. The utils are only imaginary because utility cannot be measured. When the marginal utility of each Big Mac consumed is summed, we obtain the total utility curve shown in Part (b).



You're The Economist

Why Is Water Less Expensive than Diamonds?

Applicable Concepts: total utility and marginal utility



Adam Smith posed a paradox in *The Wealth of Nations*. Water is essential to life and therefore should be of great value. On the other hand, diamonds are not essential to life, so people should value them less than water. Yet, even though water provides more utility, it is cheaper than diamonds. Smith's puzzle came to be known as the diamond-water paradox. Now you can use marginal utility analysis to explain something that baffled the father of economics.

Early economists failed to find the key to the diamond-water puzzle because they did not distinguish between marginal and total utility. Marginal utility theory was not developed until the late nineteenth century. Water is life-giving and does indeed yield much higher total utility than diamonds. However, marginal utility, and not total

utility, determines the price. Water is plentiful in most of the world, so its marginal utility is low. This follows the law of diminishing marginal utility.

Jewelry-quality diamonds, on the other hand, are scarce. Because we have relatively few diamonds, the quantity of diamonds consumed is not large. As a result, the marginal utility of diamonds and the price buyers are willing to pay for them are quite high. Thus, scarcity raises marginal utility and price regardless of the size of total utility.

Exhibit 2 presents a graphical analysis that you can use to unravel the alleged paradox. Part (a) shows the marginal utility per carat you receive from each diamond consumed, and Part (b) represents marginal utility per gallon of water consumed. The vertical line, S , in each graph is the supply of water or diamonds available

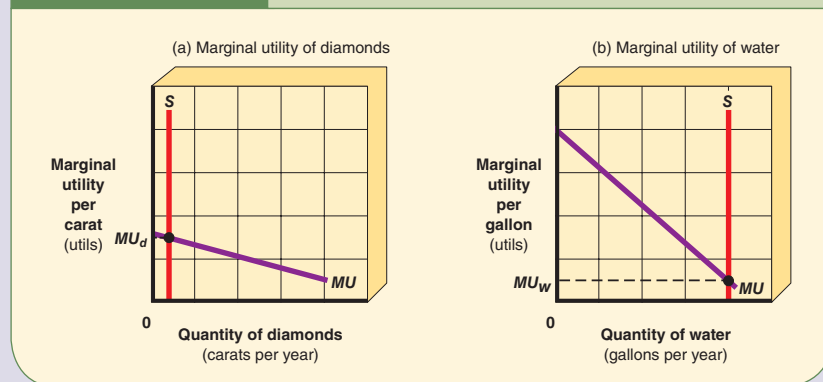


© Image copyright Le Do, 2009. Used under license from Shutterstock.com

per year. Since water is much more plentiful than diamonds, the supply curve for water intersects the marginal utility curve at MU_w , which is close to zero. Conversely, the supply curve for diamonds intersects the marginal utility curve at a much higher marginal utility, MU_d . Because of the relative marginal utilities of water and diamonds, you are willing to pay much more for one more carat of a diamond than for one more gallon of water.

Exhibit 2

The Diamond-Water Paradox



ANALYZE THE ISSUE

1. Can you imagine a situation in which water would be more expensive than diamonds?
2. Suppose the price per gallon of water is 1 cent and the price per carat of a diamond is \$10,000. Is the total utility of diamonds 10,000 times as great as the total utility received from water?

conforms to the **law of diminishing marginal utility**. The law of diminishing marginal utility is the principle that the extra satisfaction provided by a good or service declines as people consume more in a given period. Economists have found that this is a universal principle of human consumption behavior.

Exhibit 1(a) is a marginal utility, MU , graph. Consistent with the law of diminishing marginal utility, the MU curve slopes downward as you consume more Big Macs. This reflects a steady decline in the utility of each additional Big Mac consumed. If you continued to eat Big Macs, a quantity of Big Macs is eventually reached at which the marginal utility is zero. Here you say to yourself, “If I eat another bite, I’ll be sick.” Then if you did eat another bite after all, marginal utility would be negative. A rational person never consumes goods when the marginal utility is negative (disutility) unless he or she is paid enough to do so. In our example, we assume you are rational and will not eat a Big Mac that gives you a negative marginal utility and a stomach ache. Also keep in mind that the MU curve for a good is different for different circumstances and individuals. Your MU curve would be much higher if you had not eaten in days. On the other hand, a vegetarian would receive no positive marginal utility from consuming a Big Mac.

Exhibit 1(b) shows how the shape of the total utility, TU , curve varies with marginal utility as you consume more Big Macs each day. The total utility of Big Macs increases steadily because each hamburger provides *additional* satisfaction to the sum of all the Big Macs already consumed. However, the TU curve becomes flatter as the marginal utility diminishes. This is because, as you consume more, the positive pleasure per Big Mac declines and, in turn, each Big Mac adds less to total utility.

Law of diminishing marginal utility

The principle that the extra satisfaction of a good or service declines as people consume more in a given period.

Consumer Equilibrium

We will now make our example of consumer choice more realistic. Let’s examine how Bob Moore, a sophomore at Seaview College, might behave, given a limited budget and the choice between two goods. Suppose Bob goes to McDonald’s for lunch with \$8 in his pocket to spend for Big Macs and milkshakes. The price of a

<i>Exhibit 3</i>		Marginal Utility for Big Macs and Milkshakes (Utils per Day)		
Quantity	Big Macs		Milkshakes	
	MU	MU/P	MU	MU/P
1	8	4	6	3
2	4	2	4	2
3	2	1	1	1/2
4	1	1/2	0	0

NOTE: The price per Big Mac and per milkshake is \$2.

Big Mac is \$2, and the price of a milkshake is also \$2. How can Bob enjoy the maximum total utility with his limited money?

Recall from Chapter 2 the concept of *marginal analysis*. This is the method Bob uses to decide how many Big Macs and milkshakes to order. Exhibit 3 shows Bob's marginal utility for each Big Mac and milkshake consumed. The *marginal utility per dollar (MU/P)* is the ratio of the marginal utility of each good to its price. In making purchases, the key consideration is how additional satisfaction relates to price. Using marginal decision making before giving an order, Bob compares the marginal utility of one Big Mac to the marginal utility of one milkshake. Being a rational consumer, Bob sees that spending his first \$2 on a Big Mac gives more “bang for the buck.” The first Big Mac gives him 4 utils per dollar, but the same \$2 spent on a milkshake gives him 3 utils per dollar. Next, Bob ponders how to spend his next \$2. The best buy now is a milkshake because it gives 3 utils per dollar compared to 2 utils per dollar for a second Big Mac.

Spending Bob's last \$4 is a tossup. Both the second Big Mac and the second milkshake give the same 2 utils per dollar. So Bob can spend \$2 for a second Big Mac and his last \$2 for a second milkshake. Or he can spend \$2 for a second milkshake and his last \$2 for a second Big Mac. The order does not matter. Now that Bob has spent all his income, the marginal utility per dollar of the last Big Mac is equal to the marginal utility per dollar of the last milkshake.

CONCLUSION *If the marginal utility per last dollar spent on each good is equal and the entire budget is spent, total utility is maximized.*

To convince yourself that two Big Macs and two milkshakes do indeed maximize total utility, consider any other combination Bob could buy with \$8. All others yield lower total utility. Suppose Bob were to buy three Big Macs and one milkshake. The third Big Mac adds 2 utils, but giving up the second milkshake subtracts 4 utils. As a result, total utility falls by 2 utils. Or can Bob maximize utility if he were to eat only one Big Mac and drink three milkshakes? The extra utility of the third milkshake is 1 util, but this is less than the 4 utils he would lose by saying no to the second Big Mac. In this case, total utility would fall by 3 utils.

The above example demonstrates the utility-maximizing concept of **consumer equilibrium**. Consumer equilibrium is a condition in which total utility cannot increase by spending more of a given budget on one good and spending less on another good. Suppose Bob knows not only the exact marginal utility of consuming Big Macs and milkshakes, but also the marginal utility of french fries, pizza, and other goods. To obtain the highest possible satisfaction, Bob allocates his budget so the last dollar spent on good *A*, the last on good *B*, and so on yield equal *MU/P* ratios. Consumer equilibrium can be restated algebraically as

$$\frac{\text{MU of good } A}{\text{Price of good } A} = \frac{\text{MU of good } B}{\text{Price of good } B} = \frac{\text{MU of good } Z}{\text{Price of good } Z}$$

The letters *A*, *B*, . . . *Z* indicate all the goods and services purchased by the consumer with a given budget.

Consumer equilibrium

A condition in which total utility cannot increase by spending more of a given budget on one good and spending less on another good.

From Consumer Equilibrium to the Law of Demand

Understanding the law of diminishing marginal utility and consumer equilibrium provides you with a new set of tools to explore the law of demand. Let's begin with a straightforward link between the law of diminishing marginal utility and the demand curve. Declining marginal utility from consuming more Big Macs and milkshakes means each extra quantity consumed is less important or valuable to the consumer. Therefore, as the quantity consumed increases and the marginal utility falls, Bob is willing to pay less per Big Mac and milkshake. Thus, Bob's individual demand curve conforms to the law of demand and is downward sloping.

A more complete explanation of the law of demand combines diminishing marginal utility and consumer equilibrium. Suppose Bob reaches consumer equilibrium as follows:

$$\begin{array}{rcl} \frac{\text{MU of Big Mac}}{\text{Price of Big Mac}} & = & \frac{\text{MU of milkshake}}{\text{Price of milkshake}} \\ \frac{4 \text{ utils}}{\$2} & = & \frac{4 \text{ utils}}{\$2} \end{array}$$

Now suppose the price of a Big Mac falls to \$1 and upsets the above equality. This changes the formula to the following:

$$\begin{array}{rcl} \frac{\text{MU of Big Mac}}{\text{Price of Big Mac}} & > & \frac{\text{MU of milkshake}}{\text{Price of milkshake}} \\ \frac{4 \text{ utils}}{\$1} & > & \frac{4 \text{ utils}}{\$2} \end{array}$$

Now Bob gains more utility per dollar by buying a Big Mac rather than a milkshake. To restore maximum total utility, he spends more on Big Macs. The marginal utility of a Big Mac must fall as he buys more. At the same time, the marginal utility of a milkshake must rise as Bob buys fewer. A fall in the price of Big Macs therefore causes Bob to buy more Big Macs. Voilà! The law of demand.

CHECKPOINT

When Dining Out, Do You Eat Smart?

Welcome to Jose's Hacienda! Beside each dish, the menu lists the total utility from each item. If you have \$15 to spend, which meal will you order to achieve consumer equilibrium?

Jose's Hacienda Menu

Tacos – \$3 each	Flan* – \$2 each	Coke – \$1 each
1 taco (99 utils)	1 flan (40 utils)	1 Coke (25 utils)
2 tacos (162 utils)	2 flans (48 utils)	2 Cokes (29 utils)
3 tacos (174 utils)	3 flans (50 utils)	3 Cokes (32 utils)

*Mexican dessert.



INCOME AND SUBSTITUTION EFFECTS AND THE LAW OF DEMAND

Since utility is not measurable, it is desirable to have an alternative explanation of demand. Economists offer the following two complementary explanations for the law of demand, which do not rely on utility.

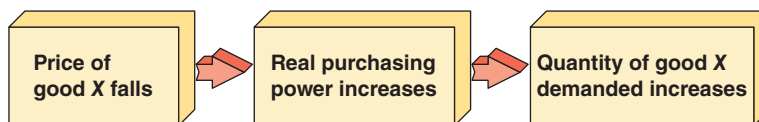
Income Effect

One reason people buy more of a good when the price falls is the effect of a price change on real income. The *nominal*, or *money*, amount of your paycheck is simply the number of dollars you earn. On the other hand, price changes alter your *real* income. A rise in prices decreases purchasing power, and a fall in prices increases purchasing power, *ceteris paribus*.

Suppose your weekly nominal income is \$100 and you decide to stock up on Pepsi-Cola (a normal good). If the price per quart is \$1, you can afford to buy 100 quarts this week. If the price is instead \$0.50 per quart and the prices of other goods remain constant, you are richer because of the rise in purchasing power. As a result, you can buy 200 quarts of Pepsi-Cola without giving up any other goods, or less than 200 quarts and more of other goods. As predicted by the law of demand, the lower price for Pepsi-Cola causes real income to rise and, in turn, causes the quantity demanded to rise. This relationship between changes in real income and your ability to buy goods and services is the **income effect**. The income effect is the change in quantity demanded of a good or service caused by a change in real income (purchasing power).

Income effect

The change in quantity demanded of a good or service caused by a change in real income (purchasing power).

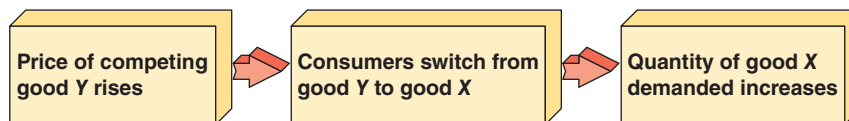


Substitution Effect

There is another reason why the change in a good's price causes a change in the quantity demanded. This reason has to do with changing *relative prices*, that is, the price of one good compared to that of another. If the price of Pepsi falls and the price of Coke remains unchanged, Pepsi becomes a better buy. As a result, many consumers will switch from Coke and other beverages and buy Pepsi. Just as the law of demand predicts, this is an increase in quantity demanded. With the price of Pepsi lower than before, the **substitution effect** causes people to substitute Pepsi for the now relatively more expensive Coke. The substitution effect is the change in quantity demanded of a good or service caused by a change in its price relative to substitutes.

Substitution effect

The change in quantity demanded of a good or service caused by a change in its price relative to substitutes.





You're The Economist Testing the Law of Demand with White Rats

Applicable Concept: substitution effect



Economists often envy the controlled laboratory experiments of biologists and other scientists. In the real world, the economist is unable to observe consumer behavior without prices of other goods, expectations, and other factors changing. So it is no wonder that the idea of studying the behavior of white rats to test the law of demand was intriguing. The question was whether the consumer choice of a white rat supports the downward-sloping demand curve.

Standard laboratory rats were placed in experimental cages with two levers. If a rat pressed one lever, nonalcoholic Collins mix was the reward. Pressing the second lever rewarded the rat with root beer. It seems rats are fond of these two beverages. Each rat was given a limited “income” of lever presses per day. After, say, 300 presses, a light above the lever went out, signaling the daily budget was gone. The next day the light was turned on, and the rat was given a new income of lever presses. The “price” of each good corresponded to the number of lever presses required to obtain one

milliliter of liquid. For example, if the number of pushes per milliliter for Collins mix released increased by 10 percent, this equaled a 10 percent increase in the price of Collins mix.

The crucial test was to measure the substitution effect resulting from a change in price. As explained in the text, a change in price sets in motion both an income effect and a substitution effect. In the experiment, the price of Collins mix was lowered by decreasing the number of pushes required per milliliter. At the same time, the price of root beer was raised by increasing the number of pushes required per milliliter. To eliminate the income effect, the number of lever presses was raised to compensate for loss of purchasing power. For example, if a rat purchased 4 milliliters of Collins mix per day and 11 milliliters of root beer before the price change, it would be given enough extra pushes after the price change to still purchase these quantities.

In one experiment, a male albino rat was given 300 pushes per day for two weeks, and both

liquids were priced at 20 pushes per milliliter. The rat soon settled into a consistent consumption pattern of 4 milliliters of Collins mix and 11 milliliters of root beer per day. Then the experimenters made changes in prices and income. The price (pushes per milliliter) of Collins mix was cut in half, and the price of root beer was doubled. At the same time, the total income of pushes was increased just enough to allow the rat to afford its initial consumption pattern. Stated differently, the income effect was eliminated in order to focus on the substitution effect. After two weeks of decisions under the new conditions, the rat changed its consumption pattern to 17 milliliters of Collins mix and 8 milliliters of root beer per day.

ANALYZE THE ISSUE

Based on the behavior of the rat described above, what do you conclude about the substitution effect and the slope of the demand curve?

SOURCE: John H. Kagel, Raymond C. Battalio, Howard Rachlin, and Leonard Green, “Demand Curves for Animal Consumers,” *Quarterly Journal of Economics* 96 (February 1981): 1–16.

Above we discussed the income and the substitution effects separately, but they are complementary explanations for the downward-sloping demand curve.

CONCLUSION *When the price of a normal good falls, the income effect and the substitution effect combine to cause the quantity demanded to increase.*

Some students express relief that this conclusion has no reference to the untidy word *utility*.



CHECKPOINT

Does the Substitution Effect Apply to Buying a Car?

Jenny Tanaka wants to buy a new car, and the annual gasoline expense is a major consideration. Her present car gets 25 miles per gallon (mpg), and she is looking at a new car that gets 40 mpg. Jenny now drives about 12,000 miles per year and pays \$3.25 per gallon of gasoline. She therefore calculates an annual gasoline consumption of 480 gallons for her 25-mpg car (12,000 miles/25 mpg) compared to 300 gallons consumed per year for the 40-mpg car (12,000 miles/40 mpg). Since driving the higher mileage car would use 180 gallons less per year, Jenny estimates the new car will save her \$585 in gasoline expense per year (180 gallons $\times$ \$3.25 per gallon). Suppose Jenny buys the 40-mpg car. Do you predict Jenny will have an annual gasoline savings equal to \$585, less than \$585, or more than \$585?

Key Concepts

Utility
Total utility
Marginal utility

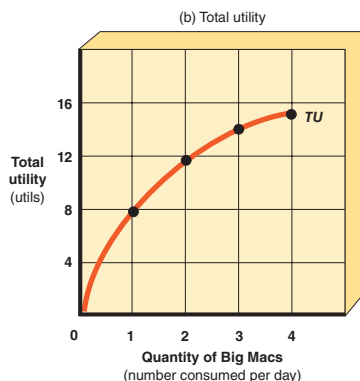
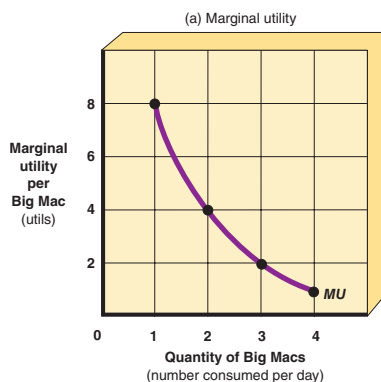
Law of diminishing marginal utility
Consumer equilibrium

Income effect
Substitution effect

Summary

- **Utility** is the satisfaction or pleasure derived from consumption of a good or service. Actual measurement of utility is impossible, but economists assume it can be measured by a fictitious unit called the *util*.
- **Total utility** is the total level of satisfaction derived from all units of a good or service consumed. **Marginal utility** is the change in total utility from a 1-unit change in the quantity of a good or service consumed.
- The **law of diminishing marginal utility** states that the marginal utility of a good or service eventually declines as consumption increases.
- **Consumer equilibrium** is the condition of reaching the maximum level of satisfaction, given a budget, when the marginal utility per dollar spent on each good purchased is equal. Consumer equilibrium and the law of diminishing marginal utility can be used to derive a downward-sloping demand curve. When the price of a good falls, consumer equilibrium no longer holds because the marginal utility per dollar for the good rises. To restore equilibrium, the consumer must increase consumption. As the quantity demanded increases, the marginal utility falls until equilibrium is again achieved. Thus, the price falls, and the quantity demanded rises, as predicted by the law of demand.

Relationship between Marginal and Total Utility



$$\frac{\text{MU of good A}}{\text{price of good A}} = \frac{\text{MU of good B}}{\text{price of good B}} = \frac{\text{MU of good Z}}{\text{price of good Z}}$$

- The **income effect** and **substitution effect** are complementary explanations for the law of demand. When the price changes, these effects work in combination to change the quantity demanded in the opposite direction. As the price falls, real purchasing power increases, causing an increase in the consumer's willingness and ability to purchase a good or service. This is the **income effect**. Also, as the price falls, the consumer substitutes the cheaper good for other goods that are now relatively more expensive. This is the **substitution effect**.

Summary of Conclusion Statements

- If the marginal utility per last dollar spent on each good is equal and the entire budget is spent, total utility is maximized.
- When the price of a normal good falls, the income effect and the substitution effect combine to cause the quantity demanded to increase.

Study Questions and Problems

1. Does a dollar given to a rich person raise the rich person's total utility more than a dollar given to a poor person raises the poor person's total utility?
2. Do you agree with the following statement? "If you like tacos, you should consume as many as you can."
3. This week you have gone to two parties. Assume the total utility you gained from these parties is 100 utils. Then you go to a third party, and your total utility rises to 110 utils. What is the marginal utility of the third party attended per week? Given the law of diminishing marginal utility, what will happen to total utility and marginal utility when you go to a fourth party this week?
4. Suppose your marginal utility for meals at the campus cafeteria this week has fallen to zero. Explain what has happened to your total utility curve derived from consuming these meals. Now explain what will happen to total utility if you eat more meals at the cafeteria this week.
5. Suppose you consume three pounds of beef and five pounds of pork per month. The price of beef is \$1.50 per pound, and pork is \$2.00 per pound. Assuming you have studied economics and achieved consumer equilibrium, what is the ratio of the marginal utility of beef to the marginal utility of pork?
6. Suppose the marginal utility of a Coke is 15 utils and its price is \$1. The marginal utility of a pizza is 20 utils, and its price is \$2. If you buy one unit of each good, will you achieve

consumer equilibrium? If not, how can greater total utility be obtained?

7. Explain the relationship between the law of diminishing marginal utility and the law of demand.
8. Consider the table below, which lists James's marginal utility schedule for steak and hamburger meals:

Steak meals per month	Marginal utility of steak meals	Price per steak meal	Hamburger meals per month	Marginal utility of hamburger meals	Price per hamburger meal
1	20	\$10	1	15	\$5
2	15	10	2	8	5
3	12	10	3	6	5
4	10	10	4	4	5
5	8	10	5	2	5

Given a budget of \$45, how many steak and hamburger meals will James buy per month to maximize his total utility? What is the total utility realized?

9. Using the marginal utility schedule in question 8, begin in consumer equilibrium, and assume the price per hamburger meal falls from \$5 to \$2, all other factors held constant. What is the total utility realized?
10. Suppose the price of a BMW falls. Explain the law of demand based on the income and substitution effects.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

When Dining Out, Do You Eat Smart?

Start with 1 taco (99 marginal utils/\$3, or 33 marginal utils/\$1). Then order a Coke (25 marginal utils/\$1). Next, order another taco (63 marginal utils/\$3, or 21 marginal utils/\$1). Now treat yourself to a flan (40 marginal utils/\$2, or 20 marginal utils/\$1). Finish it all with a second flan (4 marginal utils/\$1), another Coke

(4 marginal utils/\$1), and a third taco (4 marginal utils/\$1). You have now spent your entire \$15 budget. If you said, following the principle of consumer equilibrium, you would order 2 Cokes, 2 flans, and 3 tacos, although not a very nutritious choice, **YOU ARE CORRECT.**

Does the Substitution Effect Apply to Buying a Car?

Buying a higher mpg car will reduce the cost per mile of driving relative to substitutes, such as riding a bus, train, or airplane. As the cost of driving falls, the substitution effect predicts Jenny will drive more in the 40-mpg car than the 12,000 miles she now drives per year in the 25-mpg car. The extra cost of gasoline for driving over 12,000

miles per year in the 40-mpg car must be subtracted from the \$585 savings that was based on the assumption that Jenny's miles driven per year would remain unchanged when she bought the 40-mpg car. If you said Jenny will save less than \$585, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- As an individual consumes more of a given good, the marginal utility of that good to the consumer
 - rises at an increasing rate.
 - rises at a decreasing rate.
 - falls.
 - rises.
- The amount of added utility that a consumer gains from the consumption of one more unit of a good is called
 - incremental utility.
 - total utility.
 - diminishing utility.
 - marginal utility.
- A certain consumer buys only food and compact discs. If the quantity of food bought increases, while that of compact discs remains the same, the marginal utility of food will
 - fall relative to the marginal utility of compact discs.
 - rise relative to the marginal utility of compact discs.
 - rise, but not as fast as the marginal utility of compact discs rises.
 - fall, but not as fast as the marginal utility of compact discs falls.
- Rational consumers will continue to consume two goods until the
 - marginal utility per dollar's worth of the two goods is the same for the last dollar spent on each good.
 - marginal utility is the same for each good for the last dollar spent on each good.
 - prices of the two goods are equal for the last dollar spent on each good.
 - prices of the two goods are unequal.

Practice Quiz Continued

5. Assume that a person's consumption of just the right amounts of pork and chicken is in equilibrium. We can conclude that the
 - a. marginal utility of pork must equal the marginal utility of chicken.
 - b. price of pork must equal the price of chicken.
 - c. ratio of marginal cost to price must be the same in both the pork and the chicken markets.
 - d. ratio of marginal utility to price must be the same for pork and chicken.
6. Assume an individual consumes only milk and doughnuts and has arranged consumption so that the last glass of milk yields 12 utils and the last doughnut 6 utils. If the price of milk is \$1 per glass and the price of a doughnut is \$0.50, we can conclude that the
 - a. consumer should consume less milk and more doughnuts.
 - b. price of milk is too high relative to doughnuts.
 - c. consumer should consume more milk and fewer doughnuts.
 - d. consumer is in equilibrium.
7. Suppose an individual consumes pizza and cola. To reach consumer equilibrium, the individual must consume pizza and cola so that the
 - a. price paid for the two goods is the same.
 - b. marginal utility of the two goods is equal.
 - c. ratio of marginal utility to price is the same for both goods.
 - d. ratio of the marginal utility of cola to the marginal utility of pizza is 1.
8. A state of consumer equilibrium for goods consumed prevails when the
 - a. marginal utility of all goods is the same for the last dollar spent for each good.
 - b. marginal utility per dollar's worth of two goods is the same for the last dollar spent for each good.
 - c. price of two goods is the same for the last dollar spent for each good.
 - d. marginal cost per dollar spent on two goods is the same for the last dollar spent for each good.
9. The change in quantity demanded resulting from a change in purchasing power is known as the
 - a. income effect.
 - b. substitution effect.
 - c. law of demand.
 - d. consumer equilibrium effect.

Exhibit 4

Total Utility for Multiplex Tickets, Video Rentals, and Popcorn

Total utility from multiplex tickets	Total utility from video rentals	Total utility from popcorn
1 movie (30 utils)	1 video (14 utils)	1 bag (8 utils)
2 movies (54 utils)	2 videos (24 utils)	2 bags (13 utils)
3 movies (72 utils)	3 videos (30 utils)	3 bags (15 utils)
4 movies (84 utils)	4 videos (32 utils)	4 bags (16 utils)

10. In Exhibit 4, assume multiplex tickets cost \$6 each, video rentals cost \$2 each, and bags of popcorn cost \$1 each. What is the marginal utility of renting a third video?
 - a. 6 utils
 - b. 8 utils
 - c. 10 utils
 - d. 30 utils
11. In Exhibit 4, assume multiplex tickets cost \$6 each, video rentals cost \$2 each, and bags of popcorn cost \$1 each. Suppose the consumer has \$12 per week to spend on multiplex tickets, video rentals, and popcorn. What combination of goods will give the consumer the most utility?
 - a. 1 movie, 3 videos, and no popcorn
 - b. 1 movie, 2 videos, and 2 bags of popcorn
 - c. 1 movie, 1 video, and 4 bags of popcorn
 - d. 2 movies, no videos, and no bags of popcorn
12. In Exhibit 4, assume the multiplex tickets cost \$6 each, video rentals cost \$2 each, and bags of popcorn cost \$1 each. Suppose the consumer has \$12 per week to spend on multiplex tickets, video rentals, and popcorn. In consumer

Practice Quiz Continued

- equilibrium, what is the marginal utility per dollar for each of the three goods?
- a. 5 utils per dollar
 - b. 9 utils per dollar
 - c. 13 utils per dollar
 - d. 22 utils per dollar
13. The law of diminishing marginal utility exists for the first four units of a good if they have marginal utilities of
- a. 1, 2, 4, 8.
 - b. 8, 4, 1, 2.
 - c. 4, 8, 2, 1.
 - d. 8, 4, 2, 1.
14. The demand curve is downward-sloping because of the law of
- a. diminishing marginal utility.
 - b. diminishing consumer equilibrium.
 - c. consumer equilibrium.
 - d. diminishing utility maximization.
15. The total utilities associated with the first 5 units of consumption of good X are 15, 30, 40, 47, and 50, respectively. What is the marginal utility associated with the third unit?
- a. 15
 - b. 70
 - c. 85
 - d. 10
 - e. 45

6

Indifference Curve Analysis



This appendix explains another version of consumer choice theory based on indifference curves and budget lines.

CONSTRUCTING AN INDIFFERENCE CURVE

Let's begin with an experiment to find out a consumer's consumption preferences for quantities of two goods. The consumer samples a number of pairs of servings with various ounces of lobster tail and steak (surf and turf). Each time the same question is asked: "Would you prefer serving A or serving B?" After numerous trials, suppose the consumer states indifference between eating choices A–D shown in Exhibit A-1. This means the consumer is just as satisfied having either 7 ounces of steak and 4 ounces of lobster (A), or 3 ounces of steak and 8 ounces of lobster (D), or either of the other two combinations of B or C. Interpretation of the curve connecting these points is that each of these choices yields the same total utility because no choice is preferred to any other choice. Since, as explained in the chapter, there is no such thing as a utility meter, this approach is actually a method for determining equal levels of satisfaction or total utility for different bundles of goods without an exact measure of utils. The curve derived from this experimental data is called an **indifference curve**. Note that not only points A, B, C, and D but all other points on the smooth curve connecting them are equally satisfactory combinations to the consumer.

Indifference Curve

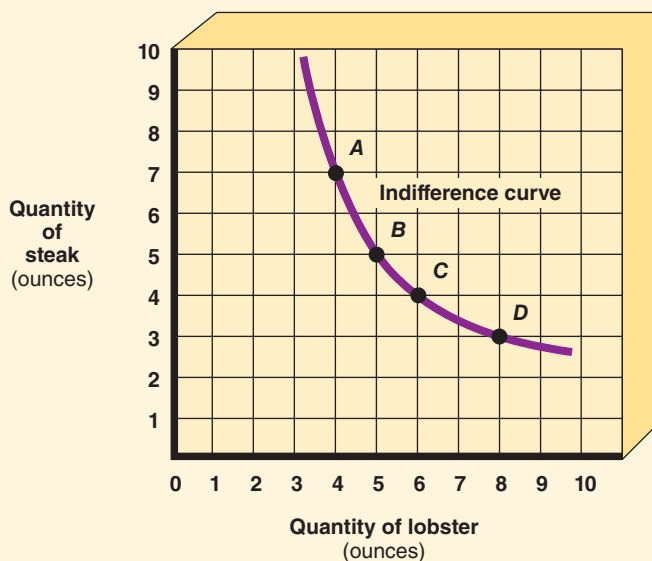
A curve showing the different combinations of two products that yield the same satisfaction or total utility to a consumer.

Why Indifference Curves Are Downward Sloping and Convex

If total utility is the same at all points along the indifference curve, then consuming more of one good must mean less of the other is consumed. Given this condition, movement along the indifference curve generates a curve with a negative slope. Suppose a consumer moves in marginal increments between any two combination

Exhibit A-1**A Consumer's Indifference Curve**

Points *A*, *B*, *C*, *D*, and each point along the curve represent a combination of steak and lobster that yields equal total utility for a given consumer. Stated differently, the consumer is indifferent between consuming servings having quantities represented by all points composing the indifference curve.

**An Indifference Schedule for a Consumer**

Choice	Steak (ounces)	Lobster (ounces)
<i>A</i>	7	4
<i>B</i>	5	5
<i>C</i>	4	6
<i>D</i>	3	8

points in Exhibit A-1. For instance, say the consumer decides to move from point *A* to point *B* and consume an extra ounce of lobster. To do so, the consumer increases total utility (+*MU*) by consuming an extra quantity of lobster.

However, since by definition total utility is constant everywhere along the curve, the consumer must give up a quantity of steak (2 ounces) in order to reduce total utility (−*MU*) by precisely enough to offset the gain in total utility from the extra lobster.

Marginal rate of substitution (MRS)

The rate at which a consumer is willing to substitute one good for another without a change in total utility. The *MRS* equals the slope of the indifference curve at any point on the curve.

The inverse relationship between goods along the downward-sloping indifference curve means that the absolute value of the slope of an indifference curve equals what is called the **marginal rate of substitution (MRS)**. The *MRS* is the rate at which a consumer is willing to substitute one good for another with no change in total utility. Begin at *A* and move to *B* along the curve. The slope and *MRS* of the curve is $-2/1$, or simply 2, when the minus sign is removed to give the absolute value. This is the consumer's subjective willingness to substitute *A* for *B*. At point *A*, the consumer has a substantial amount of steak and relatively little lobster. Therefore, the consumer is willing to forgo or "substitute" 2 ounces of steak to get 1 more ounce of lobster. In other words, the marginal utility of losing each ounce of steak between *A* and *B* is low compared to the marginal utility of gaining each ounce of lobster.

Now suppose the consumer moves from *B* to *C*, and the slope changes to $1/1$ ($MRS = 1$). Between these two points, the consumer is willing to substitute 1 ounce of steak for an equal quantity of lobster. This means that between *B* and *C* the marginal utility lost per ounce of steak equals the marginal utility gained from each ounce of lobster, while total utility remains constant. Finally, assume the consumer moves from *C* to *D*. Here the slope equals $1/2$ ($MRS = 1/2$) because the consumer at point *C* has a substantial amount of lobster and relatively little steak. Consequently, the marginal utility lost from giving up 1 ounce of steak equals twice the marginal utility gained from an additional ounce of lobster.

As we see in this example, as the quantity of lobster increases along the horizontal axis, the marginal utility of additional ounces of lobster decreases. Correspondingly, as the quantity of steak decreases along the vertical axis, its marginal utility increases. So moving down the curve means the consumer is willing to give up smaller and smaller quantities of steak on the vertical axis to obtain each additional ounce of lobster on the horizontal axis.

CONCLUSION *The slope of the indifference curve is negative and equal to the marginal rate of substitution (MRS), which declines as one moves downward along the curve. The result is a curve with a diminishing slope that is convex (bowed inward) to the origin.*

The Indifference Map

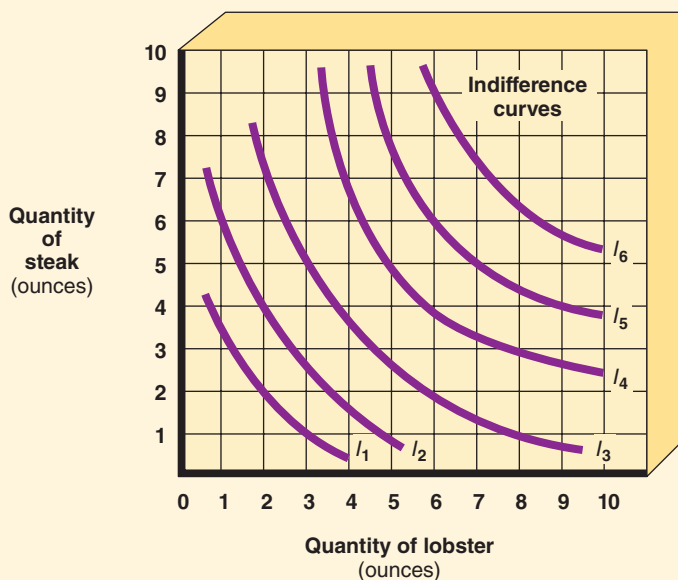
As explained above, any point selected along an indifference curve gives the same level of satisfaction or total utility. Actually, there are other indifference curves that can be drawn for a consumer. As shown in Exhibit A-2, indifference curves I_1 to I_6 also exist to form an **indifference map**, which is a selection of a consumer's indifference curves. In fact, if all possible curves were drawn, they would completely fill the space between the axes because there would be so many. And it is important to note that each curve reflects a different level of total utility. Also, each curve moving from the origin in the northeasterly direction from I_1 to I_6 and beyond yields higher total utility. This is reasonable because at each higher indifference curve the consumer is able to select more of both goods and therefore be better off. To verify this concept, select a combination on one indifference curve in Exhibit A-2, and then select a combination of more of both goods on a higher indifference curve.

Indifference map

A selection of indifference curves with each curve representing a different level of satisfaction or total utility.

*Exhibit A-2***A Consumer's Indifference Map**

An indifference map is a selected set of indifference curves. Along curves farther from the origin, it is possible to select more of both goods compared to indifference curves closer to the origin. Therefore, curves farther from the origin are preferred because they yield higher levels of total utility.



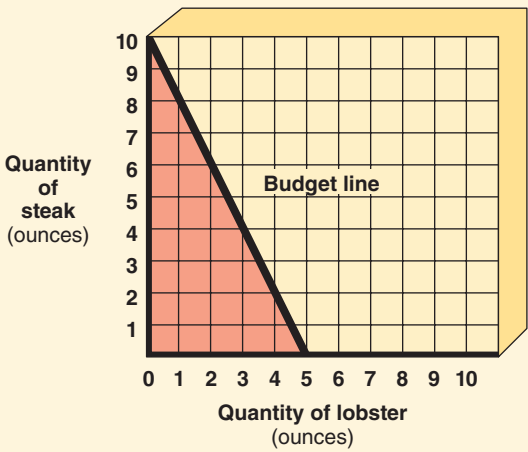
CONCLUSION *Each consumer has a set of indifference curves that form a map. Since consumers wish to achieve the highest possible total utility, they always prefer curves farther from the origin where they can select more quantities of two goods.*

The Budget Line

Having considered the consumer's preferences for steak and lobster in the indifference map, the next step is to see what the consumer can afford. The consumer's ability to purchase steak and lobster is limited or constrained by the amount of money (income) that the consumer has to spend and the prices of the two goods. Suppose the consumer likes to go to a fine restaurant and budgets \$10 per week to dine on surf and turf. The price of steak is \$1 per ounce, and the price of lobster is \$2 an ounce. If the consumer spends the entire budget on steak, 10 ounces of steak can be purchased. At the other extreme, the whole budget could be spent for lobster, and 5 ounces would be purchased. As shown in Exhibit A-3, and given the consumption possibilities of buying fractions of ounces of steak and

Exhibit A-3 A Consumer’s Budget Line

A budget line shows all the possible combinations of goods that can be purchased with a given budget and given prices for these goods.



Selected Whole-Unit Consumption Possibilities of Steak and Lobster Affordable with a \$10 Budget

Choice	Ounces of steak (price = \$1/ounce)	Ounces of lobster (price = \$2/ounce)	Total expenditure
A	10	0	\$10 (\$10 + \$0)
B	8	1	\$10 (\$8 + \$2)
C	4	3	\$10 (\$4 + \$6)
D	2	4	\$10 (\$2 + \$8)
E	0	5	\$10 (\$0 + \$10)

Budget line

A line that shows the different combinations of two goods a consumer can purchase with a given amount of money and prices for the goods.

lobster, a range of choices can be purchased along the **budget line** ranging from 10 ounces on the steak axis to 5 ounces on the lobster axis. The table in this exhibit computes selected whole-unit combinations that each equal a \$10 total expenditure.

CONCLUSION *The budget line represents various combinations of goods that a consumer can purchase at given prices with a given budget.*

Computing the slope of the budget line requires some shorthand mathematical notation. Let B represent the amount of money the consumer has to spend on steak and lobster. Also, let P_l and P_s represent the prices of lobster and steak, respectively, and L and S represent the ounces of lobster and steak, respectively. Given this notation, the budget line may be expressed as

$$P_l L + P_s S = B$$

In order to express the equation in slope-intercept form, divide both sides by P_s and get

$$\frac{P_l}{P_s} L + S = \frac{B}{P_s}$$

Solving for S yields

$$S = \frac{B}{P_s} - \frac{P_l}{P_s} L$$

Note that S is a linear function of L with a vertical intercept of B/P_s and a slope of $-P_l/P_s$. Since the price of lobster is \$2 an ounce and the price of steak is \$1 per ounce, the slope of the budget line is -2 , or 2 as an absolute value.

CONCLUSION *The slope of the budget line equals the ratio of the price of good X on the horizontal axis divided by the price of good Y on the vertical axis. Expressed as a formula:*

$$\text{slope of budget line} = P_x/P_y$$

A Consumer Equilibrium Graph

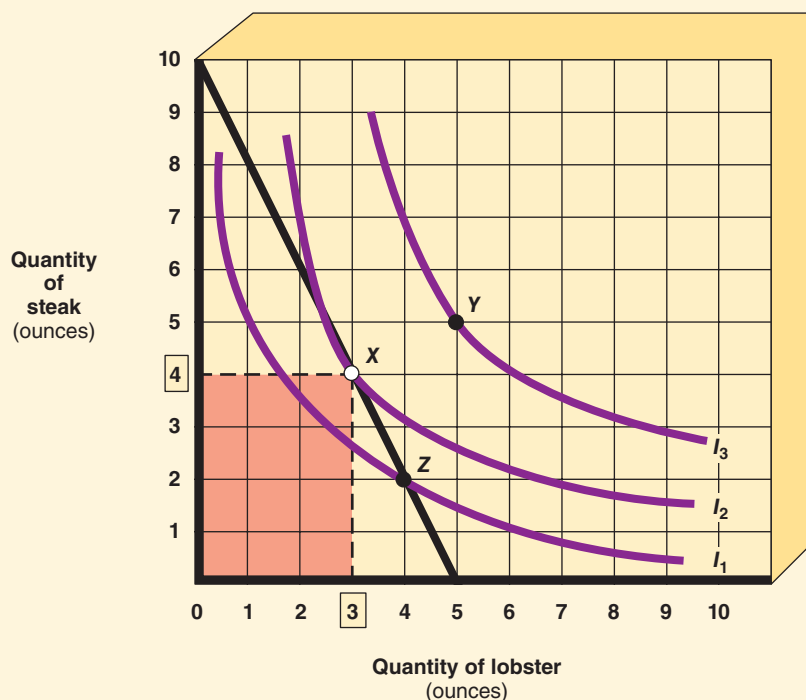
Exhibit A-4 shows the budget line from Exhibit A-3 superimposed on an indifference map. This allows us to easily compare consumer preferences and affordability. The utility-maximizing combination is the equilibrium point X where the budget line is just tangent to the highest attainable indifference curve I_2 , and the quantity of steak purchased is 4 ounces and the quantity of lobster is 3 ounces.

As explained in Exhibit A-5 of the appendix to Chapter 1, the slope of a straight line tangent to a curve is equal to the slope of the curve at that point. This mathematical relationship translates into the economic interpretation of the tangency condition in this appendix. At the point of tangency, the MRS equals the slope of the budget line. At point X , the slope is the price ratio $P_l/P_s = 2$ from Exhibit A-3, and, therefore, it follows that $MRS = 2$ at point X on curve I_2 in Exhibit A-4. At any other combination, the MRS will not be equal to the price ratio, and the consumer will reallocate the budget until equilibrium is achieved at point X .

Exhibit A-4

Consumer Equilibrium

Consumer equilibrium is at point X, where the budget line is tangent to the highest attainable indifference curve, I_2 . Only at this point does the marginal rate of substitution (MRS) along I_2 equal the slope of the budget line, which equals the price ratio P_l/P_s . Although point Y is on a higher curve, I_3 , and would yield a greater total utility than X, point Y is beyond the budget line and therefore is unattainable by the consumer. Point Z is on a lower indifference curve, but it will not be chosen. The consumer can move upward along the budget line by shifting dollars from purchases of lobster to purchases of steak and reach point X on the higher indifference curve I_2 .



CONCLUSION Consumer equilibrium occurs where the budget line is tangent to the highest attainable indifference curve. At this unique point, $MRS = \text{slope}$ (price ratio of P_x/P_y).

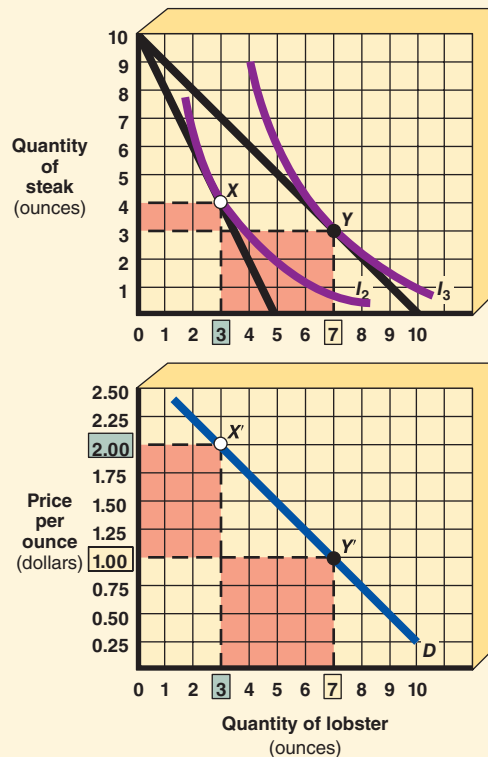
Derivation of the Demand Curve

This appendix concludes with Exhibit A-5, which shows how the demand curve for lobster can be derived from a map of two indifference curves. The table in this exhibit reproduces the table from Exhibit A-3 and adds column (4) with the price

Exhibit A-5 Deriving the Demand Curve

In the top part of this exhibit, the initial budget line intersects the highest attainable indifference curve, I_2 , at point X with the price of steak equal to \$1 per ounce and the price of lobster equal to \$2 per ounce. Holding the budget and the price of steak constant at \$10 and \$1, respectively, the price of lobster drops to \$1 per ounce. As a result, the budget line shifts to intersect the higher indifference curve, I_3 , at point Y.

The bottom part of the exhibit corresponds points X and Y to points X' and Y'. At \$2 per ounce for lobster, the consumer buys 3 ounces. At \$1 per ounce for lobster, the consumer buys 7 ounces. Connecting these two points results in a downward-sloping demand curve.



Selected Whole-Unit Combinations of Steak and Lobster Affordable with a \$10 Budget

(1) Choice	(2) Ounces of steak (price = \$1/ounce)	(3) Ounces of lobster (price = \$2/ounce)	(4) Ounces of lobster (price = \$1/ounce)	(5) Total expenditure
A	10	0	\$0	\$10 (\$10 + \$0)
B	8	1	2	\$10 (\$8 + \$2)
C	4	3	6	\$10 (\$4 + \$6)
D	2	4	8	\$10 (\$2 + \$8)
E	0	5	10	\$10 (\$0 + \$10)

of lobster equal to \$1 per ounce, rather than \$2 per ounce. Now compare columns (3) and (4) in the table. Holding the price of steak constant at \$1 per ounce and the budget equal to \$10, the consumer can afford to purchase more lobster at each choice except *A* where the entire budget is spent on steak. The top graph is drawn from Exhibit A-4 where at point *X* the price of lobster is \$2 per ounce and the quantity demanded of lobster is 3 ounces. In the bottom graph of Exhibit A-5, this is one point on the demand curve for lobster at *X'*. To find another point on the demand curve, we decrease the price of lobster to \$1 per ounce and trace the new budget line points from column (4) of the table onto the top graph. The budget line swings outward along the horizontal axis, but the original vertical intercept remains unchanged. The reason the vertical axis remains at 10 ounces of steak is because the price of steak is still at \$1 per ounce, and if the consumer spends the entire \$10 on steak, then the price of lobster is irrelevant to the vertical intercept. However, at a lower price for lobster, the consumer can afford more lobster moving downward along the new budget line with the same \$10 budget because lobster is cheaper.

Given the new budget line shown in the top graph in Exhibit A-5, the consumer finds that higher indifference curve I_3 is now attainable. As a result, consumer equilibrium moves from point *X* to point *Y*, where 7 ounces of lobster are purchased. This gives the corresponding second point *Y'* shown in the lower graph. Connecting these two points allows us to draw the consumer's demand curve for lobster. Voilà! Consistent with the law of demand, the demand curve is indeed downward sloping.

Key Concepts

Indifference curve

Marginal rate of substitution (MRS)

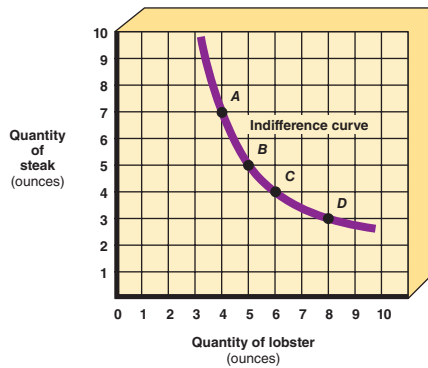
Indifference map

Budget line

Summary

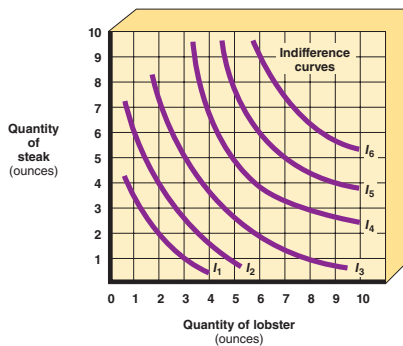
- An *indifference curve* shows the different quantity combinations of two goods that give the same satisfaction or total utility to a consumer.

Indifference Curve



- The *marginal rate of substitution* (MRS) is the rate at which a consumer is willing to substitute one good for another with no change in total utility.
- An *indifference map* is a selection of a consumer's indifference curves.

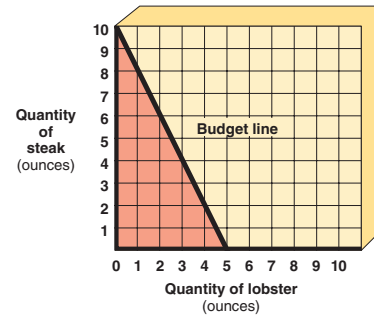
Indifference Map



- The *budget line* gives the different combinations of two goods that a consumer can purchase with a given amount of money and relative prices for the goods. The slope of

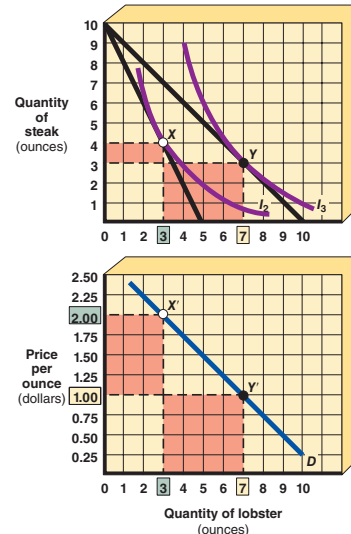
the budget line equals the price of the good on the horizontal axis divided by the price on the vertical axis.

Budget Line



- Consumer equilibrium* occurs where the budget line is tangent to the highest possible indifference curve, as shown originally at point X. If the price of one good falls, then the consumer equilibrium changes to point Y on a higher indifference curve. Connecting the two corresponding price-quantity points X' and Y' generates a downward-sloping demand curve.

Consumer Equilibrium



Summary of Conclusion Statements

- The slope of the indifference curve is negative and equal to the marginal rate of substitution (MRS), which declines as one moves downward along the curve. The result is a curve with a diminishing slope that is convex (bowed inward) to the origin.
- Each consumer has a set of indifference curves that form a map. Since consumers wish to achieve the highest possible total utility, they always prefer curves farther from the origin where they can select more quantities of two goods.
- The budget line represents various combinations of goods that a consumer can purchase at given prices with a given budget.
- The slope of the budget line equals the ratio of the price of good X on the horizontal axis divided by the price of good Y on the vertical axis. Expressed as a formula, slope = P_x/P_y .
- Consumer equilibrium occurs where the budget line is tangent to the highest attainable indifference curve. At this unique point, $MRS = \text{slope (price ratio of } P_x/P_y)$.

Study Questions and Problems

- Suppose a consumer's marginal rate of substitution is three slices of pizza for one coke. If the price of a coke is \$1 and the price of three slices of pizza is \$2, would the consumer change his or her consumption combination?
- Let M represent the quantity of medical services, such as the number of doctor visits, and let O represent the quantity of other goods purchased by a consumer in a given year. Let the budget (B) be in thousands of dollars and the price of medical services and other goods be in terms of dollars per unit, with $B = 60$, $P_m = 6$, and $P_o = 10$.
 - Graph the budget line and determine the slope.
 - Show the result if the price of medical services (P_o) decreases to \$5.
 - Add two indifference curves to the graph that are tangent to the budget line and explain the result.
- Assume that the data in the following table are an indifference curve for a consumer:
 - Graph this indifference curve and label "Quantity of Y " on the vertical axis and

"Quantity of X " on the horizontal axis. Label the points A – D .

- Assume the consumer's budget is \$12 and the prices of X and Y are \$1.00 and \$1.50, respectively. Draw the budget line in the above graph.
- What combination of X and Y will the consumer purchase?
- What is the value of the MRS and the slope (P_x/P_y) at consumer equilibrium?
- Beginning with the graph drawn in (a) above, explain and draw graphs to derive a demand curve for X .

Choice	Units of Y	Units of X
A	10	2
B	6	4
C	4	6
D	2	12

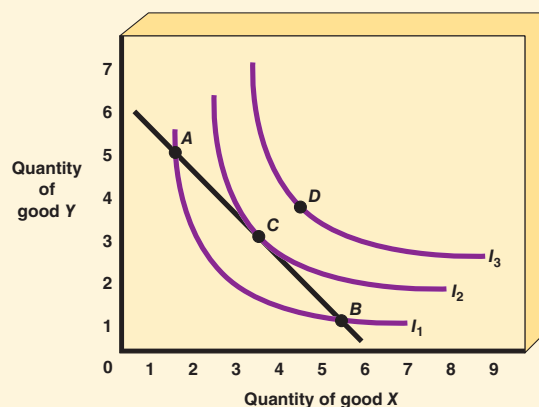
Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- An indifference curve consists of quantity combinations of two goods that yield
 - equal marginal utilities.
 - negative marginal utilities.
 - the same price ratios.
 - the same total satisfaction.
- The absolute value of the slope of an indifference curve is called the
 - marginal rate of transformation.
 - transitivity slope.
 - indifference rate of preference.
 - marginal rate of substitution.
- The slope of the indifference curve for goods X and Y is called the marginal
 - product rate.
 - rate of transformation.
 - rate of substitution.
 - rate of utility.
- Given the prices of two goods, all quantity combinations inside the budget line are
 - indifferent.
 - efficient.
 - unattainable.
 - attainable.
- Assume the price of good X is P_x , price of good Y is P_y , and B is the budget. The formula for the budget line for these two goods is
 - $P_y Q_y / P_x Q_x$.
 - $P_x B + P_y B = B$.
 - $P_x X + P_y Y = B$.
 - $(1 - P_y/B) P_x$.
- The ratio of the price of good X on the horizontal axis to the price of good Y on the vertical axis is the _____ of the budget line.
 - marginal rate
 - slope
 - marginal utility
 - equalization rate
- Assume P_x is the price of good X on the horizontal axis and P_y is the price of good Y on the vertical axis. The slope of the budget line equals
 - $P_y / P_x Y$.
 - $P_y Q_y / P_x Q_x$.
 - $(1 - P_y / P_x)$.
 - P_x / P_y .
- Consumer equilibrium occurs where the budget line is tangent to the
 - lowest possible indifference curve.
 - highest possible indifference curve.
 - utility-maximizing indifference curve.
 - utility-equalization indifference curve.
- Only at the point of consumer equilibrium does the marginal rate of substitution (MRS) equal
 - the slope of the budget line.
 - the slope of the indifference curve.
 - the price ratio.
 - all of the above.
- At point A in Exhibit A-6, consumers would be
 - spending all of their income but not maximizing total utility.
 - spending all of their income and maximizing total utility.

Exhibit A-6

A Consumer's Budget Line and Indifference Curves



Practice Quiz Continued

- c. maximizing total utility without spending all of their income.
 - d. none of the above.
11. The consumer equilibrium shown in Exhibit A-6 is located at point
- a. *A*.
 - b. *B*.
 - c. *C*.
 - d. *D*.
12. In Exhibit A-6, point *D* is
- a. a consumer equilibrium.
 - b. unattainable, given the consumer's current budget constraint.
 - c. a point that does not exhaust all of the consumer's income.
 - d. none of the above.

Production Costs



Suppose you dream of owning your own company. That's right! You want to be an entrepreneur. You crave the excitement of starting your own firm and making it successful. Instead of working for someone else, you want to be your own boss. You are under no illusions; it is going to take hard work and sacrifice.

You are an electrical engineer who is an expert at designing electronic components for cell phones and similar applications. So you quit your job and invest your nest egg in starting Computech (a mythical company). You lease factory space, hire employees, and purchase raw

materials, and soon your company's products begin rolling off the assembly line. And then you find production cost considerations influencing each decision you make in this new business venture.

The purpose of this chapter is to study production and its relationship to various types of costs. Whether your company is new and small or an international giant, understanding costs is essential for success. In this chapter and the next two chapters, you will follow Computech and learn the basic principles of production and the way various types of costs vary with output.



In this chapter, you will learn to solve these economics puzzles:

- Why would an accountant say a firm is making a profit and an economist say it is losing money?
- What is the difference between the short run and the long run?
- How can a company make a profit with a free Web site?

COSTS AND PROFIT

A basic assumption in economics is that the motivation for business decisions is profit maximization. Economists realize that managers of firms sometimes pursue other goals, such as contributing to the United Way or building an empire for the purpose of ego satisfaction. Nevertheless, the profit maximization goal has proved to be the best theory to explain why managers of firms choose a particular level of output or price. To understand profit as a driving force for business firms, we must distinguish between the way economists measure costs and the way accountants measure costs.

Explicit and Implicit Costs

Economists define the total opportunity cost of a business as the sum of *explicit costs* and *implicit costs*. **Explicit costs** are payments to nonowners of a firm for their resources. In our Computech example, explicit costs include the wages paid to labor, the rental charges for a plant, the cost of electricity, the cost of materials, and the cost of medical insurance. These resources are owned outside the firm and must be purchased with actual payments to these “outsiders.”

Implicit costs are the opportunity costs of using resources owned by the firm. These are opportunity costs of resources because the firm makes no actual payments to outsiders. When you started Computech, you gave up the opportunity to earn a salary as an electrical engineer for someone else’s firm. When you invested your nest egg in your own enterprise, you gave up the opportunity to earn interest. You also used a building you own to warehouse Computech products. Although you made no payment to anyone, you gave up the opportunity to earn rental payments.

Economic and Accounting Profit

In everyday use, the word *profit* is defined as follows:

$$\text{Profit} = \text{total revenue} - \text{total cost}$$

Economists call this concept *accounting profit*. This popular formula is expressed in economics as

$$\text{Accounting profit} = \text{total revenue} - \text{total explicit cost}$$

Explicit costs

Payments to nonowners of a firm for their resources.

Implicit costs

The opportunity costs of using resources owned by the firm.

*Exhibit 1***Computech's Accounting Profit versus Economic Profit**

Item	Accounting profit	Economic profit
Total revenue	\$500,000	\$500,000
Less explicit costs:		
Wages and salaries	400,000	400,000
Materials	50,000	50,000
Interest paid	10,000	10,000
Other payments	10,000	10,000
Less implicit costs:		
Forgone salary	0	50,000
Forgone rent	0	10,000
Forgone interest	0	5,000
Equals profit	<u>\$30,000</u>	<u>-\$35,000</u>

Because economic decisions include implicit as well as explicit costs, economists use the concept **economic profit** instead of accounting profit. Economic profit is total revenue minus explicit and implicit costs. Economic profit can be positive, zero, or negative (an economic loss). Expressed as an equation:

$$\text{Economic profit} = \text{total revenue} - \text{total opportunity costs}$$

or

$$\text{Economic profit} = \text{total revenue} - (\text{explicit costs} + \text{implicit costs})$$

Exhibit 1 illustrates the importance of the difference between accounting profit and economic profit. Computech must know how well it is doing, so you hire an accounting firm to prepare a financial report. The exhibit shows that Computech earned total revenue of \$500,000 in its first year of operation. Explicit costs for wages, materials, interest, and other payments totaled \$470,000. Based on standard accounting procedures, this left an accounting profit of \$30,000.

If the analysis ends with accounting profit, Computech is profitable. But accounting practice overstates profit. Because implicit costs are subjective and therefore difficult to measure, accounting profit ignores implicit costs. A few examples will illustrate the importance of implicit costs. Your \$50,000-a-year salary as an electrical engineer was forgone in order to spend all your time as the owner of Computech. Also forgone were \$10,000 in rental income and \$5,000 in interest that you would have earned during the year by renting your building and putting your savings in the bank. Subtracting both explicit and implicit costs from total revenue, Computech had an economic loss of \$35,000. The firm is failing to cover the opportunity costs of using its resources in the electronics industry. Thus, the firm's resources would earn a higher return if used for other alternatives.

How would you interpret a zero economic profit? It's not as bad as it sounds. Economists call this condition **normal profit**. Normal profit is the minimum profit

Economic profit

Total revenue minus explicit and implicit costs.

Normal profit

The minimum profit necessary to keep a firm in operation. A firm that earns normal profits earns total revenue equal to its total opportunity cost.

necessary to keep a firm in operation. Zero economic profit signifies there is just enough total revenue to pay the owners for all explicit and implicit costs. Stated differently, there is no benefit from reallocating resources to another use. For example, assume an owner earns zero economic profit, including an implicit (forfeited) cost of \$50,000 per year that could have been earned by working for someone else. This means the owner earned as much as would have been earned in the next best employment opportunity.

CONCLUSION *Since business decision making is based on economic profit rather than accounting profit, the word profit in this text always means economic profit.*



CHECKPOINT

Should the Professor Go or Stay?

Professor Martin is considering leaving the university and opening a consulting business. For her services as a consultant, she would be paid \$75,000 a year. To open this business, Professor Martin must convert a house from which she collects rent of \$10,000 per year into an office and hire a part-time assistant at a salary of \$15,000 per year. Also, she must withdraw \$10,000 from savings for miscellaneous expenses and forgo earning 10 percent interest per year. The university pays Professor Martin \$50,000 a year. Based only on economic decision making, do you predict the professor will leave the university to start a new business?

SHORT-RUN PRODUCTION COSTS

Having presented the basic definitions of total cost, the next step is to study cost theory. In this section, we explore the relationship between output and cost in the short run. In the next section, the time horizon shifts to the long run.

Fixed input

Any resource for which the quantity cannot change during the period of time under consideration.

Variable input

Any resource for which the quantity can change during the period of time under consideration.

Short Run versus Long Run

Suppose I ask you, “What is the difference between the short run and the long run?” Your answer might be that the short run is less than a year and the long run is over a year. Good guess, but wrong! Economists do not partition production decisions based on any specific number of days, months, or years. Instead, the distinction depends on the ability to vary the quantity of inputs or resources used in production. There are two types of inputs—*fixed inputs* and *variable inputs*. A **fixed input** is any resource for which the quantity cannot change during the period of time under consideration. For example, the physical size of a firm’s plant and the production capacity of heavy machines cannot easily change within a short period of time. They must remain as fixed amounts while managers decide to vary output. In addition to fixed inputs, the firm uses *variable inputs* in the production process. A **variable input** is any

resource for which the quantity can change during the period of time under consideration. For example, managers can hire fewer or more workers during a given year. They can also change the amount of materials and electricity used in production.

Now, we can link the concepts of fixed and variable inputs to the *short run* and the *long run*. The **short run** is a period of time so short that there is at least one fixed input. For example, the short run is a period of time during which a firm can increase output by hiring more workers (variable input), while the size of the firm's plant (fixed input) remains unchanged. The firm's plant is the most difficult input to change quickly. The **long run** is a period of time so long that all inputs are variable. In the long run, the firm can build new factories or purchase new machinery. New firms can enter the industry, and existing firms may leave the industry.

Short run

A period of time so short that there is at least one fixed input.

Long run

A period of time so long that all inputs are variable.

The Production Function

Having defined inputs, we can now describe how these inputs are transferred into outputs using a concept called **production function**. A production function is the relationship between the maximum amounts of output a firm can produce and various quantities of inputs. An assumption for the production function model we are about to develop is that the level of technology is fixed. Technological advances would mean more output is possible from a given quantity of inputs.

Exhibit 2(a) presents a short-run production function for Eaglecrest Vineyard. The variable input is the number of workers employed per day, and each worker is presumed to have equal job skills. The acreage, amount of fertilizer, and all other inputs are assumed to be fixed; therefore, our production model is operating in the short run. Employing zero workers produces no bushels of grapes. A single worker can produce 10 bushels per day, but a lot of time is wasted when one worker picks, loads containers, and transports the grapes to the winery. Adding a second worker raises output to 22 bushels per day because the workers divide the tasks and specialize. Adding four more workers raises total production to 50 bushels per day.

Production function

The relationship between the maximum amounts of output that a firm can produce and various quantities of inputs.

Marginal Product

The relationship between changes in total output and changes in labor is called the **marginal product** of labor. Marginal product is the change in total output produced by adding one unit of a variable input, with all other inputs used being held constant. When Eaglecrest increases labor from zero to one worker, output rises from zero to 10 bushels produced per day. This increase is the result of the addition of one worker. Therefore, the marginal product so far is 10 bushels per worker. Similar marginal product calculations generate the marginal product curve shown in Exhibit 2(b). Note that marginal product is plotted at the midpoints shown in the table because the change in total output occurs between each additional unit of labor used.

Marginal product

The change in total output produced by adding one unit of a variable input, with all other inputs used being held constant.

Law of diminishing returns

The principle that beyond some point the marginal product decreases as additional units of a variable factor are added to a fixed factor.

The Law of Diminishing Returns

A long-established economic law called the **law of diminishing returns** determines the shape of the marginal product curve. The law of diminishing returns states that beyond some point the marginal product decreases as additional units of a

Exhibit 2 Production Function and the Law of Diminishing Returns

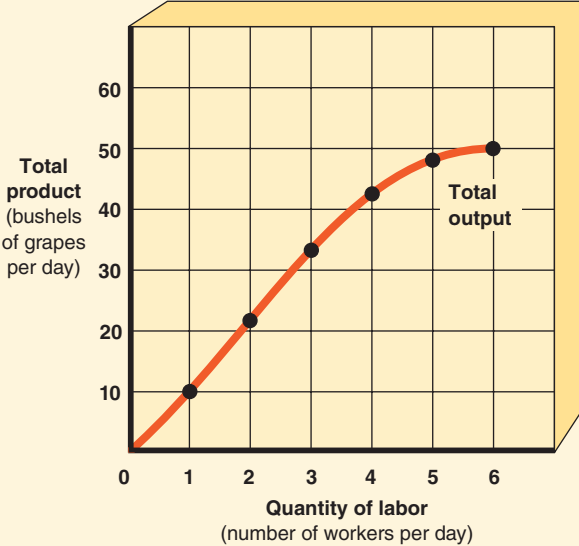
Part (a) shows how the total output of bushels of grapes per day increases as the number of workers increases while all other inputs remain constant. This figure is a short-run production function, which relates outputs to a one-variable input while all other inputs are fixed.

Part (b) illustrates the law of diminishing returns. The first worker adds 10 bushels of grapes per day, and the marginal product is 10 bushels per day. Adding a second worker adds another 12 bushels of grapes per day to total output. This is the range of increasing marginal returns. After two workers, diminishing marginal returns set in and marginal product declines continuously.

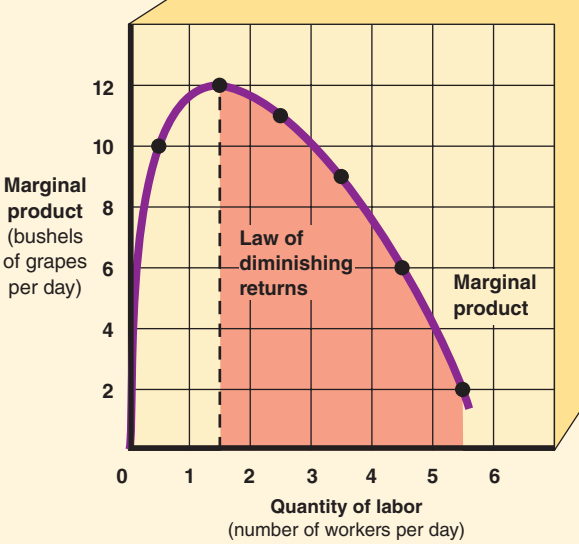
Short-Run Production Function of Eaglecrest Vineyard

(1) Labor Input (number of workers per day)	(2) Total Output (bushels of grapes per day)	(3) Marginal Product (bushels of grapes per day) [Δ(2)/Δ(1)]
0	0	
1	10	10
2	22	12
3	33	11
4	42	9
5	48	6
6	50	2

(a) Total output curve



(b) Marginal product curve



variable factor are added to a fixed factor. Because the law of diminishing returns assumes fixed inputs, this principle is a short-run, rather than a long-run, concept.

This law applies to production of both agricultural and nonagricultural products. Returning to Exhibit 2, we can identify and explain the law of diminishing returns in our Eaglecrest example. Initially, the total output curve rises quite rapidly as this firm hires the first two workers. The marginal product curve reflects the change in the total output curve because marginal product is the slope of the total output curve. As shown in Exhibit 2(b), the range from zero to two workers hired is called *increasing marginal returns*. In this range of output, the last worker hired adds more to total output than the previous worker.

Diminishing returns begin after the second worker is hired and the marginal product reaches its peak. Beyond two workers, diminishing returns occur, and the marginal product declines. The short-run assumption guarantees this condition. Eventually, marginal product falls because the amount of land per worker falls as more workers are added to fixed quantities of land and other inputs used to produce wine. Similar reasoning applies to the Computech example introduced in the chapter preview. Assume Computech operates with a fixed plant size and a fixed number of machines and all other inputs except the number of workers are fixed. Those in the first group of workers hired divide the most important tasks among themselves, specialize, and achieve increasing returns. Then diminishing returns begin and continue as Computech employs each additional worker. The reason is that as more workers are added, they must share fixed inputs, such as machinery. Some workers are underemployed because they are standing around waiting for a machine to become available. Also, as more workers are hired, there are fewer important tasks to perform. As a result, marginal product declines. In the extreme case, marginal product would be negative. At some number of workers, they must work with such limited floor space, machines, and other fixed inputs that they start stepping on each other's toes. No profit-seeking firm would ever hire workers with zero or negative marginal product. Chapter 11 explains the labor market in more detail and shows how Computech decides exactly how many workers to hire.

SHORT-RUN COST FORMULAS

To make production decisions in either the short run or the long run, a business must determine the costs associated with producing various levels of output. Using Computech, you will study the relationship between two “families” of short-run costs and output: first, the total cost curves, and next, the average cost curves.

Total Cost Curves

Total Fixed Cost As production expands in the short run, costs are divided into two basic categories—*total fixed cost* and *total variable cost*. **Total fixed cost (TFC)** consists of costs that do not vary as output varies and that must be paid even if output is zero. These are payments that the firm must make in the short run regardless

Total fixed cost (TFC)

Costs that do not vary as output varies and that must be paid even if output is zero. These are payments that the firm must make in the short run, regardless of the level of output.

of the level of output. Even if a firm, such as Computech, produces nothing, it must still pay rent, interest on loans, property taxes, and fire insurance. Fixed costs are therefore beyond management's control in the short run. The total fixed cost for Computech is \$100, as shown in column 2 of Exhibit 3.

Total variable cost (TVC)

Costs that are zero when output is zero and vary as output varies.

Total Variable Cost As the firm expands from zero output, total variable cost is added to total fixed cost. **Total variable cost (TVC)** consists of costs that are zero when output is zero and vary as output varies. These costs relate to the costs of variable inputs. Examples include wages for hourly workers, electricity, fuel, and raw materials. As a firm uses more input to produce output, its variable costs increase. Management can control variable costs in the short run by changing the level of output. Exhibit 3 lists the total variable cost for Computech in column 3.

Total cost (TC)

The sum of total fixed cost and total variable cost at each level of output.

Total Cost Given total fixed cost and total variable cost, the firm can calculate **total cost (TC)**. Total cost is the sum of total fixed cost and total variable cost at each level of output. As a formula:

$$TC = TFC + TVC$$

Total cost for Computech is shown in column 4 of Exhibit 3. Exhibit 4(a) uses the data in Exhibit 3 to construct graphically the relationships between total cost, total fixed cost, and total variable cost. Note that the TVC curve varies with the level of output and the TFC curve does not. The TC curve is simply the TVC curve plus the vertical distance between the TC and TVC curves, which represents TFC.

Average Cost Curves

In addition to total cost, firms are interested in the *per-unit cost*, or *average cost*. Average cost, like product price, is stated on a per-unit basis. The last three columns in Exhibit 3 are *average fixed cost (AFC)*, *average variable cost (AVC)*, and *average total cost (ATC)*. These average, or per-unit, curves are also shown in Exhibit 4(b). These three concepts are defined as follows:

Average fixed cost (AFC)

Total fixed cost divided by the quantity of output produced.

Average Fixed Cost As output increases, **average fixed cost (AFC)** falls continuously. Average fixed cost is total fixed cost divided by the quantity of output produced. Written as a formula:

$$AFC = \frac{TFC}{Q}$$

As shown in Exhibit 4(b), the AFC curve approaches the horizontal axis as output expands. This is because larger output numbers divide into TFC and cause AFC to become smaller and smaller.

*Exhibit 3***Short-Run Cost Schedule for Computech**

(1) Total Product (Q)	(2) Total Fixed Cost (TFC)	(3) Total Variable Cost (TVC)	(4) Total Cost (TC)	(5) Marginal Cost (MC)	(6) Average Fixed Cost (AFC)	(7) Average Variable Cost (AVC)	(8) Average Total Cost (ATC)
0	\$100	\$ 0	\$100		—	—	—
1	100	50	150	\$ 50	\$100	\$50	\$150
2	100	84	184	34	50	42	92
3	100	108	208	24	33	36	69
4	100	127	227	19	25	32	57
5	100	150	250	23	20	30	50
6	100	180	280	30	17	30	47
7	100	218	318	38	14	31	45
8	100	266	366	48	13	33	46
9	100	325	425	59	11	36	47
10	100	400	500	75	10	40	50
11	100	495	595	95	9	45	54
12	100	612	712	117	8	51	59

Average Variable Cost The **average variable cost (AVC)** in our example forms a U-shaped curve. Average variable cost is total variable cost divided by the quantity of output produced. Written as a formula:

$$AVC = \frac{TVC}{Q}$$

The AVC curve is also drawn in Exhibit 4(b). At first, the AVC curve falls, and then after an output of 6 units per hour, the AVC curve rises. Thus, the AVC curve is U-shaped. The explanation for the shape of the AVC curve is given in the next section.

Average variable cost (AVC)

Total variable cost divided by the quantity of output produced.

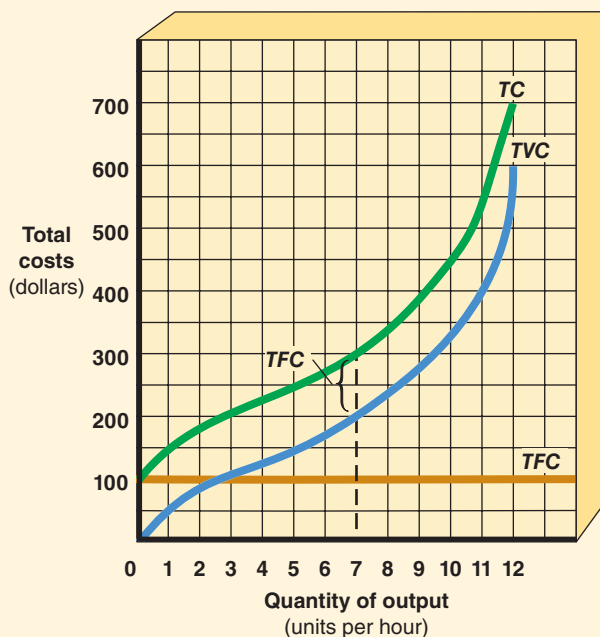
Exhibit 4

Short-Run Cost Curves

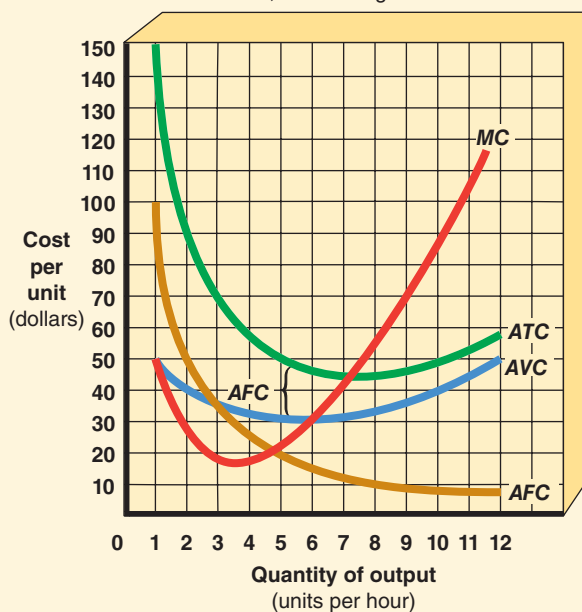
The curves in this exhibit are derived by plotting data from Exhibit 3. Part (a) shows that the total cost (TC) at each level of output is the sum of total variable cost (TVC) and total fixed cost (TFC). Because the TFC curve does not vary with output, the shape of the TC curve is determined by the shape of the TVC curve. The vertical distance between the TC and the TVC curves is TFC.

In part (b), the marginal cost (MC) curve decreases at first, then reaches a minimum, and then increases as output increases. The MC curve intersects both the average variable cost (AVC) curve and the average total cost (ATC) curve at the minimum point on each of these cost curves. The average fixed cost (AFC) curve declines continuously as output expands. AFC is also the difference between the ATC and the AVC curves at any quantity of output.

(a) Relationship of total cost to total variable cost and total fixed cost



(b) Relationship of marginal cost to average total cost, average variable cost, and average fixed cost



Average total cost (ATC)

Total cost divided by the quantity of output produced.

Average Total Cost Average total cost (ATC) is sometimes referred to as *per-unit cost*. The average total cost is total cost divided by the quantity of output produced. Written as a formula:

$$ATC = \frac{TC}{Q}$$

or

$$ATC = AFC + AVC$$

Like the AVC curve, the ATC curve is U-shaped, as shown in Exhibit 4(b). At first, the ATC curve falls because its component parts—AVC and AFC—are falling. As

output continues to rise, the *AVC* curve begins to rise, while the *AFC* curve falls continuously. Beyond the output of 7 units per hour, the rise in the *AVC* curve is greater than the fall in the *AFC* curve, which causes the *ATC* curve to rise in a U-shaped pattern.

Marginal Cost Marginal analysis asks how much it costs to produce an *additional* unit of output. Column 5 in Exhibit 3 is **marginal cost (MC)**. Marginal cost is the change in total cost when one additional unit of output is produced. Stated differently, marginal cost is the ratio of the change in total cost to a one-unit change in output. Written as a formula:

$$MC = \frac{\text{change in } TC}{\text{change in } Q}$$

Changing output by one unit at a time simplifies the marginal cost calculations in our Computech example. The marginal cost data are listed between output levels to show that marginal cost is the change in total cost as the output level changes. Exhibit 4(b) shows this marginal cost schedule graphically. In the short run, a firm's marginal cost initially falls as output expands, eventually reaches a minimum, and then rises, forming a J-shaped curve. Note that marginal cost is plotted at the mid-points because the change in cost actually occurs between each additional unit of output.

Exhibit 5 summarizes a firm's short-run cost relationships.

MARGINAL COST RELATIONSHIPS

Part (b) of Exhibit 4 presents two important relationships that require explanation. First, we will explain the rule that links the marginal cost curve to the average cost curves. Second, we will return to the marginal product curve in Exhibit 2(b) and explain its connection to the marginal cost curve.

The Marginal-Average Rule

Observe that the *MC* curve in Exhibit 4(b) intersects both the *AVC* curve and the *ATC* curve at their minimum points. This is not accidental. It is a result of a relationship called the **marginal-average rule**. The marginal-average rule states that when marginal cost is below average cost, average cost falls. When marginal cost is above average cost, average cost rises. When marginal cost equals average cost, average cost is at its minimum point. The marginal-average rule applies to grades, weights, and any average figure.

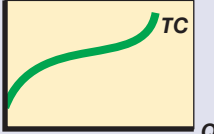
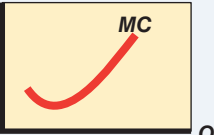
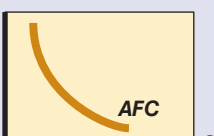
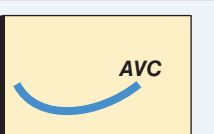
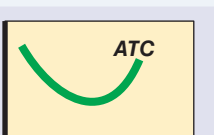
Perhaps the best way to understand this rule is to apply it to a noneconomic example. Suppose there are 20 students in your class and each student has a grade point average (GPA) of 4.0. The average GPA of the class is therefore 4.0. Now assume another student who has a GPA of 2.0 joins the class. The new average GPA of 21 students in the class falls to 3.9. The average GPA was pulled down because the *marginal* GPA of the additional student was lower than the *average*

Marginal cost (MC)

The change in total cost when one additional unit of output is produced.

Marginal-average rule

The rule that states when marginal cost is below average cost, average cost falls. When marginal cost is above average cost, average cost rises. When marginal cost equals average cost, average cost is at its minimum point.

Exhibit 5 Short-Run Cost Formulas		
Cost Concept	Formula	Graph
Total Cost (TC)	$TC = TFC + TVC$	
Marginal cost (MC)	$MC = \frac{\text{change in } TC}{\text{change in } Q}$	
Average fixed cost (AFC)	$AFC = \frac{TFC}{Q}$	
Average variable cost (AVC)	$AVC = \frac{TVC}{Q}$	
Average total cost (ATC)	$ATC = \frac{TC}{Q}$	

GPA of the other students. Now, suppose we start with a class of 20 students with a 2.0 GPA and add a student who has a 4.0 GPA. In this case, the new average GPA of the 21 students rises from 2.0 to 2.1. Thus, the *marginal* GPA of the last student was higher than the *average* GPA of all students in class before the addition of the new student.

Now consider the MC curve in part (b) of Exhibit 4. In the range of output from zero to 6 units per hour, the MC curve is below the AVC curve, and AVC is falling. Beyond 6 units per hour, the MC curve is above AVC, and AVC is rising. Hence, the relationship between AVC and MC conforms to the marginal-average rule. It follows that the MC curve intersects the AVC curve at its lowest point. This analysis also applies to the relationship between the MC and ATC curves. Initially, the MC curve is lower than the ATC curve until it reaches its minimum, causing the ATC curve to fall. Beginning with 8 units of output, the MC curve exceeds the ATC curve, causing the ATC curve to rise.

CHECKPOINT

Did Michael Jordan Beat the Marginal-Average Rule?

Michael Jordan, formerly of the Chicago Bulls, is one of the finest players in the history of basketball. Suppose he had an average of 33 points per game over the first 10 games of the season and then scored 20, 25, 40, 50, and 20 points in the next five games. Did Michael Jordan beat the marginal-average rule?



Marginal Cost's Mirror Image

Since the MC curve determines the U-shape of the AVC and ATC curves, we must explain the J-shape of the MC curve. Exhibit 6 illustrates that the shape of the MC curve is the mirror reflection of the shape of the marginal product (MP) curve. Comparing parts (a) and (b) of Exhibit 6 gives the following:

CONCLUSION *The marginal cost declines as the marginal product of a variable input rises if the wage rate is constant. Beginning at the point of diminishing returns, the marginal cost rises as the marginal product of a variable input declines.*

As explained earlier in this chapter, the law of diminishing returns is the declining portion of the MP curve that corresponds to the rising portion of the MC curve. To understand why this relationship exists, we return to the case of Eaglecrest Vineyard presented earlier in Exhibit 2. Now, we again assume that labor is the only variable input and add the new important assumption that the wage rate is constant at \$100 per day. When Eaglecrest moves from zero labor to hire one worker, its total output rises from zero to 10 bushels of grapes per day. As explained earlier, the marginal product is also 10 bushels, and the marginal cost is $\$100/10 = \$10$ ($\Delta TC / \Delta Q = \Delta TC / MP$). When Eaglecrest hires the second worker, total output rises by 12 bushels per day. Hiring this worker increases the firm's total cost by \$100, while the marginal product rises to 12 bushels. The marginal cost of the second worker therefore falls to a minimum at $\$100/12 = \$8.33$. At this point, it is noteworthy that the minimum point on the MC curve corresponds to the maximum point on the MP curve. The third worker hired yields only 11 additional bushels of grapes per day, so marginal cost rises to \$9.09. Thus, diminishing returns begin with the third worker, and the marginal cost continues to rise as more workers are hired.

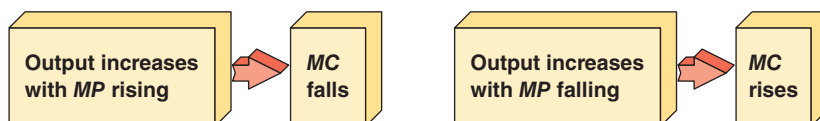
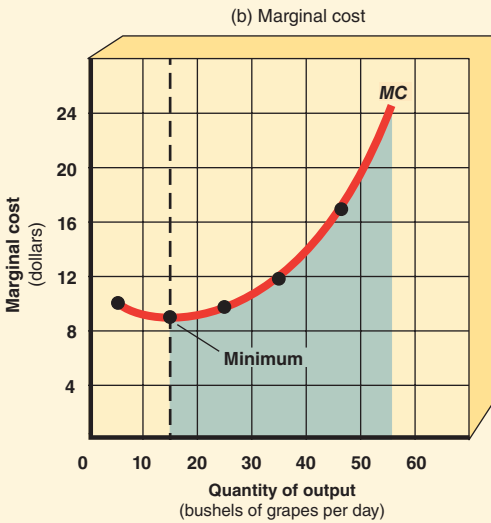
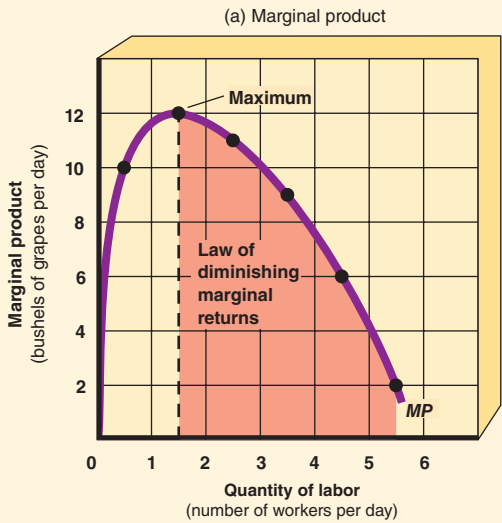


Exhibit 6 The Inverse Relationship between Marginal Product and Marginal Cost

Part (a) represents the marginal product of labor (*MP*) curve. At first, each additional worker hired adds more to output than does the previously hired worker, and the *MP* curve rises until a maximum is reached at two workers hired. At three workers, the law of diminishing returns sets in, and each additional worker hired adds less output than previously hired workers.

Part (b) shows the marginal cost (*MC*) curve is a J-shaped curve that is inversely related to the *MP* curve. Assuming the wage rate remains constant, as the *MP* curve rises, the *MC* curve falls. When the *MP* curve reaches a maximum at two workers, the *MC* curve is at a minimum. As diminishing returns set in and the *MP* curve falls, the *MC* curve rises.



(1) Labor Input (number of workers per day)	(2) Total Output (bushels of grapes per day)	(3) Marginal Product (bushels of grapes per day) [$\Delta(2)/\Delta(1)$]	(4) Total Cost per Day [\$100 $\times$ (1)]	(5) Marginal Cost [$\Delta(4)/(3)$]
0	0		\$ 0	
1	10	10	100	10.00
2	22	12	200	8.33
3	33	11	300	9.09
4	42	9	400	11.11
5	48	6	500	16.66
6	50	2	600	50.00

LONG-RUN PRODUCTION COSTS

As explained earlier in this chapter, the long run is a time period long enough to change the quantity of all fixed inputs. A firm can, for example, build a larger or smaller factory or vary the capacity of its machinery. In this section, we will discuss how varying factory size and *all* other inputs in the long run affects the relationship between production and costs.

Long-Run Average Cost Curves

Suppose Computech is making its production plans for the future. Taking a long-run view of production means the firm is not locked into a small, medium-sized, or large factory. However, once a factory of any particular size is built, the firm operates in the short run because the plant becomes a fixed input.

CONCLUSION *A firm operates in the short run when there is insufficient time to alter some fixed input. The firm plans in the long run when all inputs are variable.*

Exhibit 7 illustrates a situation in which there are only three possible factory sizes Computech might select. Short-run cost curves representing these three possible plant sizes are labeled $SRATC_s$, $SRATC_m$, and $SRATC_l$. SR is the abbreviation for short run, and ATC stands for average total cost. The subscripts s , m , and l represent small, medium, and large plant size, respectively. In the previous sections, there was no need to use SR for short run because we were discussing only short-run cost curves and not long-run cost curves.

Suppose Computech estimates that it will be producing an output level of 6 units per hour for the foreseeable future. Which plant size should the company choose? It will build the plant size represented by $SRATC_s$ because this affords a lower cost of \$30 per unit (point A) than the factory size represented by $SRATC_m$, which has a cost of \$40 per unit (point B).

What if production is expected to be 12 units per hour? In this case, the firm will choose the plant size represented by $SRATC_l$. At this plant size, the cost is \$30 per unit (point C), which is lower than \$40 per unit (point D).

CONCLUSION *The plant size selected by a firm in the long run depends on the expected level of production.*

Using the three short-run average cost curves shown in Exhibit 7, we can construct the firm's **long-run average cost curve (LRAC)**. The long-run average cost curve traces the lowest cost per unit at which a firm can produce any level of output after the firm can build any desired plant size. The $LRAC$ curve is often called the firm's planning curve. In Exhibit 7, the green shaded curve represents the $LRAC$ curve.

Exhibit 8 shows there are actually an infinite number of possible plant sizes from which managers can choose in the long run. As the intersection points of the short-run ATC curves move closer and closer together, the lumps in the $LRAC$

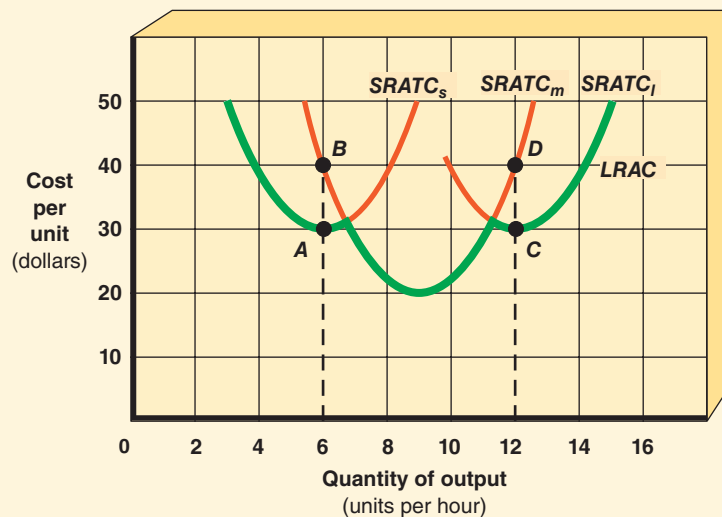
Long-run average cost curve (LRAC)

The curve that traces the lowest cost per unit at which a firm can produce any level of output when the firm can build any desired plant size.

Exhibit 7

The Relationship between Three Factory Sizes and the Long-Run Average Cost Curve

Each of the three short-run ATC curves in the exhibit corresponds to a different plant size. Assuming these are the only three plant-size choices, a firm can choose any one of these plant sizes in the long run. For example, a young firm may operate a small plant represented by the U-shaped short-run average total cost curve $SRATC_s$. As a firm matures and demand for its product expands, it can decide to build a larger factory, corresponding to either $SRATC_m$ or $SRATC_l$. The long-run average cost ($LRAC$) curve is the green shaded scalloped curve joining the short-run curves below their intersections.



curve in Exhibit 7 disappear. With a great variety of plant sizes, the corresponding short-run ATC curves trace a smooth $LRAC$ curve in Exhibit 8. When the $LRAC$ curve falls, the tangency points are to the left of the minimum points on the short-run ATC curves. As the $LRAC$ curve rises, the tangency points are to the right of the minimum points on the short-run ATC curves.

DIFFERENT SCALES OF PRODUCTION

Exhibit 8 depicts long-run average cost as a U-shaped curve. In this section, we will discuss the reasons why the $LRAC$ curve first falls and then rises when output expands in the long run. In addition, we will learn that the $LRAC$ curve can have a variety of shapes. Note that the law of diminishing returns is not an explanation here because in the long run there are no fixed inputs.

For simplicity, Exhibit 9 excludes possible short-run ATC curves that touch points along the $LRAC$ curve. Typically, a young firm starts small and builds larger plants as it matures. As the scale of operation expands, the $LRAC$ curve can follow three different patterns. Over the lowest range of output from zero to Q_1 , the firm experiences **economies of scale**. Economies of scale exist when the long-run average cost curve declines as the firm increases output.

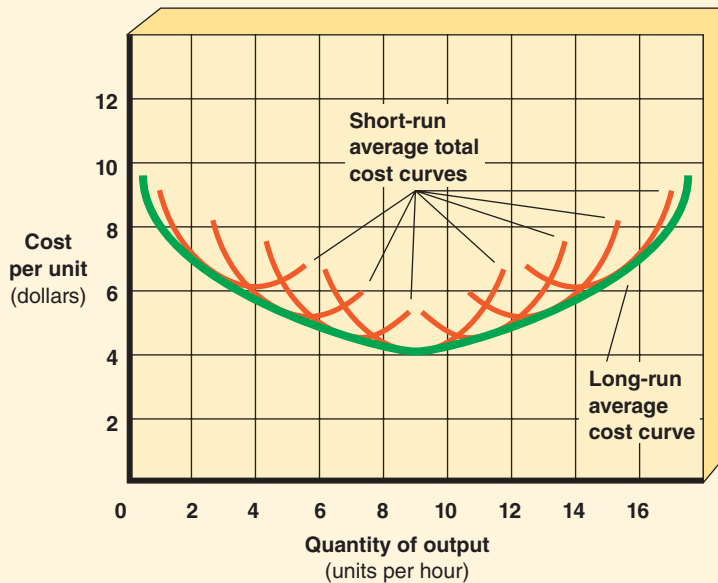
Economies of scale

A situation in which the long-run average cost curve declines as the firm increases output.

Exhibit 8

The Long-Run Average Cost Curve When the Number of Factory Sizes Is Unlimited

There are an infinite number of possible short-run *ATC* curves that correspond to different plant sizes. The long-run average cost (*LRAC*) curve is the green curve tangent to each of the possible red short-run *ATC* curves.



There are several reasons for economies of scale. First, a larger firm can increase its *division of labor* and *use of specialization*. Adam Smith noted in *The Wealth of Nations*, published in 1776, that the output of a pin factory is greater when one worker draws the wire, a second straightens it, a third cuts it, a fourth grinds the point, and a fifth makes the head of the pin. As a firm initially expands, having more workers allows managers to break a job into small tasks. Then each worker—including managers—can specialize by mastering narrowly defined tasks rather than trying to be a jack-of-all-trades.¹ The classic example is Henry Ford's assembly line, which greatly reduced the cost of producing automobiles. Today, McDonald's trains its workers at "Hamburger University"; then some workers prepare food, some specialize in taking orders, and a few workers specialize in the drive-through window operation.

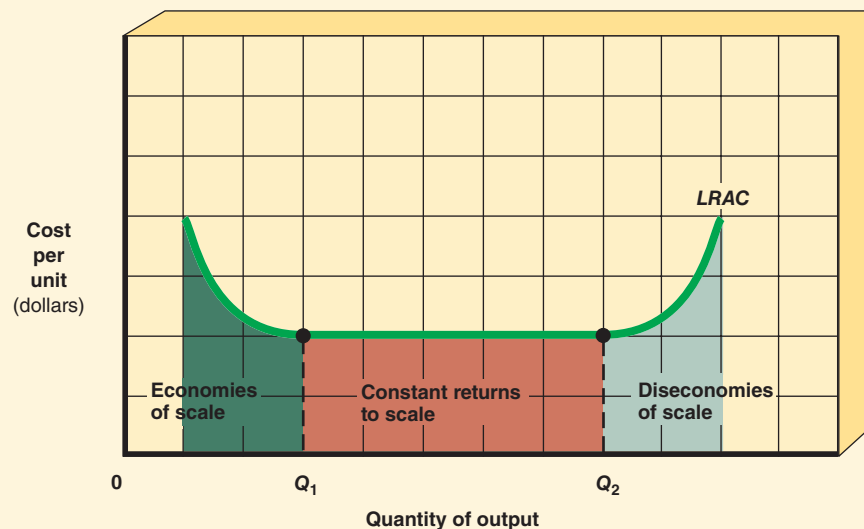
Second, economies of scale result from greater *efficiency of capital*. Suppose machine A costs \$1,000 and produces 1,000 units per day. Machine B costs \$4,000, but it is technologically more efficient and has a capacity of 8,000 units per day. The low-output firm will find it too costly to purchase machine B, so it uses machine A, and its average cost is \$1. The large-scale firm can afford to purchase machine B and produce more efficiently at a per-unit cost of only \$0.50.

1. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776; repr., New York: Random House, 1937), 4–6.

Exhibit 9

A Long-Run Average Cost Curve with Constant Returns to Scale

The long-run average cost (*LRAC*) curve illustrates a firm that experiences economies of scale until output level Q_1 is reached. Between output levels Q_1 and Q_2 , the *LRAC* curve is flat, and there are constant returns to scale. Beyond output level Q_2 , the firm experiences diseconomies of scale, and the *LRAC* curve rises.



The *LRAC* curve may not turn upward and form the U-shaped cost curve in Exhibit 8. Between some levels of output, such as Q_1 and Q_2 in Exhibit 9, the *LRAC* curve no longer declines. In this range of output, the firm increases its plant size, but the *LRAC* curve remains flat. Economists call this situation **constant returns to scale**. Constant returns to scale exist when the long-run average cost curve does not change as the firm increases output. Economists believe this is the shape of the *LRAC* curve in many real-world industries. The scale of operation is important for competitive reasons. Consider a young firm producing less than output Q_1 and competing against a more established firm producing in the constant-returns-to-scale range of output. The *LRAC* curve shows that the older firm has an average cost advantage.

As a firm becomes large and expands output beyond some level, such as Q_2 in Exhibit 9, it encounters **diseconomies of scale**. Diseconomies of scale exist when the long-run average cost curve rises as the firm increases output. A very large-scale firm becomes harder to manage. As the firm grows, the chain of command lengthens, and communication becomes more complex. People communicate through forms instead of direct conversation. The firm becomes too bureaucratic, and operations bog down in red tape. Layer upon layer of managers are paid big salaries to shuffle papers that have little or nothing to do with beating the competition by producing output at a lower cost. Consequently, it is no surprise that a firm can become too big, and these management problems can cause the average cost of production to rise.

Constant returns to scale

A situation in which the long-run average cost curve does not change as the firm increases output.

Diseconomies of scale

A situation in which the long-run average cost curve rises as the firm increases output.

You're The Economist

Why Is That Web Site You're Using Free?

Applicable Concepts: economies and diseconomies of scale



Pick the best price that you wish to pay for a product. Is zero reserved only for those who believe in Santa Claus? Recall the famous saying by economist Milton Friedman that “there’s no such thing as a free lunch.” Well, today more and more Web companies are using digital technology and the principles of *freeconomics* to make profits by giving something away free of charge. And the key to understanding this radical business model is the concept of economies of scale.

How is it possible for companies to cover their production costs with a price of zero? Don’t Web businesses have huge fixed costs to buy computer servers and design Web pages? This is true, but once the servers are powered up and the sites are online, the cost of logging in each additional customer is very small. Then, as the companies’ scale expands over time, the cost of servers, bandwidth, and software are spread out over millions of users, and the long-run cost curve declines to almost zero, which is economies of scale.¹

In the Web land of free payments called *freemiums*, the basic idea is to shift from the view of a market price matching buyers and sellers of a product to a free system with many participants and only a few who exchange cash. After customers get used to the free services, the companies hope that people will pay for more advanced services. Examples of freemiums are Adobe Reader, search engines, blogging platforms, and Skype-to-Skype phone calls. The revenue from the premiums for more powerful services covers the cost of both the premium and free activities. This is the cross-subsidy approach. A legendary example of this marketing strategy is King Gillette, who in the early 1900s was having no success selling men on the idea of shaving with disposable thin blades rather than with a straight razor. The solution was to bundle free razors with gum, coffee, marshmallows, and even new bank deposits with the slogan “Shave and Save” attached. The freebie razor without blades was useless, so customers bought the blades—and the rest of this success story is history.

Another approach is to use free services to deliver advertising, just like traditional broadcast TV or radio. One company that has very successfully applied the advertising approach to freemiums is Google. There is no cost to use their search engine, but the results pages feature “Sponsored Links,” which are advertisements paid for by Web sites related to your search terms. Google used this model to achieve impressive financial results.

ANALYZE THE ISSUE

Suppose a hugely successful Web company has used freeconomics, expanded its scale of operations, and spread its long-run costs over larger and larger audiences. After years of profits, the company’s profits fell continuously. Using production costs theory, explain why this situation might be occurring.

1. Chris Anderson, “Why \$0.00 is the Future of Business,” March 2008, <http://www.wired.com/images/press/pdf/free.pdf>.

Steven Jobs, founder of Apple Computer Company, stated:

*When you are growing [too big], you start adding middle management like crazy. . . People in the middle have no understanding of the business, and because of that, they screw up communications. To them, it’s just a job. The corporation ends up with mediocre people that form a layer of concrete.*²

2. Deborah Wise and Catherine Harris, “Apple’s New Crusade,” *Business Week*, November 26, 1984, 156.

Key Concepts

Explicit costs
Implicit costs
Economic profit
Normal profit
Fixed input
Variable input
Short run
Long run
Production function

Marginal product
Law of diminishing returns
Total fixed cost (*TFC*)
Total variable cost (*TVC*)
Total cost (*TC*)
Average fixed cost (*AFC*)
Average variable cost (*AVC*)
Average total cost (*ATC*)
Marginal cost (*MC*)

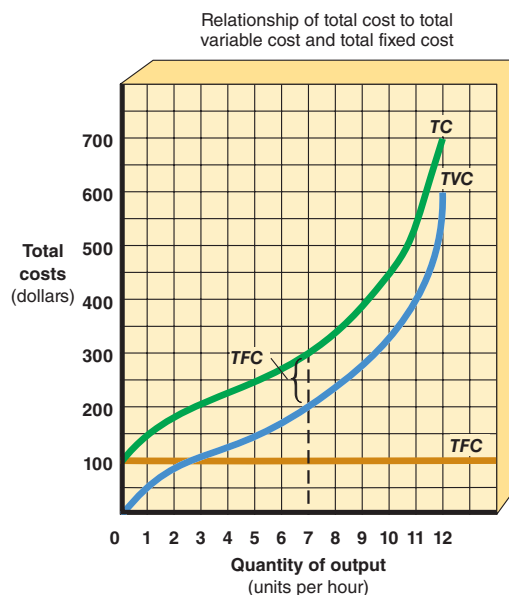
Marginal-average rule
Long-run average cost curve (*LRAC*)
Economies of scale
Constant returns to scale
Diseconomies of scale

Summary

- **Economic profit** is equal to total revenue minus both *explicit* and *implicit* costs. **Implicit costs** are the opportunity costs of forgone returns to resources owned by the firm. Economic profit is important for decision-making purposes because it includes implicit costs and accounting profit does not. Accounting profit equals total revenue minus *explicit costs*.
- The **short run** is a time period during which a firm has at least one fixed input, such as its factory size. The **long run** for a firm is defined as a period during which all inputs are variable.
- A **production function** is the relationship between output and inputs. Holding all other factors of production constant, the production function shows the total output as the amount of one input, such as labor, varies.
- **Marginal product** is the change in total output caused by a one-unit change in a variable input, such as the number of workers hired. The **law of diminishing returns** states that after some level of output in the short run, each additional unit of the variable input yields smaller and smaller marginal product. This range of declining marginal product is the region of diminishing returns.
- **Total fixed cost (*TFC*)** consists of costs that do not vary with the level of output, such as rent for office space. Total fixed cost is the cost of inputs that do not change as the firm changes output in the short run. **Total variable cost (*TVC*)** consists of costs that vary with the level of output, such as wages. Total variable cost is

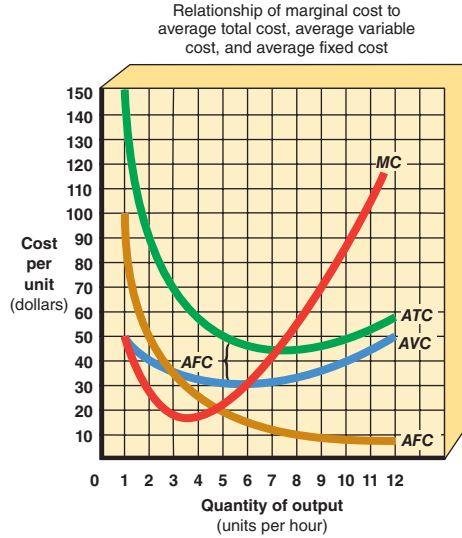
the cost of variable inputs used in production. **Total cost (*TC*)** is the sum of total fixed cost (*TFC*) and total variable cost (*TVC*).

Total Cost Curves



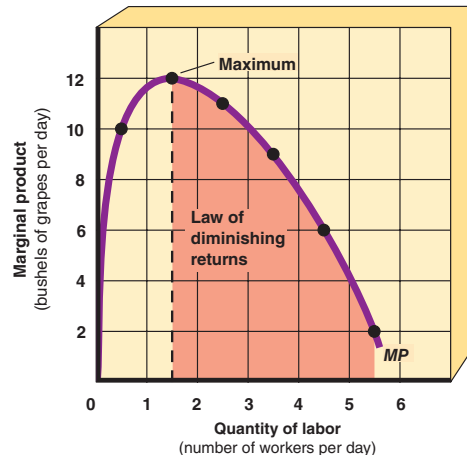
- **Marginal cost (*MC*)** is the change in total cost associated with one additional unit of output. **Average fixed cost (*AFC*)** is the total fixed cost divided by total output. **Average variable cost (*AVC*)** is the total variable cost divided by total output. **Average total cost (*ATC*)** is the total cost, or the sum of average fixed cost and average variable cost, divided by output.

Average and Marginal Cost Curves

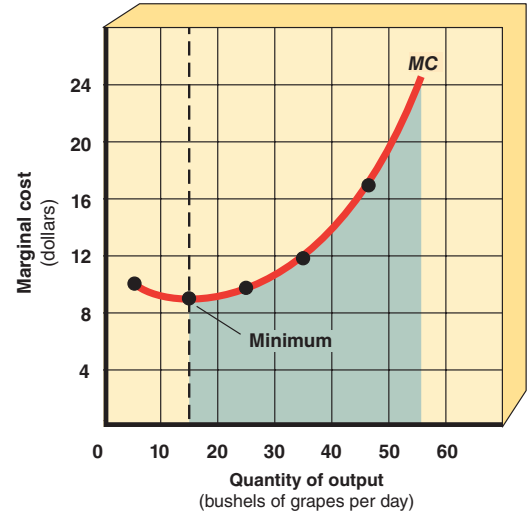


- The *marginal-average rule* explains the relationship between marginal cost and average cost. When marginal cost is less than average cost, average cost falls. When marginal cost is greater than average cost, average cost rises. Following this rule, the marginal cost curve intersects the average variable cost curve and the average total cost curve at their minimum points.
- Marginal cost (MC)** and **marginal product (MP)** are mirror images of each other. Assuming a constant wage rate, marginal cost equals the wage rate divided by the marginal product. Increasing returns cause marginal cost to fall, and diminishing returns cause marginal cost to rise. This explains the J-shaped marginal cost curve.

Marginal Product

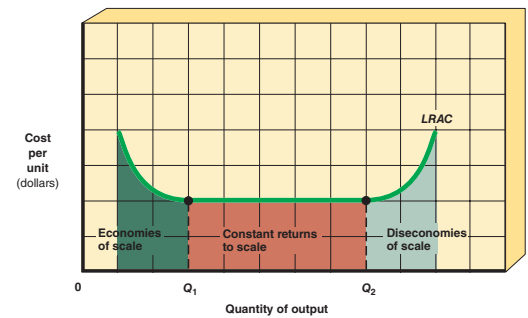


Marginal Cost



- The *long-run average cost curve (LRAC)* is a curve drawn tangent to all possible short-run average total cost curves. When the LRAC curve decreases as output increases, the firm experiences *economies of scale*. If the LRAC curve remains unchanged as output increases, the firm experiences *constant returns to scale*. If the LRAC curve increases as output increases, the firm experiences *diseconomies of scale*.

Long-Run Average Cost Curve



Summary of Conclusion Statements

- Since business decision making is based on economic profit, rather than accounting profit, the word *profit* in this text always means economic profit.
- The marginal cost declines as the marginal product of a variable input rises if the wage rate is constant. Beginning at the point of diminishing returns, the marginal cost rises as the marginal product of a variable input declines.
- A firm operates in the short run when there is insufficient time to alter some fixed input. The firm plans in the long run when all inputs are variable.
- The plant size selected by a firm in the long run depends on the expected level of production.

Study Questions and Problems

1. Indicate whether each of the following is an explicit cost or an implicit cost:
 - a. A manager's salary
 - b. Payments to IBM for computers
 - c. A salary forgone by the owner of a firm by operating his or her own company
 - d. Interest forgone on a loan an owner makes to his or her own company
 - e. Medical insurance payments a company makes for its employees
 - f. Income forgone while going to college
2. Suppose you own a video game store. List some of the fixed inputs and variable inputs you would use in operating the store.
3. a. Construct the marginal product schedule for the production function data in the following table:

Labor	Total Output	Marginal Product
0	0	
1	8	
2	18	
3	30	
4	43	
5	55	
6	65	
7	73	
8	79	
9	82	
10	80	

- b. Graph the total output and marginal product curves, and identify increasing and diminishing marginal returns.

4. Consider this statement: "Total output starts falling when diminishing returns occur." Do you agree or disagree? Explain.
5. What effect might a decrease in the demand for high-definition televisions have on the short-run average total cost curve for this product?
6. a. Construct the cost schedule using the data below for a firm operating in the short run:
9. An owner of a firm estimates that the average total cost is \$6.71 and the marginal cost is \$6.71 at the current level of output. Explain the relationship between these marginal cost and average total cost figures.
10. What short-run effect might a decline in the demand for electronic components for automatic teller machines have on Computech's average total cost curve?

Total Output (Q)	Total Fixed Cost (TFC)	Total Variable Cost (TVC)	Total Cost (TC)	Marginal Cost (MC)	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Total Cost (ATC)
0	\$ 50	\$ _____	\$ 50	_____	_____	_____	_____
1	_____	_____	\$ 70	_____	_____	_____	_____
2	_____	_____	\$ 85	_____	_____	_____	_____
3	_____	_____	\$ 95	_____	_____	_____	_____
4	_____	_____	\$100	_____	_____	_____	_____
5	_____	_____	\$110	_____	_____	_____	_____
6	_____	_____	\$130	_____	_____	_____	_____
7	_____	_____	\$165	_____	_____	_____	_____
8	_____	_____	\$215	_____	_____	_____	_____
9	_____	_____	\$275	_____	_____	_____	_____

- b. Graph the average variable cost, average total cost, and marginal cost curves.
7. Explain why the average total cost curve and the average variable cost curve move closer together as output expands.
8. Ace Manufacturing produces 1,000 hammers per day. The total fixed cost for the plant is \$5,000 per day, and the total variable cost is \$15,000 per day. Calculate the average fixed cost, average variable cost, average total cost, and total cost at the current output level.
11. For mathematically minded students, what is the algebraic relationship between the equation for output and the equation for marginal product in Exhibit 2? Explain the circumstances under which the long-run supply curve for an industry is a horizontal line. Next, explain the circumstances under which the long-run supply curve for an industry is an upward-sloping line.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Should the Professor Go or Stay?

In the consulting business, the accounting profit is \$60,000. An accountant would calculate profit as the annual revenue of \$75,000 less the explicit cost of \$15,000 per year for the secretary's salary. However, the accountant would neglect implicit costs. Professor Martin's business venture would have implicit costs of \$10,000 in forgone rent, \$50,000 in forgone earnings, and \$1,000 in forgone annual

interest on the \$10,000 taken out of savings. Her economic profit is $-\$1,000$, calculated as the accounting profit of \$60,000 less the total implicit costs of \$61,000. If you said the professor will pass up the potential accounting profit and stay with the university to avoid an economic loss, **YOU ARE CORRECT.**

Did Michael Jordan Beat the Marginal-Average Rule?

Since Jordan's marginal points in games 11 and 12 were below his average points per game, his average points per game fell from 33 to 31. Games 13 and 14 lifted his average from 31 to 33 points per game because his marginal points in both of these games exceeded his average points per game. Finally, the 20 points in game 15 again reduced his average back to 32 points per game. Thus, when Jordan's marginal points scored in a game were below his season's average points per game, his average fell. When Jordan's marginal points scored in a game were above his season's average points per game, his average rose. If you said even

Michael Jordan cannot beat the marginal-average rule, **YOU ARE CORRECT.**

Game	Marginal points	Average points
10		33 over 10 games
11	20	$32 = (33 \times 10 + 20)/11$ games
12	25	$31 = (32 \times 11 + 25)/12$ games
13	40	$32 = (31 \times 12 + 40)/13$ games
14	50	$33 = (32 \times 13 + 50)/14$ games
15	20	$32 = (33 \times 14 + 20)/15$ games

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

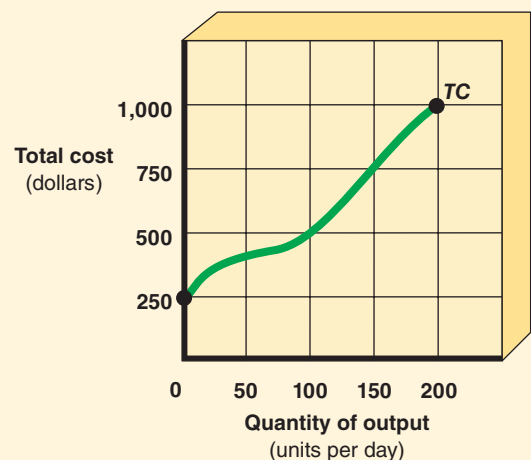
- Explicit costs are payments to
 - hourly employees.
 - insurance companies.
 - utility companies.
 - all of the above.
- Implicit costs are the opportunity costs of using the resources of
 - outsiders.
 - owners.
 - banks.
 - retained earnings.
- Which of the following equalities is *true*?
 - Economic profit = total revenue – accounting profit
 - Economic profit = total revenue – explicit costs – accounting profit
 - Economic profit = total revenue – implicit costs – explicit costs
 - Economic profit = opportunity cost + accounting cost
- Fixed inputs are factors of production that
 - are determined by a firm's plant size.
 - can be increased or decreased quickly as output changes.

Practice Quiz Continued

- c. cannot be increased or decreased as output changes.
 - d. are none of the above.
5. An example of a variable input is
 - a. raw materials.
 - b. energy.
 - c. hourly labor.
 - d. all of the above.
6. Suppose a car wash has 2 washing stations and 5 workers and is able to wash 100 cars per day. When it adds a third station, but no more workers, it is able to wash 150 cars per day. The marginal product of the third washing station is
 - a. 100 cars per day.
 - b. 150 cars per day.
 - c. 5 cars per day.
 - d. 50 cars per day.
7. If the units of variable input in a production process are 1, 2, 3, 4, and 5 and the corresponding total outputs are 10, 22, 33, 42, and 48, respectively, the marginal product of the fourth unit is
 - a. 2.
 - b. 6.
 - c. 9.
 - d. 42.
8. The total fixed cost curve is
 - a. upward sloping.
 - b. downward sloping.
 - c. upward sloping, then downward sloping.
 - d. unchanged with the level of output.
9. Assuming the marginal cost curve is a smooth J-shaped curve, the corresponding total cost curve has a (an)
 - a. linear shape.
 - b. S-shape.
 - c. U-shape.
 - d. reverse S-shape.
10. If both the marginal cost and the average variable cost curves are J-shaped, at the point of minimum average variable cost, the marginal cost must be
 - a. greater than the average variable cost.
 - b. less than the average variable cost.
 - c. equal to the average variable cost.
 - d. at its minimum.
11. Which of the following is *true* at the point where diminishing returns set in?
 - a. Both marginal product and marginal cost are at a maximum.
 - b. Both marginal product and marginal cost are at a minimum.
 - c. Marginal product is at a maximum, and marginal cost is at a minimum.
 - d. Marginal product is at a minimum, and marginal cost is at a maximum.
12. As shown in Exhibit 10, total fixed cost for the firm is
 - a. zero.
 - b. \$250.
 - c. \$500.
 - d. \$750.
 - e. \$1,000.
13. As shown in Exhibit 10, the total cost of producing 100 units of output per day is
 - a. zero.
 - b. \$250.
 - c. \$500.
 - d. \$750.
 - e. \$1,000.

Exhibit 10

Total Cost Curves



Practice Quiz Continued

14. In Exhibit 10, if the total cost of producing 99 units of output per day is \$475, the marginal cost of producing the 100th unit of output per day is approximately
- zero.
 - \$25.
 - \$475.
 - \$500.
15. Each potential short-run average total cost curve is tangent to the long-run average cost curve at
- the level of output that minimizes short-run average total cost.
 - the minimum point of the average total cost curve.
 - the minimum point of the long-run average cost curve.
 - a single point on the short-run average total cost curve.
16. Suppose a typical firm is producing x units of output per day. Using any other plant size, the long-run average cost would increase. The firm is operating at a point at which
- its long-run average cost curve is at a minimum.
 - its short-run average total cost curve is at a minimum.
 - both (a) and (b) are true.
 - neither (a) nor (b) is true.
17. The downward-sloping segment of the long-run average cost curve corresponds to
- diseconomies of scale.
 - both economies and diseconomies of scale.
 - the decrease in average variable costs.
 - economies of scale.
18. Long-run diseconomies of scale exist when the
- short-run average total cost curve falls.
 - long-run marginal cost curve rises.
 - long-run average total cost curve falls.
 - short-run average variable cost curve rises.
 - long-run average cost curve rises.
19. Long-run constant returns to scale exist when the
- short-run average total cost curve is constant.
 - long-run average cost curve rises.
 - long-run average cost curve is flat.
 - long-run average cost curve falls.
20. Which of the following is *not* a source of economies of scale?
- Division and specialization of labor
 - Increase in output
 - More efficient use of capital
 - All of the above
 - Centralized marketing

Road Map Microeconomic Fundamentals

This road map feature helps you tie material in the part together as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The key concept in each question is given for emphasis and each question or set of questions concludes with an interactive game to reinforce the concepts. Click on the Tucker Web site at www.cengage.com/economics/tucker, select the chapter, and play the visual causation chain game designed to make learning fun. Enjoy the cheers when correct and suffer the jeers if you miss. The correct answers are given in Appendix C of the text.

part 2

Chapter 3. Market Demand and Supply

1. Key Concept: Movement along vs. shift in demand

Which of the following would shift the demand curve for autos to the right?

- a. A fall in the price of autos
- b. A fall in the price of auto insurance
- c. A fall in consumers' incomes
- d. A fall in the price of steel



Causation Chain Game

Movement along a Demand Curve versus a Shift in Demand—Exhibit 3

2. Key Concept: Movement along vs. shift in supply

Assuming that soybeans and tobacco can both be grown on the same land, a decrease in the price of tobacco, other things being equal, causes a (an)

- a. rightward shift of the supply curve for tobacco.
- b. upward movement along the supply curve for soybeans.
- c. rightward shift in the supply curve for soybeans.
- d. leftward shift in the supply curve for soybeans.



Causation Chain Game

Movement along a Supply Curve versus a Shift in Supply—Exhibit 8

3. Key Concept: Surplus

Assume Q_s represents the quantity supplied at a given price and Q_d represents the quantity demanded at the same given price. Which of the following market conditions produce a downward movement of the price?

- a. $Q_s = 1,000$, $Q_d = 750$
- b. $Q_s = 750$, $Q_d = 750$
- c. $Q_s = 750$, $Q_d = 1,000$
- d. $Q_s = 1,000$, $Q_d = 1,000$

4. Key Concept: Shortage

Which of the following situations results from a ticket price to a concert set below the equilibrium price?

- A long line of people wanting to purchase tickets to the concert.
- No line of people wanting to buy tickets to the concert.
- Tickets available at the box office, but no line of people wanting to buy them.
- None of the above.



Causation Chain Game

Supply and Demand for Sneakers—Exhibit 12

Chapter 4. Markets in Action

5. Key Concept: Change in demand

A decrease in consumer income decreases the demand for compact discs. As a result of the change to a new equilibrium, there is a (an)

- leftward shift of the supply curve.
- rightward shift of the supply curve.
- upward movement along the supply curve.
- downward movement along the supply curve.



Causation Chain Game

The Effects of Shifts in Demand on Market Equilibrium—Exhibit 1

6. Key Concept: Change in supply

Consider the market for grapes. An increase in the wage paid to grape pickers will cause the

- demand curve for grapes to shift to the right, resulting in a higher equilibrium price for grapes and a reduction in the quantity consumed.
- demand curve for grapes to shift to the left, resulting in a lower equilibrium price for grapes and an increase in the quantity consumed.
- supply curve for grapes to shift to the left, resulting in a lower equilibrium price for grapes and a decrease in the quantity consumed.
- supply curve for grapes to shift to the left, resulting in a higher equilibrium price for grapes and a decrease in the quantity consumed.



Causation Chain Game

The Effects of Shifts in Supply on Market Equilibrium—Exhibit 2

7. Key Concept: Rent control

Rent controls create distortions in the housing market by

- increasing rents received by landlords.
- raising property values.
- encouraging landlords to overspend for maintenance.
- discouraging new housing construction.
- increasing the supply of housing in the long run.



Causation Chain Game

Rent Control—Exhibit 5

8. Key Concept: Minimum wage

A good example of a price floor is

- rent controls on apartments in major cities.
- general admission tickets to concerts.
- the minimum wage law.
- food stamp regulations.
- rock concert tickets.



Causation Chain Game

Minimum Wage—Exhibit 6

Chapter 5. Price Elasticity of Demand

9. Key Concept: Price elasticity of demand

Suppose Good Food's supermarket raises the price of its steak and finds its total revenue from steak sales does *not* change. This is evidence that price elasticity of demand for steak is:

- perfectly elastic.
- perfectly inelastic.
- unitary elastic.
- inelastic.
- elastic.

10. Key Concept: Tax incidence

Assuming the demand curve is more elastic (flatter) than the supply curve, which of the following is *true*?

- The full tax is always passed on to the consumer no matter how flat (elastic) the demand curve is.
- The full tax is always passed on to the seller no matter how flat (elastic) the demand curve is.
- The smaller the portion of a sales tax that is passed on to the consumer.
- It does not make any difference how flat (elastic) the demand curve is; the tax is always split evenly between buyer and seller.



Causation Chain Game

The Incidence of a Tax on Gasoline—Exhibit 10

Chapter 6. Consumer Choice Theory

11. Key Concept: Income effect

The income effect refers to a change in

- income because of changes in the CPI.
- the quantity demanded of a good because of a change in the buyer's real income.

- c. the quantity demanded of a good because of a change in the buyer's money income.
- d. none of the above.



Causation Chain Game

Income Effect

12. Key Concept: Substitution effect

Which of the following is the *best* example of the substitution effect?

- a. Joe buys fewer apples and more oranges as the result of an increase in the price of apples.
- b. Joe buys more apples when his income increases.
- c. Joe buys an apple slicer when the price of apples decreases.
- d. Joe buys less sugar as the result of an increase in price of apples.



Causation Chain Game

Substitution Effect

Chapter 7. Production Costs

13. Key Concept: Marginal product and marginal cost

Which of the following is *true* at the point where diminishing returns set in?

- a. Both marginal product and marginal cost are at a maximum.
- b. Both marginal product and marginal cost are at a minimum.
- c. Marginal product is at a maximum and marginal cost is at a minimum.
- d. Marginal product is at a minimum and marginal cost is at a maximum.



Causation Chain Game

Marginal Product Effects on Marginal Cost

Market Structures



© Getty Images

This part focuses on different types of markets, each defined by a set of characteristics that determine corresponding demand and supply conditions. Chapter 8 describes a highly competitive market consisting of an extremely large number of competing firms, and Chapter 9 explains the theory for a market with only a single seller. Between these extremes, Chapter 10 discusses two markets that have some characteristics of both competition and monopoly. The part concludes by developing labor market theory in Chapter 11.



Perfect Competition

Ostrich farmers in Iowa, Texas, Oklahoma, and other states in the Midwest “stuck their necks out.” Many invested millions of dollars converting a portion of their farms into breeding grounds for ostriches. The reason was that mating pairs of ostriches were selling for \$75,000 during the late 1990s. Ostrich breeders claimed that ostrich meat would become the low-cholesterol, low-fat health treat, and ostrich prices rose. The high prices for ostriches fueled profit expectations, and many cattle ranchers deserted their cattle and went into the ostrich business.

Adam Smith concluded that competitive forces are like an “invisible hand” that leads people who simply pursue their own interests and, in the process, serve the interests of society. In a competitive market, when the profit potential in the ostrich business looked good, firms entered this market and started raising ostriches. Over time, more and more ostrich farmers flocked to this market, and

the ostrich population exploded. As a result, the price of a breeding pair plummeted to only a few thousand dollars, profits tumbled, and the number of ostrich farms declined. A decade later, demand increased unexpectedly because mad cow disease plagued Europe, and people bought alternatives to beef. Suppliers could not meet the demand for ostrich burgers and profits rose again, causing farmers to increase supply by investing in more ostriches.

This chapter combines the demand, cost of production, and marginal analysis concepts from previous chapters to explain how competitive markets determine prices, output, and profits. Here, firms are small, like an ostrich ranch or an alligator farm, rather than huge, like Wal-Mart or Microsoft. Other types of markets in which large and powerful firms operate are discussed in the next two chapters.

In this chapter, you will learn to solve these economics puzzles:

- Why is the demand curve horizontal for a firm in a perfectly competitive market?
- Why would a firm stay in business while losing money?
- In the long run, can alligator farms earn an economic profit?



PERFECT COMPETITION

Firms sell goods and services under different market conditions, which economists call **market structures**. A market structure describes the key traits of a market, including the number of firms, the similarity of the products they sell, and the ease of entry into and exit from the market. Examination of the business sector of our economy reveals firms operating in different market structures. In this chapter and the two chapters that follow, we will study four market structures. The first is **perfect competition**, to which this entire chapter is devoted. Perfect, or pure, competition is a market structure characterized by (1) a large number of small firms, (2) a homogeneous product, and (3) very easy entry into or exit from the market. Let's discuss each of these characteristics.

Characteristics of Perfect Competition

Large Number of Small Firms How many sellers comprise a large number? And how small is a small firm? Certainly, one, two, or three firms in a market would not be a large number. In fact, the exact number cannot be stated. This condition is fulfilled when each firm in a market has no significant share of total output and, therefore, no ability to affect the product's price. Each firm acts independently, rather than coordinating decisions collectively. For example, there are thousands of independent egg farmers in the United States. If any single egg farmer raises the price, the going market price for eggs is unaffected.

CONCLUSION *The large-number-of-sellers condition is met when each firm is so small relative to the total market that no single firm can influence the market price.*

Homogeneous Product In a perfectly competitive market, all firms produce a standardized or homogeneous product. This means the good or service of each firm is identical. Farmer Brown's wheat is identical to Farmer Jones's wheat. Buyers may believe the transportation services of one independent trucker are about the same as another's services. This assumption rules out rivalry among firms in advertising and quality differences.

Market structure

A classification system for the key traits of a market, including the number of firms, the similarity of the products they sell, and the ease of entry into and exit from the market.

Perfect competition

A market structure characterized by (1) a large number of small firms, (2) a homogeneous product, and (3) very easy entry into or exit from the market. Perfect competition is also referred to as *pure competition*.

CONCLUSION *If a product is homogeneous, buyers are indifferent as to which seller's product they buy.*

Very Easy Entry and Exit Very easy entry into a market means that a new firm faces no barriers to entry. Barriers can be financial, technical, or government-imposed barriers, such as licenses, permits, and patents. Anyone who wants to try his or her hand at raising ostriches needs only a plot of land and feed.

CONCLUSION *Perfect competition requires that resources be completely mobile to freely enter or exit a market.*

No real-world market exactly fits the three assumptions of perfect competition. The perfectly competitive market structure is a theoretical or ideal model, but some actual markets do approximate the model fairly closely. Examples include farm products markets the stock market, and the foreign exchange market.

The Perfectly Competitive Firm as a Price Taker

For model-building purposes, suppose a firm operates in a market that conforms to all three of the requirements for perfect competition. This means that the perfectly competitive firm is a **price taker**. A price taker is a seller that has no control over the price of the product it sells. From the individual firm's perspective, the price of its products is determined by market supply and demand conditions over which the firm has no influence. Look again at the characteristics of a perfectly competitive firm: A small firm that is one among many firms, sells a homogeneous product, and is exposed to competition from new firms entering the market. These conditions make it impossible for the perfectly competitive firm to have the market power to affect the market price. Instead, the firm must adjust to, or "take," the market price.

Exhibit 1 is a graphical presentation of the relationship between the market supply and demand for electronic components and the demand curve facing a firm in a perfectly competitive market. Here we will assume that the electronic components industry is perfectly competitive, keeping in mind that the real-world market does not exactly fit the model. Exhibit 1(a) shows market supply and demand curves for the quantity of output per hour. The theoretical framework for this model was explained in Chapter 4. The equilibrium price is \$70 per unit, and the equilibrium quantity is 60,000 units per hour.

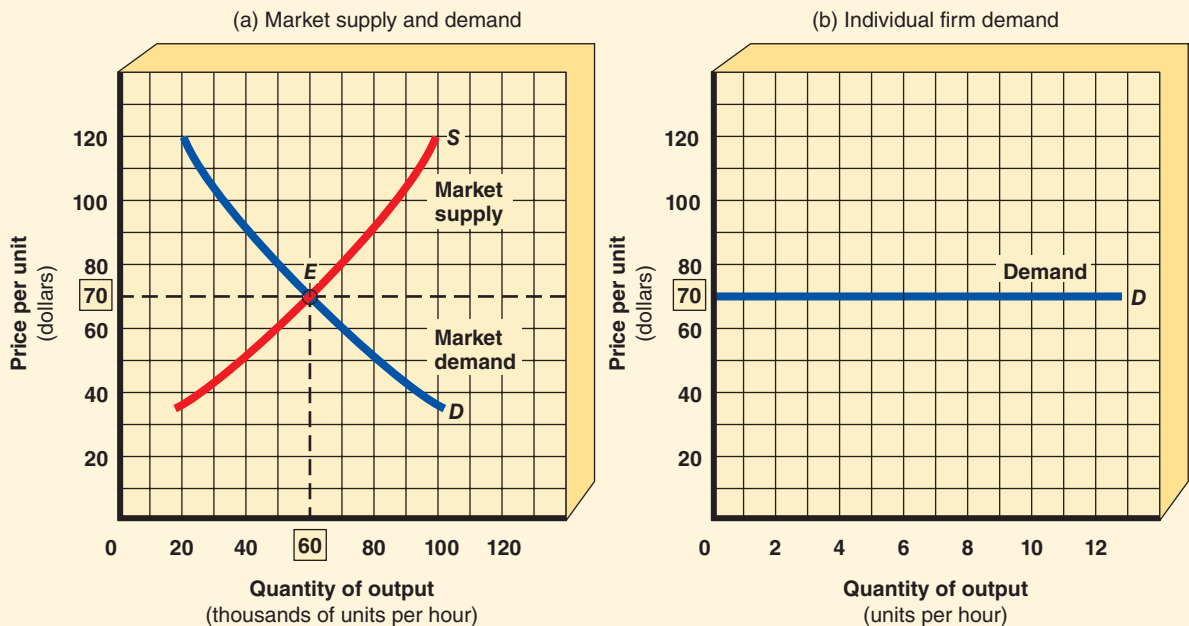
Because the perfectly competitive firm "takes" the equilibrium price, the individual firm's demand curve in Exhibit 1(b) is *perfectly elastic* (horizontal) at the \$70 market equilibrium price. (Note the difference between the firm's units per hour and the industry's thousands of units per hour.) Recall from Chapter 5 that when a firm facing a perfectly elastic demand curve tries to raise its price one penny higher than \$70, no buyer will purchase its product [Exhibit 2(a) in Chapter 5]. The reason is that many other firms are selling the same product at \$70 per unit. Hence, the perfectly competitive firm will not set the price above the prevailing market price and risk selling zero output. Nor will the firm set the price below the market price because a lower price would reduce the firm's revenue, and the firm can sell all it wants to at the going price.

Price taker

A seller that has no control over the price of the product it sells.

Exhibit 1**The Market Price and Demand for the Perfectly Competitive Firm**

In part (a), the market equilibrium price is \$70 per unit. The perfectly competitive firm in part (b) is a price taker because it is so small relative to the market. At \$70, the individual firm faces a horizontal demand curve, *D*. This means that the firm's demand curve is perfectly elastic. If the firm raises its price by even one penny, it will sell zero output.



SHORT-RUN PROFIT MAXIMIZATION FOR A PERFECTLY COMPETITIVE FIRM

Since the perfectly competitive firm has no control over price, what does the firm control? The firm makes only one decision—what quantity of output to produce that maximizes profit. This section develops two profit maximization methods that determine the output level for a competitive firm. We begin by examining the total revenue-total cost approach for finding the profit-maximizing level of output. Next, marginal analysis is used to show another method for determining the profit-maximizing level of output. The framework for the analysis is the short run with some fixed input, such as factory size.

The Total Revenue-Total Cost Method

Exhibit 2 provides hypothetical data on output, total revenue, total cost, and profit for our typical electronic components producer—Computech. Using Computech as our example allows us to extend the data and analysis presented in previous chapters. The cost figures are taken from Exhibit 3 in Chapter 7. Total fixed cost at zero output is \$100. Total revenue is reported in column 3 of Exhibit 2 and is computed as the

Exhibit 2		Short-Run Profit Maximization Schedule for Computech as a Perfectly Competitive Firm						
(1) Output (units per hour) (Q)	(2) Price per Unit (P)	(3) Total Revenue (TR)	(4) Marginal Revenue (MR)	(5) Marginal Cost (MC)	(6) Total Cost (TC)	(7) Average Variable Cost (AVC)	(8) Average Total Cost (ATC)	(9) Profit (+) or Loss (−) [(3)−(6)]
0	\$70	\$ 0			\$100	—	—	−\$100
1	70	70	\$70	\$ 50	150	\$50	\$150	−80
2	70	140	70	34	184	42	92	−44
3	70	210	70	24	208	36	69	2
4	70	280	70	19	227	32	57	53
5	70	350	70	23	250	30	50	100
6	70	420	70	30	280	30	47	140
7	70	490	70	38	318	31	45	172
8	70	560	70	48	366	33	46	194
9	70	630	70	59	425	36	47	205
10	70	700	70	75	500	40	50	200
11	70	770	70	95	595	45	54	175
12	70	840	70	117	712	51	59	128

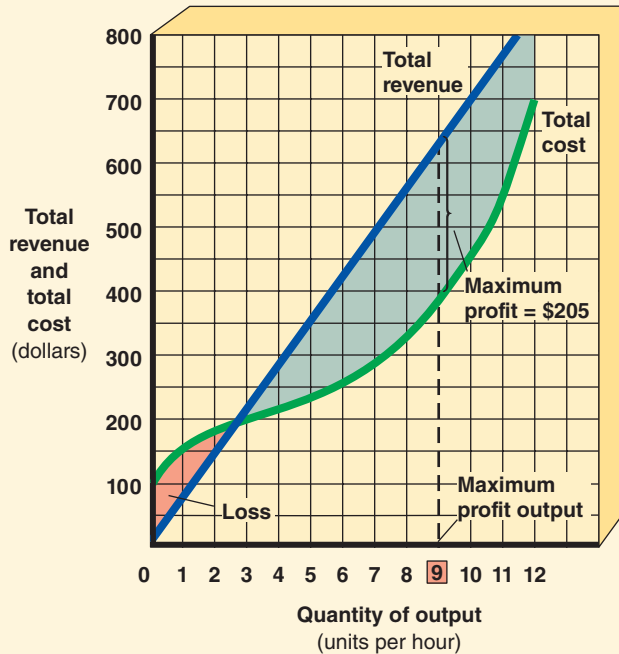
product price times the quantity. In this case, we assume the market equilibrium price is \$70 per unit, as determined in Exhibit 1. Because Computech is a price taker, the total revenue from selling 1 unit is \$70, from selling 2 units is \$140, and so on. Subtracting total cost in column 6 from total revenue in column 3 gives the total profit or loss (column 9) that the firm earns at each level of output. From zero to 2 units, the firm incurs losses, and then a *break-even point* (zero economic profit) occurs at about 3 units per hour. If the firm produces 9 units per hour, it earns the maximum profit of \$205 per hour. As output expands between 9 and 12 units of output, the firm’s profit diminishes. Exhibit 3 illustrates graphically that the maximum profit occurs where the vertical distance between the total revenue and the total cost curves is at a maximum.

Marginal Revenue Equals Marginal Cost Method

A second approach uses *marginal analysis* to determine the profit-maximizing level of output by comparing marginal revenue (marginal benefit) and marginal cost. Recall from the previous chapter that marginal cost is the change in total cost as the output level changes one unit. Also recall that these marginal cost data are listed between the quantity of output line entries because the change in total cost occurs

*Exhibit 3***Short-Run Profit Maximization Using the Total Revenue-Total Cost Method for a Perfectly Competitive Firm**

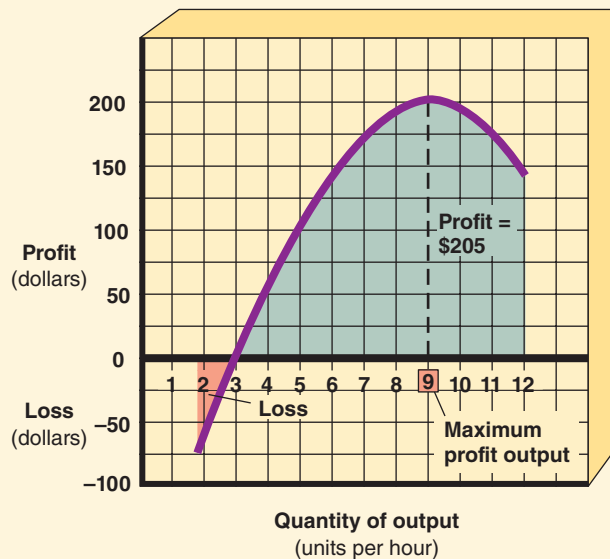
(a) Total revenue and total cost



This exhibit shows the profit-maximizing level of output chosen by a perfectly competitive firm, Computech. Part (a) shows the relationships between total revenue, total cost, and output, given a market price of \$70 per unit. The maximum profit is earned by producing 9 units per hour. At this level of output, the vertical distance between the total revenue and the total cost curves is the greatest. At an output level below 3 units per hour, the firm incurs losses.

Profit maximization is also shown in part (b). The maximum profit of \$205 per hour corresponds to the profit-maximizing output of 9 units per hour, represented in part (a).

(b) Profit or loss



Marginal revenue (MR)

The change in total revenue from the sale of one additional unit of output.

between each additional whole unit of output rather than exactly at each listed output level.

Now we introduce **marginal revenue (MR)**, a concept similar to marginal cost. Marginal revenue is the change in total revenue from the sale of one additional unit of output. Stated another way, marginal revenue is the ratio of the change in total revenue to a change in output.

Mathematically,

$$MR = \frac{\text{change in total revenue}}{\text{one-unit change in output}}$$

As shown in Exhibit 1(b), the perfectly competitive firm faces a perfectly elastic demand curve. Because the competitive firm is a price taker, the sale of each additional unit adds to total revenue, an amount equal to the price (average revenue, TR/Q). In our example, Computech adds \$70 to its total revenue each time it sells one unit. Therefore, \$70 is the marginal revenue for each additional unit of output in column 4 of Exhibit 2. As with MC , MR is also listed between the quantity of output line entries because the change in total revenue occurs between each additional unit of output.

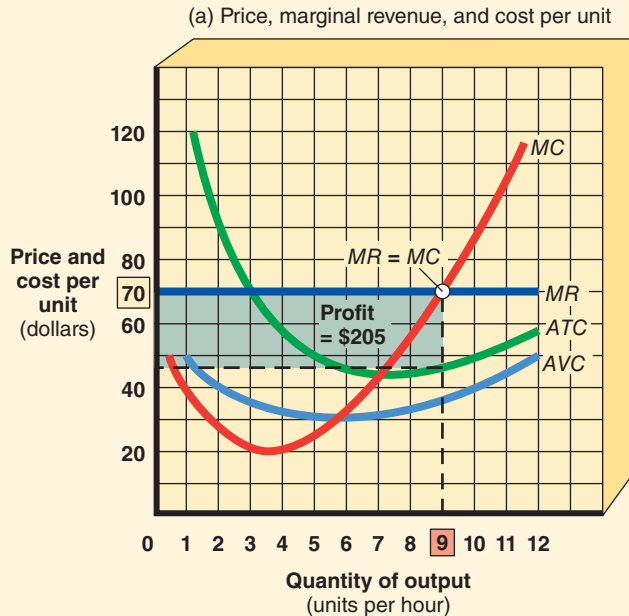
CONCLUSION *In perfect competition, a firm’s marginal revenue equals the price that the firm views as a horizontal demand curve.*

Columns 3 and 6 in Exhibit 2 show that both total revenue and total cost rise as the level of output increases. Now compare marginal revenue and marginal cost in columns 4 and 5. As explained, marginal revenue remains equal to the price, but marginal cost follows the J-shaped pattern introduced in Exhibit 4 of Chapter 7. At first, marginal cost is below marginal revenue, and this means that producing each additional unit adds less to total cost than to total revenue. Economic profit therefore increases as output expands from zero until the output level reaches 9 units per hour. Over this output range, Computech moves from a \$100 loss to a \$205 profit per hour. Beyond an output level of 9 units per hour, marginal cost exceeds marginal revenue, and profit falls. This is because each additional unit of output raises total cost by more than it raises total revenue. In this case, profit falls from \$205 to only \$128 per hour as output increases from 9 to 12 units per hour.

Our example leads to this question: How does the firm use its marginal revenue and marginal cost curves to determine the profit-maximizing level of output? The answer is that the firm follows a guideline called the $MR = MC$ rule: *The firm maximizes profit by producing the output where marginal revenue equals marginal cost.* Exhibit 4 relates the marginal revenue curve equals marginal cost curve condition to profit maximization. In Exhibit 4(a), the perfectly elastic demand curve is drawn at the industry-determined price of \$70. The average total cost (ATC) and average variable cost (AVC) curves are traced from Exhibit 2. Using marginal analysis, we can relate the $MR = MC$ rule to the same profit data given in Exhibit 2. Between 8 and 9 units of output, the MC curve is below the MR curve ($\$59 < \$70$), and the profit curve rises to its peak at \$205. Beyond 9 units of output, the MC curve is above the MR curve, and the profit curve falls. For example, between 9 and 10 units of output, marginal cost is \$75, and marginal revenue is \$70. Therefore, if the firm

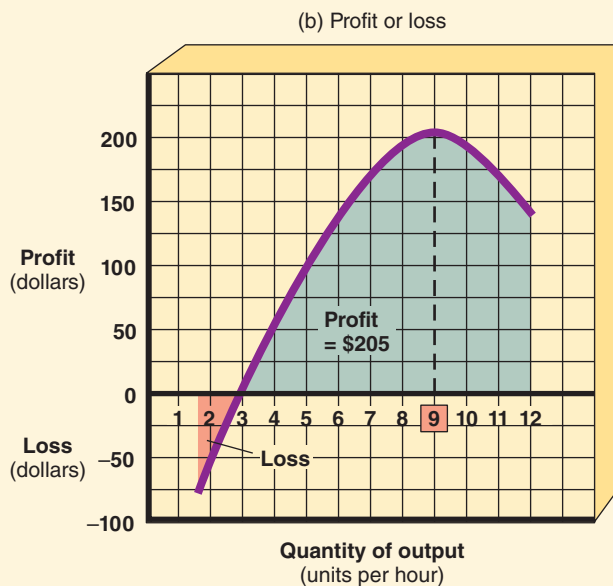
Exhibit 4

Short-Run Profit Maximization Using the Marginal Revenue Equals Marginal Cost Method for a Perfectly Competitive Firm



In addition to comparing total revenue and total cost, a firm can find the profit-maximizing level of output by comparing marginal revenue (MR) and marginal cost (MC). As shown in part (a), profit is at a maximum where marginal revenue equals marginal cost at \$70 per unit. The intersection of the marginal revenue and the marginal cost curves establishes the profit-maximizing output at 9 units per hour.

A profit curve is depicted separately in part (b) to show that the maximum profit occurs when the firm produces at the level of output corresponding to the $MR = MC$ point. Below 3 units per hour output, the firm incurs losses.



Price is above
ATC where
 $MC = MR$

Profit
Maximization

produces at 9 units of output rather than, say, 8 or 10 units of output, the MR curve equals the MC curve, and profit is maximized.

You can also calculate profit directly from Exhibit 4(a). At the profit-maximizing level of output of 9 units, the vertical distance between the demand curve and the ATC curve is the *average profit per unit*. Multiplying the average profit per unit times

the quantity of output gives the profit $[(\$70 - \$47.22) \times 9 = \$205.02]$.¹ The shaded rectangle also represents the maximum profit of \$205 per hour. Note that we have arrived at the same profit maximization amount (\$205) derived by comparing the total revenue and the total cost curves.

SHORT-RUN LOSS MINIMIZATION FOR A PERFECTLY COMPETITIVE FIRM

Because the perfectly competitive firm must take the price determined by market supply and demand forces, market conditions can change the prevailing price. When the market price drops, the firm can do nothing but adjust its output to make the best of the situation. Here only the marginal approach is used to predict output decisions of firms. Our model therefore assumes that business managers make their output decisions by comparing the *marginal* effect on profit of a *marginal* change in output.

A Perfectly Competitive Firm Facing a Short-Run Loss

Suppose a decrease in the market demand for electronic components causes the market price to fall to \$35. As a result, the firm's horizontal demand curve shifts downward to the new position shown in Exhibit 5(a). In this case, there is no level of output at which the firm earns a profit because any price along the demand curve is below the ATC curve.

Since Computech cannot make a profit, what output level should it choose? The logic of the $MR = MC$ rule given in the profit maximization case applies here as well. At a price of \$35, $MR = MC$ at 6 units per hour. Comparing parts (a) and (b) of Exhibit 5 shows that the firm's loss will be minimized at this level of output. The minimum loss of \$70 per hour is equal to the shaded area, which is the *average loss per unit* times the quantity of output $[(\$35 - \$46.66) \times 6 = -\$70]$.

Note that, although the price is not high enough to pay the average total cost, the price is high enough to pay the average variable cost. Each unit sold also contributes to paying a portion of the average fixed cost, which is the vertical distance between the ATC and the AVC curves. This analysis leads us to extend the $MR = MC$ rule: *The firm maximizes profit or minimizes loss by producing the output where marginal revenue equals marginal cost.*

A Perfectly Competitive Firm Shutting Down

What happens if the market price drops below the AVC curve, as shown in Exhibit 6? For example, if the price is \$25 per unit, should Computech produce some level of output? The answer is *no*. The best course of action is for the firm to shut down. *If the price is below the minimum point on the AVC curve, each unit*

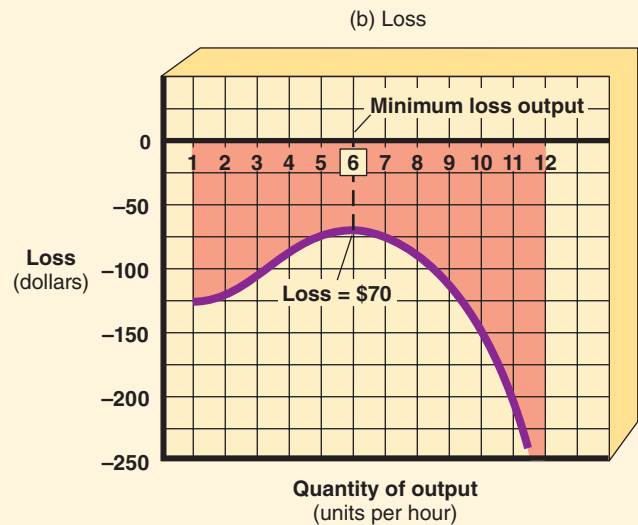
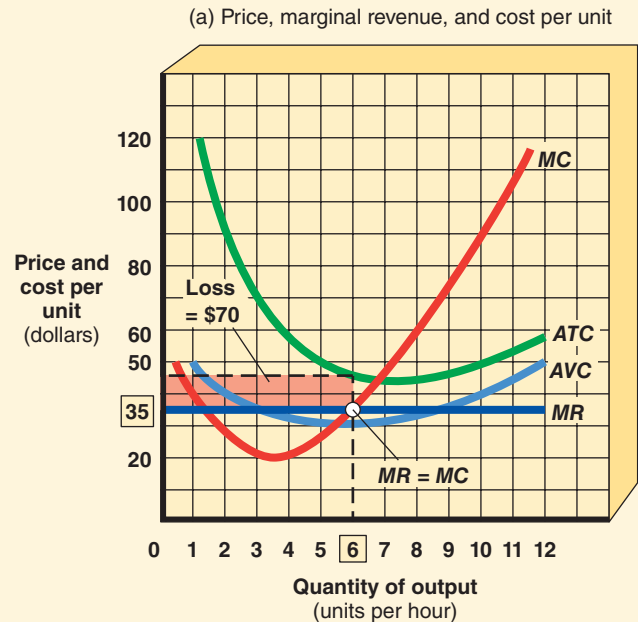
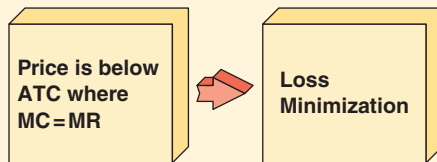
1. In Exhibit 3 in Chapter 7, the average total cost figure at 9 units of output was rounded to \$47. It also should be noted that there is often no level of output for which marginal revenue exactly equals marginal cost when dealing with whole units of output.

Exhibit 5

Short-Run Loss Minimization Using the Marginal Revenue Equals Marginal Cost Method for a Perfectly Competitive Firm

If the market price is less than the average total cost, the firm will produce a level of output that keeps its loss to a minimum. In part (a), the given price is \$35 per unit, and marginal revenue (MR) equals marginal cost (MC) at an output of 6 units per hour.

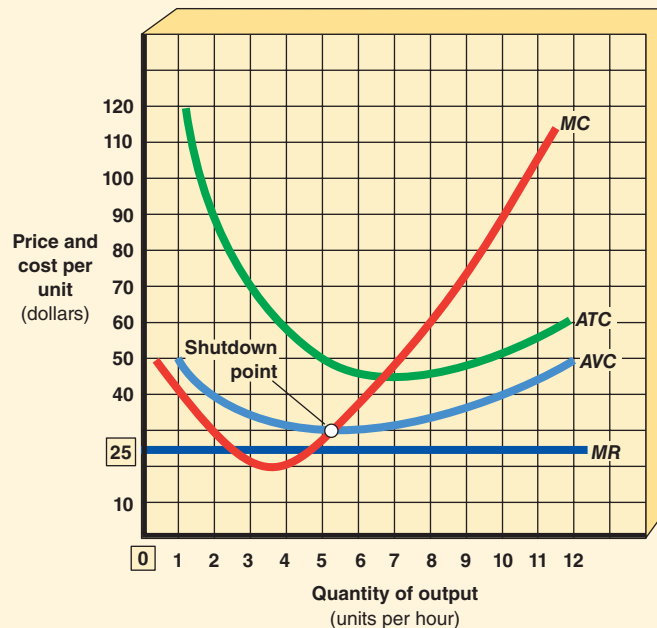
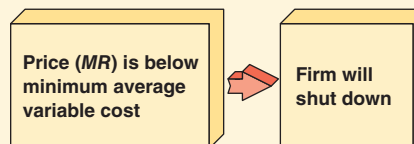
Part (b) shows that the firm's loss will be greater at any output other than where the marginal revenue and the marginal cost curves intersect. Because the price is above the average variable cost, each unit of output sold pays for the average variable cost and a portion of the average fixed cost.



produced would not cover the variable cost per unit; therefore, operating would increase losses. The firm is better off shutting down and producing zero output. While shut down, the firm might keep its factory, pay fixed costs, and hope for higher prices soon. If the firm does not believe market conditions will improve, it will avoid fixed costs by going out of business.

*Exhibit 6***The Short-Run Shutdown Point for a Perfectly Competitive Firm**

The shutdown point of \$30 per unit is the minimum point on the average variable cost curve (AVC). If the price falls below this price, the firm shuts down. The reason is that operating losses are now greater than total fixed cost. In this exhibit, the price of \$25 per unit (MR) is below the AVC curve at any level of output, and the firm would shut down at this price.

**CAUSATION CHAIN****CHECKPOINT***Should Motels Offer Rooms at the Beach for Only \$50 a Night?*

Myrtle Beach, South Carolina, with its famous Grand Strand and Calabash seafood, is lined with virtually identical motels. Summertime rates run about \$200 a night. During the winter, one can find rooms for as little as \$50 a night. Assume the average fixed cost of a room per night, including insurance, taxes, and depreciation, is \$50. The average guest-related cost for a room each night, including cleaning service and linens, is \$45. Would these motels be better off renting rooms for \$50 in the off-season or shutting down until summer?



SHORT-RUN SUPPLY CURVES UNDER PERFECT COMPETITION

The preceding examples provide a framework for a more complete explanation of the supply curve than was given earlier in Chapter 3. We now develop the short-run supply curve for an individual firm and then derive it for an industry.

The Perfectly Competitive Firm's Short-Run Supply Curve

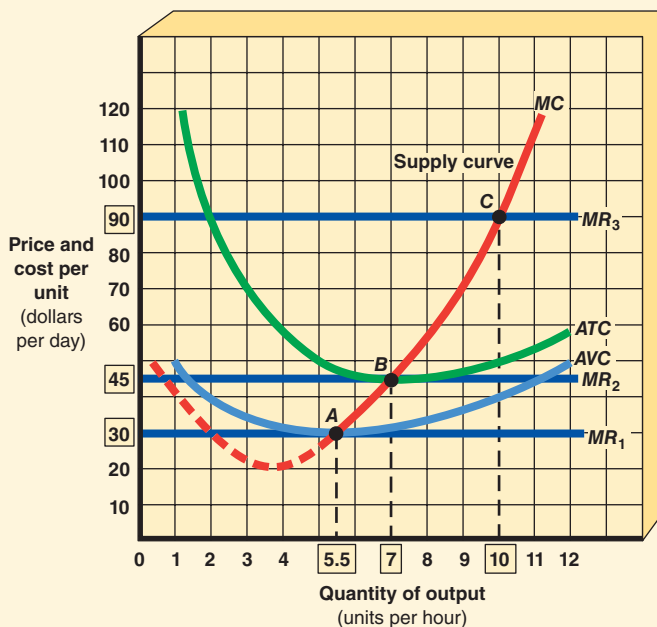
Exhibit 7 reproduces the cost curves from our Computech example. Also represented in the exhibit are three possible demand curves the firm might face— MR_1 , MR_2 , and MR_3 . As the marginal revenue curve moves upward along the marginal cost curve, the $MR = MC$ point changes.

Suppose demand for electronic components begins at a market price close to \$30. Point A therefore corresponds to a price equal to MR_1 , which equals MC at the

Exhibit 7

The Perfectly Competitive Firm's Short-Run Supply Curve

This exhibit shows how the short-run supply curve for Computech is derived. When the price is \$30, the firm will produce 5.5 units per hour at point A. If the price rises to \$45, the firm will move upward along its marginal cost curve (MC) to point B and produce 7 units per hour. At \$90, the firm continues to set price equal to marginal cost, and it produces 10 units per hour. Thus, the firm's short-run supply curve is the MC curve above its AVC curve.



Perfectly competitive firm's short-run supply curve

The firm's marginal cost curve above the minimum point on its average variable cost curve.

Perfectly competitive industry's short-run supply curve

The supply curve derived from horizontal summation of the marginal cost curves of all firms in the industry above the minimum point of each firm's average variable cost curve.

lowest point on the *AVC* curve. At any lower price, the firm cuts its loss by shutting down. At a price of about \$30, however, the firm produces 5.5 units per hour. Point *A* is therefore the lowest point on the individual firm's short-run supply curve.

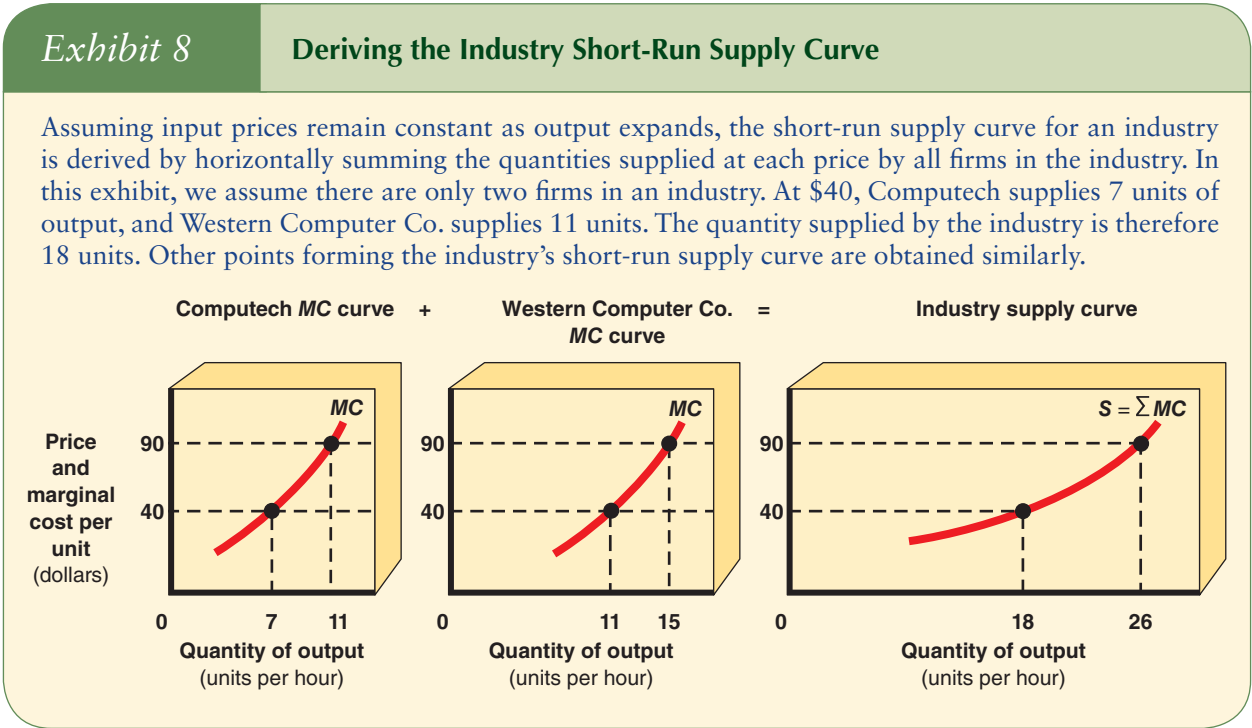
If the price rises to \$45, represented in the exhibit by MR_2 , the firm breaks even and earns a normal profit at point *B* with an output of 7 units per hour. As the marginal revenue curve rises, the firm's supply curve is traced by moving upward along its *MC* curve. At a price of \$90, point *C* is reached. Now, MR_3 intersects the *MC* curve at an output of 10 units per hour, and the firm earns an economic profit. If the price rises higher than \$90, the firm will continue to increase the quantity supplied and increase its maximum profit.

We can now define a **perfectly competitive firm's short-run supply curve**. The perfectly competitive firm's short-run supply curve is its marginal cost curve above the minimum point on its average variable cost curve.

The Perfectly Competitive Industry's Short-Run Supply Curve

Understanding that the firm's short-run supply curve is the segment of its *MC* curve above its *AVC* curve sets the stage for derivation of the **perfectly competitive industry's short-run supply curve**. The perfectly competitive industry's short-run supply curve is the horizontal summation of the marginal cost curves of all firms in the industry above the minimum point of each firm's average variable cost curve.

In Exhibit 7 in Chapter 3, we drew a market supply curve. Now we will reconstruct this market, or industry, supply curve using more precision. Although in perfect competition there are many firms, we suppose for simplicity that the industry has only two firms, Computech and Western Computer Co. Exhibit 8 illustrates the



MC curves for these two firms. Each firm's MC curve is drawn for prices above the minimum point on the AVC curve. At a price of \$40, the quantity supplied by Computech is 7 units, and the quantity supplied by Western Computer Co. is 11 units. Now, horizontally add these two quantities and obtain one point on the industry supply curve corresponding to a price of \$40 and 18 units. Following this procedure for all prices, we generate the short-run industry supply curve.

Note that the industry supply curve derived above is based on the assumption that input prices remain unchanged as output expands. In the next section, we will learn how changes in input prices affect derivation of the supply curve.

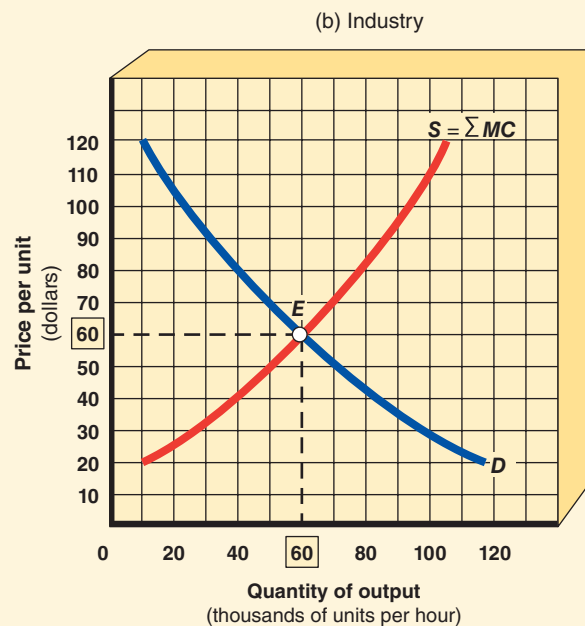
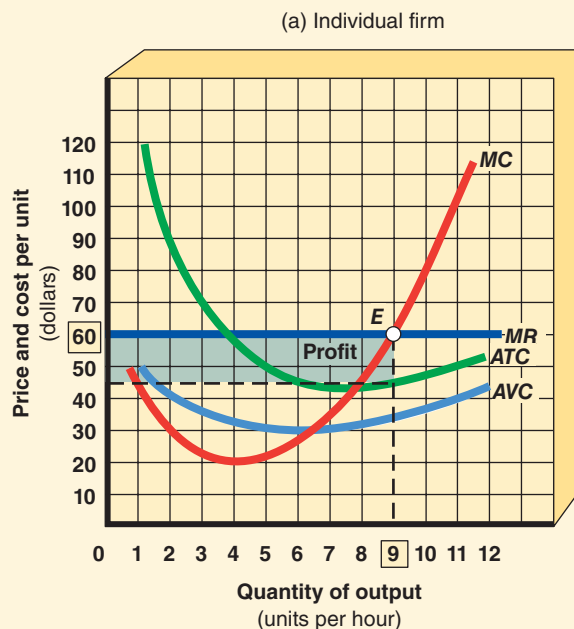
Short-Run Equilibrium for a Perfectly Competitive Firm

Exhibit 9 illustrates a condition of short-run equilibrium under perfect competition. Exhibit 9(a) represents the equilibrium price and cost situation for one of the many firms in an industry. As shown in the exhibit, the firm earns an economic profit in the short run by producing 9 units. Exhibit 9(b) depicts short-run equilibrium for the industry. As explained earlier, the industry supply curve is the aggregate of each firm's

Exhibit 9

Short-Run Perfectly Competitive Equilibrium

Short-run equilibrium occurs at point *E*. The intersection of the industry supply and demand curves shown in part (b) determines the price of \$60 facing the firm shown in part (a). Given this equilibrium price, the firm represented in part (a) establishes its profit-maximizing output at 9 units per hour and earns an economic profit shown by the shaded area. Note in part (b) that the short-run industry supply curve is the horizontal summation of the marginal cost (MC) curves of all individual firms above their minimum average variable cost points.



MC curve above the minimum point on the AVC curve. Including industry demand establishes the equilibrium price of \$60 that all firms in the industry must take. The industry's equilibrium quantity supplied is 60,000 units. This state of short-run equilibrium will remain until some factor changes and causes a new equilibrium condition in the industry.

LONG-RUN SUPPLY CURVES UNDER PERFECT COMPETITION

Recall from Chapter 7 that *all* inputs are variable in the long run. Existing firms in an industry can react to profit opportunities by building larger or smaller plants, buying or selling land and equipment, or varying other inputs that are fixed in the short run. Profits also attract new firms to an industry, while losses cause some existing firms to leave the industry. As you will now see, the free entry and exit characteristic of perfect competition is a crucial determinant of the shape of the long-run supply curve.

Long-Run Equilibrium for a Perfectly Competitive Firm

As discussed in Chapter 7, in the long run, a firm can change its plant size or any input used to produce a product. This means that an established firm can decide to *leave* an industry if it earns below normal profits (negative economic profits) and that new firms may enter an industry in which earnings of established firms exceed normal profits (positive economic profits). This process of entry and exit of firms is the key to long-run equilibrium. If there are economic profits, new firms enter the industry and shift the short-run industry supply curve to the right. This increase in short-run supply causes the price to fall until economic profits reach zero in the long run. On the other hand, if there are economic losses in an industry, existing firms leave, causing the short-run supply curve to shift to the left, and the price rises. This adjustment continues until economic losses are eliminated and economic profits equal zero in the long run.

Exhibit 10 shows a typical firm in long-run equilibrium. Supply and demand for the market as a whole set the equilibrium price. Thus, in the long run, the firm faces an equilibrium price of \$60. Following the $MR = MC$ rule, the firm produces an equilibrium output of 6 units per hour. At this output level, the firm earns a normal profit (zero economic profit) because marginal revenue (price) equals the minimum point on both the short-run average total cost curve ($SRATC$) and the long-run average cost curve ($LRAC$). Given the U-shaped $LRAC$ curve, the firm is producing with the optimal factory size.

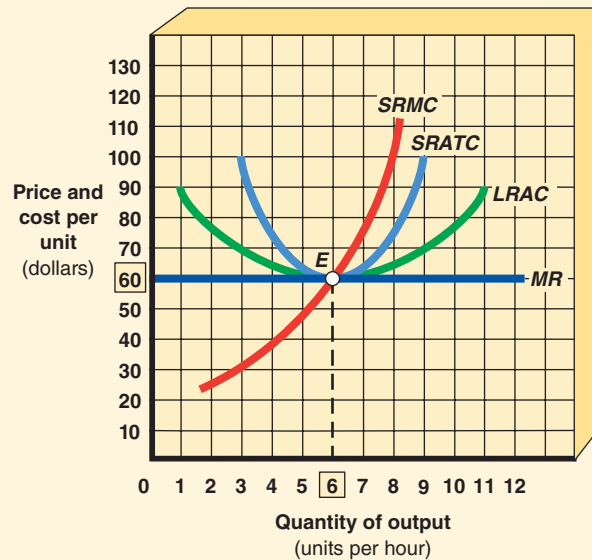
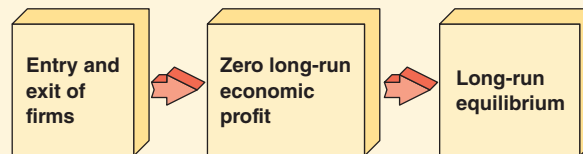
With $SRMC$ representing short-run marginal cost, the conditions for long-run perfectly competitive equilibrium can also be expressed as an equality:

$$P = MR = SRMC = SRATC = LRAC$$

As long as none of the variables in the above formula changes, there is no reason for a perfectly competitive firm to change its output level, factory size, or any aspect of its operation. Everything is just right! Because the typical firm is in a state of equilibrium, the industry is also at rest. Under long-run equilibrium conditions, there are neither positive economic profits to attract new firms to enter the industry nor negative economic

*Exhibit 10***Long-Run Perfectly Competitive Equilibrium**

Long-run equilibrium occurs at point *E*. In the long run, the firm earns a normal profit. The firm operates where the price equals the minimum point on its long-run average cost curve (*LRAC*). At this point, the short-run marginal cost curve (*SRMC*) intersects both the short-run average total cost curve (*SRATC*) and the long-run average cost curve (*LRAC*) at their minimum points.

**CAUSATION CHAIN**

profits to force existing firms to leave. In long-run equilibrium, maximum efficiency is achieved. The adjustment process of firms moving into or out of the industry is complete, and the firms charge the lowest possible price to consumers. Next, we will discuss how the firm and industry adjust when market demand changes.

CHECKPOINT*Are You in Business for the Long Run?*

You are considering building a Rent Your Own Storage Center. You are trying to decide whether to build 50 storage units at a total economic cost of \$200,000, 100 storage units at a total economic cost of \$300,000, or 200 storage units at a total economic cost of \$700,000. If you wish to survive in the long run, which size will you choose?



THREE TYPES OF LONG-RUN SUPPLY CURVES

Perfectly competitive industry's long-run supply curve

The curve that shows the quantities supplied by the industry at different equilibrium prices after firms complete their entry and exit.

Constant-cost industry

An industry in which the expansion of industry output by the entry of new firms has no effect on the individual firm's average total cost curve.

There are three possibilities for a **perfectly competitive industry's long-run supply curve**. The perfectly competitive industry's long-run supply curve shows the quantities supplied by the industry at different equilibrium prices after firms complete their entry and exit. The shape of each of these long-run supply curves depends on the response of input prices as new firms enter the industry. The following sections discuss each of these three cases.

Constant-Cost Industry

In a **constant-cost industry**, input prices remain constant as new firms enter or exit the industry. A constant-cost industry is an industry in which the expansion of industry output by the entry of new firms has no effect on the firm's cost curves. Exhibit 11(a) reproduces the long-run equilibrium situation from Exhibit 10.

Begin in part (b) of Exhibit 11 at the initial industry equilibrium point E_1 with short-run industry supply curve S_1 and industry demand curve D_1 . Now assume the industry demand curve increases from D_1 to D_2 . As a result, the industry equilibrium moves temporarily to E_2 . Correspondingly, the equilibrium price rises from \$60 to \$80, and industry output increases from 50,000 to 70,000 units.

The short-run result for the individual firm in the industry happens this way. As shown in part (a) of Exhibit 11, the firm takes the increase in price and adjusts its output from 6 to 7 units per hour. At the higher price and output, the firm changes from earning a normal profit to making an economic profit because the new price is above its $SRATC$ curve. All the other firms in the industry make the same adjustment by moving upward along their $SRMC$ curves.

In perfect competition, new firms are free to enter the industry in response to a profit opportunity, and they will do so. The addition of new firms shifts the short-run supply curve rightward from S_1 to S_2 . Firms will continue to enter the industry until profit is eliminated. This occurs at equilibrium point E_3 , where short-run industry demand curve D_2 intersects short-run supply curve S_2 . Thus, the entry of new firms has restored the initial equilibrium price of \$60. The firm responds by moving downward along its $SRMC$ curve until it once again produces 6 units and earns a normal profit.

As shown in the exhibit, the path of these changes in industry short-run equilibrium points traces a horizontal line, which is the industry's long-run supply curve.

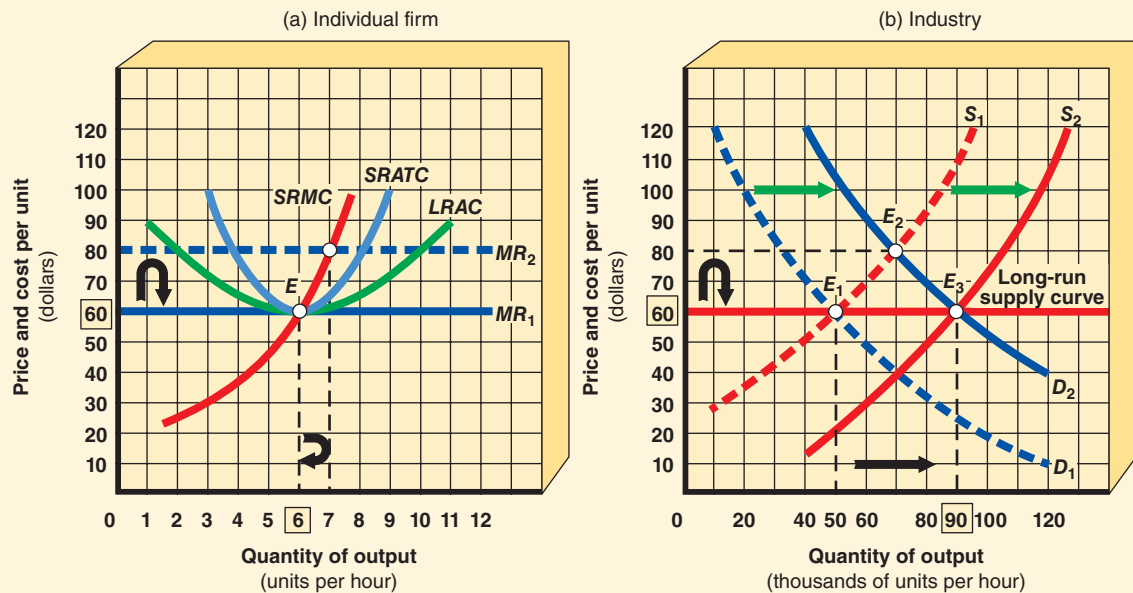
CONCLUSION *The long-run supply curve in a perfectly competitive constant-cost industry is perfectly elastic.*

Now we reconsider Exhibit 11 and ask what happens when the demand curve shifts leftward from D_2 to D_1 . Beginning in part (b) at point E_3 , the decrease in demand causes the price to fall temporarily below \$60. As a result, firms incur short-run losses, and some firms leave the industry. The exodus of firms shifts the short-run supply curve leftward from S_2 to S_1 , establishing a new equilibrium at point E_1 . This decrease in supply restores the equilibrium price to the initial price of \$60 per unit. Once equilibrium is reestablished at E_1 , there is a smaller number of firms, each earning a normal profit.

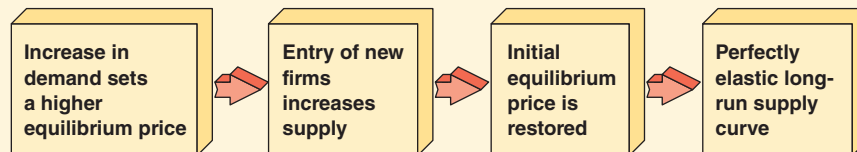
Exhibit 11

Long-Run Supply in a Constant-Cost Industry

Part (b) shows an industry in equilibrium at point E_1 , producing 50,000 units per hour and selling them for \$60 per unit. In part (a), the firm is in equilibrium, producing 6 units per hour and earning a normal profit. Then industry demand increases from D_1 to D_2 , and the equilibrium price rises to \$80. Industry output rises temporarily to 70,000 units per hour and the individual firm increases output to 7 units per hour. Firms are now earning an economic profit, which attracts new firms into the industry. In the long run, the entry of these firms causes the short-run supply curve to shift rightward from S_1 to S_2 , the price is reestablished at \$60, and a new industry equilibrium point, E_3 , is established. At E_3 , industry output rises to 90,000 units per hour, and the firm's output returns to 6 units per hour. Now the typical firm earns a normal profit, and new firms stop entering the industry. Connecting point E_1 to point E_3 generates the long-run supply curve.



CAUSATION CHAIN



Decreasing-Cost Industry

Input prices fall as new firms enter a **decreasing-cost industry**, and output expands. A decreasing-cost industry is an industry in which the expansion of industry output by the entry of new firms decreases each individual firm's cost curve (cost curve shifts downward). For example, as production of electronic components expands, the price of computer chips may decline. The reason is that greater sales volume allows the suppliers to achieve *economies of scale* and lower their input prices to firms in the electronic components industry. Exhibit 12 illustrates the adjustment process of an increase in demand based on the assumption that our example is a decreasing-cost industry.

Decreasing-cost industry

An industry in which the expansion of industry output by the entry of new firms decreases the individual firm's average total cost curve (cost curve shifts downward).

Increasing-cost industry

An industry in which the expansion of industry output by the entry of new firms increases the individual firm's average total cost curve (cost curve shifts upward).

CONCLUSION *The long-run supply curve in a perfectly competitive decreasing-cost industry is downward sloping.*

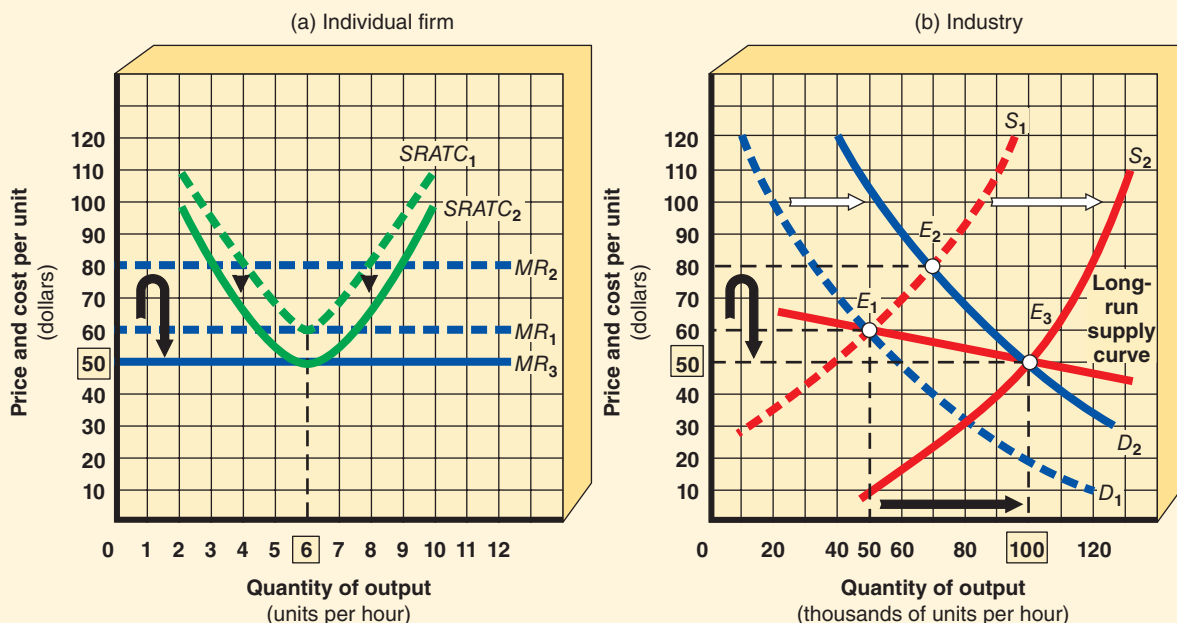
Increasing-Cost Industry

In an **increasing-cost industry**, input prices rise as new firms enter the industry, and output expands. As this type of industry uses more labor and machines, the demand for greater quantities of these inputs drives up input prices. An increasing-cost industry is an industry in which the expansion of industry output by the entry of new firms increases the individual firm's cost curve (cost curve shifts upward). Suppose

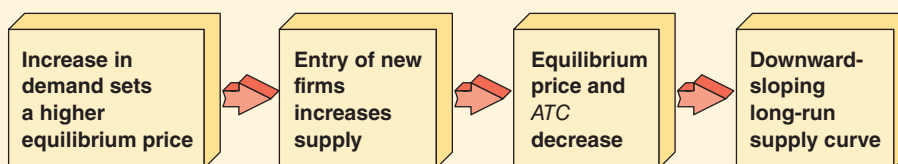
Exhibit 12

Long-Run Supply in a Decreasing-Cost Industry

The long-run supply curve for a decreasing-cost industry is downward sloping. The increase in industry demand shown in part (b) causes the price to rise to \$80 in the short run. Temporarily, the individual firm illustrated in part (a) earns an economic profit. Higher profits attract new firms, and supply increases. As the industry expands, the average total cost curve for the firm shifts lower, and the firm reestablishes long-run equilibrium at the lower price of \$50.



CAUSATION CHAIN



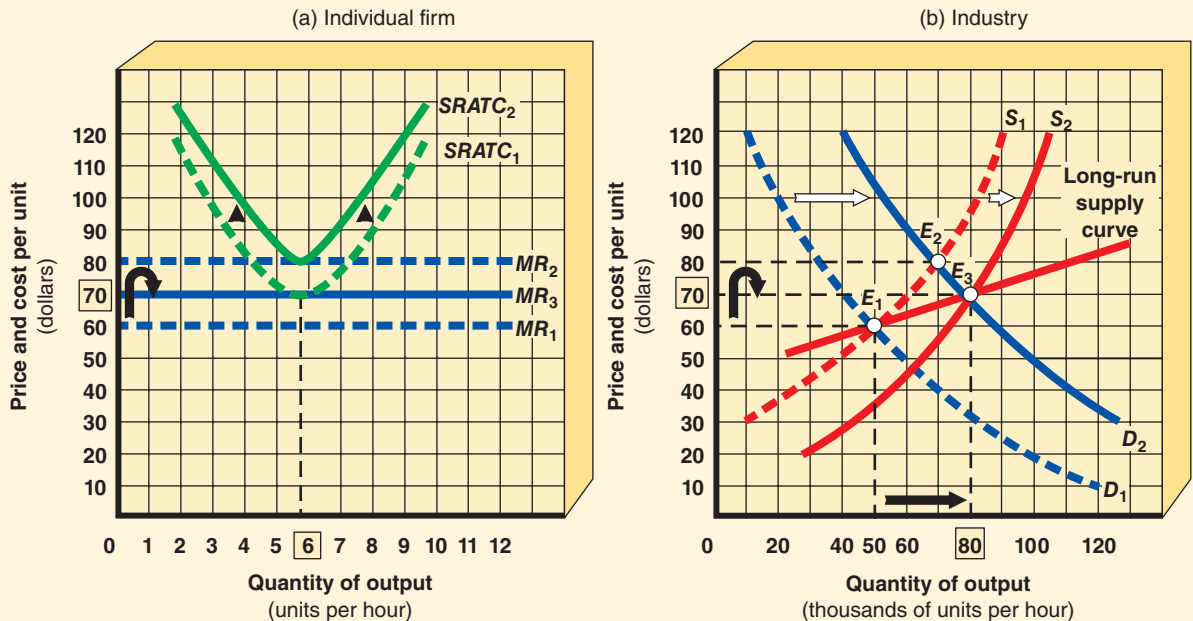
the electronic component disc business uses a significant proportion of all electrical engineers in the country. In this case, electrical engineering salaries will rise as firms hire more electrical engineers to expand industry output. In practice, most industries are increasing-cost industries, and therefore, the long-run supply curve is upward sloping.

Exhibit 13 shows what happens in an increasing-cost industry when an increase in demand causes output to expand. In part (b), the industry is initially in equilibrium at point E_1 . As in the previous case, the demand curve shifts rightward from D_1 to D_2 , establishing a new short-run equilibrium at E_2 . This movement upward along short-run industry supply curve S_1 raises the price in the short run from \$60 to \$80,

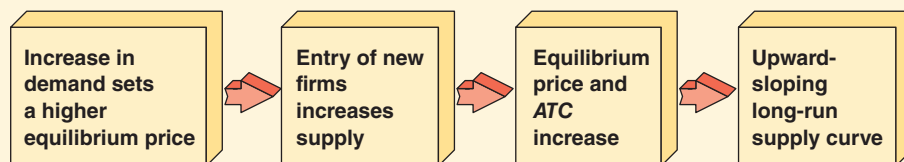
Exhibit 13

Long-Run Supply in an Increasing-Cost Industry

This pair of graphs derives the long-run supply curve based on the assumption that input prices rise as industry output expands. Part (b) shows that an increase in demand from D_1 to D_2 causes the price to increase in the short run from \$60 to \$80. The individual firm represented in part (a) earns an economic profit, and new firms enter the industry, causing an increase in industry supply from S_1 to S_2 . As output expands, input prices rise and push up the firm's short-run average total cost curve from $SRATC_1$ to $SRATC_2$. As a result, a new long-run equilibrium price is established at \$70, which is above the initial equilibrium price. The long-run supply curve for an increasing-cost industry is upward sloping.



CAUSATION CHAIN



You're The Economist **Gators Snapping Up Profits**

Applicable Concepts: short-run and long-run competitive equilibrium



In the late 1980s, many farmers who were tired of milking cows, roping steers, and slopping hogs decided to try their hands at a new animal. Anyone feeding this animal, however, could require a gun for protection.

Prior to the late 1970s, alligators were on the endangered species list. Under this protection, their numbers grew so large that wandering alligators became pests in Florida neighborhoods and police were exhausted from chasing them around. Consequently, the ban on hunting was removed, and shrewd entrepreneurs began seeking big profits by turning gators into farm animals. In fact, gator farming became one of Florida's fastest-growing businesses.

The gators spawned several hot industries. The lizard "look" came back into vogue, and the fashionable sported gator-skin purses, shoes, and belts. Chic didn't come cheap. In New York, gator cowboy boots sold for \$1,800, and attaché cases retailed for \$4,000. And you could order gator meat at trendy restaurants all along the East Coast. "Why not gator?" asked Red Lobster spokesman Dick Monroe. "Today's two-income households are looking for more variety. And they think it's neat to eat an animal that can eat them."

To meet the demand, Florida doubled the number of its licensed alligator farms compared to the previous four years when they functioned almost entirely as



© Image copyright David Huntley, 2009. Used under license from Shutterstock.com

tourist attractions. In 1985, Florida farmers raised 37,000 gators; in 1986, that figure increased by 50 percent. Revenues soared as well. Frank Godwin, owner of Gatorland in Orlando, netted an estimated \$270,000 from the 1,000 animals he harvested annually. Improved technology was applied to gator farming in order to boost profits even higher. Lawler Wells, for example, owner of Hilltop

resulting in profit for the typical firm. Once again, new firms enter the industry, and the short-run supply curve shifts rightward from S_1 to S_2 . Part (a) of Exhibit 13 shows that the response of the firm's $SRATC$ curve to the industry's expansion differs from the constant-cost industry case. In an increasing-cost industry, the firm's $SRATC$ curve shifts upward from $SRATC_1$ to $SRATC_2$, corresponding to the new short-run equilibrium at point E_3 . At this final equilibrium point, the price of \$70 is higher than the initial price of \$60. Normal profits are re-established because profits are squeezed from both the price fall and the rise in the $SRATC$ curve.

The long-run industry supply curve is drawn by connecting the two long-run equilibrium points of E_1 and E_3 . Equilibrium point E_2 is not a long-run equilibrium point because it is not established after the entry of new firms has restored normal profits.

CONCLUSION *The long-run supply curve in a perfectly competitive increasing-cost industry is upward sloping.*

Finally, given the three models presented, you may ask which is the best choice. The answer is that all three versions are possible for any given industry. Only direct observation of the industry can tell which type of industry it is.

Farms in Avon Park, raised 7,000 gators in darkened hothouses that accelerated their growth.¹

Seven years later, a 1993 article in the *Washington Post* continued the gator tale: “During the late 1980s, gator ranching was booming, and the industry was being compared to a living gold mine. People rushed into the industry. Some farmers became temporarily rich.”²

In 1995, a *USA Today* interview with a gator hunter provided evidence of long-run equilibrium: “Armed with a pistol barrel attached to the end of an 8-foot wooden pole, alligator hunter Bill Chaplin fires his ‘bankstick’ and dispatches a six-footer with a single round of .44 magnum ammunition. What’s in it for him? Financially, very little. At \$3.50 a pound for the meat and \$45 a foot for the hide, an alligator is worth perhaps \$100 a foot. After paying for skinning and processing,

neither hunter nor landowner gets rich.”³

A 2000 article in *The Dallas Morning News* provided further evidence: Mark Glass, who began raising gators in 1995 south of Atlanta, stated “I can honestly say I haven’t made any money yet, but I hope that’s about to change.”⁴ And a 2003 article from *Knight Ridder/Tribune Business News* gave a pessimistic report for Florida: “Revenue from alligator harvesting has flattened in recent years, despite Florida’s efforts to promote the alligator as part of a viable ‘aquaculture’ industry. It’s a tough business.”⁵ And in 2007, in response to numerous complaints of nuisance alligators, the Florida Fish and Wildlife Conservation Commission considered eliminating some rules that have protected this species for years.

ANALYZE THE ISSUE

1. Draw short-run firm and industry competitive equilibriums for a perfectly competitive gator-farming industry before the number of alligator farms in Florida doubled. For simplicity, assume the gator farm is earning zero economic profit. Now show the short-run effect of an increase in demand for alligators.
2. Assuming gator farming is perfectly competitive, explain the long-run competitive equilibrium condition for the typical gator farmer and the industry as a whole.

1. Ron Moreau and Penelope Wang, “Gators: Snapping Up Profits,” *Newsweek*, December 8, 1986, 68.

2. William Booth, “Bag a Gator and Save the Species,” *The Washington Post*, August 25, 1993, A1.

3. J. Taylor Buckley, “S. Carolina Lets Hunters Go for Gators Again,” *USA Today*, September 21, 1995, News Section, A1.

4. “More Bite for the Buck,” *Dallas Morning News*, December 6, 2000, 2A.

5. Jerry W. Jackson, “Alligators are Growing Part of Florida’s Agricultural Landscape,” *Knight Ridder/Tribune Business News*, January 26, 2003.

Key Concepts

Market structure
Perfect competition
Price taker
Marginal revenue (MR)

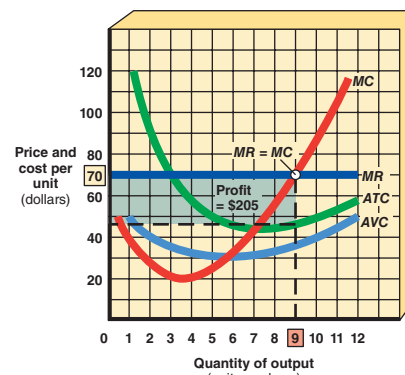
Perfectly competitive firm's
short-run supply curve
Perfectly competitive industry's
short-run supply curve

Perfectly competitive industry's
long-run supply curve
Constant-cost industry
Decreasing-cost industry
Increasing-cost industry

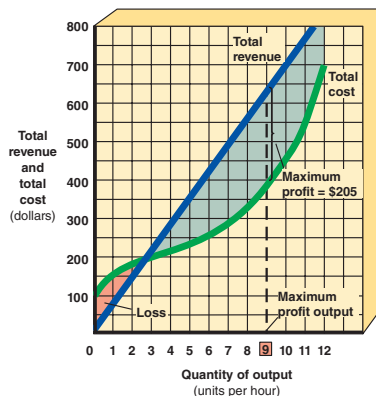
Summary

- **Market structure** consists of three market characteristics: (1) the number of sellers, (2) the nature of the product, and (3) the ease of entry into or exit from the market.
- **Perfect competition** is a market structure in which an individual firm cannot affect the price of the product it produces. Each firm in the industry is very small relative to the market as a whole, all the firms sell a homogeneous product, and firms are free to enter and exit the industry.
- A **price-taker** firm in perfect competition faces a perfectly elastic demand curve. It can sell all it wishes at the market-determined price, but it will sell nothing above the given market price. This is because so many competitive firms are willing to sell the same product at the going market price.
- The **total revenue-total cost method** is one way a firm determines the level of output that maximizes profit. Profit reaches a maximum when the vertical difference between the total revenue and the total cost curves is at a maximum.
- The **marginal revenue equals marginal cost method** is a second approach to finding where a firm maximizes profits. **Marginal revenue (MR)** is the change in total revenue from a one-unit change in output. Marginal revenue for a perfectly competitive firm equals the market price. The $MR = MC$ rule states that the firm maximizes profit or minimizes loss by producing the output where marginal revenue equals marginal cost. If the price (average revenue) is below the minimum point on the average variable cost curve, the $MR = MC$ rule does not apply, and the firm shuts down to minimize its losses.

Marginal Revenue Equals Marginal Cost Method



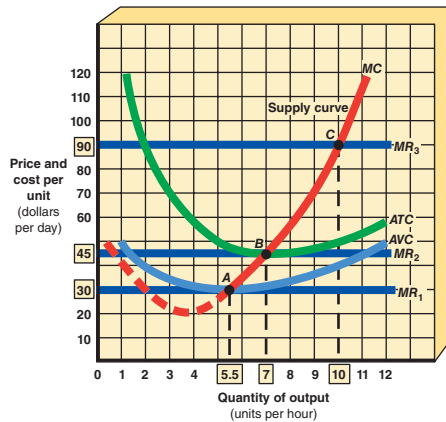
Total Revenue-Total Cost Method



- The **perfectly competitive firm's short-run supply curve** is a curve showing the relationship between the price of a product and the quantity supplied in the short run.

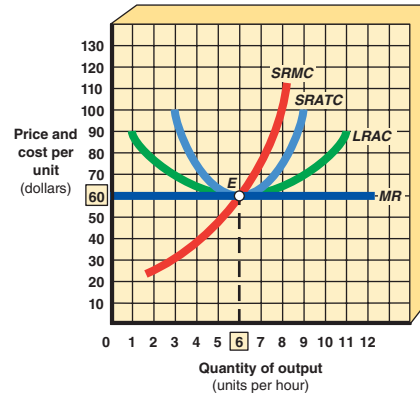
The individual firm always produces along its marginal cost curve above its intersection with the average variable cost curve. The perfectly competitive industry's short-run supply curve is the horizontal summation of the short-run supply curves of all firms in the industry.

Short-Run Supply Curve



- **Long-Run Perfectly Competitive Equilibrium** occurs when a firm earns a normal profit by producing where price equals minimum long-run average cost equals minimum short-run average total cost equals short-run marginal cost.

Long-Run Perfectly Competitive Equilibrium



- In a **constant-cost industry**, total output can be expanded without an increase in the individual firm's average total cost. Because input prices remain constant, the long-run supply curve in a constant-cost industry is perfectly elastic.
- In a **decreasing-cost industry**, lower input prices result in a downward-sloping industry long-run supply curve. As industry output expands, an individual firm's average total cost curve declines (shifts downward), and the long-run equilibrium market price falls.
- In an **increasing-cost industry**, input prices rise as industry output increases. As a result, an individual firm's average total cost curve rises (shifts upward), and the industry long-run supply curve for an increasing-cost industry is upward sloping.

Summary of Conclusion Statements

- The large-number-of-sellers condition is met when each firm is so small relative to the total market that no single firm can influence the market price.
- If a product is homogeneous, buyers are indifferent as to which seller's product they buy.
- Perfect competition requires that resources be completely mobile to freely enter or exit a market.
- In perfect competition, the firm's marginal revenue equals the price that the firm views as a horizontal demand curve.
- In perfect competition, the firm maximizes profit or minimizes loss by producing the output where marginal revenue equals marginal cost.
- In perfect competition, if the price is below the minimum point on the AVC curve, each unit produced would not cover the variable cost per unit. Therefore, the firm shuts down.

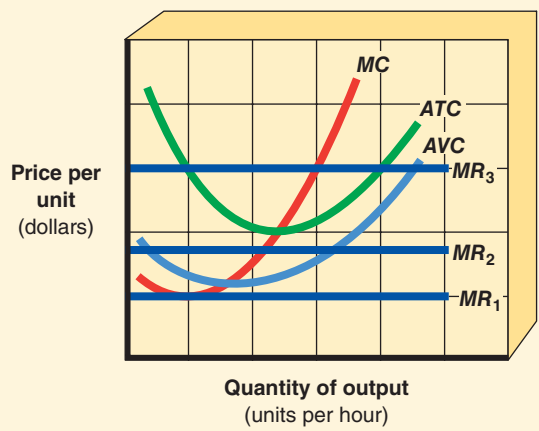
- The long-run supply curve in a perfectly competitive constant-cost industry is perfectly elastic.
- The long-run supply curve in a perfectly competitive decreasing-cost industry is downward sloping.
- The long-run supply curve in a perfectly competitive increasing-cost industry is upward sloping.

Study Questions and Problems

1. Explain why a perfectly competitive firm would or would not advertise.
2. Does a Kansas wheat farmer fit the perfectly competitive market structure? Explain.
3. Suppose the market equilibrium price of wheat is \$2 per bushel in a perfectly competitive industry. Draw the industry supply and demand curves and the demand curve for a single wheat farmer. Explain why the wheat farmer is a price taker.
4. Assuming the market equilibrium price for wheat is \$5 per bushel, draw the total revenue and the marginal revenue curves for the typical wheat farmer in the same graph. Explain how marginal revenue and price are related to the total revenue curve.
5. Consider the following cost data for a perfectly competitive firm in the short run:

Exhibit 14

A Perfectly Competitive Firm



Output (Q)	Total fixed Cost (TFC)	Total variable Cost (TVC)	Total cost (TC)	Total revenue (TR)	Profit
1	\$100	\$120	\$ _____	\$ _____	\$ _____
2	100	200	_____	_____	_____
3	100	290	_____	_____	_____
4	100	430	_____	_____	_____
5	100	590	_____	_____	_____

If the market price is \$150, how many units of output will the firm produce in order to maximize profit in the short run? Specify the amount of economic profit or loss. At what level of output does the firm break even?

6. Consider this statement: “A firm should increase output when it makes a profit.” Do you agree or disagree? Explain.
7. Consider this statement: “When marginal revenue equals marginal cost, total cost equals total revenue, and the firm makes zero profit.” Do you agree or disagree? Explain.
8. Consider Exhibit 14, which shows the graph of a perfectly competitive firm in the short run.
 - a. If the firm’s demand curve is MR_3 , does the firm earn an economic profit or loss?
 - b. Which demand curve(s) indicate(s) the firm incurs a loss?
 - c. Which demand curve(s) indicate(s) the firm would shut down?
 - d. Identify the firm’s short-run supply curve.
9. Consider this statement: “The perfectly competitive firm will sell all the quantity of output consumers will buy at the prevailing market price.” Do you agree or disagree? Explain your answer.
10. Suppose a perfectly competitive firm’s demand curve is below its average total cost curve. Explain the conditions under which a firm continues to produce in the short run.
11. Suppose the industry equilibrium price of residential housing construction is \$100 per square foot and the minimum average variable cost for a residential construction contractor is \$110 per square foot. What would you advise the owner of this firm to do? Explain.
12. Suppose independent truckers operate in a perfectly competitive industry. If these firms are earning positive economic profits, what happens in the long run to the following: the price of trucking services, the industry quantity of output and the profits of trucking firms? Given these conditions, is the independent trucking industry a constant-cost, an increasing-cost, or a decreasing-cost industry?

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Should Motels Offer Rooms at the Beach for Only \$50 a Night?

As long as price exceeds average variable cost, the motel is better off operating than shutting down. Since \$50 is more than enough to cover the guest-related variable costs of \$45 per room, the firm will operate. The \$5 remaining after covering variable costs can be put toward the \$50 of fixed

costs. Were the motel to shut down, it could make no contribution to these overhead costs. If you said the Myrtle Beach motels should operate during the winter because they can get a price that exceeds their average variable cost, **YOU ARE CORRECT.**

Are You in Business for the Long Run?

In the long run, surviving firms will operate at the minimum of the long-run average cost curve. The average cost of 50 storage units is \$4,000 (\$200,000/50), the average cost of 100 storage units is \$3,000 (\$300,000/100), and the average cost of

200 storage units is \$3,500 (\$700,000/200). Of the three storage-unit quantities given, the one with the lowest average cost is closest to the minimum point on the *LRAC* curve. If you chose 100 storage units, **YOU ARE CORRECT.**



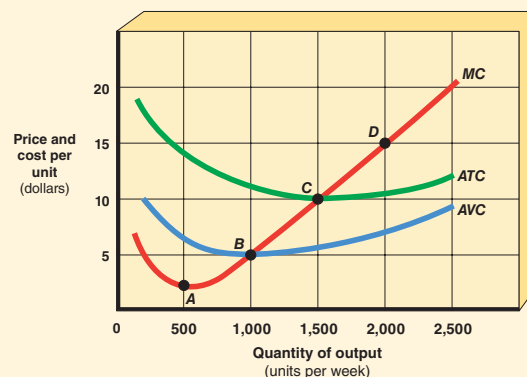
Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

1. A perfectly competitive market is *not* characterized by
 - a. many small firms.
 - b. a great variety of different products.
 - c. free entry into and exit from the market.
 - d. any of the above.
2. Which of the following is a characteristic of perfect competition?
 - a. Entry barriers
 - b. Homogeneous products
 - c. Expenditures on advertising
 - d. Quality of service
3. Which of the following are the same at all levels of output under perfect competition?
 - a. Marginal cost and marginal revenue
 - b. Price and marginal revenue
 - c. Price and marginal cost
 - d. All of the above
4. If a perfectly competitive firm sells 100 units of output at a market price of \$100 per unit, its marginal revenue per unit is
 - a. \$1.
 - b. \$100.
 - c. more than \$1, but less than \$100.
 - d. less than \$100.
5. Short-run profit maximization for a perfectly competitive firm occurs where the firm's marginal cost equals
 - a. average total cost.
 - b. average variable cost.
 - c. marginal revenue.
 - d. all of the above.
6. A perfectly competitive firm sells its output for \$100 per unit, and the minimum average variable cost is \$150 per unit. The firm should
 - a. increase output.
 - b. decrease output, but not shut down.
 - c. maintain its current rate of output.
 - d. shut down.
7. A perfectly competitive firm's supply curve follows the upward-sloping segment of its marginal cost curve above the
 - a. average total cost curve.
 - b. average variable cost curve.
 - c. average fixed cost curve.
 - d. average price curve.
8. Assume the price of the firm's product in Exhibit 15 is \$15 per unit. The firm will produce
 - a. 500 units per week.
 - b. 1,000 units per week.
 - c. 1,500 units per week.
 - d. 2,000 units per week.
 - e. 2,500 units per week.
9. In Exhibit 15, the lowest price at which the firm earns zero economic profit in the short run is
 - a. \$5 per unit.
 - b. \$10 per unit.
 - c. \$20 per unit.
 - d. \$30 per unit.

Exhibit 15

Marginal Revenue and Cost per Unit Curves



Practice Quiz Continued

10. Assume the price of the firm's product in Exhibit 15 is \$6 per unit. The firm should
 - a. continue to operate because it is earning an economic profit.
 - b. stay in operation for the time being even though it is incurring an economic loss.
 - c. shut down temporarily.
 - d. shut down permanently.
11. Assume the price of the firm's product in Exhibit 15 is \$10 per unit. The maximum profit the firm earns is
 - a. zero.
 - b. \$5,000 per week.
 - c. \$1,500 per week.
 - d. \$10,500 per week.
12. In Exhibit 15, the firm's total revenue at a price of \$10 per unit pays for
 - a. a portion of total variable costs.
 - b. a portion of total fixed costs.
 - c. none of the total fixed costs.
 - d. all of the total fixed costs and total variable costs.
13. As shown in Exhibit 15, the short-run supply curve for this firm corresponds to which segment of its marginal cost curve?
 - a. A to D and all points above
 - b. B to D and all points above
 - c. C to D and all points above
 - d. B to C only
14. In long-run equilibrium, the perfectly competitive firm's price is equal to which of the following?
 - a. Short-run marginal cost
 - b. Minimum short-run average total cost
 - c. Marginal revenue
 - d. All of the above
15. In a constant-cost industry, input prices remain constant as
 - a. the supply of inputs fluctuates.
 - b. firms encounter diseconomies of scale.
 - c. workers become more experienced.
 - d. firms enter and exit the industry.
16. Suppose that, in the long run, the price of feature films rises as the movie production industry expands. We can conclude that movie production is a (an)
 - a. increasing-cost industry.
 - b. constant-cost industry.
 - c. decreasing-cost industry.
 - d. marginal-cost industry.
17. Which of the following is *true* of a perfectly competitive market?
 - a. If economic profits are earned, then the price will fall over time.
 - b. In long-run equilibrium, $P = MR = SRMC = SRATC = LRAC$.
 - c. A constant-cost industry exists when the entry of new firms has no effect on their cost curves.
 - d. All of the above are true.
18. Suppose that in a perfectly competitive market, firms are making economic profits. In the long run, we can expect to see
 - a. some firms leave.
 - b. the market price rise.
 - c. market supply shift to the left.
 - d. economic profits become zero.
 - e. production levels remaining the same as in the short-run.
19. Assume the short-run average total cost for a perfectly competitive industry decreases as the output of the industry expands. In the long run, the industry supply curve will
 - a. have a positive slope.
 - b. have a negative slope.
 - c. be perfectly horizontal.
 - d. be perfectly vertical.
20. The long-run supply curve for a competitive constant-cost industry is
 - a. horizontal.
 - b. vertical.
 - c. upward sloping.
 - d. downward sloping.



Monopoly

Playing the popular board game of Monopoly teaches some of the characteristics of monopoly theory presented in this chapter. In the game version, players win by gaining as much economic power as possible. They strive to own railroads, utilities, Boardwalk, Park Place, and other valuable real estate. Then each player tries to bankrupt opponents by having hotels that charge high prices. A player who rolls the dice and lands on another player's property has no choice—either pay the price or lose the game.

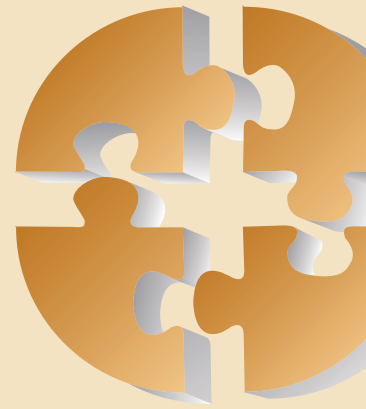
In the last chapter, we studied perfect competition, which may be viewed as the paragon of economic virtue. Why? Under perfect competition, there are many sellers, each lacking any power to influence price. Perfect competition and monopoly are polar extremes. The word *monopoly*

is derived from two Greek words meaning “single seller.” A monopoly has the market power to set its price and not worry about competitors. Perhaps your college or university has only one bookstore where you can buy textbooks. If so, students are likely to pay higher prices for textbooks than they would if many sellers competed in the campus textbook market.

This chapter explains why firms do not or cannot enter a particular market and compete with a monopolist. Then we explore some of the interesting actual monopolies around the world. We study how a monopolist determines what price to charge and how much to produce. The chapter ends with a discussion of the pros and cons of monopoly. Most of the analytical tools required here have been introduced in previous chapters.

In this chapter, you will learn to solve these economics puzzles:

- Why doesn't the monopolist gouge consumers by charging the highest possible price?
- How can price discrimination be fair?
- Are medallion cabs in New York City monopolists?



THE MONOPOLY MARKET STRUCTURE

The model at the opposite extreme from perfect competition is monopoly. Under **monopoly**, the consumer has a simple choice—either buy the monopolist's product or do without it. Monopoly is a market structure characterized by (1) a single seller, (2) a unique product, and (3) impossible entry into the market. Unlike perfect competition, there are no close substitutes for the monopolist's product. Monopoly, like perfect competition, corresponds only approximately to real-world industries, but it serves as a useful benchmark model. Following are brief descriptions of each monopoly characteristic.

Monopoly

A market structure characterized by (1) a single seller, (2) a unique product, and (3) impossible entry into the market.

Single Seller

In perfect competition, many firms make up the industry. In contrast, a monopoly means that a single firm *is* the industry. One firm provides the total supply of a product in a given market. Local monopolies are more common real-world approximations of the model than national or world market monopolies. For example, the campus bookstore, local telephone service, cable television company, and electric power company may be local monopolies. The only gas station, drug store, or grocery store in Nowhere County, Utah, and a hotdog stand at a football game are also examples of monopolies. Nationally, the U.S. Postal Service monopolizes first-class mail.

Unique Product

A unique product means there are *no close substitutes* for the monopolist's product. Thus, the monopolist faces little or no competition. In reality, however, there are few, if any, products that have no close substitutes. For example, students can buy used textbooks from sources other than the campus bookstore, and textbooks can be purchased over the Internet. Natural gas and oil furnaces are good substitutes for electric heat. Similarly, the fax machine and email are substitutes for mail service, and a satellite dish can replace your local cable television service.

Impossible Entry

In perfect competition, there are no constraints to prevent new firms from entering an industry. In the case of monopoly, extremely high barriers make it very difficult or

impossible for new firms to enter an industry. Following are the three major barriers that prevent new firms from entering a market and competing with a monopolist.

Ownership of a Vital Resource

Sole control of the entire supply of a strategic input is one way a monopolist can prevent a newcomer from entering an industry. A famous historical example is Alcoa's monopoly of the U.S. aluminum market from the late 19th century until the end of World War II. The source of Alcoa's monopoly was its control of bauxite ore, which is necessary to produce aluminum. Today, it is very difficult for a new professional sports league to compete with the National Football League (NFL) and the National Basketball Association (NBA). Why? NFL and NBA teams have contracts with the best players and leases for the best stadiums and arenas.

Legal Barriers

The oldest and most effective barriers protecting a firm from potential competitors are the result of government franchises and licenses. The government permits a single firm to provide a certain product and excludes competing firms by law. For example, water and sewer service, natural gas, and cable television operate under monopoly franchises established by state and local governments. In many states, the state government runs monopoly liquor stores and lotteries. The U.S. Postal Service has a government franchise to deliver first-class mail.

Government-granted licenses restrict entry into some industries and occupations. For example, the Federal Communications Commission (FCC) must license radio and television stations. In most states, physicians, lawyers, dentists, nurses, teachers, real estate agents, hairstylists, taxicabs, liquor stores, funeral homes, and other professions and businesses are required to have a license.

Patents and copyrights are another form of government barrier to entry. The government grants patents to inventors, thereby legally prohibiting other firms from selling the patented product for 20 years. Copyrights give creators of literature, art, music, and movies exclusive rights to sell or license their works. The purpose behind granting patents and copyrights is to encourage innovation and new products by guaranteeing exclusive rights to profit from new ideas for a limited period.

Economies of Scale

Why might competition among firms be unsustainable so that one firm becomes a monopolist? Recall the concept of *economies of scale* from the chapter on production costs. As a result of large-scale production, the long-run average cost (LRAC) of production falls. This means a monopoly can emerge in time *naturally* because of the relationship between average cost and the scale of an operation. As a firm becomes larger, its cost per unit of output is lower compared to a smaller competitor. In the long run, this “survival of the fittest” cost advantage forces smaller firms to leave the industry. Because new firms cannot hope to produce and sell output equal or close to that of the monopolist, thereby achieving the monopolist's low costs, they will not enter the industry. Thus, a monopoly can arise over time and remain dominant in an industry even though the monopolist does not own an essential resource or obtain legal barriers.

Economists call the situation in which one seller emerges in an industry because of economies of scale a **natural monopoly**. A natural monopoly is an industry in which the long-run average cost of production declines throughout the entire market. As a result, a single firm can supply the entire market demand at a lower cost than two or more smaller firms. Public utilities, such as the natural gas, water, and local telephone companies, are examples of natural monopolies. The government grants these industries an exclusive franchise in a geographic area so consumers can benefit from the cost savings that occur when one firm in an industry with significant economies of scale sells a large output. The government then regulates these monopolies through a board of commissioners to prevent exploitation.

Exhibit 1 depicts the *LRAC* curve for a natural monopoly. A single firm can produce 100 units at an average cost of \$15 and a total cost of \$1,500. If two firms each produce 50 units, the total cost rises to \$2,500. With five firms producing 20 units each, the total cost rises to \$3,500. In the chapter on antitrust and regulation, regulation of a natural monopoly will be explored in greater detail.

Natural monopoly

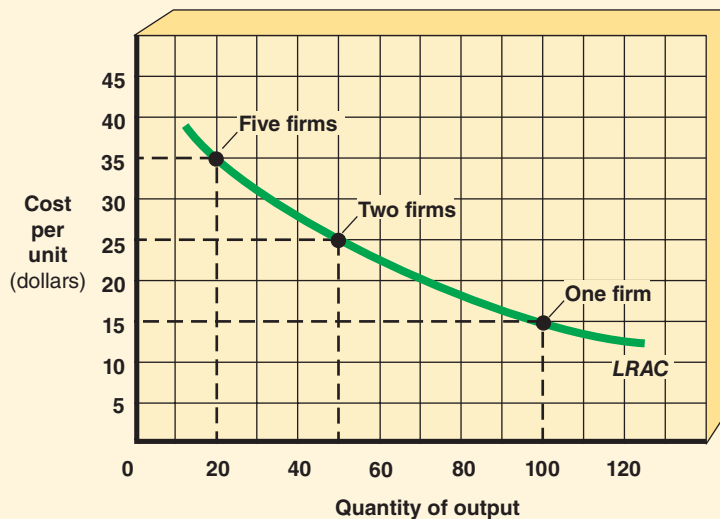
An industry in which the long-run average cost of production declines throughout the entire market. As a result, a single firm can supply the entire market demand at a lower cost than two or more smaller firms.

CONCLUSION *Because of economies of scale, a single firm in an industry will produce output at a lower per-unit cost than two or more firms.*

Exhibit 1

Minimizing Costs in a Natural Monopoly

In a natural monopoly, a single firm in an industry can produce at a lower cost than two or more firms. This condition occurs because the *LRAC* curve for any firm decreases over the relevant range. For example, one firm can produce 100 units at an average cost of \$15 and a total cost of \$1,500. Two firms in the industry can produce 100 units of output (50 units each) for a total cost of \$2,500, and five firms can produce the same output for a total cost of \$3,500.



Global Economics Monopolies Around the World

Applicable Concept: monopoly

© Photos.com/Jupiter Images



Interesting examples of monopolies can be found in other countries. Let's begin with a historical example. In the sixteenth through eighteenth centuries, monarchs granted monopoly rights for a variety of businesses. For example, in 1600 Queen Elizabeth I

chartered the British East India Company and gave it a monopoly over England's trade with India. This company was even given the right to coin money and to make peace or war with non-Christian powers. As a result of its monopoly, the company made substantial profits from the trade in Indian cotton goods, silks, and spices. In the late 1700s, the growing power of the company and huge personal fortunes of its officers provoked more and more government control. Finally, in 1858, the company was abolished, ending its trade monopoly, great power, and patronage.

"Diamonds are forever," and perhaps so is the diamond monopoly. DeBeers, a South African corporation, was close to a world monopoly. Through its Central Selling Organization (CSO) headquartered in London, DeBeers controlled 80 percent of all the diamonds sold in the world. DeBeers controlled the price of jewelry-quality diamonds by requiring suppliers in Russia, Australia, Congo, Botswana, Namibia, and other countries to sell their rough diamonds through DeBeers's CSO. Why did suppliers of rough diamonds allow DeBeers to set the price and quantity of diamonds sold throughout the world?

The answer was that the CSO could put any uncooperative seller out of business. All the CSO had to do was to reach into its huge stockpile of diamonds and flood the market with the type of diamonds being sold by an independent seller. As a result, the price of diamonds would plummet in the competitor's market, and it ceased to sell diamonds.

In recent years, DeBeers lost some of its control of the market. Mines in Australia became more independent, diamonds were found in Canada, and Russian mines began selling to independents. To deal with the new conditions, DeBeers changed its policy in 2001 by closing the CSO and promoting DeBeers's own brand of diamonds rather than trying to control the world diamond supply. DeBeers proclaimed its strategy to be "the diamond supplier of choice." Will this monopoly continue? It is an interesting question.

Genuine caviar, the salty black delicacy, is naturally scarce because it comes from the eggs of sturgeon harvested by fisheries from the Caspian Sea near the mouth of the Volga River. After the Bolshevik revolution in Russia in 1917, a caviar monopoly was established under the control of the Soviet Ministry of Fisheries and the Paris-based Petrosian Company. The Petrosian brothers limited exports of caviar and pushed prices up as high as \$1,000 a pound for some varieties. As a result of this worldwide monopoly, both the Soviet government and the Petrosian Company earned handsome profits. It is interesting to note that the vast majority of the tons of caviar harvested each year was consumed at government banquets or sold at bargain prices to top Communist Party officials. With the fall of the Soviet Union, it was impossible for the Ministry of Fisheries to control all exports of caviar. Various former Soviet republics claimed jurisdiction and negotiated independent export contracts. As a result, caviar export prices dropped sharply.

Network Good

Economies of scale and monopoly power can exist because consumers choose a product that everyone else is using. A **network good** is a good that increases in value to each user as the total number of users increases. Examples include such Internet products as Facebook and Match.com. People post on Facebook to belong to the same network where everyone posts their profile. Similarly, Match.com is the largest dating service with the largest selections of potential dates.

CONCLUSION *The greater the number of people connected to a network goods system, the more benefits of the product to each person are increased.*

Network goods can result in a firm increasing sales rapidly and thus achieving economies of scale, as illustrated in Exhibit 1. Smaller firms therefore have higher-cost products that cannot compete and they go out of business.

PRICE AND OUTPUT DECISIONS FOR A MONOPOLIST

A major difference between perfect competition and monopoly is the shape of the demand curve, not the shapes of the cost curves. As explained in the previous chapter, a perfectly competitive firm is a *price taker*. In contrast, the next sections explain that a monopolist is a **price maker**. A price maker is a firm that faces a downward-sloping demand curve. This means a monopolist has the ability to select the product's price. In short, a monopolist can set the price with its corresponding level of output, rather than being a helpless pawn at the mercy of the going industry price. To understand the monopolist, we again apply the marginal approach to our hypothetical electronics company—Computech.

Marginal Revenue, Total Revenue, and Price Elasticity of Demand

Suppose engineers at Computech discover an inexpensive miracle electronic device called SAV-U-GAS that anyone can easily attach to a car's engine. Once installed, the device raises gasoline mileage to over 100 miles per gallon. The government grants Computech a patent, and the company becomes a monopolist selling this gas-saver gizmo. Because of this barrier to entry, Computech is the only seller in the industry. Although other firms try to compete with this invention, they create poor substitutes. This means the downward-sloping demand curve for the industry and for the monopolist are identical.

Exhibit 2(a) illustrates the demand and the marginal revenue (*MR*) curves for a monopolist such as Computech. As the monopolist lowers its price

Network good

A good that increases in value to each user as the total number of users increase. As a result, a firm can achieve economies of scale. Examples include Facebook and Match.com.

Price maker

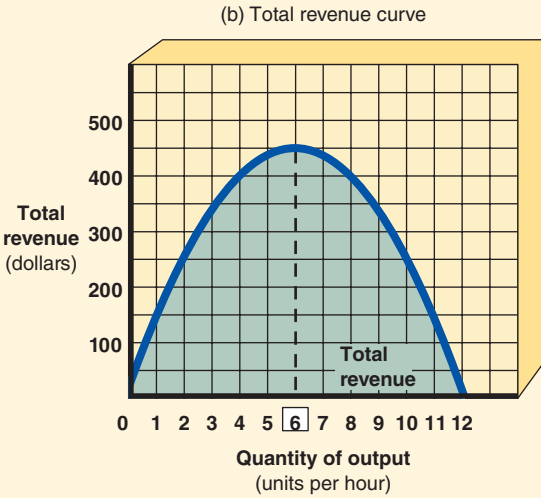
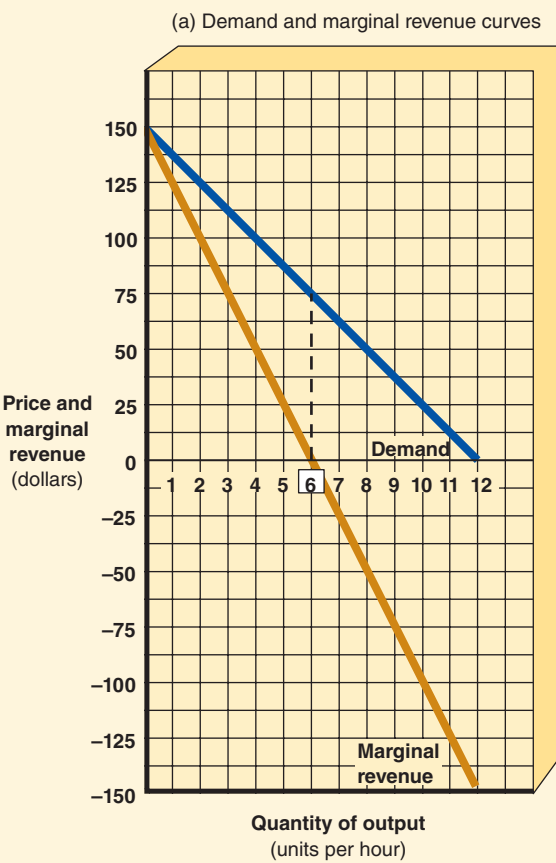
A firm that faces a downward-sloping demand curve and therefore it can choose among price and output combinations along the demand curve.

Exhibit 2 Demand, Marginal Revenue, and Total Revenue for a Monopolist

Part (a) shows the relationship between the demand and the marginal revenue curves. The *MR* curve is below the demand curve. Between zero and 6 units of output, $MR > 0$; at 6 units of output, $MR = 0$; beyond 6 units of output, $MR < 0$.

The relationship between demand and total revenue is shown in part (b). When the price is \$150, total revenue is zero. When the price is set at zero, total revenue is also zero. In between these two extreme prices, the price of \$75 maximizes total revenue. This price corresponds to 6 units of output, which is where the *MR* curve intersects the quantity axis, halfway between the origin and the intercept of the demand curve.

Output per Hour	Price	Total Revenue	Marginal Revenue
0	\$150	\$ 0	
1	138	138	\$138
2	125	250	112
3	113	339	89
4	100	400	61
5	88	440	40
6	75	450	10
7	63	441	0
8	50	400	-9
9	38	342	-41
10	25	250	-58
11	13	143	-92
12	0	0	-107



to increase the quantity demanded, changes in both price and quantity affect the firm's total revenue (price times quantity), as shown graphically in Exhibit 2(b). If Computech charges \$150, consumers purchase zero units, and, therefore, total revenue is zero. To sell 1 unit, Computech must lower the price to \$138, and total revenue rises from zero to \$138. Because the marginal revenue is the increase in total revenue that results from a 1-unit change in output, the *MR* curve at the first unit of output is \$138 ($\$138 - 0$). Thus, the price and the marginal revenue from selling 1 unit are equal at \$138. To sell 2 units, the monopolist must lower the price to \$125, and total revenue rises to \$250. The marginal revenue from selling the second unit is \$112 ($\$250 - \$138$), which is \$13 less than the price received.

As shown in Exhibit 2(a), as the monopolist lowers its price, price is greater than marginal revenue after the first unit of output. Like all marginal measurements, marginal revenue is plotted midway between the quantities.

CONCLUSION *The demand and marginal revenue curves of the monopolist are downward sloping, in contrast to the horizontal demand and corresponding marginal revenue curves facing the perfectly competitive firm [compare Exhibit 2(a) with Exhibit 1(b) of the previous chapter].*

Starting from zero output, as the price falls, total revenue rises until it reaches a maximum at 6 units, and then it falls, tracing the “revenue hill” drawn in part (b). The explanation was presented earlier in the discussion of price elasticity of demand in Chapter 5. Recall that a straight-line demand curve has an elastic ($E_d > 1$) segment along the upper half, a unit elastic ($E_d = 1$) at the midpoint, and an inelastic ($E_d < 1$) segment along the lower half (see Exhibit 4 in Chapter 5). Recall from Chapter 5 that when $E_d > 1$, total revenue rises as the price drops, and total revenue reaches a maximum where $E_d = 1$. When $E_d < 1$, total revenue falls as the price falls.

As shown in Exhibit 2(b), total revenue for a monopolist is related to marginal revenue. When the *MR* curve is above the quantity axis (elastic demand), total revenue is increasing. At the intersection of the *MR* curve and the quantity axis (unit elastic demand), total revenue is at its maximum. When the *MR* curve is below the quantity axis, total revenue is decreasing (inelastic demand). The monopolist will never operate on the inelastic range of its demand curve that corresponds to a negative marginal revenue. The reason is that, in this inelastic range, the monopolist can increase total revenue by cutting output and raising price. In our example, Computech would not charge a price lower than \$75 or produce an output greater than 6 units per hour. Now we turn to the question of what price the monopolist will charge to maximize profit.

In Exhibit 2(a), observe that the *MR* curve cuts the quantity axis at 6 units, which is half of 12 units. Following an easy rule helps locate the point along the quantity axis where marginal revenue equals zero: *The marginal revenue curve for a straight-line demand curve intersects the quantity axis halfway between the origin and the quantity axis intercept of the demand curve.*

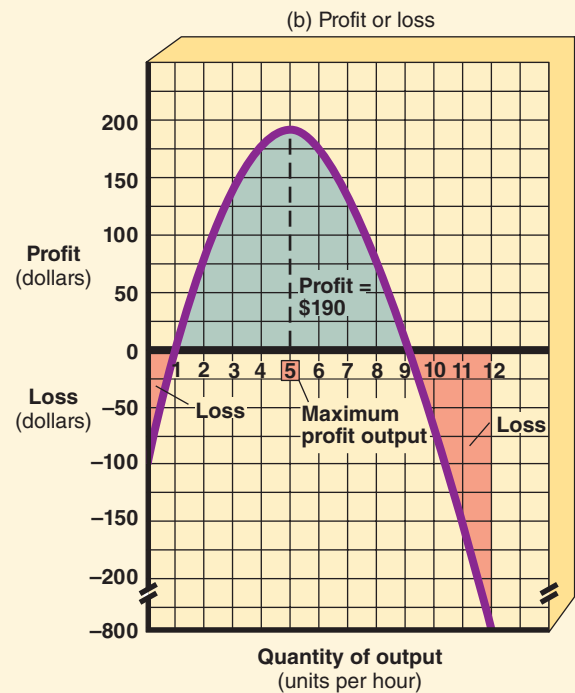
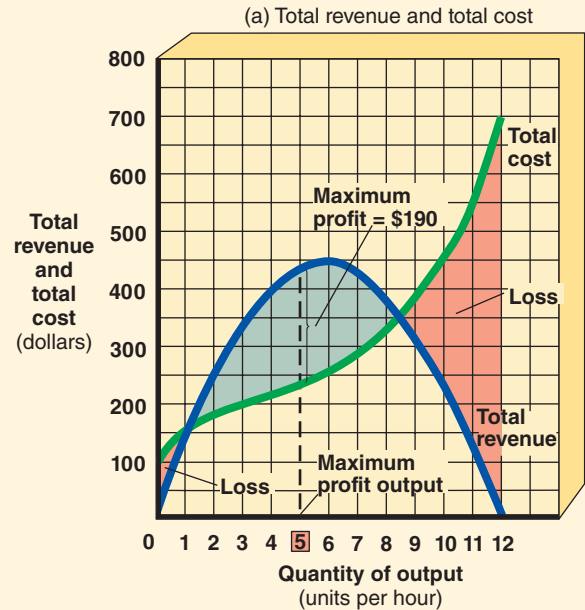
Short-Run Profit Maximization for a Monopolist Using the Total Revenue-Total Cost Method

Exhibit 3 reproduces the demand, total revenue, and marginal revenue data from Exhibit 2 and adds cost data from the previous two chapters. These data illustrate a situation in which Computech can earn monopoly economic profit in the short run. Subtracting total cost in column 6 from total revenue in column 3 gives the total profit or loss in column 8 that the firm earns at each level of output. From zero to 1 unit, the monopolist incurs losses, and then a break-even point occurs before 2 units per hour. If the monopolist produces 5 units per hour, it earns the maximum profit of \$190 per hour. As output expands between 5 and 8 units of output, the monopolist’s profit diminishes. After 8 units of output, there is a second break-even point, and losses increase as output expands. Exhibit 4

Exhibit 3		Short-Run Profit Maximization Schedule for Computech as a Monopolist					
(1) Output per Hour (Q)	(2) Price per Unit (P)	(3) Total Revenue (TR)	(4) Marginal Revenue (MR)	(5) Marginal Cost (MC)	(6) Total Cost (TC)	(7) Average Total Cost (ATC)	(8) Profit (+) or Loss (–)
0	\$150	\$ 0			\$100	–	–\$100
1	138	138	\$138	\$50	150	\$150	–12
2	125	250	112	34	184	92	66
3	113	339	89	24	208	69	131
4	100	400	61	19	227	57	173
5	88	440	40	23	250	50	190
6	75	450	25	25	280	47	170
7	63	441	10	30	318	45	123
8	50	400	–9	38	366	46	34
9	38	342	–41	48	425	47	–83
10	25	250	–58	59	500	50	–250
11	13	143	–92	75	595	54	–452
12	0	0	–107	95	712	59	–712
			–143	117			

*Exhibit 4***Short-Run Profit Maximization for a Monopolist Using the Total Revenue-Total Cost Method**

The profit-maximizing level of output for Computech as a monopolist is shown in this exhibit. Part (a) shows that maximum profit is earned by producing 5 units per hour and charging a price of \$88 per unit where the vertical distance between the total revenue and total cost curves is the greatest. In part (b), the maximum profit of \$190 per hour corresponds to the profit-maximizing output of 5 units per hour illustrated in part (a). At output levels below 2 or above 8, the monopolist incurs losses.



illustrates graphically that where the vertical distance between the total revenue and total cost curves is maximum corresponds to the profit-maximizing output. Note that the total revenue maximizing output level of 6 units is greater than the profit-maximizing output at 5 units.

Short-Run Profit Maximization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method

Exhibit 5 reproduces the demand and cost curves from the table in Exhibit 3. Like the perfectly competitive firm, a monopolist maximizes profit by producing the quantity of output where $MR = MC$ and charging the corresponding price on its demand curve. In this case, 5 units is the quantity at which $MR = MC$. As represented by point A on the demand curve, the price at 5 units is \$88. Point B represents an average total cost (ATC) of \$50 at 5 units. Because the price of \$88 is above the ATC curve at the $MR = MC$ output, the monopolist earns a profit of \$38 per unit. At the hourly output of 5 units, total profit is \$190 per hour, as shown by the shaded area (\$38 per unit $\times$ 5 units).

Observe that a monopolist charges neither the highest possible price nor the total revenue-maximizing price. In Exhibit 5(a), \$88 is not the highest possible price. Because Computech is a *price maker*, it could have set a price above \$88 and sold less output than 5 units. However, the monopolist does not maximize profit by charging the highest possible price. Any price above \$88 does not correspond to the intersection of the MR and MC curves. Now note that 5 units is below the output level where MR intersects the quantity axis and total revenue reaches its peak. Since $MR = 0$ and $E_d = 1$ when total revenue is maximum at 6 units of output, $MC = 0$ must also hold to maximize revenue and profit at the same time. A monopolist producing with zero marginal cost is an unlikely case. Hence, the price charged to maximize profit is higher on the demand curve than the price that maximizes total revenue.

CONCLUSION *The monopolist always maximizes profit by producing at a price on the elastic segment of its demand curve.*

A Monopolist Facing a Short-Run Loss

Having a monopoly does not guarantee profits. A monopolist has no protection against changes in demand or cost conditions. Exhibit 6 shows a situation in which the demand curve is lower at any point than the ATC curve, and total cost therefore exceeds total revenue at any price charged. Because the point where $MR = MC$ at a price of \$50 (point A) on the demand curve is above the AVC curve, but below the ATC curve, the best Computech can do is to minimize its loss. This means the monopolist, like the perfectly competitive firm, produces in the short run at a quantity of 5 units per hour where $MR = MC$. At a price of \$50 (point A), the ATC is \$70

Exhibit 5

Short-Run Profit Maximization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method

Part (a) illustrates a monopolist electronics firm, Computech, maximizing profit by producing 5 units of output where the marginal revenue (MR) and the marginal cost (MC) curves intersect. The profit-maximizing price the monopolist charges at 5 units of output is \$88, which is point A on the demand curve. Because \$88 is above the average total cost (ATC) of \$50 at point B, the monopolist earns a short-run profit of \$190 per hour, represented by the shaded area (\$38 profit per unit $\times$ 5 units).

At a price of \$88 and output of 5 units per hour in part (a), the shaded area in part (b) shows that the profit curve is maximized at \$190 per hour. At output levels below 2 or above 8, the monopolist incurs losses.

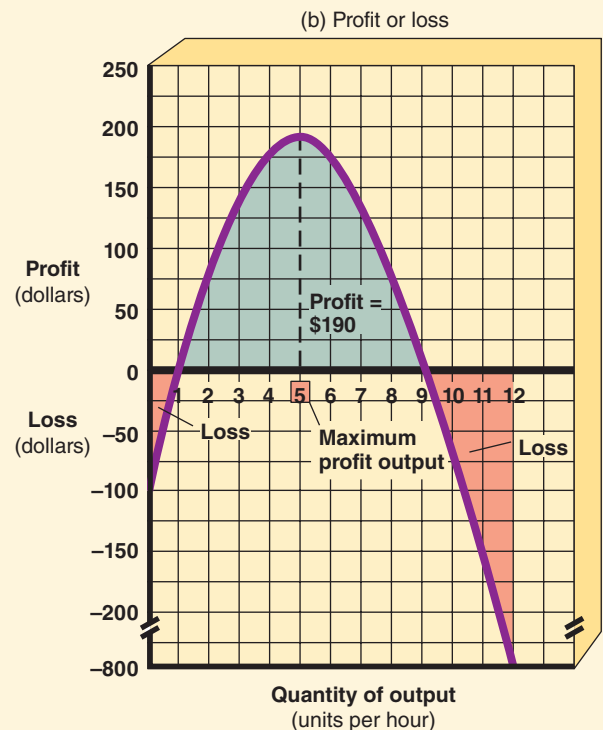
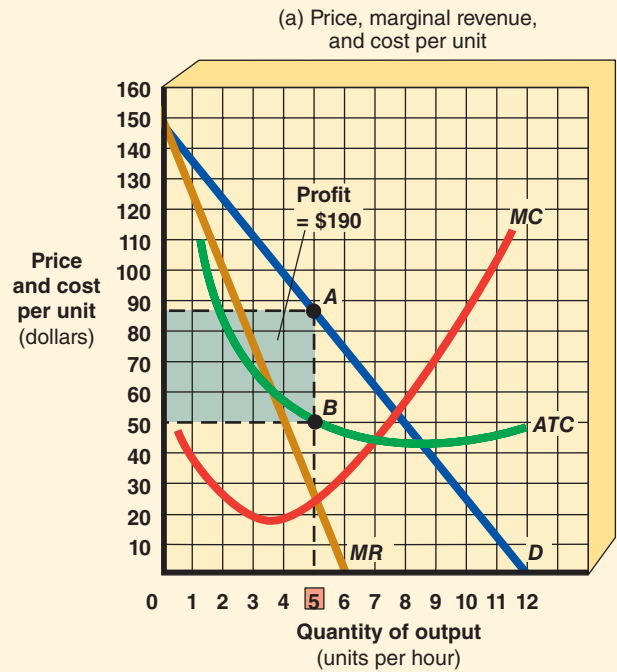
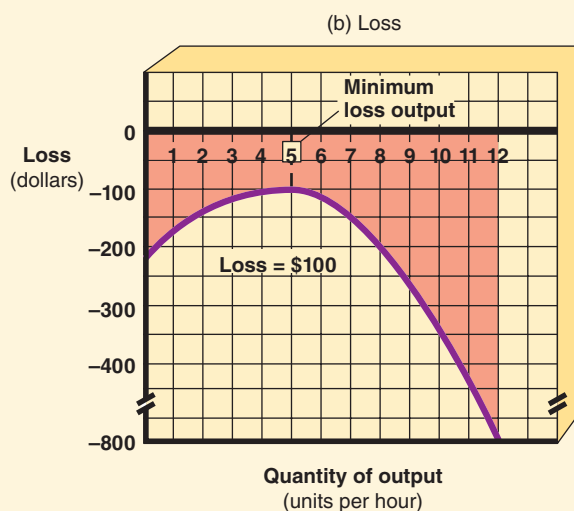
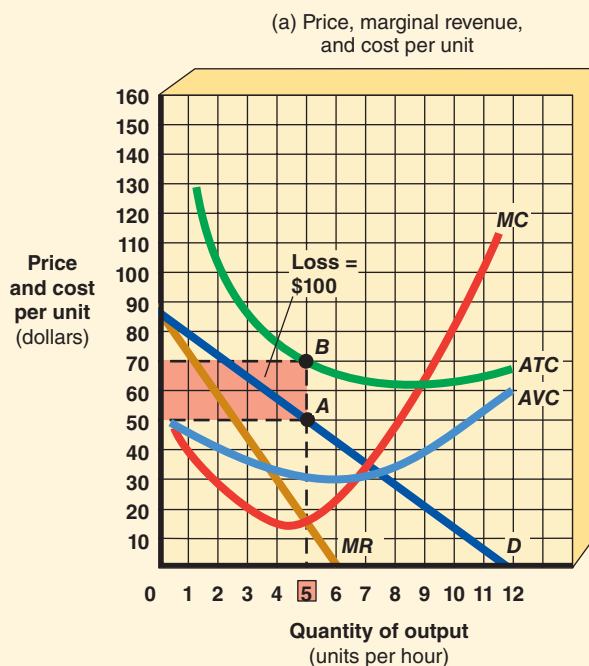


Exhibit 6

Short-Run Loss Minimization for a Monopolist Using the Marginal Revenue Equals Marginal Cost Method

In part (a), all points along the demand curve lie below the *ATC* curve. If the market price charged corresponds to the output where the marginal revenue (*MR*) and marginal cost (*MC*) curves intersect, the firm will keep its loss to a minimum. At point A, the loss-minimizing price is \$50 per unit, and marginal revenue equals marginal cost at an output of 5 units per hour with *ATC* equal to \$70 per unit (point B). The short-run loss represented by the shaded area is \$100 (\$20 loss per unit $\times$ 5 units).

Part (b) shows that the firm's short-run loss will be greater at any output other than where the marginal revenue and the marginal cost curves intersect at an output of 5 units per hour. Because the price of \$50 is above the average variable cost, each unit of output sold pays for the average variable cost and a portion of the average fixed cost.



(point B), and Computech incurs a loss of \$100 per hour, represented by the shaded area (\$20 $\times$ 5 units).

What if $MR = MC$ at a price on the demand curve that is below the *AVC* for a monopolist? As under perfect competition, the monopolist will shut down. To operate would only add further to its losses.

You're The Economist The Standard Oil Monopoly

Applicable Concept: monopoly



Oil was discovered in western Pennsylvania by Colonel Edwin L. Drake in 1859, and after the Civil War, oil wells sprang up across the landscape. Because oil was plentiful, there was cut-throat competition, and the result was low prices and profits. At this time, John D. Rockefeller, who had grown up selling eggs, was a young Cleveland produce wholesaler in his early twenties. He was doing well in produce, but realized that greater profits could be made in refining oil, where there was less competition than in drilling for oil. So, in 1869, Rockefeller borrowed all the money he could and began with two small oil refineries.

To boost his market power, Rockefeller's Standard Oil of Ohio negotiated secret agreements

with the railroads. In addition to information on his competitors' shipments, Rockefeller negotiated contracts with the railroads to pay rebates not only on Standard Oil's oil shipments, but also on its competitors' shipments. Soon Standard Oil was able to buy 21 of its 26 refining competitors in the Cleveland area. As its profits grew, Standard Oil expanded its refining empire by acquiring its own oil fields, railroads, pipelines, and ships. The objective was to control oil from the oil well to the consumer. Over time, Rockefeller came to own a major part of the petroleum industry. Competitors found railroads and pipelines closed to their oil shipments. Rivals that could not be forced out of business were merged with Standard Oil.

In 1870, Standard Oil controlled only 10 percent of the oil industry in the United States. By 1880, Standard Oil controlled over 90 percent of the industry, and its oil was being shipped throughout the world. The more Standard Oil monopolized the petroleum industry, the higher its profits rose, and the greater its power to eliminate competition became. As competitors dropped out of the industry, Rockefeller became a price maker. He raised prices, and Standard Oil's profits soared. Finally, in 1911, Standard Oil was broken up under the Sherman Antitrust Act of 1890 into competing companies, including companies that eventually became Exxon and Mobil.

Monopoly in the Long Run

In perfect competition, economic profits are impossible in the long run. The entry of new firms into the industry drives the product's price down until profits reach zero. Extremely high barriers to entry, however, protect a monopolist.

CONCLUSION *If the positions of a monopolist's demand and cost curves give it a profit and nothing disturbs these curves, the monopolist will earn profit in the long run.*

In the long run, the monopolist has great flexibility. The monopolist can alter its plant size to lower cost just as a perfectly competitive firm does. But firms such as Computech will not remain in business in the long run when losses persist—regardless of their monopoly status. Facing long-run losses, the monopolist will transfer its resources to a more profitable industry.

In reality, no monopolist can depend on barriers to protect it fully from competition in the long run. One threat is that entrepreneurs will find innovative ways to compete with a monopoly. For example, Computech must fear that firms will use their ingenuity and new electronic discoveries to develop a better and cheaper gasoline-saving device. To dampen the enthusiasm of potential rivals, one alternative for the monopolist is to sacrifice short-run profits to earn greater profits in the long run. Returning to part (a) of Exhibit 5, the monopolist might wish to charge a price below \$88 and produce an output greater than 5 units per hour.

PRICE DISCRIMINATION

Our discussion so far has assumed the monopolist charges each customer the same price. What if Computech decides to sell identical SAV-U-GAS units for, say, \$50 to truckers and \$100 to everyone else? Under certain conditions, a monopolist may practice **price discrimination** to maximize profit. Price discrimination occurs when a seller charges different prices for the same product that are not justified by cost differences.

Price discrimination

The practice of a seller charging different prices for the same product that are not justified by cost differences.

Conditions for Price Discrimination

All monopolists cannot engage in price discrimination. The following three conditions must exist before a seller can price discriminate:

1. The seller must be a price maker and therefore face a downward-sloping demand curve. This means that monopoly is not the only market structure in which price discrimination may occur.
2. The seller must be able to segment the market by distinguishing between consumers willing to pay different prices. Momentarily, this separation of buyers will be shown to be based on different price elasticities of demand.
3. It must be impossible or too costly for customers to engage in **arbitrage**. Arbitrage is the practice of earning a profit by buying a good at a low price and reselling the good at a higher price. For example, suppose your campus bookstore tried to boost profits by selling textbooks at a 50 percent discount to seniors. It would not take seniors long to cut the bookstore's profits by buying textbooks at the low price, selling these texts under the list price to all students who are not seniors, and pocketing the difference. In so doing, even without knowing the word *arbitrage*, the seniors would destroy the bookstore's price discrimination scheme.

Arbitrage

The practice of earning a profit by buying a good at a low price and reselling the good at a higher price.

Although not monopolies, college and university tuition policies meet the conditions for price discrimination. First, lower tuition increases the quantity of openings demanded. Second, applicants' high school grades and SAT scores allow the admissions office to classify "consumers" with different price elasticities of demand. Students with lower grades and SAT scores have fewer substitutes, and their demand curve is less elastic than that of students with higher grades and SAT scores. If the tuition rises at University X, few students with lower grades will be lost because they have few offers of admission from other universities. On the other hand, the loss of students with higher grades and SAT scores is greater because they have more admissions opportunities. Third, the nature of the product prevents arbitrage. A student cannot buy University X admission at one price and sell it to another student for a higher price.

Exhibit 7

Price Discrimination

To maximize profit, University X separates students applying for admission into two markets. The demand curve for admission of average students in part (a) is less elastic than the demand curve for admission of superior students in part (b). Profit maximization occurs when $MR = MC$ in each market. Therefore, University X sets a tuition of T_1 for average students and gives scholarships to superior students, which lowers their tuition to T_2 . Using price discrimination, University X earns a greater profit than it would by charging a single tuition to all students.

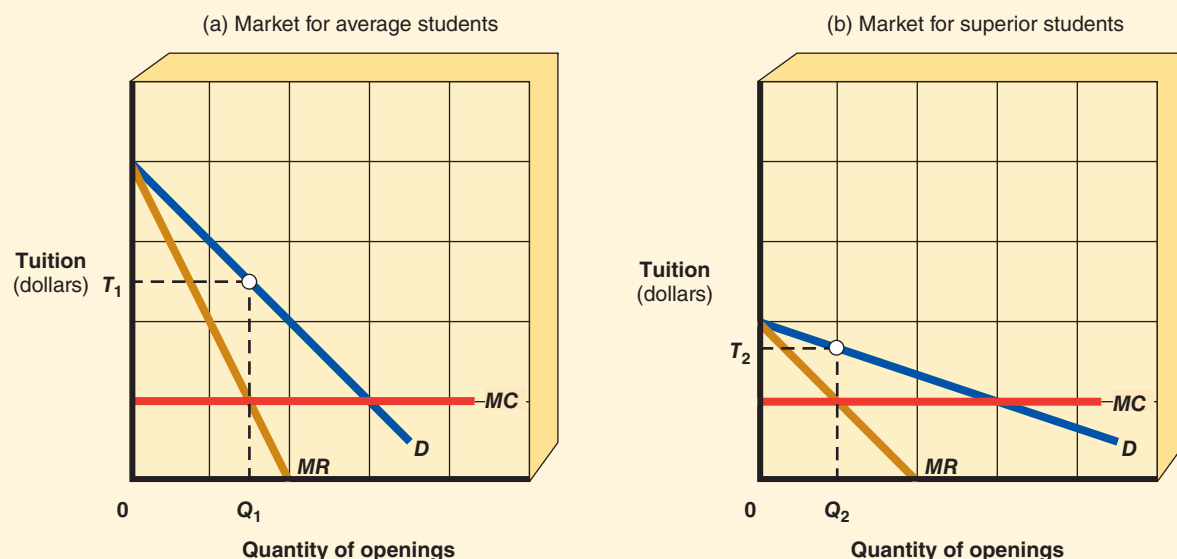


Exhibit 7 illustrates how University X price discriminates. For simplicity, assume the marginal cost of providing education to students is constant and therefore is represented by a horizontal MC curve. To maximize profit, University X follows the $MR = MC$ rule in each market. Given the different price elasticities of demand, the price at which $MR = MC$ differs for average and superior students. As a result, University X sets a higher tuition, T_1 , in the average-student market, where demand is less responsive to the higher price. In the superior-student market, where demand is more responsive, these students receive scholarships, and their tuition is lower at T_2 .

Is Price Discrimination Unfair?

Examples of price discrimination abound. Movie theaters offer lower prices for children than for adults. Electric utilities, which are monopolies, charge industrial users of electricity lower rates than residential users. Hotels and restaurants often give discounts to senior citizens, and airlines offer lower fares to vacationers who buy weeks early.

The typical reaction to price discrimination is that it is unfair. From the viewpoint of buyers who pay the higher prices, it is. But look at the other side of price discrimination. First, the seller is pleased because price discrimination increases profits. Second, many buyers benefit from price discrimination by not being excluded from

purchasing the product. In Exhibit 7, price discrimination makes it possible for superior students who could not afford to pay a higher tuition to attend University X. Price discrimination also allows retired persons to enjoy hotels and restaurants they could not otherwise afford and enables more children to attend movies.



CHECKPOINT

Why Don't Adults Pay More for Popcorn at the Movies?

At the movies, adults pay a higher ticket price than children, and each group gets a different-colored ticket. However, when adults and children go to the concession stand, both groups pay the same amount for popcorn and other snacks. Which of the following statements best explains why price discrimination stops at the ticket window? (1) The demand curve for popcorn is perfectly elastic. (2) The theater has no way to divide the buyers of popcorn based on different price elasticities of demand. (3) The theater cannot prevent resale.

COMPARING MONOPOLY AND PERFECT COMPETITION

Now that the basics of the two extremes of perfect competition and monopoly have been presented, we can compare and evaluate these market structures. This is an important assessment because the contrast between the disadvantages of monopoly and the advantages of perfect competition is the basis for many government policies, such as antitrust laws. To keep the analysis simple, we assume the monopolist charges a single price, rather than engaging in price discrimination.

The Monopolist as a Resource Misallocator

Recall the discussion of market efficiency in Chapter 4. This condition exists when a firm charging the equilibrium price uses neither too many nor too few resources to produce a product, so there is no *market failure*. Now you can state this definition of market efficiency in terms of price and marginal cost, as follows: *A perfectly competitive firm that produces the quantity of output at which $P = MC$ achieves an efficient allocation of resources.* This means production reaches the level of output when the price of the last unit produced matches the cost of producing it.

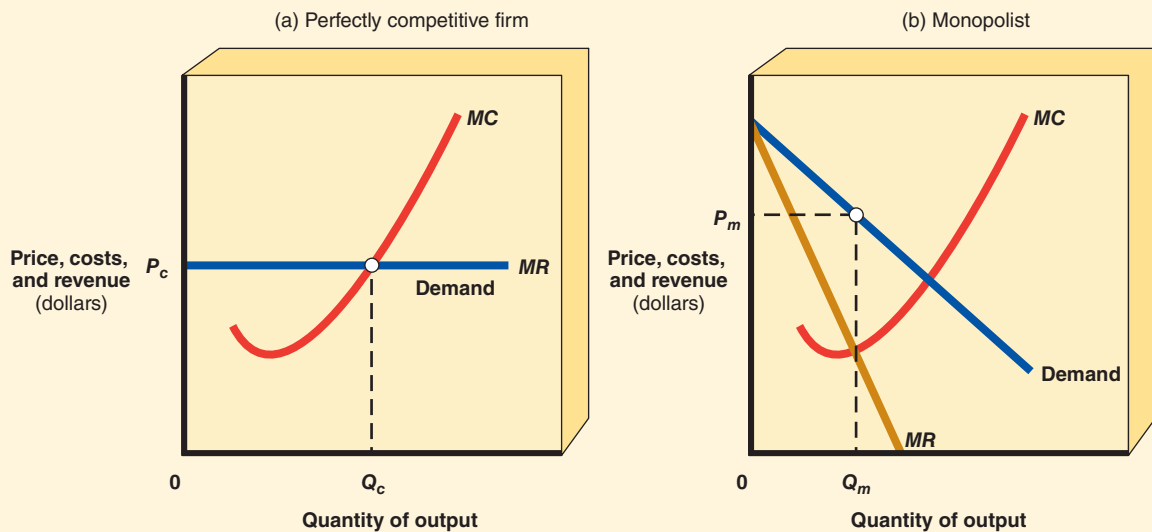
Exhibit 8(a) shows that a perfectly competitive firm produces the quantity of output at which $P = MC$. The price, P_c (marginal benefit), of the last unit produced equals the marginal cost of the resources used to produce it. In contrast, the monopolist shown in Exhibit 8(b) charges a price, P_m , greater than marginal cost, $P > MC$. Therefore, consumers are shortchanged because the marginal benefit of the last unit produced exceeds the marginal cost of producing it. Consumers want the monopolist to use more resources and produce additional units, but the monopolist restricts output to maximize profit.

Exhibit 8

Comparing a Perfectly Competitive Firm and a Monopolist

The perfectly competitive firm in part (a) sets $P = MC$ and produces Q_c output. Therefore, at the last unit of output, the marginal benefit is equal to the marginal cost of resources used to produce it. This condition means perfect competition achieves efficiency.

Part (b) shows that the monopolist produces output Q_m where $P > MC$. By so doing, consumers are shortchanged because the marginal benefit of the last unit produced exceeds the marginal cost of producing it. Under monopoly, inefficiency occurs because the monopolist underallocates resources to the production of its product. As a result, Q_m is less than Q_c .



CONCLUSION A monopolist is characterized by inefficiency because resources are underallocated to the production of its product.

Perfect Competition Means More Output for Less

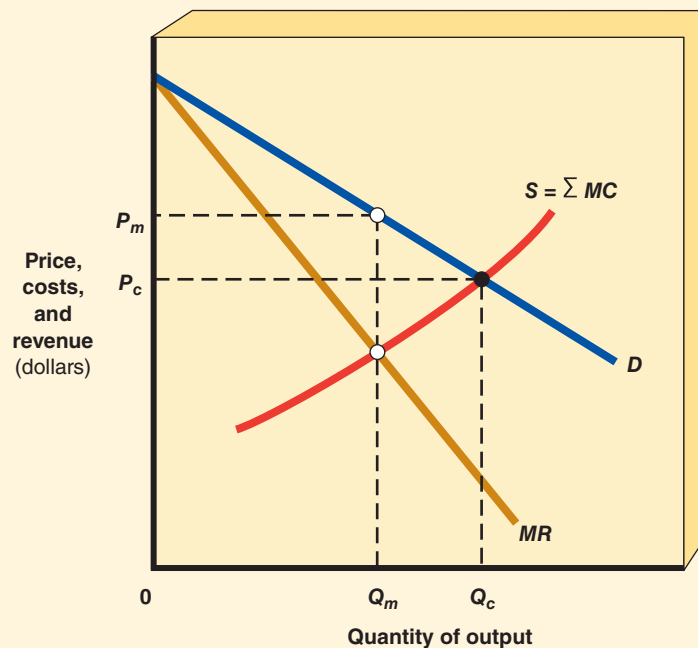
Exhibit 9 presents a comparison of perfect competition and monopoly in the same graph. Suppose the industry begins as perfectly competitive. The market demand curve, D (equal to MR), and the market supply curve, S , establish a perfectly competitive price, P_c , and output, Q_c . Recall from Exhibit 8 in the previous chapter that the competitive industry's supply curve, S , is the horizontal sum of the marginal cost (MC) curves of all the firms in the industry.

Now let's suppose the market structure changes when one firm buys out all the competing firms and the industry becomes a monopoly. Assume further that

Exhibit 9

The Impact of Monopolizing an Industry

Assume an industry is perfectly competitive, with market demand curve D and market supply curve S . The market supply curve is the horizontal summation of all the individual firms' marginal cost curves above their minimum average variable costs. The intersection of market supply and market demand establishes the equilibrium price of P_c and the equilibrium quantity of Q_c . Now assume the industry suddenly changes to a monopoly. The monopolist produces the $MR = MC$ output of Q_m , which is less than Q_c . By restricting output to Q_m , the monopolist is able to charge the higher price of P_m .



the demand and cost curves are unaffected by this dramatic change. In a monopoly, the industry demand curve *is* the monopolist's demand curve. Because the single firm is a price maker, the MR curve lies below the demand curve. The industry supply curve now becomes the MC curve for the monopolist. To maximize profit, the monopolist sets $MR = MC$ by restricting the output to Q_m and raising the price to P_m .

CONCLUSION *Monopoly harms consumers on two fronts. The monopolist charges a higher price and produces a lower output than would result under a perfectly competitive market structure.*

You're The Economist

New York Taxicabs: Where Have All the Fare Flags Gone?

Applicable Concept: perfect competition versus monopoly



Yellow taxicabs in New York City, which are today one of the most famous icons of the city, are a love and hate relationship. Just pretend you're the Statue of Liberty, and stick your arm straight up in the sky to hail a cab that will take you to your destination. The downside of an abundance of cabs is the traffic jams speckled with yellow cabs that service the city. Flashback to the 1920s, when New York taxicabs were competitive. There was no limit on the number of taxis, and hack licenses were only \$10. In addition to a low barrier to entry, taxis engaged in price competition. Cabbies could choose among three different flags to attach to their cars. A red flag cab charged a surcharge for extra passengers. A white flag signaled no surcharge for extra passengers. A green flag meant the cabbie was offering a discount fare. Price wars often erupted, and

the vast majority of cabbies flew green flags and charged bargain fares. One strategy was to fly the red flag (high rate) during rush hour and the green flag to offer discounts at off-peak times. Taxi companies also offered a variety of cabs—old, new, big, and small.¹

As years passed, the system changed because of the concern that competition was causing an overabundance of taxis that congested city streets. The solution was to create a monopoly by law in 1937 designed to limit the number of cabs by requiring all cabs accepting street hails to be painted yellow and possess a medallion on the hood of the taxi. Currently, the Taxi and Limousine Commission (TLC) sets rates and imposes regulations. There are no price wars and the barrier to entry is high due to the high price of medallions. Today, the aluminum badges that give the rights to pick up passengers on the street cost more than

\$400,000, as determined at infrequent auctions. Because of their high prices, most cabs are owned by investment companies and are leased to the drivers. On the other hand, it is illegal for cabs without medallions to cruise and pick up passengers who hail them, although the law is often ignored. Nonmedallion cabs are authorized to respond only to customers who have ordered the cab in advance by phone or other means. There's no limit on the number of nonmedallion cabs or what the drivers may charge.

ANALYZE THE ISSUE

Use a graph to compare the price and output of medallion yellow cabs in New York City today with the taxi market before the 1920s.

1. John Tierney, "You'll Wonder Where the Yellow Went," *The New York Times*, July 12, 1998, Section 6, p. 18.

THE CASE AGAINST AND FOR MONOPOLY

So far, a strong case has been made against monopoly and in favor of perfect competition. Now it is time to pause and summarize the economist's case against monopoly:

- A monopolist "gouges" consumers by charging a higher price than would be charged under perfect competition.
- Because a monopolist restricts output in order to maximize profit, too few resources are used to produce the product. Stated differently, the monopolist

misallocates resources by charging a price greater than marginal cost. In perfectly competitive industries, price is set equal to marginal cost, and the result is an optimal allocation of resources.

- Long-run economic profit for a monopolist exceeds the zero economic profit earned in the long run by a perfectly competitive firm.
- To the extent that the monopolist is a rich John D. Rockefeller, for example, and consumers of oil are poor, monopoly alters the distribution of income in favor of the monopolist.

Not all economists agree that monopoly is bad. Joseph Schumpeter and John Kenneth Galbraith praised monopoly power. They argued that the rate of technological change is likely to be greater under monopoly than under perfect competition. In their view, monopoly profits afford giant monopolies the financial strength to invest in the well-equipped laboratories and skilled labor necessary to create technological change.

The counterargument is that monopolists are slow to innovate. Freedom from direct competition means the monopolist is not motivated and therefore tends to stick to the “conventional wisdom.” As Nobel laureate Sir John Hicks put it, “The best of all monopoly profit is a quiet life.” In short, monopoly offers the opportunity to relax a bit and not worry about the “rat race” of technological change.

What does research on this issue suggest? Not surprisingly, many attempts have been made to verify or refute the effect of market structure on technological change. Unfortunately, the results to date have been inconclusive. For all we know, a mix of large and small firms in an industry may be the optimal mix to create technological change.

Key Concepts

Monopoly
Natural monopoly

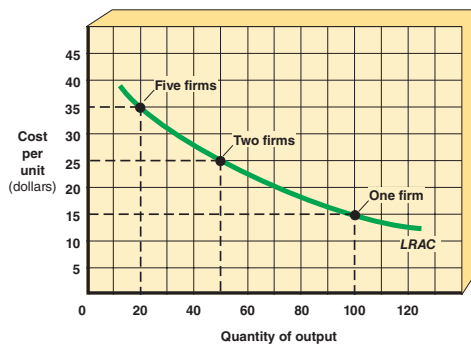
Network good
Price maker

Price discrimination
Arbitrage

Summary

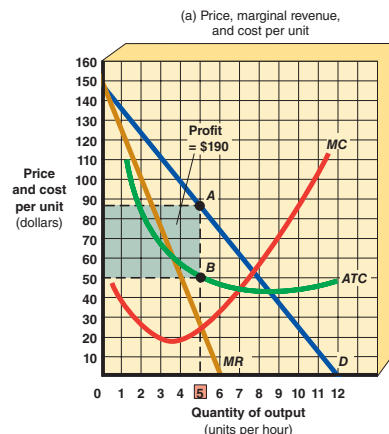
- **Monopoly** is a single seller facing the entire industry demand curve because it is the industry. The monopolist sells a unique product, and extremely high barriers to entry protect it from competition.
- **Barriers to entry** that prevent new firms from entering an industry are (1) ownership of an essential resource, (2) legal barriers, and (3) economies of scale. Government franchises, licenses, patents, and copyrights are the most obvious legal barriers to entry.
- A **natural monopoly** arises because of the existence of economies of scale in which the long-run average cost (LRAC) curve falls as production increases. Without government restrictions, economies of scale allow a single firm to produce at a lower cost than any firm producing a smaller output. Thus, smaller firms leave the industry, new firms fear competing with the monopolist, and the result is that a monopoly emerges *naturally*.
- A **price-maker** firm faces a downward-sloping demand curve. It therefore searches its demand curve to find the price-output combination that maximizes its profit and minimizes its loss.
- The **marginal revenue** and demand curves are downward sloping for a monopolist. The marginal revenue curve for a monopolist is below the demand curve, and the total revenue curve reaches its maximum where marginal revenue equals zero.
- **Price elasticity of demand** corresponds to sections of the marginal revenue curve. When MR is positive, price elasticity of demand is elastic, $E_d > 1$. When MR is equal to zero, price elasticity of demand is unit elastic, $E_d = 1$. When MR is negative, price elasticity of demand is inelastic, $E_d < 1$.
- The **short-run profit-maximizing monopolist**, like the perfectly competitive firm, locates the profit-maximizing price by producing the output where the MR and MC curves intersect. If this price is less than the average variable cost (AVC) curve, the monopolist shuts down to minimize losses.

Natural Monopoly

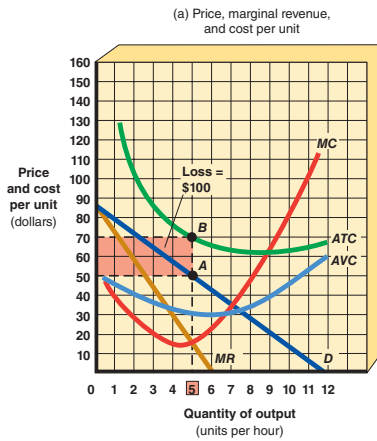


- A **network good** is a good that increases in value to each user as the total number of users increases. Examples are Facebook and Match.com.

Short-Run Profit Maximizing Monopolist

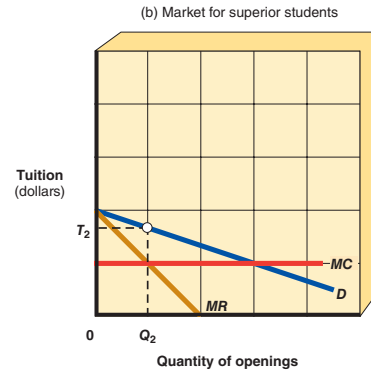
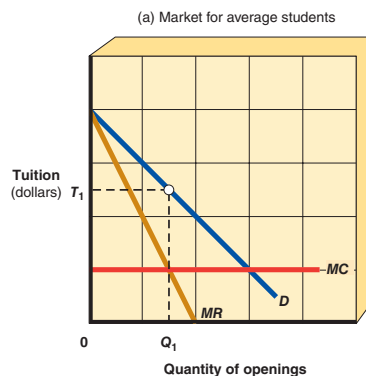


Short-Run Loss-Minimizing Monopolist



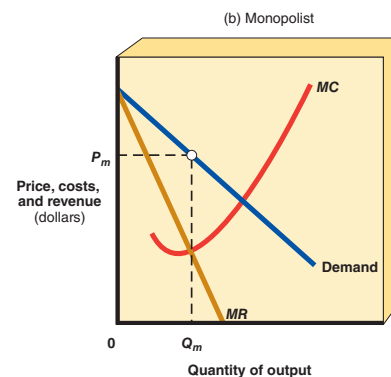
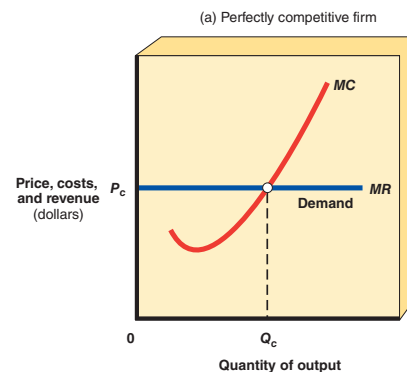
- The *long-run profit-maximizing monopolist* earns a profit because of barriers to entry. If demand and cost conditions prevent the monopolist from earning a profit, the monopolist will leave the industry.
- *Price discrimination* allows the monopolist to increase profits by charging buyers different prices rather than a single price. Three conditions are necessary for price discrimination: (1) the demand curve must be downward sloping, (2) buyers in different markets must have different price elasticities of demand, and (3) buyers must be prevented from reselling the product at a higher price than the purchase price.

Price Discrimination



- *Monopoly disadvantages* include the following: (1) a monopolist charges a higher price and produces less output than a perfectly competitive firm, (2) resource allocation is inefficient because the monopolist produces less than if competition existed, (3) monopoly produces higher long-run profits than if competition existed, and (4) monopoly transfers income from consumers to producers to a greater degree than under perfect competition.

Monopoly Disadvantages



Summary of Conclusion Statement

- Because of economies of scale, a single firm in an industry will produce output at a lower per-unit cost than two or more firms.
- The greater the number of people connected to a network goods system, the more benefits of the product to each person are increased.
- The demand and marginal revenue curves of the monopolist are downward sloping in contrast to the horizontal demand and corresponding marginal revenue curves facing the perfectly competitive firm.
- The marginal revenue curve for a straight-line demand curve intersects the quantity axis halfway between the origin and the quantity axis intercepts of the demand curve.
- The monopolist always maximizes profit by producing at a price on the elastic segment of its demand curve.
- If the positions of a monopolist's demand and cost curves give it a profit and nothing disturbs these curves, the monopolist will earn profit in the long run.
- A monopolist is characterized by inefficiency because resources are underallocated to the production of its product.
- Monopoly harms consumers on two fronts. The monopolist charges a higher price and produces a lower output than would result under a perfectly competitive market structure.

Study Questions and Problems

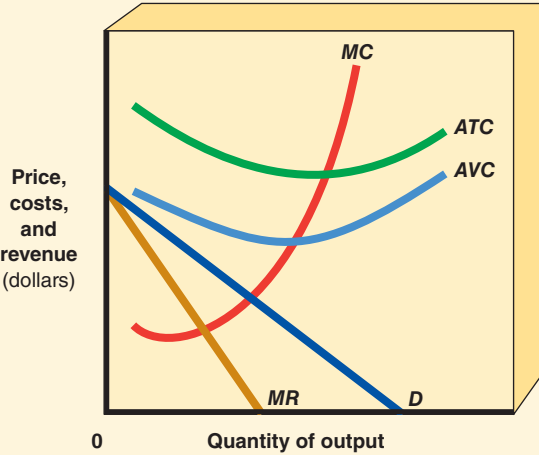
- Using the three characteristics of monopoly, explain why each of the following is a monopolist:
 - Local telephone company
 - San Francisco 49ers football team
 - U.S. Postal Service
- Why is the demand curve facing a monopolist downward sloping while the demand curve facing a perfectly competitive firm is horizontal?
- Suppose an investigator finds that the prices charged for drugs at a hospital are higher than the prices charged for the same products at drugstores in the area served by the hospital. What might explain this situation?
- Explain why you agree or disagree with the following statements:
 - "All monopolies are created by the government."
 - "The monopolist charges the highest possible price."
 - "The monopolist never takes a loss."
- Suppose the average cost of producing a kilowatt-hour of electricity is lower for one firm than for another firm serving the same market. Without the government granting a franchise to one of these competing power companies, explain why a single seller is likely to emerge in the long run.
- Use the following demand schedule for a monopolist to calculate total revenue and marginal revenue. For each price, indicate whether demand is elastic, unit elastic, or inelastic. Using the data from the demand schedule, graph the demand curve, the marginal revenue curve, and the total revenue curve. Identify the elastic, unit elastic, and inelastic segments along the demand curve.

Price	Quantity Demanded (Q)	Total Revenue (TR)	Marginal Revenue (MR)	Price Elasticity of Demand (E_d)
\$5.00	0	\$ _____	\$ _____	_____
4.50	1	_____	_____	_____
4.00	2	_____	_____	_____
3.50	3	_____	_____	_____
3.00	4	_____	_____	_____
2.50	5	_____	_____	_____
2.00	6	_____	_____	_____
1.50	7	_____	_____	_____
1.00	8	_____	_____	_____
0.50	9	_____	_____	_____
0	10	_____	_____	_____

7. Make the unrealistic assumption that production is costless for the monopolist in question 6. Given the data from the above demand schedule, what price will the monopolist charge, and how much output should the firm produce? How much profit will the firm earn? When marginal cost is above zero, what will be the effect on the price and output of the monopolist?
8. Explain why a monopolist would never produce in the inelastic range of the demand curve.
9. In each of the following cases, state whether the monopolist would increase or decrease output:
- a. Marginal revenue exceeds marginal cost at the output produced.
 - b. Marginal cost exceeds marginal revenue at the output produced.
10. Suppose the demand and cost curves for a monopolist are as shown in Exhibit 10 below. Explain what price the monopolist should charge and how much output it should produce.
11. Which of the following constitute price discrimination?
- a. A department store has a 25 percent off sale.
 - b. A publisher sells economics textbooks at a lower price in North Carolina than in New York.
 - c. The Japanese sell cars at higher prices in the United States than in Japan.
 - d. The phone company charges higher long-distance rates during the day.

Exhibit 10

Monopoly in the Short Run



12. Suppose the candy bar industry approximates a perfectly competitive industry. Suppose also that a single firm buys all the assets of the candy bar firms and establishes a monopoly. Contrast these two market structures with respect to price, output, and allocation of resources. Draw a graph of the market demand and market supply for candy bars before and after the takeover.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWER

Why Don't Adults Pay More for Popcorn at the Movies?

First, there are no other popcorn sellers in the lobby, so the theater is a price maker for popcorn and the demand curve slopes downward. Second, the theater could easily set up different lines for adults and children and charge different prices for popcorn. Third, is there a practical way to prevent

resale? Does the theater want to try to stop children who resell popcorn to their parents, friends, and other adults? If you said theaters do not practice price discrimination at the concession counter because resale cannot be prevented, **YOU ARE CORRECT.**

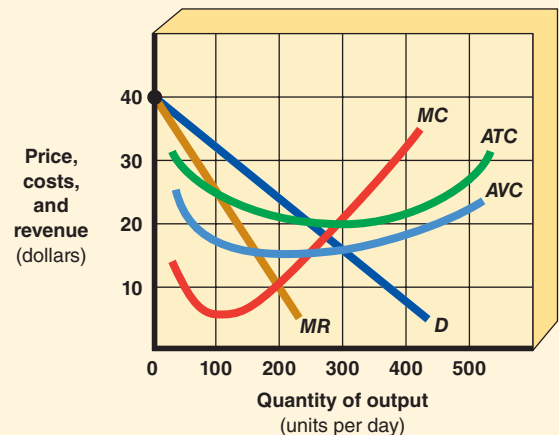
Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

1. A monopolist always faces a demand curve that is
 - a. perfectly inelastic.
 - b. perfectly elastic.
 - c. unit elastic.
 - d. the same as the market demand curve.
2. A monopolist sets the
 - a. price at which marginal revenue equals zero.
 - b. price that maximizes total revenue.
 - c. highest possible price on its demand curve.
 - d. price at which marginal revenue equals marginal cost.
3. A monopolist sets
 - a. the highest possible price.
 - b. a price corresponding to minimum average total cost.
 - c. a price equal to marginal revenue.
 - d. a price determined by the point on the demand curve corresponding to the level of output at which marginal revenue equals marginal cost.
 - e. none of the above.
4. Which of the following is *true* for the monopolist?
 - a. Economic profit is possible in the long run.
 - b. Marginal revenue is less than the price charged.
 - c. Profit maximizing or loss minimizing occurs when marginal revenue equals marginal cost.
 - d. All of the above are true.
5. As shown in Exhibit 11, the profit-maximizing or loss-minimizing output for this monopolist is
 - a. 100 units per day.
 - b. 200 units per day.
 - c. 300 units per day.
 - d. 400 units per day.

Exhibit 11

Profit Maximizing for a Monopolist



Practice Quiz Continued

6. As shown in Exhibit 11, this monopolist
 - a. should shut down in the short run.
 - b. should shut down in the long run.
 - c. earns zero economic profit.
 - d. earns positive economic profit.
7. To maximize profit or minimize loss, the monopolist in Exhibit 11 should set its price at
 - a. \$30 per unit.
 - b. \$25 per unit.
 - c. \$20 per unit.
 - d. \$10 per unit.
 - e. \$40 per unit.
8. If the monopolist in Exhibit 11 operates at the profit-maximizing output, it will earn total revenue to pay about what portion of its total fixed cost?
 - a. None
 - b. One-half
 - c. Two-thirds
 - d. All total fixed costs
9. For a monopolist to practice effective price discrimination, one necessary condition is
 - a. identical demand curves among groups of buyers.
 - b. differences in the price elasticity of demand among groups of buyers.
 - c. a homogeneous product.
 - d. none of the above.
10. What is the act of buying a commodity at a lower price and selling it at a higher price?
 - a. Buying short
 - b. Discounting
 - c. Tariffing
 - d. Arbitrage
11. Under both perfect competition and monopoly, a firm
 - a. is a price taker.
 - b. is a price maker.
 - c. will shut down in the short run if price falls short of average total cost.
 - d. always earns a pure economic profit.
 - e. sets marginal cost equal to marginal revenue.
12. At any point where a monopolist's marginal revenue is positive, the downward-sloping straight-line demand curve is
 - a. perfectly elastic.
 - b. elastic, but not perfectly elastic.
 - c. unit elastic.
 - d. inelastic.
13. Suppose a monopolist charges a price corresponding to the intersection of the marginal cost and marginal revenue curves. If this price is between its average variable cost and average total cost curves, the firm will
 - a. earn an economic profit.
 - b. stay in operation in the short-run, but shut down in the long run if demand remains the same.
 - c. shut down.
 - d. none of the above.
14. In contrast to a perfectly competitive firm, a monopolist operates in the long run at a quantity of output at which
 - a. $P = MC$.
 - b. $MR = MC$.
 - c. $P = ATC$.
 - d. $P > MR$.
15. The monopolist, unlike the perfectly competitive firm, can continue to earn an economic profit in the long run because of
 - a. collusive agreements with competitors.
 - b. price leadership.
 - c. cartels.
 - d. a dominant firm.
 - e. extremely high barriers to entry.

Monopolistic Competition and Oligopoly



Suppose your favorite restaurant is Ivan's Oyster Bar. Ivan's does not fit either of the two extreme models studied in the previous two chapters. Instead, Ivan's characteristics are a blend of monopoly and perfect competition. For starters, like a monopolist, Ivan's demand curve is downward sloping. This means Ivan's is a *price maker* because it can charge a higher price for seafood and lose some customers, but many loyal customers will keep coming. The reason is that Ivan's distinguishes its products from the competition by advertising, first-rate service, a great salad bar, and other attributes. In short, like a monopolist, Ivan's has a degree of *market power*, which allows it to restrict output and maximize profit. But like a

perfectly competitive firm and unlike a monopolist, Ivan's is not the only place to buy a seafood dinner in town. It must share the market with many other restaurants within an hour's drive.

The small Ivan's Oyster Bars and the gigantic Microsofts of the world represent most of the firms with which you deal. These firms compete in two different market structures: *monopolistic competition* or *oligopoly*. Ivan's operates in the former, and Microsoft belongs to the latter. The theories of perfect competition and monopoly from the previous two chapters will help you understand the impact of monopolistic competition and oligopoly market structures on the price and output decisions of real-world firms.



In this chapter, you will learn to solve these economics puzzles:

- Why will Ivan's Oyster Bar make zero economic profit in the long run?
- Why do OPEC and other cartels tend to break down?
- Are Cheerios, Rice Krispies, and other brands sold by firms in the breakfast cereal industry produced under monopolistic competition or oligopoly?
- How does the NCAA Final Four basketball tournament involve imperfect competition?

THE MONOPOLISTIC COMPETITION MARKET STRUCTURE

Monopolistic competition

A market structure characterized by (1) many small sellers, (2) a differentiated product, and (3) easy market entry and exit.

Economists define **monopolistic competition** as a market structure characterized by (1) many small sellers, (2) a differentiated product, and (3) easy market entry and exit. Monopolistic competition fits numerous real-world industries. The following is a brief explanation of each characteristic.

Many Small Sellers

Under monopolistic competition, as under perfect competition, the exact number of firms cannot be stated. Ivan's Oyster Bar, described in the chapter preview, is an example of a monopolistic competitor. Ivan assumes that his restaurant can set prices slightly higher or improve service *independently* without fear that competitors will react by changing their prices or giving better service. Thus, if any single seafood restaurant raises its price, the going market price for seafood dinners increases by a very small amount.

CONCLUSION *The many-sellers condition is met when each firm is so small relative to the total market that its pricing decisions have a negligible effect on the market price.*

Product differentiation

The process of creating real or apparent differences between goods and services.

Differentiated Product

The key feature of monopolistic competition is **product differentiation**. Product differentiation is the process of creating real or apparent differences between goods and services. A differentiated product has close, but not perfect, substitutes. Although the products of each firm are highly similar, the consumer views them as somewhat different or distinct. There may be 25 seafood restaurants in a given city, but they are not all the same. They differ in location, atmosphere, quality of food, quality of service, and so on.

Product differentiation can be real or imagined. It does not matter which is correct so long as consumers believe such differences exist. For example, many customers think Ivan's has the best seafood in town even though other restaurants actually offer a similar product. The importance of this viewpoint is that consumers are willing to pay a slightly higher price for Ivan's seafood. This gives Ivan the incentive to appear on local TV cooking shows and to buy ads showing him personally catching the seafood he serves.

CONCLUSION *When a product is differentiated, buyers are not indifferent as to which seller's product they buy.*

The example of Ivan's restaurant makes it clear that under monopolistic competition rivalry centers on **nonprice competition** in addition to price competition. With nonprice competition, a firm competes using advertising, packaging, product development, better quality, and better service, rather than lower prices. Nonprice competition is an important characteristic of monopolistic competition that distinguishes it from perfect competition and monopoly. Under perfect competition, there is no nonprice competition because the product is identical for all firms. Likewise, the monopolist has little incentive to engage in nonprice competition because it sells a unique product.

Nonprice competition

The situation in which a firm competes using advertising, packaging, product development, better quality, and better service, rather than lower prices.

Easy Entry and Exit

Unlike a monopoly, firms in a monopolistically competitive market face low barriers to entry. But entry into a monopolistically competitive market is not quite as easy as entry into a perfectly competitive market. Because monopolistically competitive firms sell differentiated products, it is somewhat difficult for new firms to become established. Many persons who want to enter the seafood restaurant business can get loans, lease space, and start serving seafood without too much trouble. However, these new seafood restaurants may at first have difficulty attracting consumers because of Ivan's established reputation as the best seafood restaurant in town.

Monopolistic competition is by far the most common market structure in the United States. Examples include retail firms, such as grocery stores, hair salons, gas stations, DVD rental stores, diet centers, and restaurants.

THE MONOPOLISTICALLY COMPETITIVE FIRM AS A PRICE MAKER

Given the characteristics of monopolistic competition, you might think the monopolistic competitor is a *price taker*, but it is not. The primary reason is that its product is differentiated. This gives the monopolistically competitive firm, like the monopolist, limited control over its price. When the price is raised, brand loyalty ensures some customers will remain steadfast. As for a monopolist, the demand curve and

the corresponding marginal revenue curve for a monopolistically competitive firm are downward sloping. But the existence of close substitutes causes the demand curve for the monopolistically competitive firm to be more elastic than the demand curve for a monopolist. When Ivan's raises its prices 10 percent, the quantity of seafood dinners demanded declines, say, 30 percent. Instead, if Ivan's had a monopoly, no close substitutes would exist, and consumers would be less sensitive to price changes. As a monopolist, the same 10 percent price hike might lose Ivan's only, say, 15 percent of its quantity of seafood dinners demanded.

CONCLUSION *The demand curve for a monopolistically competitive firm is less elastic (steeper) than for a perfectly competitive firm and more elastic (flatter) than for a monopolist.*

Advertising Pros and Cons

Before presenting the complete graphical models for monopolistic competition, let's pause to examine the topic of advertising further. As explained at the beginning of this chapter, a distinguishing feature of a monopolistically competitive firm is that it engages in nonprice competition by using expensive ads to differentiate its product. Instead of lowering the price, the firm's goal is to convince customers that its product is really different from its rivals' products. Monopolistically competitive firms are frequently running ads that feature lower prices, a higher quality of service, or new products to win customers. Ads proclaim that products make you smarter, better looking, or nicer to be around. Graphically, the firm hopes advertising will make the demand curve less elastic and shift it rightward by changing consumers' tastes in favor of its product. Profit rises when advertising increases the firm's revenue more than the cost of the advertising.

Exhibit 1 illustrates the effect of advertising on the long-run average cost ($LRAC$) curve for Yummy Frozen Yogurt. Yummy competes with It Can't Be Yogurt and five other stores in the northeastern part of town. Without advertising, the $LRAC_1$ curve represents Yummy's average cost. At the given price charged, the quantity demanded is 6,000 frozen yogurt dishes per month, and the average cost is \$2.00 per dish (point A).

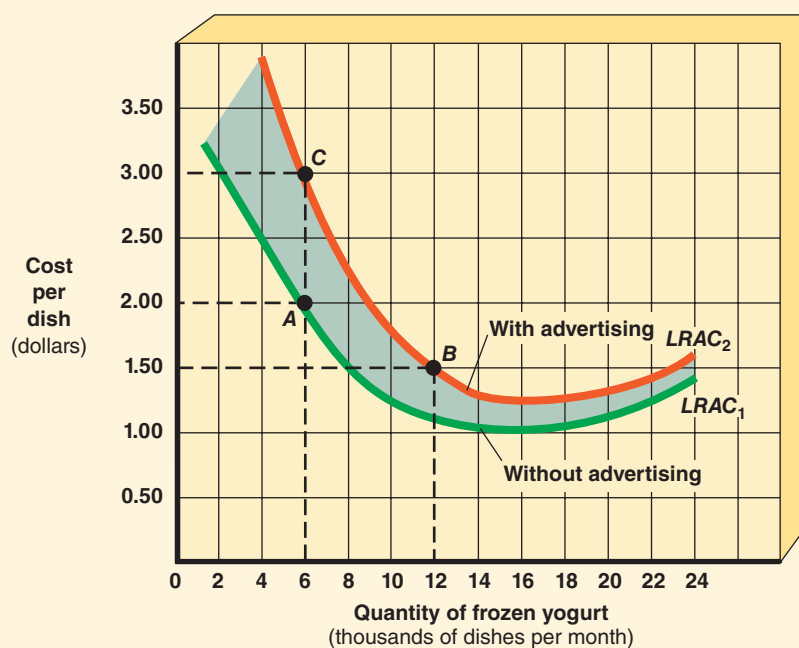
To increase profits in the short run, Yummy decides to advertise. Yummy knows, however, that in the long run new entrants and rising costs will shrink all yogurt stores' economic profits to zero. Then Yummy must come up with some new product to boost sales. But for now, suppose Yummy's advertising campaign is successful and demand increases. Then two short-run effects occur. One is an upward shift in the average cost curve at any level of output from $LRAC_1$ to $LRAC_2$. The vertical distance between these two curves measures the additional average fixed cost of advertising. Another effect is that the quantity demanded increases to 12,000 frozen yogurt dishes per month. Now the average cost is \$1.50 at point B on $LRAC_2$.

So far, our story illustrates a social benefit of advertising. Look again at Exhibit 1. The increased volume of sales caused by advertising leads to *economies of scale*, explained in Chapter 7. Without advertising, Yummy operated with a lower output and a higher average cost. With advertising, the benefit to consumers from the reduction in average total cost from A to B outweighs the boost in cost per unit from advertising.

Exhibit 1

The Effect of Advertising on Average Cost

When Yummy Frozen Yogurt increases its advertising costs to sell more yogurt, the firm's average cost curve shifts upward from $LRAC_1$ to $LRAC_2$. If advertising increases the quantity demanded from 6,000 to 12,000 dishes per month, average total cost falls from \$2.00 (point A) to \$1.50 (point B). However, if the extra cost of advertising fails to increase the quantity demanded, average total cost rises from \$2.00 (point A) to \$3.00 (point C).



On the other hand, suppose Yummy's advertising campaign is not successful and demand remains unchanged. In this case, the quantity demanded remains at the original 6,000 frozen yogurt dishes per month, but the average total cost rises to \$3.00 (point C). Critics of advertising argue this is the typical case and not the reduction from A to B. Instead of economies of scale, advertising is self-canceling. Yummy, It Can't Be Yogurt, and other firms spend large outlays on advertising just to keep their present market share. And in the process, the cost, and therefore the price, of yogurt is increased. Moreover, the additional cost of advertising does not improve the yogurt at all. The only purpose is to persuade or mislead consumers into buying something they do not need. From society's viewpoint, the resources used in advertising could be used for schools, hospitals, bridges, or other more useful purposes.

Proponents of advertising counter the argument that advertising is valueless. They argue that ads provide information. Advertising informs consumers of sales, the availability of products, and the advantages of products. Although the product



You're The Economist Social Networking Sites: The New Advertising Game *Applicable Concept: product differentiation*



A key characteristic of the market structures discussed in this chapter is that they use advertising to promote product differentiation, which is a form of nonprice competition. The television commercial is considered the most effective method of mass-market advertising. This explains why TV networks charge such high prices for commercial airtime during prominent events, such as the Super Bowl football game. However, the days when television commercials dominate the advertising world could be fading away. Don't want to be bothered by those advertisements? It's easy: Just press the fast forward button on the remote of a digital video recorder (DVR). Advertisers are therefore struggling to figure out how to get the attention of consumers by tapping into the popularity of such social networking sites as Facebook, MySpace, and YouTube. These sites connect

individuals with others who interact through personal profiles, games, video clips, and more. There are also niche sites focused on very specific activities for a hyper-targeted audience. For example, Dogster.com is a site for dog lovers and Greenthumb.com is a site for gardeners.

The challenge for Web economy entrepreneurs is to earn profits by differentiating their product and creating innovative ways to include advertising. The search engine is a highly successful business model. If someone Googles for golf clubs, sponsored links for golf clubs appear on the screen. Social networks provide the prospect of tailoring ads to people's specific interests. Now suppose a golf club company pays Facebook, the crown jewel of social networking, for a page where you and your friends can register and play a game of golf. What does the company get out of it? A database of tens of thousands of names,

all potential customers. However, some ideas are not winners. Facebook implemented a new approach that informed friends whenever a member purchased something from online retailers. Consumers protested this was an invasion of privacy, and the program was abandoned. Now consider this idea: Imagine being at a concert and text messaging a shout-out to your friends. Your message appears during the concert next to the stage on a big screen with a large ad from a company. Is this imposing a negative externality that distracts others in the audience from the performance?

ANALYZE THE ISSUE

Advertising is tasteless, offensive, and a nuisance that wastes resources. Give three arguments against this idea.

costs a little more, this information saves consumers money and time. Ads also increase price competition among sellers. When Yummy offers discount coupons, other yogurt stores see these ads and respond with lower prices. Finally, consumers are rational and cannot be fooled by advertising. If a product is undesirable, customers will not buy it.

Does monopolistic competition lead to lower prices, greater output, and better-informed consumers? Or does this market structure simply raise prices and annoy customers with useless and often misleading information? This fascinating and ongoing debate is perhaps best analyzed on a case-by-case basis. In a later section, you will learn that advertising to differentiate a product is also a key characteristic of oligopoly.

PRICE AND OUTPUT DECISIONS FOR A MONOPOLISTICALLY COMPETITIVE FIRM

Now we are prepared to develop the short-run and long-run graphical models for monopolistic competition. In the short run, you will see that monopolistic competition resembles monopoly. In the long run, however, entry by new firms leads to a more competitive market structure. This section presents a graphical analysis that shows why a monopolistically competitive firm is part perfectly competitive and part monopolistic.

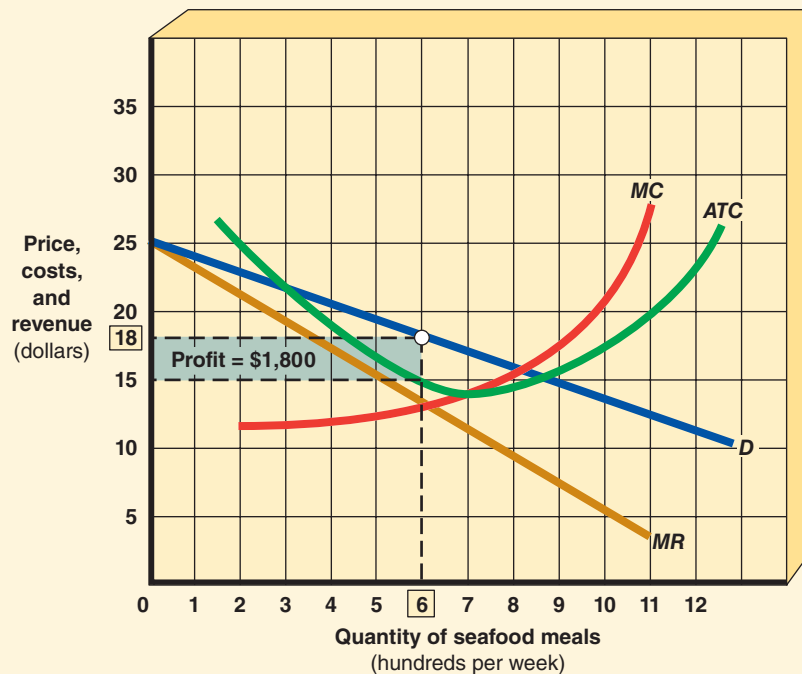
Monopolistic Competition in the Short Run

Exhibit 2 shows the short-run equilibrium position for Ivan's Oyster Bar—a typical firm under monopolistic competition. As explained earlier, the demand curve slopes downward because customers believe, rightly or wrongly, that Ivan's products are a

Exhibit 2

A Monopolistically Competitive Firm in the Short Run

Ivan's Oyster Bar is a monopolistically competitive firm that maximizes short-run profit by producing the output where marginal revenue equals marginal cost. At an output of 600 seafood dinners per week, the price of \$18 per dinner is dictated by the firm's demand curve. Given the firm's costs, output, and prices, Ivan's will earn a short-run profit of \$1,800 per week.



little better than its competitors' products. Customers like Ivan's family atmosphere, location, and quality of service. These nonprice factors differentiate Ivan's products and allow the restaurant to raise the price of sautéed alligator, shrimp, and oysters at least slightly without losing many sales.

Like the monopolist, the monopolistically competitive firm maximizes short-run profit by following the $MR = MC$ rule. In this case, the marginal cost (MC) and marginal revenue (MR) curves intersect at an output of 600 seafood meals per week. The price per meal of \$18 is the point on the demand curve corresponding to this level of output. Because the price exceeds the average total cost (ATC) of \$15 per meal, Ivan's earns a short-run economic profit of \$1,800 per week. As under monopoly, if the price equals the ATC curve, the firm earns a short-run normal profit. If the price is below the ATC curve, the firm suffers a short-run loss, and if the price is below the average variable cost (AVC) curve, the firm shuts down.

Monopolistic Competition in the Long Run

The monopolistically competitive firm, unlike a monopolist, will not earn an economic profit in the long run. Rather, like a perfect competitor, the monopolistically competitive firm earns only a normal profit (that is, zero economic profit) in the long run. Recall from the chapter on production costs that *normal profit* is the minimum profit necessary to keep a firm in operation. The reason is that short-run profits and easy entry attract new firms into the industry. When Ivan's Oyster Bar earns a short-run profit, as shown in Exhibit 2, two things happen. First, Ivan's demand curve shifts downward as some of each seafood restaurant's market share is taken away by new firms seeking profit. Second, Ivan's, and other seafood restaurants as well, tries to recapture market share by advertising, improving its decor, and utilizing other forms of nonprice competition. As a result, long-run average costs increase, and the firm's $LRAC$ curve shifts upward.

The combination of the leftward shift in the firm's demand curve and the upward shift in its $LRAC$ curve continues in the long run until the monopolistic competitive firm earns zero or normal economic profit. The result is the long-run equilibrium condition shown in Exhibit 3. At a price of \$17 per meal, the demand curve is tangent to the $LRAC$ curve at the $MR = MC$ output of 500 meals per week. Once long-run equilibrium is achieved in a monopolistically competitive industry, there is no incentive for new firms to enter or established firms to leave.

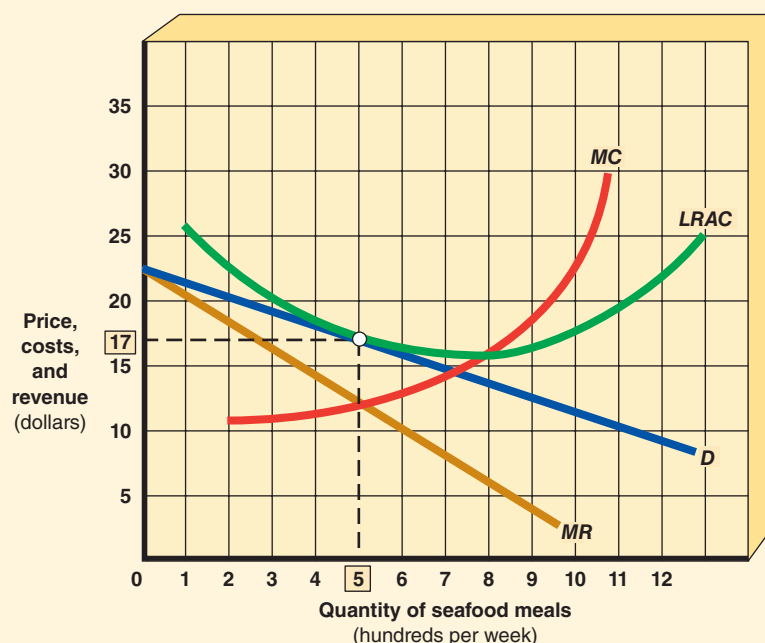
COMPARING MONOPOLISTIC COMPETITION AND PERFECT COMPETITION

Some economists argue that the long-run equilibrium condition for a monopolistically competitive firm, as shown in Exhibit 3, results in poor economic performance. Other economists contend that the benefits of a monopolistically competitive industry outweigh the costs. In this section, we again use the standard of perfect competition to understand both sides of this debate.

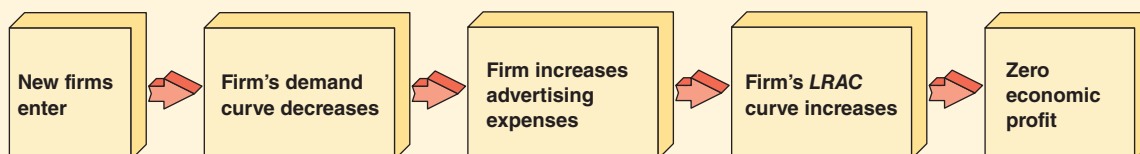
Exhibit 3

A Monopolistically Competitive Firm in the Long Run

In the long run, the entry of new seafood restaurants decreases the demand for Ivan's seafood. In addition, Ivan's shifts its average cost curve upward by increasing advertising and other expenses in order to compete against new entrants. In the long run, the firm earns zero economic profit at a price of \$17 per seafood meal and produces an $MR = MC$ output of 500 meals per week.



CAUSATION CHAIN



The Monopolistic Competitor as a Resource Misallocator

Like a monopolist, the monopolistically competitive firm fails the efficiency test. As shown in Exhibit 3, under monopolistic competition, Ivan's charges a price that exceeds the marginal cost. Thus, the value to consumers of the last meal produced is greater than the cost of producing it. Ivan's could devote more resources and produce more seafood dinners. To sell this additional output, Ivan's must move downward along its demand curve by reducing the \$17 price per meal. As a result, customers

would purchase the additional benefits of consuming more seafood meals. However, Ivan's uses less resources and restricts output to 500 seafood meals per week in order to maximize profits where $MR = MC$.

Monopolistic Competition Means Less Output for More

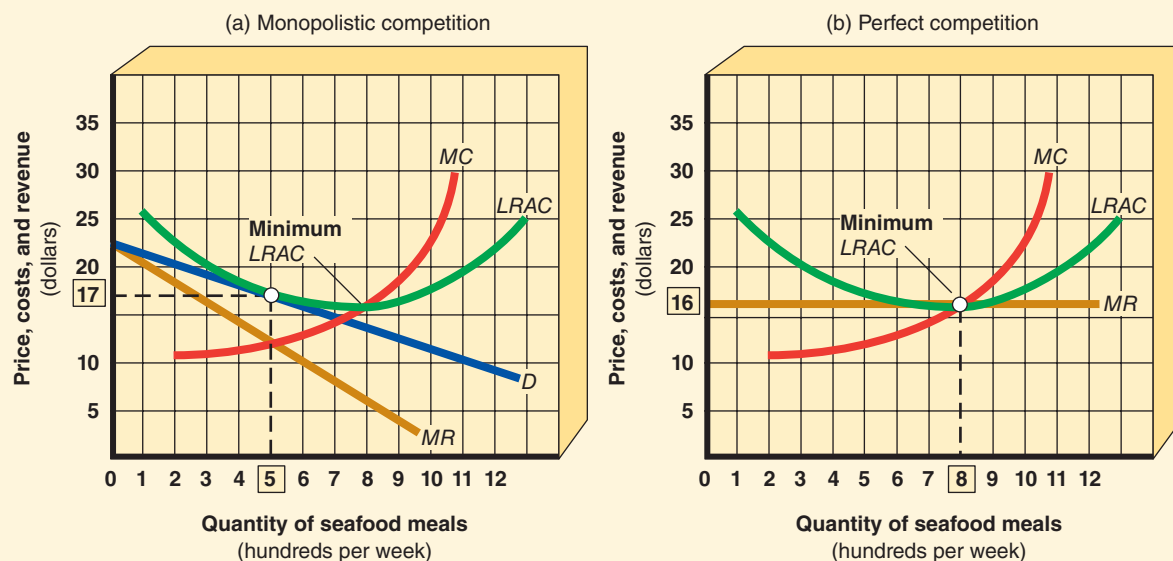
Exhibit 4(a) reproduces the long-run condition from Exhibit 3. Exhibit 4(b) assumes that the seafood restaurant market is perfectly competitive. Recall from Chapter 8 that the characteristics of perfect competition include the condition that customers perceive seafood meals as *homogeneous* and, as a result, no firms engage in

Exhibit 4

A Comparison of Monopolistic Competition and Perfect Competition in the Long Run

In part (a), Ivan's Oyster Bar is a monopolistically competitive firm that sets its price at \$17 per seafood meal and produces 500 meals per week. As a monopolistic competitor, Ivan's earns zero economic profit in the long run and does not produce at the lowest point on its $LRAC$ curve.

Under conditions of perfect competition in part (b), Ivan's becomes a price taker, rather than a price maker. Here the firm faces a flat demand curve at a price of \$16 per seafood meal, which is the equilibrium price set by the market demand and supply curves. The output is 800 meals per week, which corresponds to the lowest point on the $LRAC$ curve. Therefore, the price is lower, and the excess capacity of 300 meals per week is utilized when Ivan's operates as a perfectly competitive firm, rather than as a monopolistically competitive firm.



advertising. Because we now assume for the sake of argument that Ivan's product is identical to all other seafood restaurants, Ivan's becomes a *price taker*. In this case, the industry's long-run supply and demand curves set an equilibrium price of \$16 per meal. Consequently, Ivan's faces a horizontal demand curve with the price equal to marginal revenue. Also recall from Chapter 8 that long-run equilibrium for a perfectly competitive firm is established by the entry of new firms until the minimum point of \$16 per meal on the firm's *LRAC* curve equals the price, *MR* and *MC*. Stated as a formula:

$$P = MR = MC = LRAC$$

A comparison of parts (a) and (b) of Exhibit 4 reveals two important points. First, both the monopolistic competitor and the perfect competitor earn zero economic profit in the long run. Second, the long-run equilibrium output of the monopolistically competitive firm is to the left of the minimum point on the *LRAC* curve and the price exceeds *MC*. Like a monopolist, the monopolistically competitive firm therefore charges a higher price and produces less output than a perfectly competitive firm.

In our example, Ivan's would charge \$1 less per meal and produce 300 more seafood meals per week in a perfectly competitive market. The extra 300 meals not produced are *excess capacity*, which represents underutilized resources. The criticism of monopolistic competition, then, is that there are too many firms producing too little output at inflated prices and wasting society's resources in the process. For example, on many nights, there are not enough customers for all the restaurants in town. Servers, cooks, tables, and other resources are therefore underutilized. With fewer firms, each would produce a greater output at a lower price and with a lower average cost.

Opinions vary concerning whether the benefits of monopolistic competition exceed the costs. Having many seafood restaurants offers consumers more choice and variety of output. Having Ivan's Oyster Bar and many similar competitors gives consumers extra quality and service options. If you do not like Ivan's sautéed alligator, you may be able to find another restaurant that serves this dish. Also, having many restaurants in a market saves consumers valuable time. Chances are that you will not shed crocodile tears because the travel time required to enjoy an alligator meal is lower.

THE OLIGOPOLY MARKET STRUCTURE

Now we turn to oligopoly, an imperfectly competitive market structure in which a few large firms dominate the market. Many manufacturing industries, such as steel, aluminum, automobiles, aircraft, drugs, and tobacco, are best described as oligopolistic. This is the "big business" market structure, in which firms aggressively compete by bombarding us with advertising on television and filling our mailboxes with junk mail.

Economists define an **oligopoly** as a market structure characterized by (1) few sellers, (2) either a homogeneous or a differentiated product, and (3) difficult market entry. Like monopolistic competition, oligopoly is found in real-world industries. Let's examine each characteristic.

Oligopoly

A market structure characterized by
(1) few sellers,
(2) either a homogeneous or a differentiated product, and
(3) difficult market entry.

Mutual interdependence

A condition in which an action by one firm may cause a reaction from other firms.

Few Sellers

Oligopoly is competition “among the few.” Here we refer to the “Big Three” or “Big Four” to mean that three or four firms dominate an industry. But what does “a few” firms really mean? Does this mean at least two, but less than ten? As with other market structures, the answer is there is no specific number of firms that must dominate an industry before it is an oligopoly. Basically, an oligopoly is a consequence of **mutual interdependence**. Mutual interdependence is a condition in which an action by one firm may cause a reaction from other firms. Stated another way, a market structure with a few powerful firms makes it easier for oligopolists to collude. The large number of firms under perfect competition or monopolistic competition and the absence of other firms in monopoly rule out mutual interdependence and collusion in these market structures.

When General Motors (GM) considers a price hike or a style change, it must predict how Ford, Chrysler, and Toyota will change their prices and styling in response. Therefore, the decisions under oligopoly are more complex than under perfect competition, monopoly, and monopolistic competition.

CONCLUSION *The few-sellers condition is met when these few firms are so large relative to the total market that they can affect the market price.*

Homogeneous or Differentiated Product

Under oligopoly, firms can produce either a homogeneous (identical) or a differentiated product. The steel produced by USX is identical to the steel from Republic Steel. The oil sold by Saudi Arabia is identical to the oil from Iran. Similarly, zinc, copper, and aluminum are standardized or homogeneous products. But cars produced by the major automakers are differentiated products. Tires, detergents, and breakfast cereals are also differentiated products sold in oligopolies.

CONCLUSION *Buyers in an oligopoly may or may not be indifferent as to which seller's product they buy.*

Difficult Entry

Similar to monopoly, formidable barriers to entry in an oligopoly protect firms from new entrants. These barriers include exclusive financial requirements, control over an essential resource, patent rights, and other legal barriers. But the most significant barrier to entry in an oligopoly is *economies of scale*. For example, larger automakers achieve lower average total costs than those incurred by smaller automakers. Consequently, the U.S. auto industry has moved over time from more than 60 firms to only three major U.S.-owned firms.

PRICE AND OUTPUT DECISIONS FOR AN OLIGOPOLIST

Mutual interdependence among firms in an oligopoly makes this market structure more difficult to analyze than perfect competition, monopoly, or monopolistic competition. The price-output decision of an oligopolist is not simply a matter of charging the price where $MR = MC$. Making price and output decisions in an oligopoly is like playing a game of chess. One player's move depends on the anticipated reactions of the opposing player. One player thinks, "If I move my rook here, my opponent might move her knight there." Likewise, a firm in an oligopoly can have many different possible reactions to the price, nonprice, and output changes of another firm. Consequently, there are different oligopoly models because no single model can cover all cases. The following is a discussion of five well-known oligopoly models: (1) nonprice competition, (2) the kinked demand curve, (3) price leadership, (4) the cartel, and (5) game theory.

Nonprice Competition

Major oligopolists often compete using advertising and product differentiation. Instead of "slugging it out" with price cuts, oligopolists may try to capture business away from their rivals through better advertising campaigns and improved products. This model of behavior explains why advertising expenditures often are large in the cigarette, soft drink, athletic shoe, and automobile industries. It also explains why the research and development (R&D) function is so important to oligopolists. For example, much engineering effort is aimed largely at developing new products and improving existing products.

Why might oligopolists compete through nonprice competition, rather than price competition? The answer is that each oligopolist perceives that its rival will easily and quickly match any price reduction. In contrast, it is much more difficult to combat a clever and/or important product improvement.

The Kinked Demand Curve

Unlike other market structures, different assumptions define different models for any given oligopolistic industry. Over time, the "rules of the game" change, and a new model becomes the best predictor of the behavior of oligopolists. We begin with the **kinked demand curve**. The strange shape of this curve explains why prices in an oligopolistic market selling cars change far less often than prices in a perfectly competitive market selling wheat.

The kinked demand curve is a demand curve facing an oligopolist that assumes rivals will match a price decrease, but ignore a price increase. Without collusion, the kinked demand curve exists because management tacitly believes that the competition will not be "undersold." On the other hand, a price hike by one firm allows competitors to capture its share of the market. Oligopolistic firms must make pricing decisions, so they are *price makers*, rather than price takers. But as we will soon see, in the kinked demand model, the high degree of interdependence among oligopolists restricts their pricing discretion.

Kinked demand curve

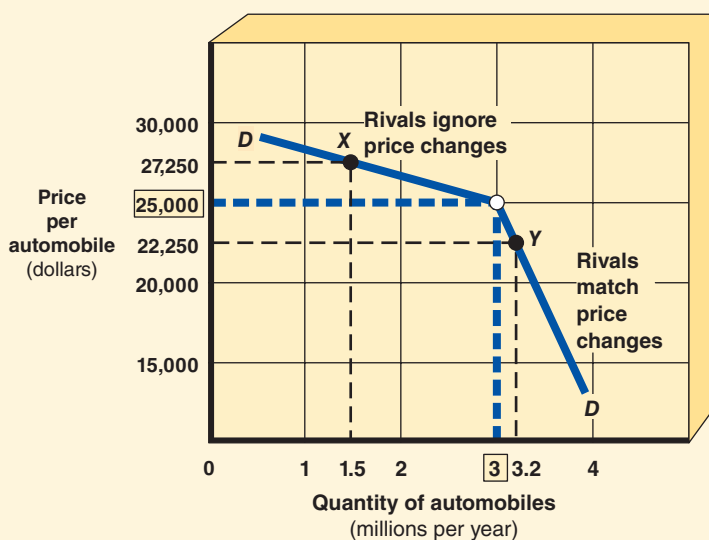
A demand curve facing an oligopolist that assumes rivals will match a price decrease, but ignore a price increase.

In Exhibit 5, a kinked demand curve is drawn for Tucker Motor Company, which we assume competes with GM, Ford, Toyota, and Chrysler in the automobile market. (I suggest you check out the movie titled *Tucker* at your video rental store.) The current price per Tucker car is \$25,000, and the quantity demanded at this price is 3 million cars per year. Tucker's management assumes that if it raises its price even slightly above \$25,000, the other automakers *will not follow* with higher prices. This price gap between the Tucker and other cars would drive many of Tucker's customers over to its rivals. The segment of the demand curve above \$25,000 is therefore relatively flat. Stated differently, above the "kink" in the demand curve, demand is relatively elastic. If Tucker raises the price to,

Exhibit 5

The Kinked Demand Curve

An oligopolist's demand curve may be kinked. In this graph, an automobile producer believes it faces two demand curves. A price hike from \$25,000 to \$27,250 per auto causes a sizable reduction in the quantity demanded from 3 million to 1.5 million autos (point X). Demand above the kink is elastic because rivals ignore the firm when it raises the price. Below the kink, the demand curve is less elastic. A price reduction from \$25,000 to \$22,250 per auto attracts very few new customers, and the quantity demanded increases from 3 million to only 3.2 million autos per year (point Y). Under the kinked demand curve theory, prices will be rigid.



say, \$27,250 at point X, this price hike cuts Tucker's quantity demanded to 1.5 million cars per year. Since raising its price is ill-advised, management can consider a price reduction strategy. Suppose Tucker cuts the price of its cars from \$25,000 to \$22,250 at point Y. The model shows that Tucker gains few customers and the quantity demanded rises only slightly from 3 million to 3.2 million cars per year. The reason for such a small sales boost is that other automakers also cut their prices so that each firm can keep its initial market share. However, the lower price does attract some new buyers who could not afford a car at the higher price. The segment of the demand curve below the kink is therefore relatively steep. Here demand is less elastic, meaning the quantity demanded is not very responsive to a price drop.

Given the kinked demand curve facing the oligopolist, management fears the worst and is afraid to raise or lower the price of its product. Under this model of oligopoly, the price established at the kink changes very infrequently. Price rigidity is eliminated only after large cost increases or decreases force a new kinked demand curve with a new higher or lower price at the kink.

Economists continue to debate the importance of the kinked demand model. Critics challenge the theory on theoretical and empirical grounds. On a theoretical level, there is no explanation for how the original price at the kink was determined. On empirical grounds, studies of certain oligopolistic industries fail to find price stickiness. On the other hand, widespread use of price lists in catalogs that remain fixed for a long time is consistent with kinked demand theory. In any case, the kinked demand theory does not provide a complete explanation of price and output decisions.

Price Leadership

Without formal agreement, firms can play a game of follow-the-leader that economists call **price leadership**. Price leadership is a pricing strategy in which a dominant firm sets the price for an industry and the other firms follow. Following this tactic, firms in an industry simply match the price of perhaps, but not necessarily, the biggest firm.

Price leadership is not uncommon. In addition to GM, USX Corporation (steel), Alcoa (aluminum), DuPont (nylon), R. J. Reynolds (cigarettes), and Goodyear Tire and Rubber (tires) are examples of price leaders in U.S. industries.

The Cartel

The price leadership model assumes that firms do not collude to avoid price competition. Instead, firms avoid price wars by informally playing by the established pricing rules. Another way to avoid price wars is for oligopolists to agree to a peace treaty. Instead of allowing mutual interdependence to lead to rivalry, firms openly or secretly conspire to form a monopoly called a **cartel**. A cartel is a group of firms that formally agree to control the price and the output of a product. The goal of a cartel is to reap monopoly profits by replacing competition with cooperation. Cartels are illegal in the United States, but not in other nations. The best-known cartel is the Organization of Petroleum Exporting Countries (OPEC). The members of OPEC divide "black gold" output among themselves according to quotas openly agreed

Price leadership

A pricing strategy in which a dominant firm sets the price for an industry and the other firms follow.



*Global
Economics*

Cartel

A group of firms that formally agrees to control the price and the output of a product.

Global Economics Major Cartels in Global Markets

Applicable Concepts: cartel

Cartels flourished in Germany and other European countries in the first half of the twentieth century. Many had international memberships. After World War II, European countries passed laws against such restrictive trade practices. The following are some of the most important cartels today:

- **Organization of Petroleum Exporting Countries (OPEC).** OPEC was created by Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela in Baghdad in 1960. Today, the Vienna-based OPEC's membership consists of 12 countries that control about 70 percent of the world's oil reserves. Cartels are anticonsumer. OPEC's objective is to set oil production quotas for its members and, in turn, influence global prices of oil and gasoline.
- **International Telecommunication Union (ITU).** Perhaps the world's least-known and most

effective cartel of about 140 member nations is based in Geneva, Switzerland. The ITU was founded in 1865 and became an agency of the United Nations in 1947. It is responsible for international regulations and standards governing global telecommunications including satellite communications, Internet access, and radio and TV broadcasting.

- **International Air Transport Association (IATA).** Originally founded in 1919, most of the world's international airlines belong to the IATA. This cartel headquartered in Montreal sets international airline ticket prices and safety and security standards for passenger and cargo shipping. It controls access to airports, and challenges rules and regulations considered to be unreasonable. The IATA also is concerned with minimizing the impact of air transport on the environment.

upon at meetings of the OPEC oil ministries. Saudi Arabia is the largest producer and has the largest quota. The Global Economics feature provides a brief summary of some of today's major global cartels.

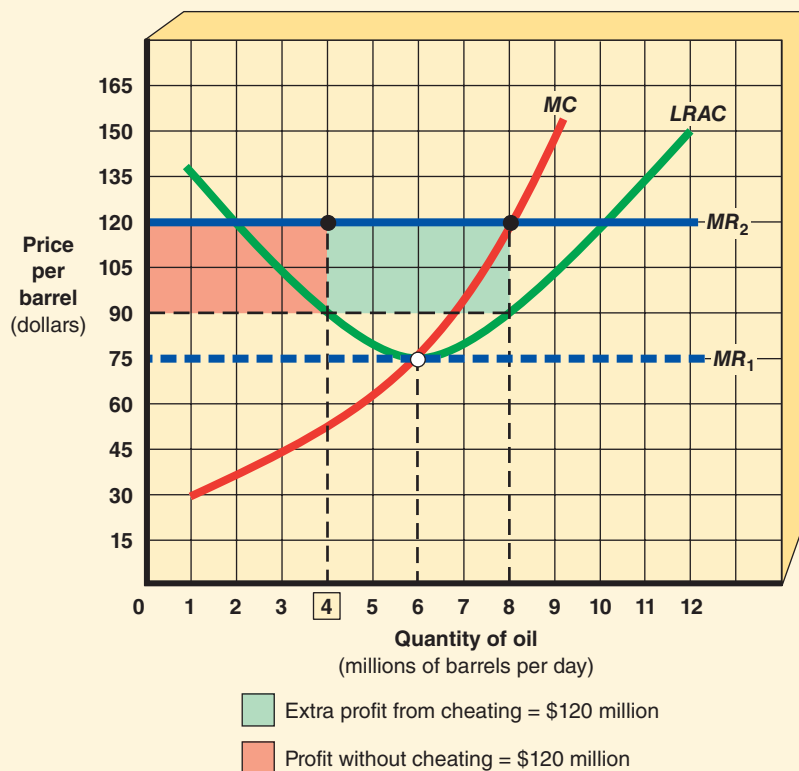
Using Exhibit 6, we can demonstrate how a cartel works and why keeping members from cheating is a problem. Our analysis begins before oil-producing firms have formed a cartel. Assume each firm has the same cost curve shown in the exhibit. Price wars have driven each firm to charge \$75 a barrel, which is equal to the minimum point on its $LRAC$ curve. Because oil is a standardized product, as under perfect competition, each firm fears raising its price because it will lose all its customers. Thus, the typical firm is in long-run competitive equilibrium at a price of \$75 per barrel (MR_1), producing 6 million barrels per day. In this condition, economic profits are zero, and the firms decide to organize a meeting of all oil producers to establish a cartel.

Now assume the cartel is formed and each firm agrees to reduce its output to 4 million barrels per day and charge \$120 per barrel. If no firms cheat, each firm faces a higher horizontal demand curve, represented by MR_2 . At the cartel price, each firm earns an economic profit of \$120 million, rather than a normal profit. But what if one firm decides to cheat on the cartel agreement by stepping up its output while other firms stick to their quotas? Output corresponding to the point at which $MR_2 = MC$ is 8 million barrels per day. If a cheating firm expands its output to this level, it can double its profit by earning an extra \$120 million. Of course, if all firms cheat and the cartel breaks up, the price and output of each firm return to the initial levels, and economic profit again falls to zero.

Exhibit 6

Why a Cartel Member Has an Incentive to Cheat

A representative oil producer operating in a perfectly competitive industry would be in long-run equilibrium at a price of \$75 per barrel, producing 6 million barrels per day and making zero economic profit. A cartel can agree to raise the price of oil from \$75 to \$120 per barrel by restricting the firm to 4 million barrels per day. As a result of this quota, the cartel price is above \$90 on the *LRAC* curve, and the firm earns a daily profit of \$120 million. However, if the firm cheats on the cartel agreement, it will set the cartel price equal to the *MC* curve and earn a total profit of \$240 million by adding an additional \$120 million. If all firms cheat, the original long-run equilibrium will be reestablished.



Game Theory

Game theory is a model of the strategic moves and countermoves of rivals. To illustrate, let's use a noncollusive example of US Airways competing with American Airlines. Each airline independently sets its fare, and Exhibit 7 is a *payoff matrix* that shows profit outcomes for the two airlines resulting from charging either a high fare or a low fare. If both charge the high fare in cell A, they split the market, and each makes a profit of \$8 billion. If both decide to charge the low fare in cell D, they also

Game theory

A model of the strategic moves and countermoves of rivals.

Exhibit 7 A Two-Firm Payoff Matrix

Game theory is a method of analyzing the oligopoly puzzle. Two fare options of charging either a high fare or a low fare are given for USAirways and American Airlines. The profit or loss that each earns in cells A–D depends on the pricing decisions of these two rivals. Their collective interest is best served in cell A where each charges the high fare and each makes the maximum profit of \$8 billion. But once either airline independently seeks the higher profit of \$10 billion by using a low-fare strategy in cell B or C, the other airline counters with a low fare, and both end up charging the low fare in cell D. As a result, mutual profits are \$5 billion, rather than \$8 billion in cell A. Cell D is the equilibrium outcome because both fear changing the price and causing the other to counter.

		USAirways' options	
		High fare	Low fare
American Airlines' options	High fare	A USAirways' profit = \$8 billion American Airlines' profit = \$8 billion	B USAirways' profit = \$10 billion American Airlines' loss = −\$2 billion
	Low fare	C USAirways' loss = −\$2 billion American Airlines' profit = \$10 billion	D USAirways' profit = \$5 billion American Airlines' profit = \$5 billion

split the market, and the profit for each falls to \$5 billion. If one charges the high fare and the other the low fare in cell B or cell C, then the low-fare airline attracts most of the customers and earns the maximum possible profit of \$10 billion, while the high-fare airline loses \$2 billion.

Both rivals in our example are clearly *mutually interdependent* because an action by one firm may cause a reaction from the other firm. Suppose both airlines initially select the most mutually profitable solution and both charge high fares in cell A. This outcome creates an incentive for either airline to charge a lower fare in cell B or cell C and earn the highest possible profit by pulling customers away from its rival. Consequently, assume the next day one airline cuts its fare to gain higher profits. In order to avoid losing customers, this action causes the other airline to counter with an equally low fare. Price competition has therefore forced both airlines to charge the low fare in cell D and earn less than maximum joint profits. Once cell D is reached, neither airline has an incentive to alter the fare either higher or lower because both fear their rival's countermoves. Note that when both firms charge the low fare in equilibrium at cell D, consumers benefit from not paying high fares in the other cells.

CONCLUSION *The payoff matrix demonstrates why a competitive oligopoly tends to result in both rivals using a low-price strategy that does not maximize mutual profits.*



You're The Economist

How Oligopolists Compete at the Final Four

Applicable Concept: oligopoly



Suppose March Madness included your basketball team making it all the way to the Final Four and you were going to be there. Before leaving, you checked the official Web site and noticed a Coke ad giving a prize to the person who submitted the best video commercial for a new Coke product. But this was only the beginning of the Great Cola Wars. Shortly after leaving the plane at the airport, you encountered a group of students who were giving away huge inflatable plastic hands with index fingers sticking up in the air signaling that your team is number one. The plastic hands were imprinted with the Pepsi-Cola logo and your choice of a Final Four team. And the group was also giving away free ice-cold cans of Pepsi. As you walked along the

streets to your hotel, giant inflatable “cans” of Pepsi appeared all over the downtown area on the sidewalks and on top of gas stations. And not to be outdone, the entire side of a prominent three-story building was painted Coca-Cola red and white with the 64 NCAA basketball finalists and all the winners listed, bracket by bracket. Following the first-round games, painters were three stories up on scaffolding, filling in the Coke sign’s brackets for the final two teams, in school colors no less. Inside the arena, the colas continued their battle by scrolling cola ads with other ads under the press rows along either side of the basketball court. This was indeed competition between showboating industry giants worthy of the Final Four competition among the basketball teams.

Many fascinating markets function during the Final Four basketball tournament, including competitive markets that determine prices for parking lots, restaurants, and tickets. (Recall the Checkpoint in Chapter 4 on ticket scalping.) Then there were the hotels surrounding the arena, which joined a centralized booking service. Each hotel had raised its normal price by 75 percent for the weekend.

ANALYZE THE ISSUE

In this feature, two forms of oligopoly were observed. Identify each of these forms and explain why it is being used by the oligopolists.

How can these oligopolists avoid the low-fare outcome in cell D and instead stabilize the more jointly profitable high-fare payoffs in cell A? One possible strategy is called *tit-for-tat*. Under this approach, a player will do whatever the other player did the last time. If one airline defects from cell A by cutting its fare to gain a profit advantage, the other competitor will also cut its fare. After repeated trials, these price-cutting responses serve as a signal that says, “You are not going to get the best of me, so move your fare up!” Once the defector responds by moving back to the high fare, the other airline cooperates and also moves to the high fare. The result is that both players return to cell A without a formal agreement.

Another informal approach is for rivals to coordinate their pricing decisions based on price leadership, as discussed earlier in this chapter. For example, one airline may be much more established or dominant, and the other airline follows whatever price the leader sets. Another approach would be to informally rotate the leadership. Thus, without a formal agreement, the leader sets the profit-maximizing high price in cell A and the other competitor follows. However, this system does not eliminate the threat that the price follower will cheat.

Finally, if cartels were legal in the United States, the airlines could collude and make a formal agreement that each will charge the high fare. However, as explained in the previous section, there is always the incentive for one firm to cheat by moving from cell A to either cell B or cell C, and therefore, cartels tend to break down. A remedy might be for the rivals to agree on a penalty for any party that reneges by lowering its fare.

CONCLUSION *As long as the benefits exceed the costs, cheating can threaten formal or informal agreements among oligopolists to maximize joint profits.*

AN EVALUATION OF OLIGOPOLY

Oligopoly is much more difficult to evaluate than other market structures. None of the models just presented gives a definite answer to the question of efficiency under oligopoly. Depending on the assumptions made, an oligopolist can behave much like a perfectly competitive firm or more like a monopoly. Nevertheless, let's assume some likely changes that occur if a perfectly competitive industry is suddenly turned into an oligopoly selling a differentiated product.

First, the price charged for the product will be higher than under perfect competition. The smaller the number of firms in an oligopoly and the more difficult it is to enter the industry, the higher the oligopoly price will be in comparison to the perfectly competitive price.

Second, an oligopoly is likely to spend money on advertising, product differentiation, and other forms of nonprice competition. These expenditures can shift the demand curve to the right. As a result, both price and output may be higher under oligopoly than under perfect competition.

Third, in the long run, a perfectly competitive firm earns zero economic profit. The oligopolist, however, can earn a higher profit because it is more difficult for competitors to enter the industry.

CHECKPOINT

Which Model Fits the Cereal Aisle?

As you walk along the cereal aisle, notice the many different cereals on the shelf. For example, you will probably see General Mills' Wheaties, Total, and Cheerios; Kellogg's Corn Flakes, Cracklin' Oat Bran, Frosted Flakes, and Rice Krispies; Quaker Oats' Cap'n Crunch and 100% Natural; and Post's Super Golden Crisp, to name only a few. There are many different brands of the same product-cereal on the shelves. Each brand is slightly different from the others. Is the breakfast cereal industry's market structure monopolistic competition or oligopoly?



REVIEW OF THE FOUR MARKET STRUCTURES

Now that we have completed the discussion of perfect competition, monopoly, monopolistic competition, and oligopoly, you are prepared to compare these four market structures. Exhibit 8 summarizes the characteristics and gives examples of each market structure.

<i>Exhibit 8</i> Comparison of Market Structures				
Market structure	Number of sellers	Type of product	Entry condition	Examples
Perfect competition	Large	Homogeneous	Very easy	Agriculture*
Monopoly	One	Unique	Impossible	Public utilities
Monopolistic competition	Many	Differentiated	Easy	Retail trade
Oligopoly	Few	Homogeneous or differentiated	Difficult	Auto, steel, oil

*In the absence of government intervention.

Key Concepts

Monopolistic competition
Product differentiation
Nonprice competition

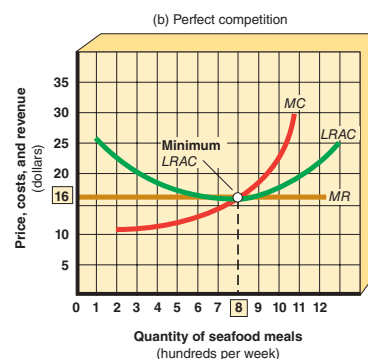
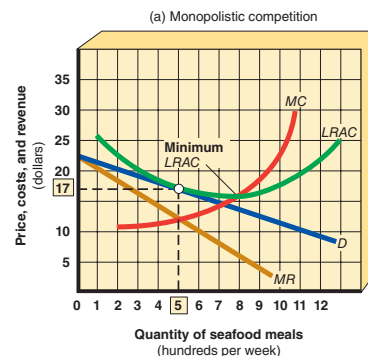
Oligopoly
Mutual interdependence
Kinked demand curve

Price leadership
Cartel
Game theory

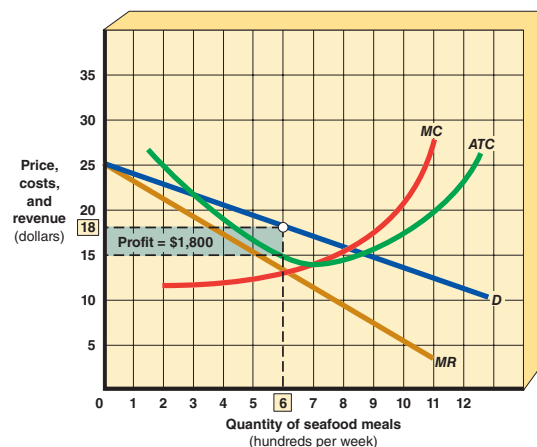
Summary

- **Monopolistic competition** is a market structure characterized by (1) many small sellers, (2) a differentiated product, and (3) easy market entry and exit. Given these characteristics, firms in monopolistic competition have a negligible effect on the market price.
- **Product differentiation** is a key characteristic of monopolistic competition. It is the process of creating real or apparent differences between products.
- **Nonprice competition** includes advertising, packaging, product development, better quality, and better service. Under monopolistic competition and oligopoly, firms may compete using nonprice competition, rather than price competition.
- **Short-run equilibrium for a monopolistic competitor** can yield economic losses, zero economic profits, or economic profits. In the long run, monopolistic competitors make zero economic profits.
- **Comparing monopolistic competition with perfect competition**, we find that in the long run the monopolistically competitive firm does not achieve allocative efficiency, charges a higher price, restricts output, and does not produce where average costs are at a minimum.

Comparison of Monopolistic and Perfect Competition

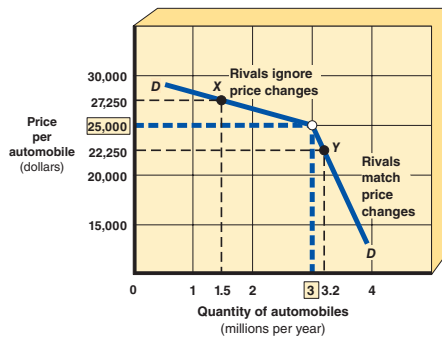


Short-Run Equilibrium for a Monopolistic Competitor



- **Oligopoly** is a market structure characterized by (1) few sellers, (2) either a homogeneous or a differentiated product, and (3) difficult market entry. Oligopolies are *mutually interdependent* because an action by one firm may cause a reaction from other firms.
- The **nonprice competition model** is a theory that might explain oligopolistic behavior. Under this theory, firms use advertising and product differentiation, rather than price reductions, to compete.
- The **kinked demand curve** model explains why prices may be rigid in an oligopoly. The kink occurs because an oligopolist assumes that rivals will match a price decrease, but ignore a price increase.

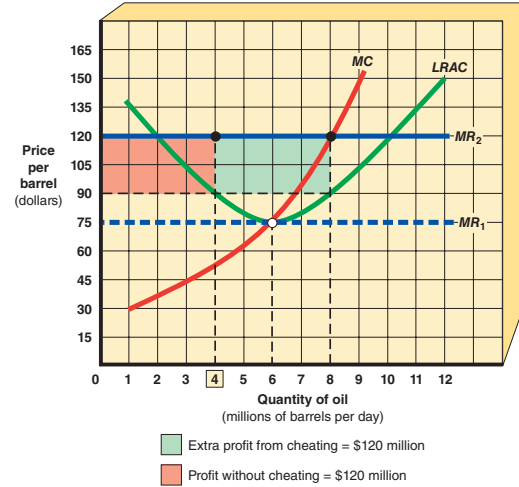
Kinked Demand Curve



- **Price leadership** is another theory of pricing behavior under oligopoly. When a dominant firm in an industry raises or lowers its price, other firms follow suit.
- A **cartel** is a formal agreement among firms to set prices and output quotas. The goal is to

maximize profits, but firms have an incentive to cheat, which is a constant threat to a cartel.

Cartel



- **Game theory** reveals that (1) oligopolies are mutually interdependent in their pricing policies; (2) without collusion, oligopoly prices and mutual profits are lower; and (3) oligopolists have a temptation to cheat on any collusive agreement.
- **Comparing oligopoly with perfect competition**, we find that the oligopolist allocates resources inefficiently, charges a higher price, and restricts output so that price may exceed average cost.

Summary of Conclusion Statement

- The many-sellers condition is met when each firm is so small relative to the total market that its pricing decisions have a negligible effect on the market price.
- When a product is differentiated, buyers are not indifferent as to which seller's product they buy.
- The demand curve for a monopolistically competitive firm is less elastic (steeper) than for a perfectly competitive firm and more elastic (flatter) than for a monopolist.
- The few-sellers condition is met when these few firms are so large relative to the total market that they can affect the market price.
- Buyers in an oligopoly may or may not be indifferent as to which seller's product they buy.

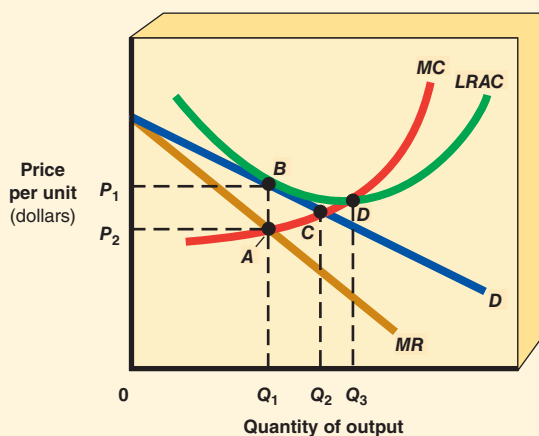
- The payoff matrix demonstrates why a competitive oligopoly tends to result in both rivals using a low-price strategy that does not maximize mutual profits.
- As long as the benefits exceed the costs, cheating can threaten formal or informal agreements among oligopolists to maximize joint profits.

Study Questions and Problems

1. Compare the monopolistically competitive firm's demand curve to those of a perfect competitor and a monopolist.
2. Suppose the minimum point on the *LRAC* curve of a soft-drink firm's cola is \$1 per liter. Under conditions of monopolistic competition, will the price of a liter bottle of cola in the long run be above \$1, equal to \$1, less than \$1, or impossible to determine?
3. Exhibit 9 represents a monopolistically competitive firm in long-run equilibrium.
 - a. Which price represents the long-run equilibrium price?
 - b. Which quantity represents the long-run equilibrium output?
 - c. At which quantity is the *LRAC* curve at its minimum?
 - d. Is the long-run equilibrium price greater than, less than, or equal to the marginal cost of producing the equilibrium output?
4. Consider this statement: "Because price equals long-run average cost and profits are zero, a monopolistically competitive firm is efficient." Do you agree or disagree? Explain.
5. Assuming identical long-run cost curves, draw two graphs, and indicate the price and output that result in the long run under monopolistic competition and perfect competition. Evaluate the differences between these two market structures.
6. Draw a graph that shows how advertising affects a firm's *ATC* curve. Explain how advertising can lead to lower prices in a monopolistically competitive industry.
7. List four goods or services that you have purchased that were produced or rendered by an oligopolist. Why are these industries oligopolistic, rather than monopolistically competitive?
8. Why is mutual interdependence important under oligopoly, but not so important under perfect competition, monopoly, or monopolistic competition?
9. Suppose the jeans industry is an oligopoly in which each firm sells its own distinctive brand of jeans. Each firm believes its rivals will not follow its price increases, but will follow its price cuts. Explain the demand curve facing each firm. Does this demand curve mean that firms in the jeans industry do or do not compete against one another?
10. What might be a general distinction between oligopolists that advertise and those that do not?
11. Suppose IBM raised the price of its printers, but Hewlett-Packard (the largest seller) refused to follow. Two years later, IBM cut its price, and Hewlett-Packard retaliated

Exhibit 9

Firm in Long-Run Equilibrium



9. Suppose the jeans industry is an oligopoly in which each firm sells its own distinctive brand of jeans. Each firm believes its rivals will not follow its price increases, but will follow its price cuts. Explain the demand curve facing each firm. Does this demand curve mean that firms in the jeans industry do or do not compete against one another?
10. What might be a general distinction between oligopolists that advertise and those that do not?
11. Suppose IBM raised the price of its printers, but Hewlett-Packard (the largest seller) refused to follow. Two years later, IBM cut its price, and Hewlett-Packard retaliated

with an even deeper price cut, which IBM was forced to match. For the next five years, Hewlett-Packard raised its prices five times, and each time IBM followed suit within 24 hours. Does the pricing behavior of these computer industry firms follow the cartel model or the price leadership model? Why?

12. Evaluate the following statement: “A cartel will put an end to price war, which is a barbaric form of competition that benefits no one.”

13. Assume the payoff matrix in Exhibit 7 applies to spending for advertising rather than airline fares. Substitute “Don’t Advertise” for “High fare” and “Advertise” for “Low fare.” Assume the same profit and loss figures in each cell, but substitute “Marlboro” for “US Airways” and “Camel” for “American Airlines.” Explain the dynamics of the model and why cigarette companies might be pleased with a government ban on all cigarette advertising.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWER

Which Model Fits the Cereal Aisle?

The fact that there is a differentiated product does not necessarily mean that many firms are competing along the cereal aisle. The different cereals listed in this example are produced by only four companies: General Mills, Kellogg’s, Quaker Oats,

and Post. In fact, there are relatively few firms in the cereal industry, so even though they sell a differentiated product, the market structure cannot be monopolistic competition. If you said the cereal industry is an oligopoly, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- An industry with many small sellers, a differentiated product, and easy entry would *best* be described as which of the following?
 - Oligopoly
 - Monopolistic competition
 - Perfect competition
 - Monopoly
- Which of the following industries is the *best* example of monopolistic competition?
 - Wheat
 - Restaurant
 - Automobile
 - Water service
- Which of the following is *not* a characteristic of monopolistic competition?
 - A large number of small firms
 - A differentiated product
 - Easy market entry
 - A homogeneous product
- A monopolistically competitive firm will
 - maximize profits by producing where $MR = MC$.
 - not earn an economic profit in the long run.
 - shut down if price is less than average variable cost.
 - do all of the above.

Practice Quiz Continued

5. The theory of monopolistic competition predicts that in long-run equilibrium, a monopolistically competitive firm will
 - a. produce the output level at which price equals long-run marginal cost.
 - b. operate at minimum long-run average cost.
 - c. overutilize its insufficient capacity.
 - d. produce the output level at which price equals long-run average cost.
6. A monopolistically competitive firm is inefficient because the firm
 - a. earns positive economic profit in the long run.
 - b. is producing at an output where marginal cost equals price.
 - c. is not maximizing its profit.
 - d. produces an output where average total cost is not minimum.
7. A monopolistically competitive firm in the long run earns the same economic profit as a
 - a. perfectly competitive firm.
 - b. monopolist.
 - c. cartel.
 - d. none of the above.
8. One possible effect of advertising on a firm's long-run average cost curve is to
 - a. raise the curve.
 - b. lower the curve.
 - c. shift the curve rightward.
 - d. shift the curve leftward.
9. Monopolistic competition is an inefficient market structure because
 - a. firms earn zero profit in the long run.
 - b. marginal cost is less than price in the long run.
 - c. a wider variety of products is available compared to perfect competition.
 - d. all of the above.
10. The "Big Three" U.S. automobile industry is described as
 - a. a monopoly.
 - b. perfect competition.
 - c. monopolistic competition.
 - d. an oligopoly.
11. The cigarette industry in the United States is described as
 - a. a monopoly.
 - b. perfect competition.
 - c. monopolistic competition.
 - d. an oligopoly.
12. A characteristic of an oligopoly is
 - a. mutual interdependence in pricing decisions.
 - b. easy market entry.
 - c. both (a) and (b).
 - d. neither (a) nor (b).
13. The kinked demand curve theory attempts to explain why an oligopolistic firm
 - a. has relatively large advertising expenditures.
 - b. fails to invest in research and development (R&D).
 - c. infrequently changes its price.
 - d. engages in excessive brand proliferation.
14. According to the kinked demand curve theory, when one firm raises its price, other firms will
 - a. also raise their prices.
 - b. refuse to follow.
 - c. increase their advertising expenditures.
 - d. exit the industry.
15. Which of the following is evidence that OPEC is a cartel?
 - a. Agreement on price and output quotas by oil ministries
 - b. Ability to raise prices regardless of demand
 - c. Mutual interdependence in pricing and output decisions
 - d. Ability to completely control entry
16. Assume costs are identical for the two firms in Exhibit 10. If both firms were allowed to form a cartel and agree on their prices, equilibrium would be established by
 - a. Zeba Oil charging \$100 and Tucker Oil charging \$100.
 - b. Zeba Oil charging \$100 and Tucker Oil charging \$50.
 - c. Zeba Oil charging \$50 and Tucker Oil charging \$50.
 - d. Zeba Oil charging \$50 and Tucker Oil charging \$100.

Practice Quiz Continued

Exhibit 10

A Two-Firm Payoff Matrix

		Tucker Oil Company	
		\$100	\$50
Zeba Oil Company	\$100	A \$25 billion \$25 billion	B \$15 billion \$5 billion
	\$50	C \$5 billion \$15 billion	D \$10 billion \$10 billion

17. Suppose costs are identical for the two firms in Exhibit 10. If both firms assume the other will compete and charge a lower price, equilibrium will be established by
- Zeba Oil charging \$100 and Tucker Oil charging \$100.
 - Zeba Oil charging \$100 and Tucker Oil charging \$50.
 - Zeba Oil charging \$50 and Tucker Oil charging \$100.
 - Zeba Oil charging \$50 and Tucker Oil charging \$50.
18. Suppose costs are identical for the two firms in Exhibit 10. Each firm assumes without formal agreement that if it sets the high price, its rival will not charge a lower price. Under these “tit-for-tat” conditions, equilibrium will be established by
- Zeba Oil charging \$100 and Tucker Oil charging \$100.
 - Zeba Oil charging \$100 and Tucker Oil charging \$50.
 - Zeba Oil charging \$50 and Tucker Oil charging \$50.
 - Zeba Oil charging \$50 and Tucker Oil charging \$100.
19. Which of the following is a game theory strategy for oligopolists to avoid a low-price outcome?
- Tit-for-tat
 - Win-win
 - Last-in first-out
 - Second best
20. Which of the following is a game theory strategy for oligopolists to avoid a low-price outcome?
- Tit-for-tat
 - Price leadership
 - Cartel
 - All of the above



Labor Markets

In 2009, actor Brad Pitt earned the impressive figure of \$28 million, but talk show host Oprah Winfrey did even better. She earned \$275 million. While one headline reports a sports team signed their star player to a contract paying \$10 million annually, another cites a recent survey showing chief executive officers (CEOs) of America's biggest corporations are paid millions of dollars in compensation. The president of the United States is paid \$400,000 per year. The worker with only a bachelor's degree earns an average of about \$55,000. The average high school graduate earns less than \$30,000, while many others, including college students, toil for the minimum wage.

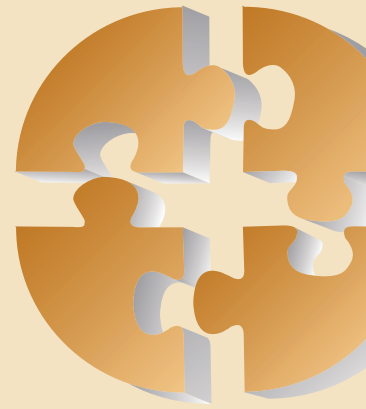
How are earnings determined? What accounts for the wide differences in earnings? This chapter provides answers by explaining different types of labor markets that determine workers'

compensation and the quantity of workers firms hire. Understanding hiring decisions is indeed a key to understanding why some become rich and famous by playing baseball—a kid's game—while other workers might be exploited by firms with labor market power.

The chapter begins with the development of a competitive labor market in which no single buyer or seller can influence the price (wage rate) of labor. The chapter concludes with a discussion on power. As in the product markets, labor market determinations are affected by market power. Power on the side of either unions or employers can alter wage and employment outcomes. For example, the chapter explains how unions affect wages and examines trends in union membership around the world.

In this chapter, you will learn to solve these economics puzzles:

- What determines the wage rate an employer pays?
- How do labor unions influence wages and employment?
- Does the NCAA exploit college athletes?



THE LABOR MARKET UNDER PERFECT COMPETITION

In Chapters 8–10, you studied the price and quantity determinations of goods and services produced by firms operating under different market structures—perfect competition, monopoly, oligopoly, and monopolistic competition. As you have learned, market structure affects the price and the quantity of a good or service sold by firms to consumers. Similarly, as this chapter will demonstrate, the price (wage rate) paid to labor and the quantity of labor hired by firms are influenced by whether or not the labor market is competitive.

Recall from Chapter 8 that we assumed the hypothetical firm called Computech produces and sells electronic units for automated teller machines in a perfectly competitive market. Here, we also assumed, Computech hires workers in a perfectly competitive labor market. In a perfectly competitive labor market, there are many sellers and buyers of labor services. Consequently, wages and salaries are determined by the intersection of the demand for labor and the supply of labor.

The Demand for Labor

How many workers should Computech hire? To answer this question, Computech must know how much workers contribute to its output. Column 1 of Exhibit 1 lists possible numbers of workers Computech might hire per day and as discussed earlier in Chapter 7 on production costs, column 2 shows the total output per day. One worker would produce 5 units per day, 2 workers together would produce 9 units per day, and so on. Note that columns 1 and 2 constitute a *production function*, as represented earlier in Exhibit 2(a) in Chapter 7. Column 3 lists the additional output from hiring each worker. The first worker hired would add 5 units of output per day, the second would produce an additional 4 units (total difference of $9 - 5$ units produced), and so on. Recall from Chapter 7 that the additional output from hiring another unit of labor is defined as the *marginal product of labor* [see Exhibit 2(b) in Chapter 7]. Consistent with the *law of diminishing returns*, the marginal product falls as the firm hires more workers.¹

1. Recall from Chapter 7 that at low rates of output, marginal product may increase with the addition of more labor due to specialization and division of labor. Then, as output expands in the short run, the law of diminishing returns will cause marginal product to decrease.

Exhibit 1		Computech's Demand for Labor					
	(1)	(2)	(3)		(4)	(5)	
Points	Labor Input (workers per day)	Total Output (units per day)	Marginal Product (units per day)		Product Price	Marginal Revenue Product [(3) × (4)]	
	0	0			\$70		
A	1	5		5	70		\$350
				4			
B	2	9		3	70		210
				2			
C	3	12		1	70		70
D	4	14			70		
E	5	15			70		

Marginal revenue product (MRP)

The increase in a firm's total revenue resulting from hiring an additional unit of labor or other variable resource.

The next step in Computech's hiring decision is to convert marginal product into dollars by calculating the **marginal revenue product (MRP)**, which is the increase in a firm's total revenue resulting from hiring an additional unit of labor or other variable resource. Stated simply, *MRP* is the dollar value of worker productivity. It is the extra revenue a firm earns from selling the output of an extra worker. Returning to Exhibit 1 in Chapter 8 on perfect competition, suppose the market equilibrium price per unit is \$70. Because Computech operates in a perfectly competitive market, the firm can sell any quantity of its product at the \$70 market-determined price. Given this situation, the first unit of labor contributes an *MRP* of \$350 per day to revenue (\$70 per unit times the 5 units of output). Column 5 of Exhibit 1 lists the *MRP* of each additional worker hired.

CONCLUSION *A perfectly competitive firm's marginal revenue product is equal to the marginal product of its labor times the price of its product. Expressed as a formula: $MRP = P \times MP$.*

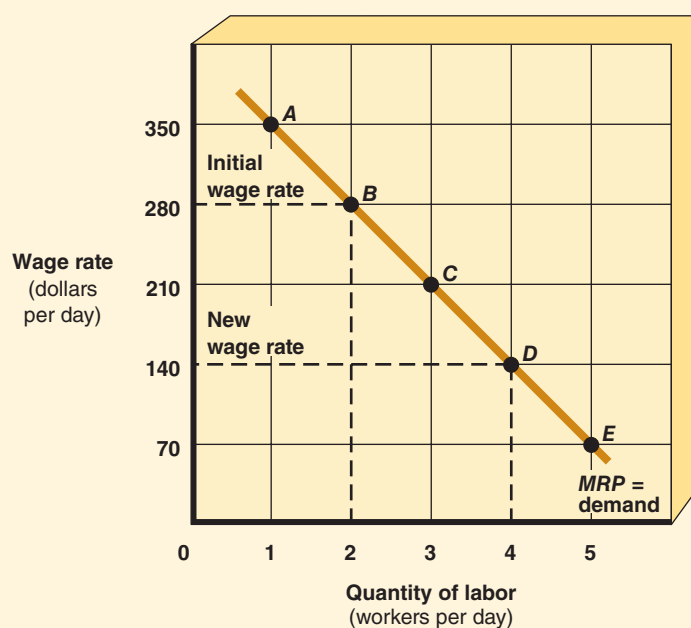
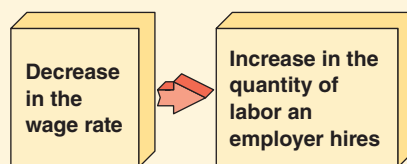
Demand curve for labor

A curve showing the different quantities of labor employers are willing to hire at different wage rates in a given time period, *ceteris paribus*. It is equal to the marginal revenue product of labor.

Now assuming all other inputs are fixed, Computech can derive its **demand curve for labor**, which conforms to the law of demand explained in Chapter 3. The demand curve for labor is a curve showing the different quantities of labor employers are willing to hire at different wage rates. It is equal to the *MRP* of labor. The *MRP* numbers from Exhibit 1 are duplicated in Exhibit 2. As shown in Exhibit 2, the price of labor in terms of daily wages is measured on the vertical axis. The quantity of workers Computech will hire per day at each wage rate is measured on the horizontal axis. The demand curve for labor is downward sloping: As the wage rate falls, Computech will hire more workers per day. If the

*Exhibit 2***Computech's Demand Curve for Labor**

Computech's downward-sloping demand curve for labor is derived from the marginal revenue product (*MRP*) of labor, which declines as additional workers are hired. The *MRP* is the change in total revenue that results from hiring one more worker (see Exhibit 1). At point *B*, Computech pays \$280 per day and finds it profitable to pay this wage to 2 workers because each worker's *MRP* equals or exceeds the wage rate. If Computech pays a lower wage rate of \$140 per day at point *D*, it is not profitable for the firm to hire the fifth worker because this worker's *MRP* of \$70 is below the wage rate of \$140 per day. At a wage rate of \$70, the fifth worker would be hired.

**CAUSATION CHAIN**

wage rate is above \$350 (point *A*), Computech will hire no workers because the cost of a worker is more than the dollar value of any worker's contribution to total revenue (*MRP*). But what happens if Computech pays each worker \$280 per day? At point *B*, Computech finds it profitable to hire 2 workers because the *MRP* of the first worker is greater than the wage rate (extra cost) and the second worker's *MRP* equals the wage rate. If the wage rate is \$140 per day at point *D*, Computech will find it profitable to hire 4 workers. In this case, Computech

will not hire the fifth worker. Why? The fifth worker contributes an *MRP* of \$70 to total revenue (point *E*), but this amount is below the wage rate paid of \$140. Consequently, Computech cannot maximize profits by hiring the fifth worker because it would be adding more to costs than to revenue. Specifically, Computech would lose \$70 per day by hiring the fifth worker. At a wage rate of \$70, however, the fifth worker would be hired.

CONCLUSION *A firm hires additional workers up to the point where the MRP equals the wage rate.*

Derived demand

The demand for labor and other factors of production that depends on the consumer demand for the final goods and services the factors produce.

Each firm in the market has a demand for labor based on its *MRP* data. Summing these individual demand curves for labor provides the market demand curve for labor in the electronic components industry. Another important point must be made. The demand for labor is called **derived demand**. The derived demand for labor and other factors of production depend on the consumer demand for the final goods and services the factors produce. If consumers are not willing to purchase products requiring electronic components, such as bank teller machines, there is no *MRP*, and firms will hire no workers to make electronic components for them. On the other hand, if customer demand for bank teller machines soars, the price of units rises, and the *MRP* of firms in the electronic components industry also rises. The result is a rightward shift in the market demand curve for labor.

Supply curve of labor

A curve showing the different quantities of labor that workers are willing to offer employers at different wage rates in a given time period, *ceteris paribus*.

The Supply of Labor

The **supply curve of labor** is also consistent with the law of supply discussed in Chapter 3. The supply curve of labor shows the different quantities of labor that workers are willing to offer employers at different wage rates. Summing the individual supply curves of labor for firms producing electronic units for automated teller machines provides the market supply curve of labor. As shown in Exhibit 3, as the wage rate rises, more workers are willing to supply their labor. Each point indicates the wage rate that must be paid to attract the corresponding number of workers. At point *A*, 20,000 workers offer their services to the industry for \$140 per day. At the higher wage rate of \$280 per day (point *B*), the quantity of labor supplied is 40,000 workers. More people are willing to work at higher wage rates because the incentive of earning more compensates for the opportunity cost of leisure time. Higher wages also attract workers from other industries that require similar skills, but have lower wage rates.

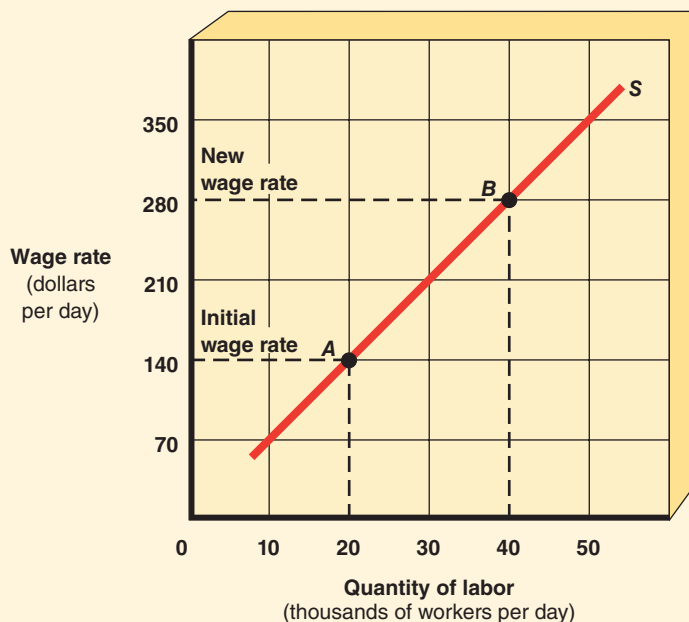
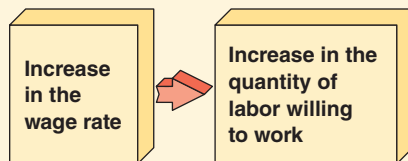
Human capital

The accumulation of education, training, experience, and health that enables a worker to enter an occupation and be productive.

Ignoring differences in wage scales, why might the supply of less-skilled workers (e.g., carpenters) be greater than that of more-skilled workers (e.g., physicians)? The explanation for this difference is the **human capital** required to perform various occupations. Human capital is the accumulation of education, training, experience, and health that enables a worker to enter an occupation and be productive. Less human capital is required to be a carpenter than a physician. Therefore, many people are qualified for such work, and the supply of carpenters is larger than the supply of physicians.

*Exhibit 3***The Market Supply Curve of Labor**

The upward-sloping supply curve of labor for the electronic components industry indicates that a direct relationship exists between the wage rate and the quantity of labor supplied. At point A, 20,000 workers are willing to work for \$140 per day in this market. If the wage rate rises to \$280 per day, 40,000 workers will supply their services to the electronic components labor market.

**CAUSATION CHAIN**

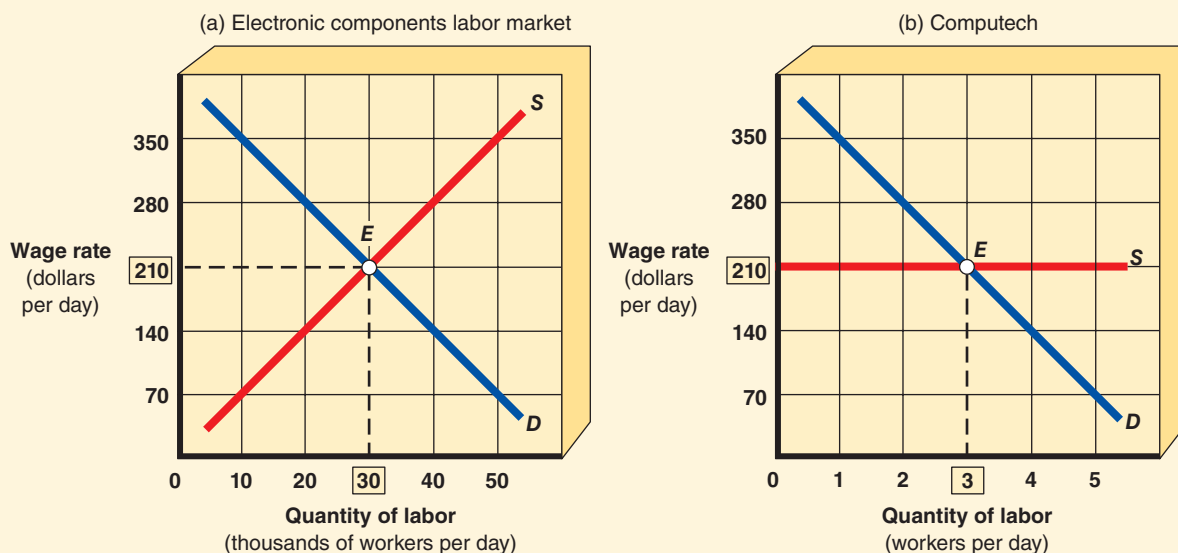
The Equilibrium Wage Rate

Wage rates are determined in perfectly competitive markets by the interaction of labor supply and demand. The equilibrium wage rate for the entire electronic components market, shown in Exhibit 4(a), is \$210 per day. This wage rate clears the market because the quantity of 30,000 workers demanded equals the quantity of 30,000 workers who are willing to supply their labor services at that wage rate. In a competitive labor market, no single worker can set his or her wage above the equilibrium wage. Such a worker fears not being hired because there are so many workers who will work for \$210 per day. Similarly, so many firms

Exhibit 4

A Competitive Labor Market Determines the Firm's Equilibrium Wage

In part (a), the intersection of the supply of labor and the demand for labor curves determines the equilibrium wage rate of \$210 per day in the electronic components industry. Part (b) illustrates that a single firm, such as Computech, is a “wage taker.” The firm can hire all the workers it wants at this equilibrium wage, so its supply curve, S , is a horizontal line. Computech chooses to hire 3 workers, where the firm's demand curve for labor intersects its supply curve of labor.



are hiring labor that a single firm cannot influence the wage by paying workers more or less than the prevailing wage. Hence, a wage rate above \$210 per day would create a surplus of workers seeking employment (unemployment) in the electronic components market, and a wage rate below \$210 per day would cause a shortage.

Why does a cardiologist make a much higher hourly wage than a server in a restaurant? As demonstrated in Exhibit 4(a), wage differentials are determined by the demand and supply curves in labor markets for these two occupations. In this case, the equilibrium wage rate for cardiologists greatly exceeds the equilibrium wage rate for servers. In the next chapter, this labor market model is used to explain differences in wages resulting from racial discrimination.

Although the supply curve of labor is upward sloping for the electronic components market, this is not the case for an individual firm, such as Computech, shown in Exhibit 4(b). Because a competitive labor market assumes that each firm is too small to influence the wage rate, Computech is a “wage taker” and therefore pays the market-determined wage rate of \$210 per day regardless of the quantity of labor it employs. For this reason, the labor supply to Computech is represented by a horizontal line at the equilibrium wage rate. Given this wage rate of \$210 per day, Computech then hires labor up to the equilibrium point, E , where the wage rate equals the third worker's marginal revenue product.

LABOR UNIONS: EMPLOYEE POWER

The perfectly competitive model does not apply to workers who belong to unions. Unions arose because workers recognized that acting together gave them more bargaining power than acting individually and being at the mercy of their employers. Some of the biggest unions are the Teamsters, United Auto Workers, National Education Association, and American Federation of Government Employees. Two primary objectives of unions are to improve working conditions and raise the wages of union members above the level that would exist in a competitive labor market. To raise wages, unions use three basic strategies: (1) increase the demand for labor, (2) decrease the supply of labor, and (3) exert power to force employers to pay a wage rate above the equilibrium wage rate.

Unions Increase the Demand for Labor

Now suppose the workers form a union. One way to increase wages is to use a method called *featherbedding*. This means the union forces firms to hire more workers than are required or to impose work rules that reduce output per worker. For example, contract provisions may prohibit any workers but carpenters from doing even the simplest carpentry work. Another approach is to boost domestic demand for labor by decreasing competition from other nations. For example, the union might lobby Congress to protect the U.S. electronic parts industry against competition from China. Another approach might be to advertise and try to convince the public to “Look for the Union Label.” Effective advertising would boost the demand for electronic products with union-made components and, in turn, the demand for union labor because it is *derived demand*.

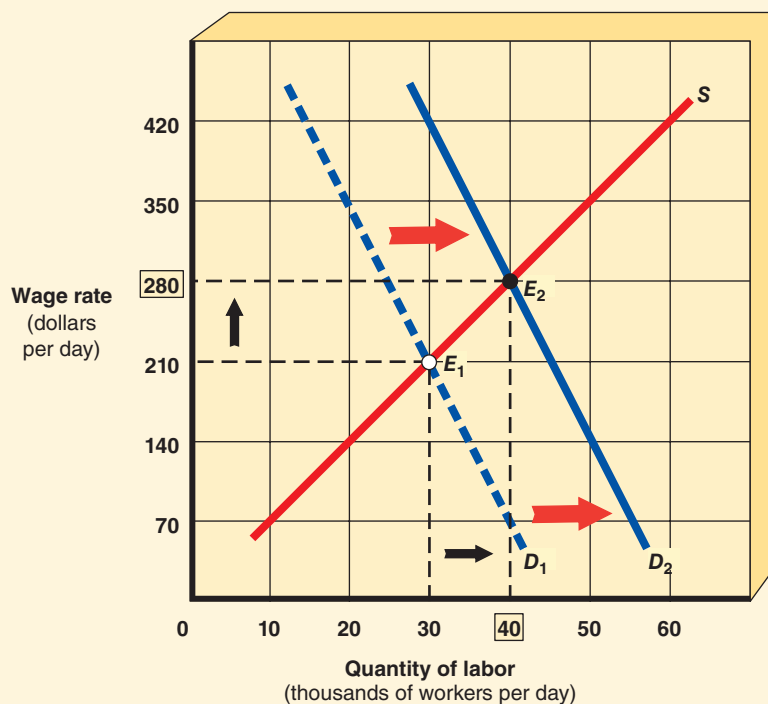
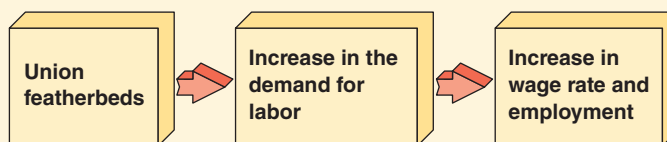
Exhibit 5 shows how union power can be used to increase the demand curve for labor. This exhibit reproduces the labor market for electronic components workers from Exhibit 4(a). Begin at equilibrium point E_1 , with the wage rate of \$210 per day paid to each of 30,000 workers. Then the union causes the demand curve for labor to increase from D_1 to D_2 . At the new equilibrium point, E_2 , firms hire an additional 10,000 workers and pay each worker an extra \$70 per day.

Unions Decrease the Supply of Labor

Exhibit 6 shows another way unions can use their power to increase the wage rate of their members by restricting the supply of labor. Now suppose the labor market is in equilibrium at point E_1 , with 40,000 workers making electronic units and earning \$210 per day. Then the union uses its power to shift the supply curve of labor leftward from S_1 to S_2 by, say, requiring a longer apprenticeship, charging higher fees, or using some other device designed to reduce union membership. For example, the union might lobby for legislation to reduce immigration or to shorten working hours. As a result of these union actions, the equilibrium wage rate rises to \$280 per day at point E_2 , and employment is artificially reduced to 30,000 workers. It should be noted that self-serving practices of unions to limit the labor supply and raise wages can be disguised as standards of professionalism, such as those required by the American Medical Association and the American Bar Association, teacher certification requirements, Ph.D. requirements for university faculty, and so on.

*Exhibit 5***A Union Causes an Increase in the Demand Curve for Labor**

A union shifts the demand curve for labor rightward from D_1 to D_2 by feather-bedding or other devices. As a result, the equilibrium wage rate increases from \$210 per day at point E_1 to \$280 per day at point E_2 , and employment rises from 30,000 to 40,000 workers.

**CAUSATION CHAIN****Collective bargaining**

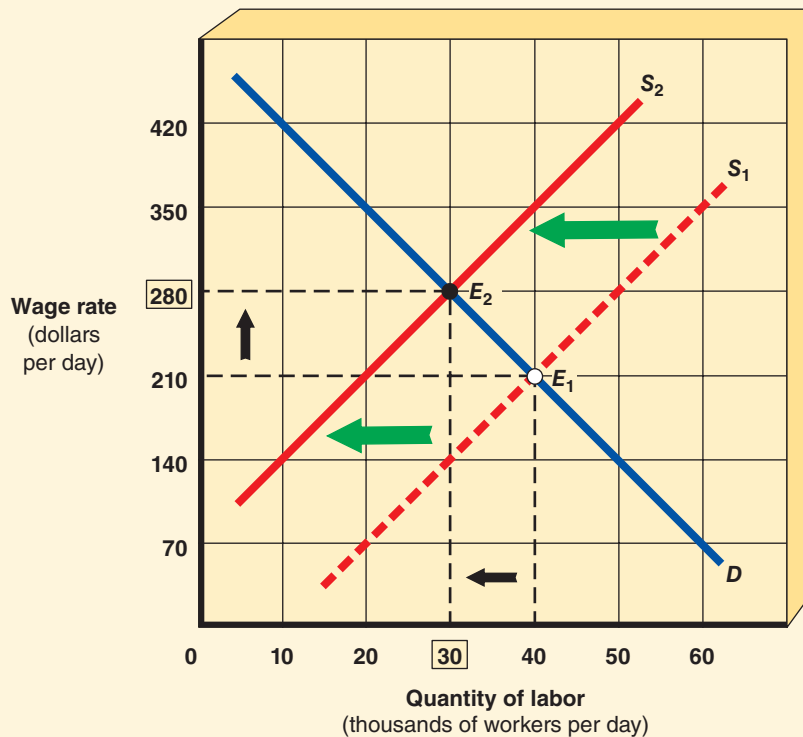
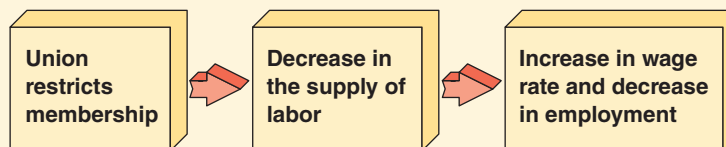
The process of negotiating labor contracts between the union and management concerning wages and working conditions.

Unions Use Collective Bargaining to Boost Wages

A third way to raise the wage rate above the equilibrium level is to use **collective bargaining**. Collective bargaining is the process of negotiating labor contracts between the union and management concerning wages and working conditions. By law, once a union has been certified as the representative of a majority of the workers, employers must deal with the union. If employers deny union demands, the union can strike and reduce profits until the firms agree to a higher wage rate.

*Exhibit 6***A Union Causes a Decrease in the Supply Curve of Labor**

A union shifts the supply curve of labor leftward from S_1 to S_2 by restricting union membership or by using other techniques. As a result, the equilibrium wage rate rises from \$210 per day at point E_1 to \$280 per day at point E_2 , and the number of workers hired falls from 40,000 to 30,000.

**CAUSATION CHAIN**

The result of collective bargaining is shown in Exhibit 7. Again, we return to the situation depicted for the electronic components market in Exhibit 4(a). At the equilibrium wage rate of \$210 per day (point E), there is no surplus or shortage of workers. Then the industry is unionized, and a collective bargaining agreement takes effect in which firms agree to pay the union wage rate of \$280 per day. At the higher wage rate, employment falls from 30,000 to 20,000 workers. However, 40,000 workers wish to work for \$280 per day, so there is a surplus of 20,000 unemployed workers in the industry. How might firms react to a situation in which

Exhibit 7

Union Collective Bargaining Causes a Wage Rate Increase

A union exerts its power through collective bargaining. Instead of the competitive wage rate of \$210 at point *E*, firms in the industry avoid a strike by agreeing in a labor contract to \$280 per day. The effect is to artificially create a labor surplus (unemployment) of 20,000 workers at the negotiated wage.

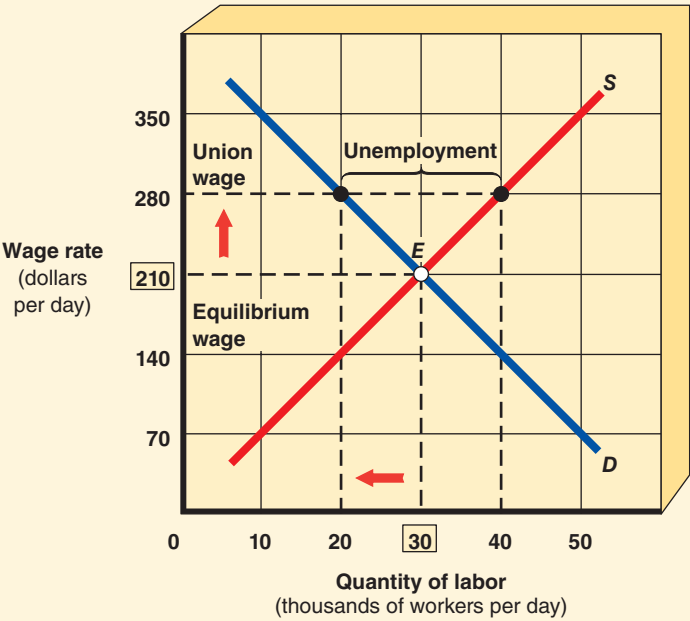


Exhibit 8

Factors Causing Changes in Labor Demand and Labor Supply

Changes in labor demand	Changes in labor supply
1. Unions	1. Unions
2. Prices of substitute inputs	2. Demographic trends
3. Technology	3. Expectations of future income
4. Demand for final products	4. Changes in immigration laws
5. Marginal product of labor	5. Education and training

they hire fewer workers and pay higher wages? Employers might respond by substituting capital for labor or by transferring operations overseas, where labor costs are lower than in the United States.

Finally, several factors can cause either the demand curve for labor or the supply curve of labor to shift. Exhibit 8 provides a list of these factors.

UNION MEMBERSHIP AROUND THE WORLD



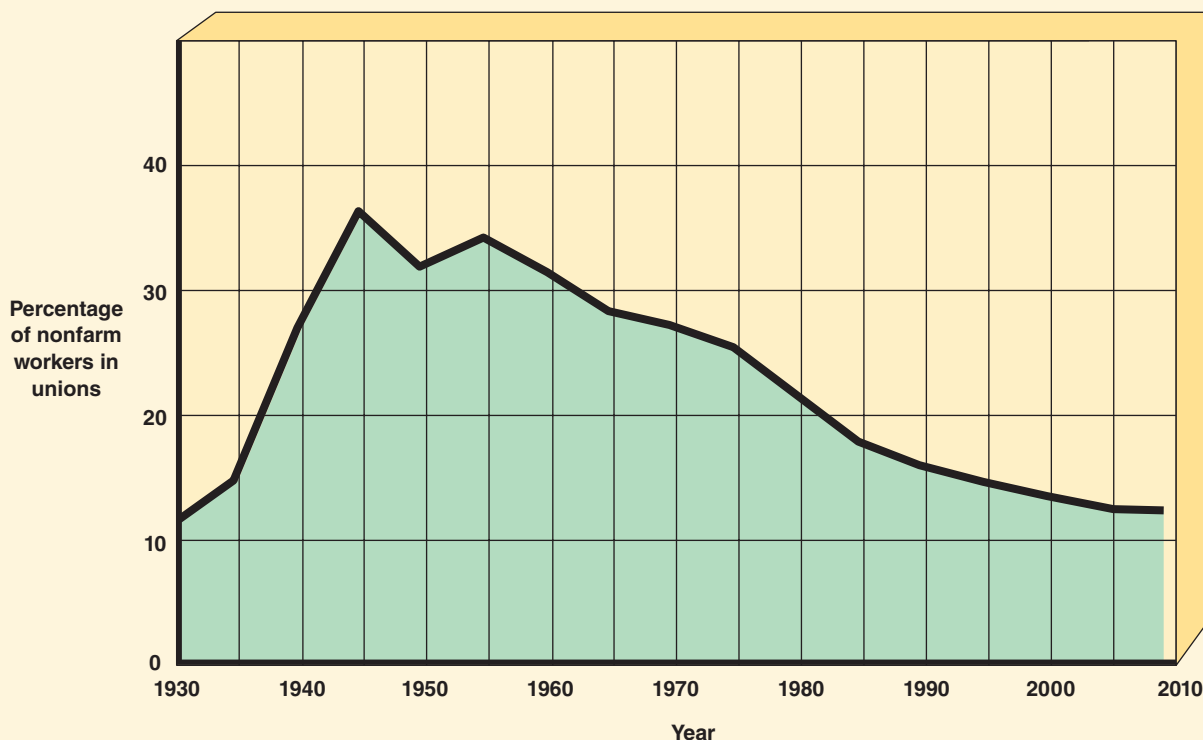
Global
Economics

How important are unions as measured by the percentage of the labor force that belongs to a union? Let's start during the Great Depression, when millions of people were out of work and union membership was relatively low (see Exhibit 9). To boost employment and earnings, President Franklin D. Roosevelt's National Industrial Recovery Act (NIRA) of 1933 established the right of employees to bargain collectively with their employers, but the act was declared unconstitutional by the Supreme Court in 1935. However, the 1935 National Labor Relations Act (NLRA), known as the Wagner Act, incorporated the labor provisions of the NIRA. The Wagner Act guaranteed workers the right to form unions and to engage in collective bargaining. The combined impact of this legislation and the production demands of World War II created a surge in union membership between 1935 and 1945.

Exhibit 9

U.S. Union Membership, 1930–2009

As a percentage of nonfarm workers, union membership in the United States grew most rapidly during the decade 1935–1945. Since its peak in 1945, union membership as a percentage of the labor force has fallen to about the level in 1935.

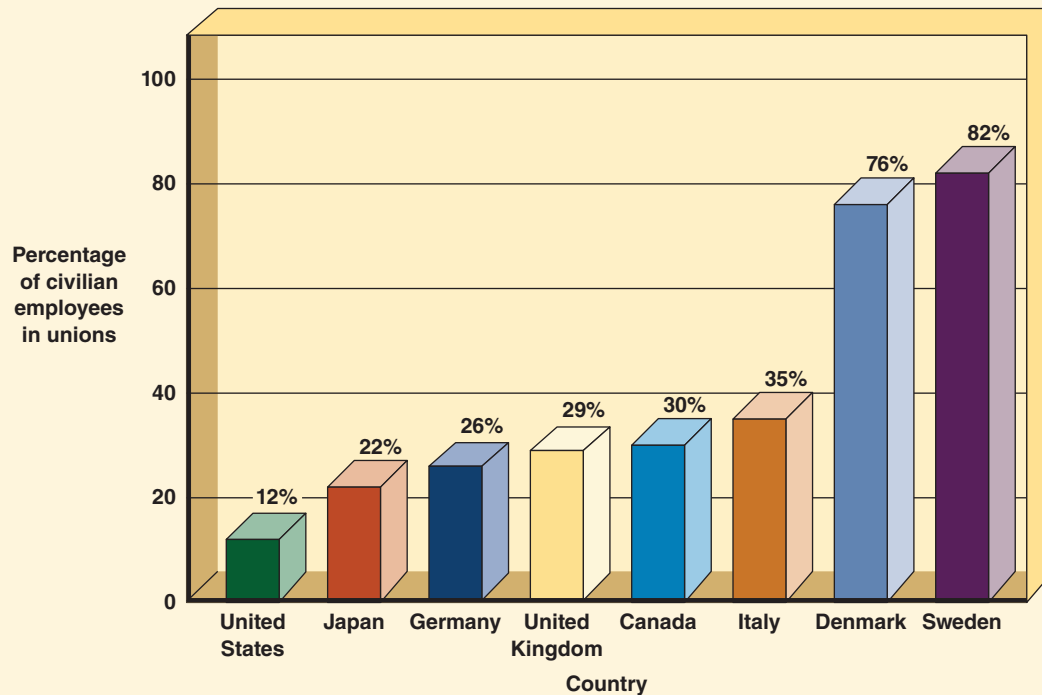


SOURCE: *Statistical Abstract of the United States*, 2010, <http://www.census.gov/compendia/statab/>, Table 648

Exhibit 10

Union Membership for Selected Countries, 2009

Union membership as a percentage of the civilian labor force in Denmark and Sweden is far above that of the United States. The unionization rates of other industrialized countries such as Japan, Canada, Germany, the United Kingdom, and Italy are also higher than the rate in the United States.



SOURCE: NationMaster.com, *Trade Union Membership by Country*, <http://www.nationmaster.com/statistics>

Since World War II, union power has declined. Union membership has fallen from about 35 percent of the labor force in 1945 to 12 percent today. Since 1985, union membership of public sector workers has changed little from 35.7 percent to 35.9 in 2009. On the other hand, union membership for private sector workers has declined significantly from 14.3 percent to 7.5 percent over the same period of time.

Exhibit 10 shows the unionization rates in other countries. While in Sweden and Denmark nearly all workers belong to a union, union membership in the United States is far below that of other industrialized countries.

EMPLOYER POWER

Monopsony

A labor market in which a single firm hires labor.

So far labor markets have been explained with employees possessing varying degrees of power to influence wage rates and employment while employers were competitive with no market power. However, significant power can exist on the employer side of the labor market. The extreme case occurs in a **monopsony**. Monopsony is

a labor market in which a single firm hires labor. For example, a single textile mill, mining company, or housing contractor might be the only buyer of labor in a particular market. The classical phrase for this situation is the “company town,” where for miles around a small town everyone’s livelihood depends on a single employer. The reason for monopsony is the absence of other firms in the area competing for relatively immobile labor because workers must acquire new skills to find work outside the company town market. Even if a firm doesn’t dominate a local labor market, it may have monopsony power over certain types of labor. A hospital, for example, may be the only large employer of nurses in a local market; therefore, it has monopsony power.

Marginal Factor Cost

This chapter began by assuming Computech operated in a competitive labor market in which no single employer in the electronic components market had any direct influence on the market wage rate. Recall from Exhibit 4 that Computech is a wage taker. More precisely, Computech hires the quantity of labor at the prevailing labor market equilibrium wage rate, which is determined by the point where the firm’s downward-sloping *MRP* curve (demand curve for labor) intersects the horizontal supply curve of labor. The equilibrium wage rate is established by a competitive labor market beyond Computech’s power to control.

Now we visit the isolated small town of Plainsville and find General Griffin’s, which is a monopsonist producing turkeys. As shown in Exhibit 11, the supply of labor curve facing the monopsonist is upward sloping rather than horizontal. The reason is that General Griffin’s is the only firm hiring workers in Plainsville, so it faces the industry, or entire supply curve of labor in the Plainsville labor market. This situation compares to that of the monopolist, which faces the industry demand curve for a particular product. As a result, the monopolist in a product market cannot sell an additional unit of a good without lowering the price, and the marginal revenue curve falls below the demand curve. For the monopsonist, a distinction exists between the supply curve of labor and the **marginal factor cost (MFC)** curve. Marginal factor cost is the additional total cost resulting from a one-unit increase in the quantity of a factor. Note that the *MFC* curve starts above the bottom of the supply curve of labor and then rises above it. The *MFC* points are plotted at the midpoints because the change in total wage cost occurs between each additional unit of labor. Having made this observation, relax and take a deep breath; then we will proceed to the nuts and bolts of monopsonist theory.

If General Griffin’s pays \$3 per hour at point *A* on the upward-sloping supply curve of labor in Plainsville, only one worker will be willing to be hired. If the monopsonist wants to hire more labor, it must offer higher wages. If the firm raises its wage offer to \$6 per hour for each worker (point *B*), the quantity of labor supplied increases to two workers per hour. In the exhibit, the total wage cost per hour in column 3 is computed by multiplying the wage rate per hour in column 1 times the number of workers per hour in column 2. At point *A*, the total wage cost per hour is \$3, which equals the wage rate. At point *B*, the total wage cost per hour rises to \$12, and *MFC* is greater than the wage rate of \$6 per hour. The explanation is that all workers are assumed to perform the same job. Consequently, the first worker will demand to be paid the same wage rate as the second worker hired at the higher wage rate. Stated differently, General Griffin’s must pay a higher wage not only to

Marginal factor cost (MFC)

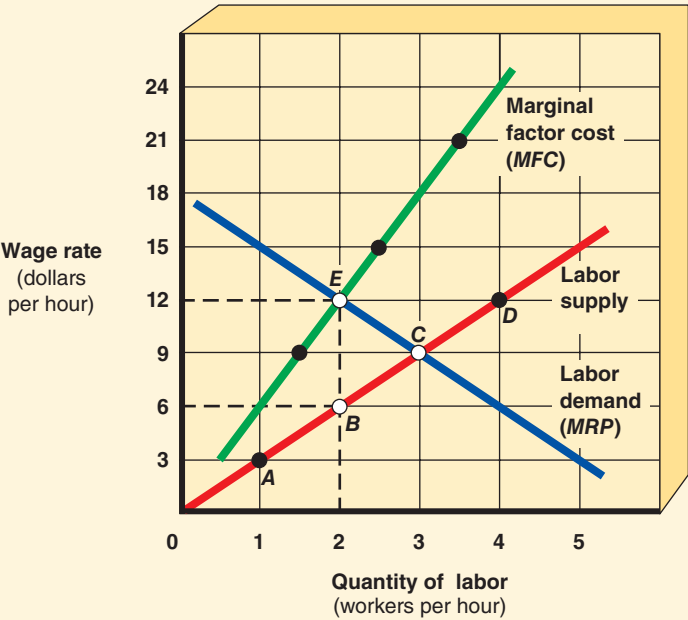
The additional total cost resulting from a one-unit increase in the quantity of a factor.

Exhibit 11

A Monopsonist Determines Its Wage Rate

The monopsonist, General Griffin’s, faces the industry upward-sloping supply curve of labor in the small town of Plainsville. As the wage rate rises, all workers must be paid the same higher wage. As a result, the change in total wage cost (marginal factor cost in column 4) exceeds the wage paid to the last worker (column 1). The *MFC* curve therefore lies above the supply curve of labor.

The demand curve for labor is the marginal revenue product (*MRP*), or the worth to the monopsonist of each worker it hires. The intersection of the *MFC* and *MRP* curves at point *E* determines that General Griffin’s hires two workers per hour. Because this firm has a monopsony in the Plainsville labor market, it can pay \$6 per hour at point *B* on the supply curve of labor, which is enough to attract two workers. However, the worker is exploited because the *MRP* at point *E* for the second worker is \$12 per hour and the wage rate is only \$6. In a competitive labor market, the equilibrium would be at point *C*, and General Griffin’s would pay a higher wage and employ more workers.



	(1)	(2)	(3)	(4)
	Wage Rate (per hour)	Labor Input (workers per hour)	Total Wage Cost (per hour) [(1) × (2)]	Marginal Factor Cost (MFC) [Δ(3)/Δ(2)]
Points				
	\$ 0	0	\$ 0	
A	3	1	3	\$ 3
B	6	2	12	9
C	9	3	27	15
D	12	4	48	21

each additional worker but also to all previously hired workers. If General Griffin's attempts to pay different wage rates for the same job, worker morale will deteriorate, causing labor unrest. Comparing points *A* through *D* confirms that *MFC* is greater than the wage rate for a monopsonist, much like the monopolist's price, which is greater than the marginal revenue.

CONCLUSION *Because the monopsonist can hire additional workers only by raising the wage rate for all workers, the marginal factor cost exceeds the wage rate.*

Monopsonistic Equilibrium

How many workers will General Griffin's hire? To answer this question, the demand curve for labor that traces labor's marginal revenue product (*MRP*), explained earlier in this chapter is required. Recall that *MRP* reflects the value or contribution of each additional worker because *MRP* is the increase in total revenue produced by hiring each additional worker. Also, as explained in Chapter 8, the profit-maximizing producer selects the level of output where marginal revenue equals marginal cost. *Similarly, the monopsonist in the labor market hires the quantity of labor at which the marginal revenue product of labor equals its marginal factor cost.*

In Exhibit 11, General Griffin's will follow the $MRP = MFC$ rule by hiring workers, determined by the intersection of the *MRP* and *MFC* curves at point *E*. But pay special attention to this point: The monopsonist is a "wage maker." It has labor market power and does not have to pay \$12 per hour, which equals the contribution of the second worker measured by his or her *MRP*. Instead of paying workers what their services are worth, the monopsonist follows the supply curve of labor, selects point *B*, and pays \$6 per hour rather than \$12 per hour. Since \$6 per hour is all the firm must pay to attract and hire two workers, the monopsonist can exploit labor by paying less than its marginal revenue product.

One alternative for labor facing a powerful employer is to organize a powerful union and engage in collective bargaining. Totally successful collective bargaining by a labor union could raise the wage rate from \$6 per hour at point *B* to \$12 per hour at point *E*. General Griffin's will resist the union's demands and offer a lower wage closer to point *B*. Thus, points *B* and *E* represent the boundaries of a potential final settlement. What the negotiated final equilibrium wage rate will be, depends on the tactics and resources of the negotiating parties.

Finally, suppose the monopsony is broken up into a large number of small firms. Recall from earlier in this chapter that in competitive labor markets additional workers are hired to the point where the wage rate is equal to the *MRP*. In this case, the supply curve of labor intersects the *MRP* (demand) curve at point *C*, and more workers would be hired with \$9 per hour paid to each worker.

CONCLUSION *A monopsonist hires fewer workers and pays a lower wage than a firm in a competitive labor market.*

You're The Economist Should College Athletes Be Paid?

Applicable Concept: monopsony



It was perfect football weather on a beautiful autumn Saturday at Nebraska State's stadium.

There was a hush in the crowd of 80,000 as the clock showed 5 seconds left in the game and the scoreboard read Home 26, Visitor 30. The Screaming Eagles were playing the Fighting Irish, and the season was on the line. With time running out, the Eagles' All-American quarterback, Joe Wyoming, launched a desperation pass from his 45-yard line. The pass hit the extended fingers of a wide receiver who leaped over three defenders at the Irish 25-yard line and then ran into the end zone all alone. The home crowd roared with joy after staring defeat in the face.

So the season had been in the hands of Joe Wyoming, who received a full scholarship, which cost the university more than \$40,000 over four years. Because Joe led the Eagles to victory over Notre Dame, the team played in the Sugar Bowl, which paid Nebraska State \$5 million for the appearance. In addition, the next year's ticket sales, alumni contributions, and trademark licensing boosted revenues \$10 million, while applications for admission to the university increased sharply.

Economist John Leonard argued that college athletes are clearly underpaid because players cannot be paid salaries under National Collegiate Athletic Association (NCAA) rules. His study estimated



© Image copyright Susan Law Cain, 2009. Used under license from Shutterstock.com

that a star college football player who is named to an All-American team generates a marginal revenue product of \$100,000 per year for the university. Yet that athlete is paid only a \$10,000 scholarship per year.

In Chapter 10, a cartel was explained as a group of firms that use a collusive agreement to act as a monopoly. NCAA regulations serve as a collusive agreement among colleges and universities to act as a monopsony and hire the services of college-bound athletes. Just like an output or sellers' cartel, such as the Organization of Petroleum Exporting Countries (OPEC), the NCAA must enforce the rules against cheaters.

Because this agreement holds players' wages far below their marginal revenue product, the gap creates an incentive for schools to offer "illegal" inducements of

cars, money, clothes, and trips to attract good players. Such cheating benefits the college athletes whose wages are raised closer to their marginal revenue products. A school that is not caught benefits by recruiting better players, achieving athletic success, and receiving greater sports revenue. Schools that follow the rules must depend on the NCAA to punish cheaters by taking away TV appearances, tournament play, bowl invitations, and scholarships.

ANALYZE THE ISSUE

Do you favor paying college athletes salaries determined by a competitive labor market rather than by an NCAA agreement? Explain.

CHECKPOINTS

Can The Minimum Wage Create Jobs?

In Chapter 4, Exhibit 5 explained that the effect of the minimum wage in a competitive labor market is to decrease the number of unskilled workers employed. Assume the minimum wage is \$9, and consider the effect on the monopsonist represented in Exhibit 11. This means by law the monopsonist cannot hire a worker for a lower wage. In the case of monopsony, contrary to the case of perfect competition, can the minimum wage increase the number of persons working? Explain your answer using Exhibit 11.

If You Don't Like It, Mickey, Take Your Bat And Go Home

Mickey Mantle described his salary negotiations with the Yankees in his autobiography *The Mick*. After winning baseball's Triple Crown in 1955, his salary increased from about \$85,000 to \$100,000. The next season, he raised his batting average even higher, and the Yankee team owner offered him a pay cut. What is the most likely explanation for the owner's behavior—an increase in the supply of star baseball players, owner monopsony power, or the owner's desire that Mantle find another team?



Key Concepts

Marginal revenue product (*MRP*)
Demand curve for labor
Derived demand

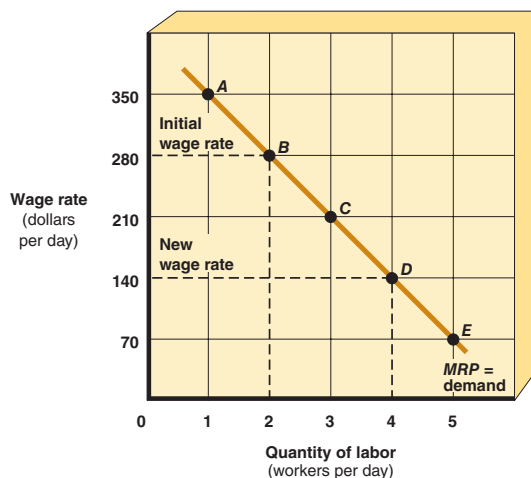
Supply curve of labor
Human capital
Collective bargaining

Monopsony
Marginal factor cost (*MFC*)

Summary

- **Marginal revenue product (*MRP*)** is determined by a worker's contribution to a firm's total revenue. Algebraically, the marginal revenue product equals the price of the product times the worker's marginal product: $MRP = P \times MP$.
- The **demand curve for labor** shows the quantities of labor a firm is willing to hire at different prices of labor. The marginal revenue product (*MRP*) of labor curve is the firm's demand curve for labor. Summing individual demand for labor curves gives the market demand curve for labor.

Demand Curve for Labor

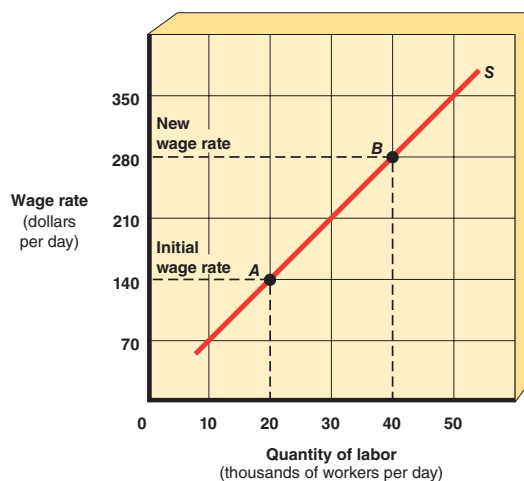


- **Derived demand** means that a firm demands labor because labor is productive. Changes in consumer demand for a product cause

changes in the demand for labor and for other resources used to make the product.

- The **supply curve of labor** shows the quantities of workers willing to work at different prices of labor. The market supply curve of labor is derived by adding the individual supply curves of labor.

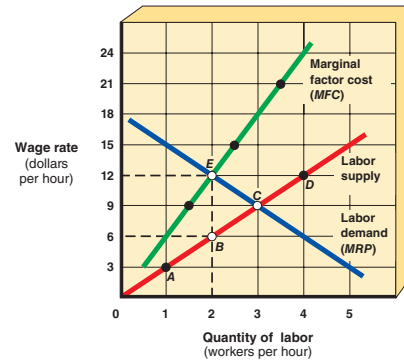
Supply Curve of Labor



- **Human capital** is the accumulated investment people make in education, training, experience, and health in order to make themselves more productive. One explanation for earnings differences is differences in human capital.
- **Collective bargaining** is the process through which a union and management negotiate a labor contract.
- **Monopsony** is a labor market in which a single firm hires labor. Because the monopsonist faces

the industry supply curve of labor and each worker is paid the same wage, changes in total wage cost exceed the wage rate necessary to hire each additional worker. As a result, the **marginal factor cost (MFC)** of labor curve, which measures changes in total wage cost per worker, lies above the supply curve of labor. The monopsonist's wage rate and quantity of labor are determined where the *MFC* equals *MRP*. Since at this point the worker's *MRP* is greater than the wage paid, the monopsonist exploits workers.

Monopsony



Summary of Conclusion Statements

- A perfectly competitive firm's marginal revenue product is equal to the marginal product of its labor times the price of its product. Expressed as a formula: $MRP = P \times MP$.
- A firm hires additional workers up to the point where the *MRP* equals the wage rate.
- Because the monopsonist can hire additional workers only by raising the wage rate for all workers, the marginal factor cost exceeds the wage rate.
- A monopsonist hires fewer workers and pays a lower wage than a firm in a competitive labor market.

Study Questions and Problems

1. Consider this statement: "Workers demand jobs and employers supply jobs." Do you agree or disagree? Explain.
2. The Zippy Paper Company has no control over either the price of paper or the wage it pays its workers. The following table shows the relationship between the number of workers Zippy hires and total output:

Labor input (workers per day)	Total output (boxes of paper per day)
0	0
1	15
2	27
3	36
4	43
5	48
6	51

If the selling price is \$10 per box, answer the following questions:

- a. What is the marginal revenue product (*MRP*) of each worker?
 - b. How many workers will Zippy hire if the wage rate is \$100 per day?
 - c. How many workers will Zippy hire if the wage rate is \$75 per day?
 - d. Assume the wage rate is \$75 per day and the price of a box of paper is \$20. How many workers will Zippy hire?
3. Assume the Grand Slam Baseball Store sells \$100 worth of baseball cards each day, with 1 employee operating the store. The owner decides to hire a second worker, and the 2 workers together sell \$150 worth of baseball cards. What is the second worker's marginal revenue product (*MRP*)? If the price per

card sold is \$5, what is the second worker’s marginal product (*MP*)?

- 4. What is the relationship between the marginal revenue product (*MRP*) and the demand curve for labor?
- 5. The market supply curve of labor is upward sloping, but the supply curve of labor for a single firm is horizontal. Explain why.
- 6. Assume the labor market for loggers is perfectly competitive. How would each of the following events influence the wage rate loggers are paid?
 - a. Consumers boycott products made with wood.
 - b. Loggers form a union that requires longer apprenticeships, charges high fees, and uses other devices designed to reduce union membership.
- 7. How does a human capital investment in education increase your lifetime earnings?
- 8. Suppose states pass laws requiring public school teachers to have a master’s degree in order to retain their teaching certificates. What effect would this legislation have on the labor market for teachers?
- 9. Use the data in question 2, and assume the equilibrium wage rate is \$90 per day, determined in a perfectly competitive labor market. Now explain the impact of a union-negotiated

collective bargaining agreement that changes the wage rate to \$100 per day.

- 10. Some economists argue that the American Medical Association and the American Bar Association create an effect on labor markets similar to that of a labor union. Do you agree?
- 11. NFL draft and employment rules create monopsony power for each member club. Assume the Jaguars are in the process of hiring players. Using the following hypothetical table of data, construct a graph to determine the number of quarterbacks the Jaguars hired and the salary paid to each quarterback. Assuming the labor market was competitive, what would be the number of quarterbacks hired and the salary paid to each?

(1)	(2)	(3)	(4)	(5)
Salary (thousands of dollars)	Number of quarterbacks	Total cost of quarterbacks (thousands of dollars)	Marginal factor cost (<i>MFC</i>) (thousands of dollars)	Marginal revenue product (<i>MRP</i>) (thousands of dollars)
\$ 0	0	\$ 0	–	–
100	1	100	\$100	\$700
200	2	400	300	600
300	3	900	500	500
400	4	1,600	700	400
500	5	2,500	900	300

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Can the Minimum Wage Create Jobs?

The minimum wage of \$9 corresponds to point C in Exhibit 11. At this point, the labor supply and labor demand (*MRP*) curves intersect. Thus, the effect of the minimum wage is to force the monopolist to operate at the equilibrium that

would be established in a competitive labor market. If you said that under monopsony the minimum wage could raise the wage rate and create additional employment, **YOU ARE CORRECT.**



If You Don't Like It, Mickey, Take Your Bat and Go Home

Baseball players had no free-agent rights in the 1950s. If Mantle did not like the salary offer, his only choice was to go back to his home in Oklahoma. Faced with that alternative, he accepted the salary cut. If you

said each team owner achieved monopsony power by prohibiting players from going to another team, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

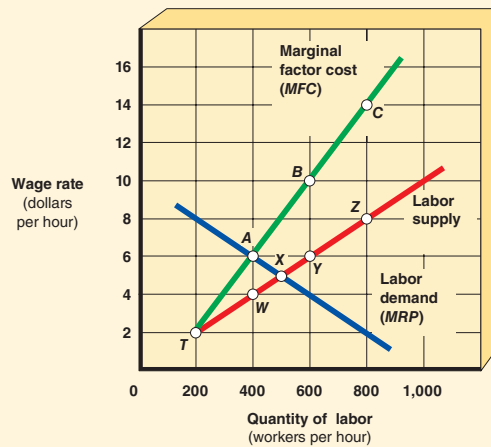
- Marginal revenue product measures the increase in
 - output resulting from one more unit of labor.
 - total revenue resulting from one more unit of output.
 - revenue per unit from one more unit of output.
 - total revenue resulting from one more unit of labor.
- Troll Corporation sells dolls for \$10 each in a market that is perfectly competitive. Increasing the number of workers from 100 to 101 would cause the output to rise from 500 to 510 dolls per day. Troll should hire the 101st worker only when the wage is
 - \$100 or less per day.
 - more than \$100 per day.
 - \$5.10 or less per day.
 - none of the above.
- Derived demand for labor depends on the
 - cost of factors of production used in the product.
 - market supply curve of labor.
 - consumer demand for the final goods produced by labor.
 - firm's total revenue less economic profit.
- If demand for a product falls, the demand curve for labor used to produce the product will
 - shift leftward.
 - shift rightward.
 - shift upward.
 - remain unchanged.
- The owner of a restaurant will hire servers if the
 - additional labor's pay is close to the minimum wage.
 - marginal product is at the maximum.
 - additional work of the employees adds more to total revenue than to costs.
 - waiters do not belong to a union.
- In a perfectly competitive market, the demand curve for labor
 - slopes upward.
 - slopes downward because of diminishing marginal productivity.
 - is perfectly elastic at the equilibrium wage rate.
 - is described by all of the above.
- A union can influence the equilibrium wage rate by
 - featherbedding.
 - requiring longer apprenticeships.
 - favoring trade restrictions on foreign products.
 - all of the above.
 - none of the above.
- In which of the following market structures is the firm *not* a price taker in the factor market?
 - Oligopoly
 - Monopsony
 - Monopoly
 - Perfect competition
- The extra cost of obtaining each additional unit of a factor of production is called the marginal
 - physical product.
 - revenue product.

Practice Quiz Continued

- c. factor cost.
d. implicit cost.
10. A monopsonist's marginal factor cost (*MFC*) curve lies above its supply curve because the firm must
- increase the price of its product to sell more.
 - lower the price of its product to sell more.
 - increase the wage rate to hire more labor.
 - lower the wage rate to hire more labor.
11. To maximize profits, a monopsonist will hire the quantity of labor to the point where the marginal factor cost is equal to
- marginal physical product.
 - marginal revenue product.
 - total revenue product.
 - any of the above.
12. BigBiz, a local monopsonist, currently hires 50 workers and pays them \$6 per hour. To attract an additional worker to its labor force, BigBiz would have to raise the wage rate to \$6.25 per hour. What is BigBiz's marginal factor cost?
- \$6.25 per hour
 - \$12.50 per hour
 - \$18.75 per hour
 - \$20.00 per hour
13. Suppose a firm can hire 100 workers at \$8.00 per hour, but must pay \$8.05 per hour to hire 101 workers. Marginal factor cost (*MFC*) for the 101st worker is approximately equal to
- \$8.00.
 - \$8.05.
 - \$13.05.
 - \$13.00.
14. A monopsonist in equilibrium has a marginal revenue product of \$10 per worker hour. Its equilibrium wage rate must be
- less than \$10.
 - equal to \$10.
 - greater than \$10.
 - equal to \$5.
15. If the labor market shown in Exhibit 12 is a monopsony, the wage rate and number of workers employed will be determined at point
- A.
 - W.
 - C.
 - Y.
 - Z.

Exhibit 12

A Labor Market



Road Map

Market Structures

This road map feature helps you tie material in the part together as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The key concept in each question is given for emphasis and each question or set of questions concludes with an interactive game to reinforce the concepts. Click on the Tucker Web site at academic.cengage.com/economics/tucker, select the chapter, and play the visual causation chain game designed to make learning fun. Enjoy the cheers when correct and suffer the jeers if you miss. The correct answers to the multiple-choice questions are given in Appendix C of the text.

part 3

Chapter 8. Perfect Competition

1. Key Concept: Short-Run Shutdown Point

Suppose product price is fixed at \$24, $MR = MC$ at $Q = 200$, $AFC = \$6$, $AVC = \$25$. What do you advise this firm to do?

- Increase output.
- Decrease output.
- Shut down operations.
- Stay at the current output; the firm is earning a profit of \$1,400.
- Stay at the current output; the firm is losing \$1,400.



Causation Chain Game

The Short-Run Shutdown Point—Exhibit 6

2. Key Concept: Long-Run Equilibrium

Consider a firm operating with the following: price = 10, $MR = 10$, $MC = 10$, $ATC = 10$. This firm is

- making an economic profit of 10.
- an example of monopolistic competition.
- going to go out of business in the long run.
- a monopolist for a product with a relatively inelastic demand.
- perfectly competitive in long-run equilibrium.



Causation Chain Game

Long-Run Perfectly Competitive Equilibrium—Exhibit 10

3. Key Concept: Constant-Cost Industry

Assume the short-run average total cost for a perfectly competitive industry remains constant as the output of the industry expands. In the long run, the industry supply curve will

- have a positive slope.
- have a negative slope.

- c. be perfectly horizontal.
- d. be perfectly vertical.



Causation Chain Game

Long-Run Supply in a Constant-Cost Industry—Exhibit 11

4. Key Concept: Decreasing-Cost Industry

Assume the short-run average total cost for a perfectly competitive industry decreases as the output of the industry expands. In the long run, the industry supply curve will

- a. have a positive slope.
- b. have a negative slope.
- c. be perfectly horizontal.
- d. be perfectly vertical.



Causation Chain Game

Long-Run Supply in Decreasing-Cost Industry—Exhibit 12

5. Key Concept: Increasing-Cost Industry

Suppose that, in the long run, the price of feature films rises as the movie production industry expands. We can conclude that movie production is a (an)

- a. increasing-cost industry.
- b. constant-cost industry.
- c. decreasing-cost industry.
- d. marginal-cost industry.



Causation Chain Game

Long-Run Supply in an Increasing-Cost Industry—Exhibit 13

Chapter 9. Monopoly

6. Key Concept: Profit Maximization

Assume a monopolist's marginal cost and marginal revenue curves intersect and the demand curve passes above its average total cost curve. The firm will

- a. make an economic profit.
- b. stay in operation in the short run, but shut down in the long run.
- c. shut down in the short run.
- d. lower the price.

7. Key Concept: Loss Minimization

Assume a monopolist's marginal cost and marginal revenue curves intersect and the demand curve passes above its average total cost curve. The firm will

- a. make an economic profit.
- b. stay in operation in the short run, but shut down in the long run.
- c. shut down in the short run.
- d. lower the price.



Causation Chain Game

Profit Maximization and Loss Minimization—Exhibits 4–5

Chapter 10. Monopolistic Competition and Oligopoly

8. Key Concept: Long-Run Monopolistic Competition

In the long run, the economic profits of Hoot's Chicken 'n' Ribs, a monopolistic competitor, are

- a. not eliminated, because competition is not perfect.
- b. not eliminated, because the demand curve slopes downward.
- c. eliminated due to firms entering the industry.
- d. eliminated due to firms leaving the industry.
- e. not eliminated, because firms cannot enter the industry.



Causation Chain Game

A Monopolistically Competitive Firm in the Long Run—Exhibit 3

Chapter 11. Labor Markets

9. Key Concept: Market Supply Curve of Labor

Which of the following statements concerning the supply of labor is *true*?

- a. The supply of labor is determined by the prevailing wage rate.
- b. The labor supply curve is downward sloping.
- c. The wage rate has no effect on the supply of labor.
- d. None of the above.



Causation Chain Game

The Market Supply Curve of Labor—Exhibit 3

10. Key Concept: Increase in Demand for Labor

Featherbedding allows unions to increase wages by

- a. limiting the supply of labor.
- b. increasing firms' demand for labor.
- c. forcing firms to accept higher-than-equilibrium wages.
- d. reducing labor share of payroll taxes.



Causation Chain Game

A Union Causes An Increase in the Demand Curve for Labor—Exhibit 5

11. Key Concept: Decrease in Supply of Labor

Which of the following statements is *true*?

- a. Derived demand for labor depends on the demand for the product labor produces.
- b. Unions can either increase demand or decrease the supply of labor.
- c. Investment in human capital is expected to increase the demand for those workers.
- d. All of the above.



Causation Chain Game

A Union Causes a Decrease in the Supply Curve of Labor—Exhibit 6

Microeconomic Policy Issues



© Getty Images

These three chapters apply micro principles learned in previous chapters to explore policy issues concerning some important economic topics. The first chapter in this part extends the theory of labor market into an examination of actual data on income and poverty. The second chapter mixes politics and economic theory to discuss such interesting topics as the Microsoft case and the deregulation of energy. The third chapter takes a closer look at ways to deal with externalities, such as pollution permits, which are actually traded on the Chicago Board of Trade.



Income Distribution, Poverty, and Discrimination

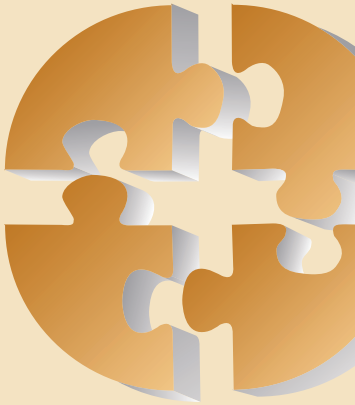
The previous chapter examined how variations in wages are determined in competitive and monopsonistic labor markets. These labor supply and demand models do not give the complete picture of labor markets. In this chapter, we turn our attention to the distribution of income, poverty, and discrimination, which are important topics related to labor market wage decisions. The chapter begins by exploring the controversial issue of how the total family income “pie” is cut into various size “slices” or shares for different groups of families. You will examine government data that indicate the trend over the years in the share of income for the richest fifth of the population and the poorest fifth. Here the hotly contested issue of whether the “rich got richer” at the expense of the poor is addressed. In addition, the inequality of income in the United States is compared to that of other countries.

Poverty is an unhappy consequence of an unequal income distribution. Eighteenth-century English poet and essayist Samuel Johnson stated, “A decent provision for the poor is the true test of civilization.” One purpose of this chapter is to define poverty and who are the poor. Another objective is to discuss government programs that aid the poor and provide criticisms of these programs. A special feature concerns the important issue of Social Security: past, present, and future.

The chapter concludes with the subject of discrimination, which is one possible explanation for unequal income distribution and poverty. Here, you will apply the supply and demand model to explain why women earn less on average than men and African-Americans earn less than whites.

In this chapter, you will learn to solve these economics puzzles:

- Could the rich become richer and other income groups also become better off?
- How can a negative income tax solve the welfare controversy?
- Is pay for females fair?



THE DISTRIBUTION OF INCOME

One function of labor markets is to determine the *distribution of income*—that is, how wages and salaries are divided among members of society. Recall from Chapter 2 that the *For Whom* question is one of the three basic questions that any economic system must answer. Here we study the *For Whom* question in more detail.

Trends in Income Distribution

One way to analyze the distribution of income in the United States is illustrated in Exhibit 1. In column 1 of this exhibit, families are divided into six groups according to the percentage of the total annual money income they received. The remaining columns of the table give the percentages of the total money income for each of the six groups in selected years since 1929. These data reveal changes in the distribution of income among families over time. For example, families with income in the top 5 percent in 1929 earned about 9 percent more of the total income pie than they did in 2008. Otherwise, the distribution of income has not fluctuated greatly since 1947. Nonetheless, there is concern that since 1970 the percentage of income received by families in the lowest 20 percent group has fallen, while the income percentages received by the families in the highest fifth and the highest 5 percent have risen.

<i>Exhibit 1</i>	The Division of Total Annual Money Income among Families, 1929–2008					
Percentage of families	1929	1947	1970	1980	1990	2008
Highest 5%	30%	17%	16%	15%	17%	21%
Highest fifth	54	43	41	41	44	48
Second-highest fifth	19	23	24	24	24	23
Middle fifth	14	17	18	18	16	15
Second-lowest fifth	9	12	12	12	11	10
Lowest fifth	4	5	5	5	5	4

SOURCE: U.S. Bureau of the Census, Historical Income Tables, <http://www.census.gov/hhes/www/income/income.html>, Table F-2.

As shown in Exhibit 1, there is an unequal distribution of income among families. Why didn't each fifth of the families receive 20 percent of the total income? There are many reasons. For example, Exhibit 2 reveals that families headed by a college graduate fare better than those headed by an individual with less education. Recall from the previous chapter that human capital refers to education and skills that increase a worker's productivity. Workers with a greater investment in human capital are likely to be worth more to an employer. Data in this exhibit also indicate that families headed by a male generally earn more than those headed by a female.

Equality versus Efficiency

Because the data presented in Exhibits 1 and 2 show that an unequal distribution of income exists in the United States, the normative question to be debated concerns the pros and cons of a more equal income distribution. Those who favor greater equality fear the link between the rich and political power. The wealthy may well use their money to influence national policies that benefit the rich. It is also argued that income inequality results in unequal opportunities for various groups. For example, children of the poor have difficulty obtaining a college education. Consequently, their underutilized productive capacity is a waste of human capital. The poor are also unable to afford health care, and this is a national concern.

Advocates of income inequality pose this question. Suppose you had your choice of living in egalitarian society A, where every person earns \$40,000 a year, or society B, where 20 percent earn \$100,000 and 80 percent earn \$30,000. You would likely choose society B because the incentive to earn more and live better is worth the risk of earning less and living worse. After all, why is the average income higher in society B? The answer is that income inequality gives people an incentive to be productive. In contrast, people in society A lack such motivation because everyone earns the same income. Those who favor equality of income believe that critics

Exhibit 2

Median Money Income of Families, 2008

Characteristic	Median income*
All families	\$61,521
Families headed by a male	43,571
Families headed by a female	30,129
Families with head aged 25–34 years	52,845
Families with head aged 65 years and over	44,188
Families headed by person with less than 9th grade education	28,798
Families headed by a high school graduate	49,414
Families headed by a person with at least a bachelor's degree	100,000

* Fifty percent of families earn less than the median income and 50 percent earn more.

SOURCE: U.S. Bureau of the Census, Historical Income Tables, <http://www.census.gov/hhes/www/income/income.html>, Tables F-7, F-11, and F-18.

ignore the nonmonetary incentives, such as pride in one's work and nation, that can motivate people.

A frequently debated topic concerning income inequality is whether the “rich are getting richer.” As we observed earlier, the data in Exhibit 1 reveal that the percentages of total income received by the highest 5 percent and the highest fifth have increased in recent decades, while the percentages received by each of the fifths below the highest decreased slightly.

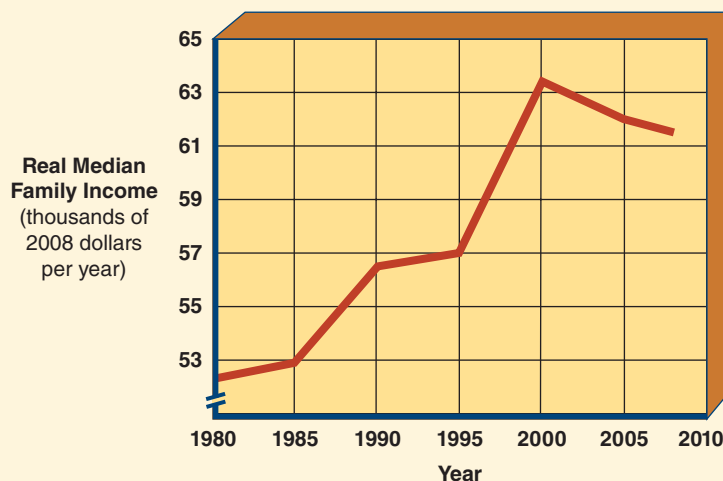
CONCLUSION *Measured by distribution of family money income, the richest families have become a little richer and the rest of the family groups a little poorer in recent decades.*

It is important to note that simply observing changes in income distribution over time does not tell the whole story. Exhibit 3 traces real median family income, adjusted for rising prices, for the period 1980–2009. This measure indicates the trend of the average level of income received by all groups. Generally, the trend for real median income since the 1980s has been upward. This means the size of the income “pie” grew, and therefore, all of the slices grew larger. However, consistent with the distribution data in Exhibit 1, the relative share of the pie for those with

Exhibit 3

Real Median Family Income, 1980–2008

Real median income measures the income adjusted for inflation received by all families in the United States. Fifty percent of families earn less and 50 percent earn more than the median income. The trend of this measure was generally upward until 2000. In 2000, real median income reached a new high before falling during the recessions of 2001 and 2007.



SOURCE: U.S. Bureau of the Census, Historical Income Tables, <http://www.census.gov/hhes/www/income/income.html>, Table F-7.

the biggest slice grew slightly larger. In 2000, real median income reached a new high before falling during the recessions of 2001 and 2007.

Lorenz curve

A graph of the actual cumulative distribution of income compared to a perfectly equal cumulative distribution of income.

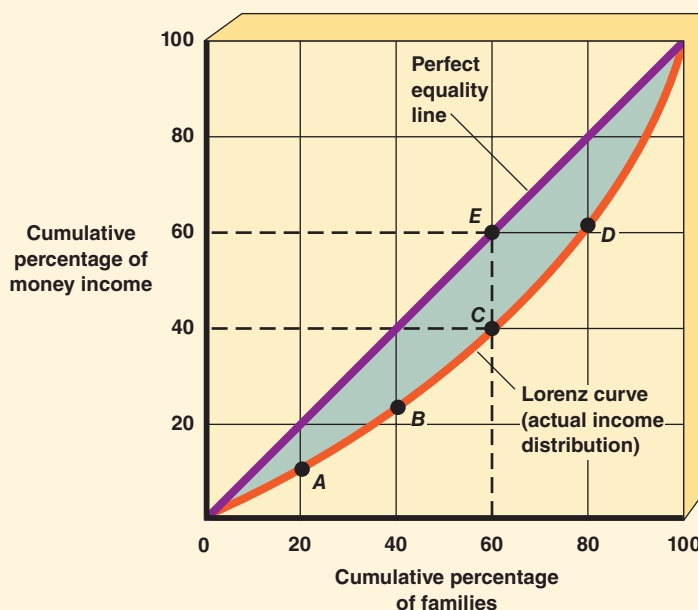
The Lorenz Curve

The distribution of income data presented in Exhibit 1 can be represented by the **Lorenz curve**. The Lorenz curve is a graph of the actual cumulative distribution of income compared to a perfectly equal cumulative distribution of income. This curve is a primary tool for measuring income distribution developed in 1905 by statistician M. O. Lorenz. Look at the hypothetical Lorenz curve in Exhibit 4. The vertical axis measures the *cumulative* percentage of money income, and the horizontal axis measures the *cumulative* percentage of families from poorest

Exhibit 4

A Hypothetical Lorenz Curve

The Lorenz curve shows the cumulative percentage of money income earned from 0 to 100 percent by the cumulative percentage of families, also from 0 to 100 percent. If the income distribution followed the 45-degree perfect equality line, 20 percent of the families earn 20 percent of total money income, 40 percent receive 40 percent of total money income, and so on. The shaded area between the perfect equality line and the Lorenz curve measures the degree of inequality in the distribution of income. The more the Lorenz curve is bowed outward, the more unequal the distribution of income is.



to richest. Starting at the lower left-hand corner on the graph, 0 percent of the families earned 0 percent of the cumulative percentage of money income. At the upper right-hand corner on the graph, 100 percent of the families earned 100 percent of the cumulative percentage of money income. The combination of other total family-total money income points between 0 and 100 percent forms the Lorenz curve.

Reading along the horizontal axis, each fifth (20 percent) of the cumulative percentage of families corresponds to its cumulative share of income earned, measured along the curve. At point *A*, the lowest 20 percent of families receive 10 percent of total or cumulative income. To read this, go from the 20 percent point on the horizontal axis up to point *A* on the Lorenz curve. Then draw a horizontal line to the vertical axis, and read that it intersects this axis at 10 percent. Point *B* is interpreted as the lowest 40 percent of families earning 10 percent plus 15 percent, which equals a cumulative share of 25 percent. Similarly, point *C* is the cumulative share earned by the lowest 60 percent of families, which equals 40 percent. Finally, point *D* is a bit tricky to interpret. At this point, the lowest 80 percent of families receive about 62 percent of total income. And here is the twist. You must interpret that the richest 20 percent of families earn 38 percent of income (100 percent – 62 percent).

We now turn to the 45-degree line above the Lorenz curve that cuts the box in half. This line represents perfect equality: 20 percent of the families receive 20 percent of total income, 40 percent of the families receive 40 percent of total income, and so on. The distance of the Lorenz curve from the perfect equality line is therefore a measure of unequal income distribution. The gap between points *C* and *E*, for example, indicates that 60 percent of families earn 20 percent less of total income than required for perfect equality. Similar measurements generate the shaded area between the Lorenz curve and the perfect equality line. Thus, the shaded area is a measure of the degree of income inequality for our hypothetical data. A larger shaded area would mean greater income inequality, and the shape of the Lorenz curve would become more bowed outward. A smaller shaded area would represent a more equal income distribution, and the Lorenz curve would be a flatter curve.

It is very important to note that there are limitations associated with using money income statistics. Such data are not adjusted for government-provided food stamps, medical care, housing, or other goods and services. Money income also reflects income before taxes and does not measure unreported income or wealth. Still, used carefully, the Lorenz curve is a convenient tool for visualizing the degree of income inequality.

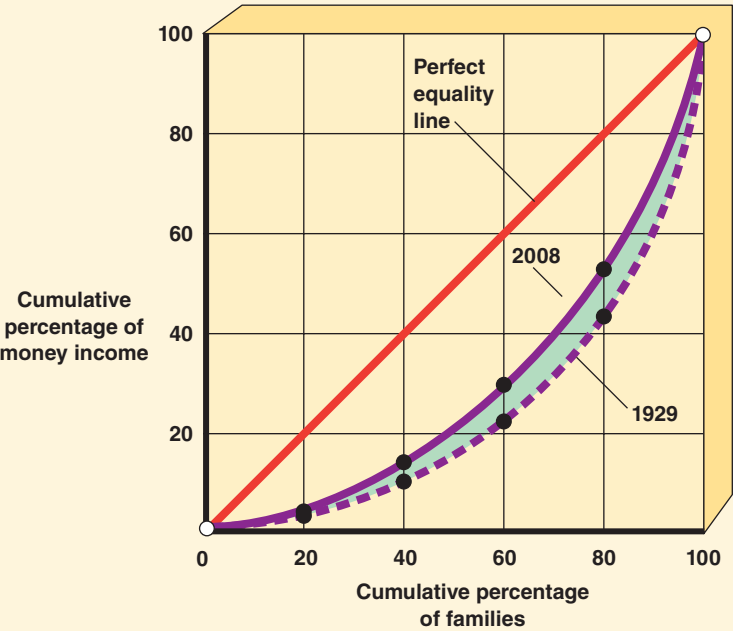
Income Distribution Trend in the United States

In Exhibit 1, we looked at income distributions for selected years between 1929 and 2008. What can we conclude from these data using the Lorenz curve? Has the overall income distribution become more or less equal? The table in Exhibit 5 restates the income share data for 1929 and 2008 from Exhibit 1, and the cumulative percentage shares of families of quintiles are calculated from the percentage shares.

Exhibit 5

Lorenz Curves for Family Income Distribution in the United States, 1929 and 2008

Since 1929, the Lorenz curve has shifted somewhat inward toward the perfect equality line. Thus, there has been a reduction in the inequality of distribution of family money income since 1929.



Percentage of families	1929		2008	
	Percentage share	Cumulative share	Percentage share	Cumulative share
Lowest fifth	4%	4%	4%	4%
Second-lowest fifth	9	13	10	14
Middle fifth	14	27	15	29
Second-highest fifth	19	46	23	52
Highest fifth	54	100	48	100

Exhibit 5 suggests that overall money income distribution has changed little over the period. In the exhibit, there is only a small shaded area between the 1929 and 2008 Lorenz curves. However, the share of income received by the highest fifth of families fell from 54 percent in 1929 to 48 percent in 2008. Note that comparing other years can lead to different conclusions. For example, as shown in Exhibit 1, the distribution of income is less equal since 1970.

CONCLUSION *The Lorenz curve has shifted only slightly inward, and therefore closer to the perfect equality line, between 1929 and 2008.*

GLOBAL COMPARISONS OF INCOME DISTRIBUTION

How does the distribution of income in the United States compare with that of other countries? Exhibit 6 presents separate Lorenz curves for the United States, the Czech Republic, and Brazil. This exhibit indicates that the degree of income inequality in the United States exceeds that of the Czech Republic. On the other hand, income distribution is more equal in the United States than in Brazil. In general, the distribution of income in developed nations, such as the United States, Germany, Italy, and Sweden, is more equal than in developing nations, such as Brazil, Mexico, and Zimbabwe.

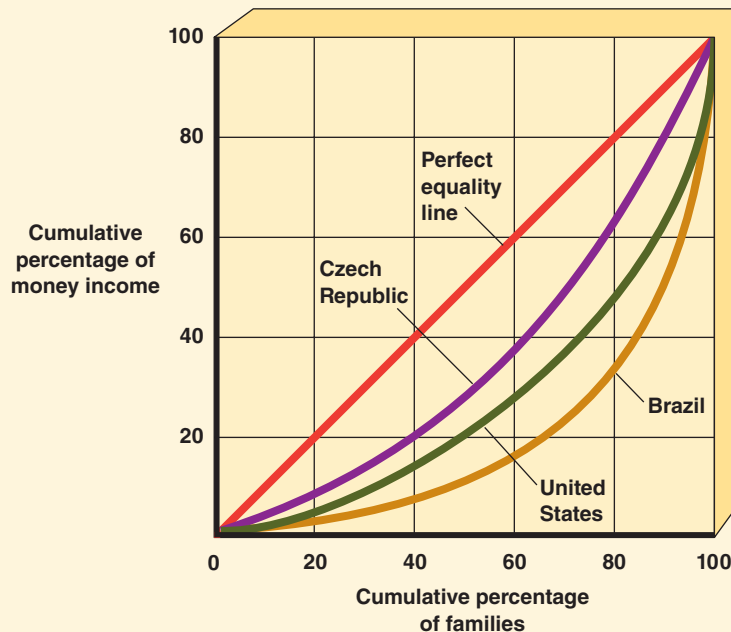


Global
Economics

Exhibit 6

Lorenz Curves for Selected Countries

Comparing Lorenz curves for the United States, the Czech Republic, and Brazil reveals that income is distributed more equally in the Czech Republic than in the United States and Brazil. As illustrated by the Lorenz curve for Brazil, income inequality is usually greater in less-developed countries.



SOURCE: The World Bank Group, <http://data.worldbank.org/data-CATALOG>.

POVERTY

Having discussed the broader question of how the degree of income distribution inequality is measured, we now turn the spotlight on the fiercely debated issue of poverty. We are all disturbed by homelessness and hungry children. How can poverty exist in a nation of abundance such as the United States? Can economists offer useful ideas to reform and improve our current welfare system? Most of the nation agrees that the welfare system must undergo reforms to reduce poverty, cut welfare dependency, and save taxpayers money. The first step to understanding the problem is to ask this question: Who is poor?

Defining Poverty

What is poverty? Is it eating Spam when others are eating steak? Or is poverty a family having one car when others have two or more? Is the poverty standard only a matter of normative arguments? Indeed, the term *poverty* is difficult to define. A person whose income is comparatively low in the United States may be viewed as well off in a less-developed country. Or what we in the United States regard as poverty today might have seemed a life of luxury 200 years ago.

There are two views of poverty. One defines poverty in *absolute* terms, and the other defines poverty in *relative* terms. Absolute poverty can be defined as a dollar figure that represents some level of income per year required to purchase some minimum amount of goods and services essential to meeting a person's or a family's basic needs. In contrast, relative poverty might be defined as a level of income that places a person or family in the lowest, say, 20 percent of all persons or families receiving incomes. An unequal distribution of income guarantees that some persons or families will occupy in relative terms the bottom rung of the income ladder. The U.S. government first established an official definition of the **poverty line** in 1964. The poverty line is the level of income below which a person or a family is considered poor. The poverty line is defined in absolute terms: It is based on the cost of a minimal diet multiplied by three because low-income families spend about one-third of their income on food. In 1964, the poverty income level for a family of four was \$3,000 (\$1,000 for food $\times$ 3). Since 1969, the poverty line figure has been adjusted upward each year for inflation. In 1988, for example, the official poverty income level was \$12,092 or below for a family of four. In 2008, a family of four needed an income of \$22,207 to clear the poverty threshold.

Exhibit 7(a) shows the percentage of all persons in the U.S. population below the poverty level, beginning with 1959. The poverty rate for all persons was on a downward trend until the early 1980s. From 1980 to 1995, the percentage remained between 13 and 14 percent until the rate dropped to 11 percent in 2000. This was the lowest level in more than a quarter-century. Following the recession of 2007, the poverty rate rose to 13 percent in 2008. The exhibit also gives an idea of poverty levels by race for selected years. As shown by comparing parts (b) and (c), the percentage of African Americans below the poverty line remained almost three times the percentage of whites between 1970 and 1995. In 2008, the ratio was over twice as great.

The poverty rate shown in Exhibit 7 has two major problems. First, this percentage gives no indication of how poor the people included are. A person with an income \$1 below the poverty line counts, and so does a person whose income is \$5,000 below the threshold. Second, the poverty rate is computed by comparing

Poverty line

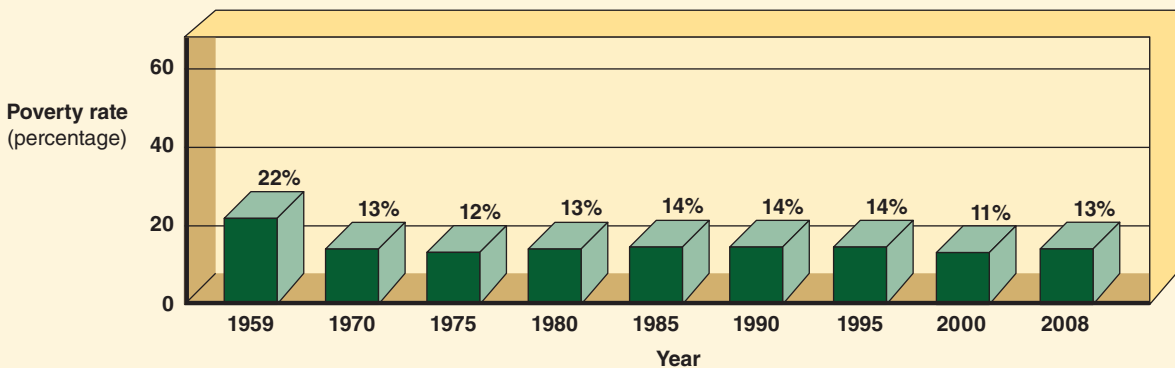
The level of income below which a person or a family is considered to be poor.

Exhibit 7

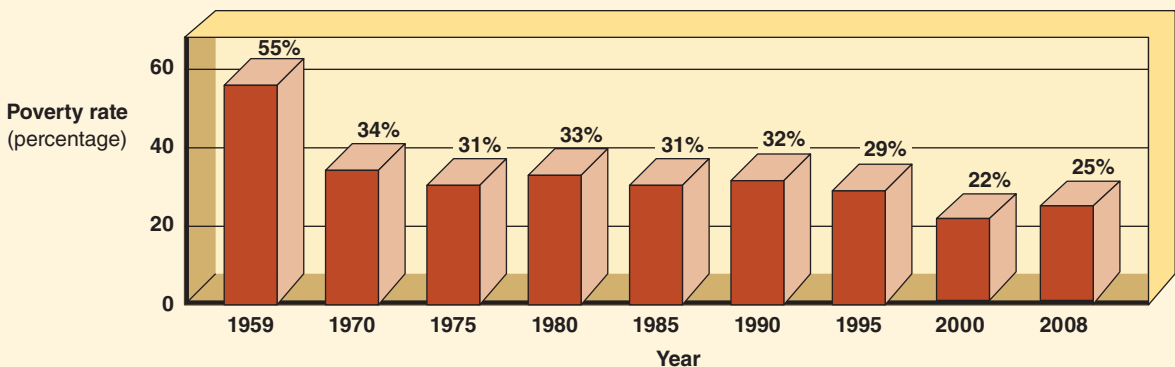
Persons below the Poverty Level as a Percentage of the U.S. Population, 1959–2008

In part (a), the official poverty rate for all persons declined sharply between 1959 and the 1970s. After the recession of 2007, the poverty rate rose. Comparison of parts (b) and (c) reveals that the poverty rate for African-Americans fell sharply between 1959 and 1970, but since then it remained almost three times the poverty rate of whites until 1995. In 2008, the ratio was 2.4 times as great.

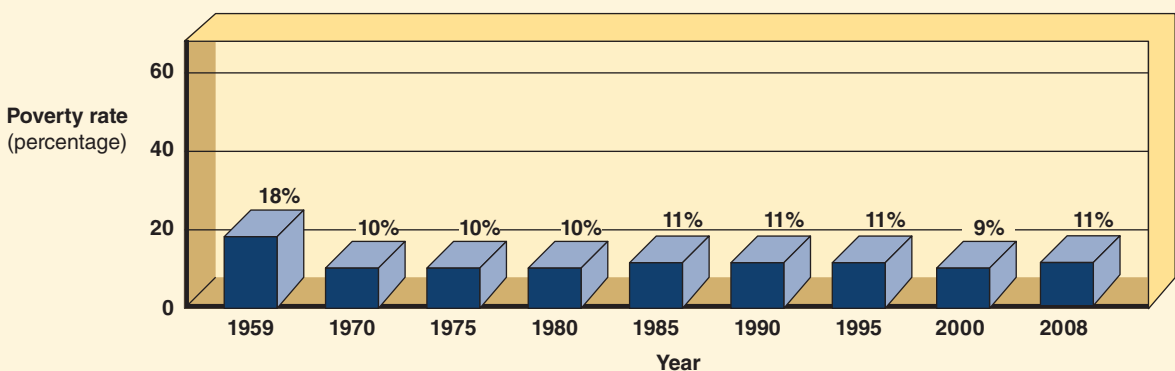
(a) The official poverty rate for all persons



(b) The official poverty rate for African-Americans



(c) The official poverty rate for whites



SOURCE: U.S. Bureau of the Census, *Income, Poverty, and Health Insurance in the United States: 2009*, <http://www.census.gov/index.html>, Table B-1.

In-kind transfers

Government payments in the form of goods and services, rather than cash, including such government programs as food stamps, Medicaid, and housing.

a family’s census cash income from all sources to the poverty line. Cash income includes cash payments from Social Security, unemployment compensation, and Temporary Assistance to Needy Families (TANF). Cash income for the poor does not include noncash transfers, called **in-kind transfers**. In-kind transfers are government payments in the form of goods and services, rather than cash, including such government programs as food stamps, Medicaid, and housing. These antipoverty programs will be discussed in more detail in the next section.

Who Are the Poor?

Exhibit 8 lists selected characteristics of families below the poverty level in 2008. Geographically, poor families are most likely to live in the South. An important characteristic of families living below the poverty line in the United States is family structure. The poverty rate was 29 percent for families headed by a female with no husband present and 14 percent for families headed by a male with no female present, compared to only 6 percent for married couples. Finally, poverty is greatly influenced by the lack of educational achievement of the head of household. As shown in the exhibit, 24 percent of families with household heads who have not received a high school diploma are below the poverty line compared to only 4 percent of families whose heads have at least a bachelor’s degree.

Exhibit 8 Characteristics of U.S. Persons and Families below the 2008 Poverty Level	
Characteristic	Percentage below the poverty line
Region	
South	14%
West	14
Northeast	12
Midwest	12
Type of Family	
Headed by married couple	6
Headed by male, no wife	14
Headed by female, no husband	29
Education of Household Head	
No high school diploma	24
High school diploma, no college	13
Bachelor’s degree or more	4

SOURCE: U.S. Bureau of the Census, *Income, Poverty, and Health Insurance in the United States: 2009*, <http://www.census.gov/hhes/www/poverty.html>, Table 3 and POV29.

ANTIPOVERTY PROGRAMS

The government has a number of programs specifically designed to aid the poor. The groups eligible for such assistance include disabled persons, elderly persons, and poor families with dependent children. People become eligible for public assistance if their income is below certain levels as measured by a *means test*. A **means test** is a requirement that a family's income not exceed a certain level to be eligible for public assistance. People who pass the means test may be *entitled* to government assistance. Thus, government welfare programs are often called *entitlement programs*.

Federal programs to assist the poor in the United States are classified into two broad types of programs: *cash* assistance and *in-kind transfers*. As explained previously, the current definition of the poverty threshold excludes in-kind transfers because these programs did not exist when the poverty rate measure was adopted decades ago.

Means test

A requirement that a family's income not exceed a certain level to be eligible for public assistance.

Cash Transfer Programs

The following are major government programs that alleviate poverty by providing eligible persons with cash payments needed to purchase food, shelter, clothing, and other basic needs.

Social Security (OASDHI) The technical name for our gigantic social insurance program is Old Age, Survivors, Disability and Health Insurance, or OASDHI. Under the Social Security Act passed in 1935, each worker must pay a payroll tax matched in equal amount by his or her employer. Look at your paycheck, and you will find this deduction under FICA, which stands for Federal Insurance Contribution Act. Most of this money is used on a “pay-as-you-go” basis to pay current benefit recipients, and the remainder goes into the Social Security Trust Fund. Workers may retire between the ages of 65 and 67, depending on year of birth, with full benefits, or at age 62, with reduced benefits. If a wage earner dies, Social Security provides payments to survivors, including spouse and children, until about 18 years of age (age 21 if they are in school). In addition, payments are made to disabled workers.

Earned-Income Tax Credit (EITC) This is a refundable federal tax credit based on earned income below a maximum amount provided to low-income wage earners with the purpose of offsetting Social Security payroll taxes paid by the workers. In short, EITC is designed to avoid taxing the working poor further into poverty. Under this program, the tax credit reduces federal income taxes or provides a cash payment if the credit exceeds the tax liability.

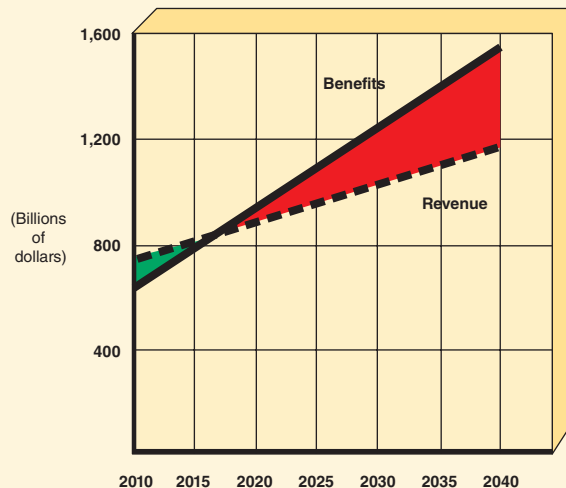
Unemployment Compensation **Unemployment compensation** is a government insurance program that pays income for a short time period to unemployed workers. This unemployment insurance is financed by a payroll tax on employers, which varies by state and according to the size of the firm's payroll. This means nothing is deducted from employees' paychecks for unemployment compensation. Although the federal government largely collects the taxes and funds this program, it is administered by the states. Any insured worker who becomes unemployed, and did not just quit his or her job, can become eligible for benefit payments after a short waiting period of usually one week.

Unemployment compensation

The government insurance program that pays income for a short time period to unemployed workers.

Social Security: Past, Present, and Future

Social Security Trust Fund Projections



President Franklin D. Roosevelt signed the Social Security Act as a bedrock of the New Deal program to help Americans besieged by the Great Depression. On December 1, 1936, the first official Social Security card was drawn arbitrarily from a stack of applications. The recipient was John D. Sweeney, Jr., who was the son of a wealthy factory owner and had grown up in a 15-room home staffed with servants. Unfortunately, Mr. Sweeney died at the age of 61 without ever receiving any benefits from the Social Security program.

Currently, the Social Security Trust Fund takes in more money in taxes and interest than it pays out in benefits and the balance is invested exclusively in interest-bearing U.S. Treasury securities. However, as shown in the graph, revenue will fall below benefits

Temporary Assistance to Needy Families (TANF) TANF gives states broad discretion to determine eligibility and benefit levels. However, families may not receive benefits for longer than 60 months. Unwed teenage parents must stay in school and live at home, and people convicted of drug-related felonies are banned from receiving TANF or food stamp benefits. In addition, nonworking adults must participate in community service within two months of receiving benefits, and must find work within two years. Parents with children under age one are exempt from the work requirements (under age six if child care is not available).

In-Kind Transfers

The following are important government in-kind transfer programs that raise the standard of living for the poor.

Medicare This federal health care program is available to Social Security beneficiaries and persons with certain disabilities. Coverage is provided for hospital care and post-hospital nursing services. It also makes available supplementary low-cost insurance programs that help pay for doctor services and prescription drug expenses. Medicare is financed by payroll taxes on employers and employees.

Medicaid This is the largest in-kind transfer program. Medicaid provides medical services to eligible poor under age 65 who pass a means test. TANF families qualify for Medicaid in all states. It is financed by general tax revenues.

in 2016, and the system will begin dipping into the trust fund to make up the difference. In 2037, it is estimated that the trust fund will be depleted. Excluding increasing the retirement age, the solution to financing a secure retirement program for future generations is to reduce benefits and/or increase revenues.

One idea to restore the trust fund is to allow people to obtain a higher return on their investment by channeling all or some of the money into their own private stock market account because stocks generally outperform U.S. Treasury securities by a significant margin. Unanswered questions of such partial privatization system include: (1) How much money could workers divert from Social Security into their private investment account? (2) What are the transition

costs for new government debt required to pay benefits to current retirees not financed by payroll taxes because of money diverted to private accounts? and (3) How should workers be protected if their investments lose money?

Another reform idea is to increase tax revenue by lifting the cap on income subject to Social Security taxes. Currently, employers and employees each pay a fixed percentage of 12.4 percent (6.2 percent from employees and 6.2 percent from employers) payroll tax on their earnings up to a maximum amount of each employee's salary. However, no tax is paid on the income above that maximum amount, which is currently \$106,800. The effect would be to raise revenue by expanding the tax base to include highest-paid employees.

Food Stamps The food stamp program began in 1964 as a federally financed program that is administered by state governments. The government issues coupons to the poor, who use them like money at the grocery store. The grocer cashes the stamps at a local bank, which redeems them at face value from the government. The cash value of stamps issued varies with the eligible recipient's income and family size. The food stamp program has become a major part of the welfare system in the United States.

Housing Assistance Federal and state governments have a number of different programs to provide affordable housing for poor people. The federal agency overseeing most of these programs is the Department of Housing and Urban Development (HUD). These programs include housing projects owned and operated by the government and subsidies to assist people who rent private housing. In both cases, recipients pay less than the market value for apartments and therefore receive an in-kind transfer.

Welfare Criticisms

The majority of objections to welfare can be classified into the following major criticisms:

- **Work Disincentives.** Critics have argued that because welfare provides income that is easier to obtain than by working, the poor are often induced to reduce their work effort. In fact, the more a recipient earns from a job, the fewer the

benefits he or she receives. Moreover, the taxes to finance welfare payments have some disincentive effects on the work effort of taxpayers. Taxes reduce take-home pay and thus reduce the reward for work.

- **Inefficiencies.** Critics have charged that the huge welfare bureaucracy in Washington, D.C., and throughout the nation results in more money in the pockets of bureaucrats than in the pockets of the poor. This major criticism was expressed by economics professor Thomas Sowell as follows:

The amount necessary to lift every man, woman, and child in America above the poverty line has been calculated, and it is one-third of what is in fact spent on poverty programs. Clearly, much of the transfer ends up in the pockets of highly paid administrators, consultants, and staff as well as higher income recipients of benefits from programs advertised as antipoverty efforts.¹

- **Inequities.** Today, many critics argue that poor persons with equal needs receive different benefits. For example, a needy family in California might receive welfare benefits twice as great as those received by a needy family of the same size in South Carolina. The reason is that benefits under TANF and Medicaid are essentially controlled by the states.

REFORM PROPOSALS

Although there have been numerous proposals for reforming welfare, the various ideas can be classified into two broad approaches. First, the negative income tax offers a major transformation of the entire patchwork of federal, state, and local welfare programs. Second, workfare, which is the cornerstone of TANF, is a departure from the previous welfare system because it is based on work rather than entitlement. However, workfare is not without considerable debate and controversy.

Negative Income Tax

Negative income tax (NIT)

A plan under which families below a certain break-even level of income would receive cash payments that decrease as their incomes increase.

The idea of **negative income tax (NIT)** was first advanced by the prominent economist Milton Friedman in the early 1960s to reduce work disincentives and welfare bureaucracy while providing for the poor. NIT is a plan under which families below a certain break-even level of income would receive cash payments that decrease as their incomes increase. An NIT system would combine all cash and in-kind transfer welfare programs into a single program administered by a single agency.

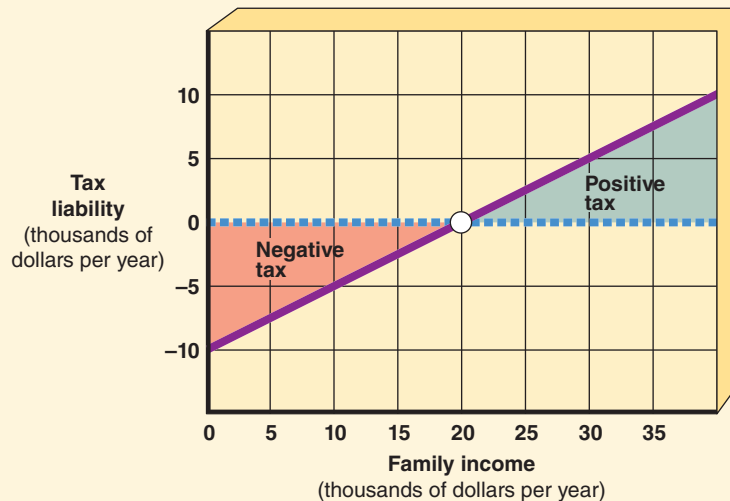
Exhibit 9 illustrates how a negative income tax might work. A low-income family of four receives a cash payment until it reaches a *break-even income* at \$20,000 per year, where the family neither receives a payment nor pays income taxes. Above \$20,000, the family pays income taxes. For example, a family with an income of \$30,000 pays \$5,000 in taxes, while a family with an income of \$10,000 is paid an NIT subsidy of \$5,000. A family with zero income receives an NIT payment of \$10,000. Thus, the government pays families an amount that varies inversely (negatively) with income.

1. Thomas Sowell, *Markets and Minorities* (New York: Basic Books, 1981), p. 122.

Exhibit 9

A Negative Income Tax Plan

In this example, a family with no earned income receives a \$10,000 payment from the government. From \$0 to \$20,000, payments are reduced by a phase-out rate of \$0.50 for each \$1.00 of additional income. When income exceeds \$20,000, payments fall to zero, and the family pays income taxes. Thus, a family with an income of \$30,000 pays \$5,000 in taxes.



CONCLUSION *The negative income tax is the reverse of a positive income tax system, in which people pay the government an amount that varies directly with their income.*

The basic idea behind the NIT system is simple: Families with incomes above the break-even income finance payments to families with incomes below the break-even income. Begin at zero income in the exhibit, and assume the income guarantee is set at the poverty income threshold of \$10,000. Beyond the guaranteed minimum income of \$10,000, government payments are reduced by, say, \$0.50 for each \$1.00 earned. This rate, called the *phase-out rate*, determines the cash transfers to low-income families until the break-even income is reached.

The NIT system offers several potential advantages. First, bureaucratic costs would be cut because an NIT program could be administered by a single agency. Second, poor people would not suffer the stigma of repeatedly standing in lines at the welfare office or using food stamps in the grocery store. The needy would simply file annual, or perhaps quarterly, income returns with the IRS. Third, many economists argue that individuals are rational and know best how to spend their money. Thus, a cash subsidy is preferable to an in-kind transfer.

You're The Economist

Pulling on the Strings of the Welfare Safety Net

Applicable Concept: welfare reform



Welfare reform appears to be a success: The number of families on welfare has fallen sharply from 4.4 million in 1996 to 1.7 million in 2007.¹ The following is a sampling of articles describing the evolution of welfare under the Personal Responsibility and Work Opportunity Act of 1996.

As reported in *The Washington Post*, Los Angeles County provides a striking contrast of welfare prior to and after reform in 1996. Prior to 1996, Los Angeles County had a traditional welfare program that provided education and job training

without work requirements. After the welfare reform act of 1996, independent researchers found that 43 percent of poor families who were required to participate in the city's new welfare reform program with work requirements got jobs, while only 32 percent of families randomly selected to remain in the traditional welfare program did. This represented an increase of one-third over the old welfare program. The typical welfare family subject to the new reform initiatives earned \$1,286 in the first six months of the program, while "control group" families earned \$879, a difference of 46 percent.²

A 2002 article in the *Los Angeles Times* concerned the new approach of the federal government providing block grants to states and mandating that the needy find jobs rather than just handing them welfare checks:

Before 1996, when the nation's welfare laws were radically altered, welfare families might have gotten a monthly welfare check for the rest of their lives. Martha Soria's job would have been mostly to shuffle their paperwork. But with welfare reform came time limits on such benefits and strict new work requirements.

1. U.S. Census Bureau, *Statistical Abstract of the United States*, 2008, <http://www.census.gov/compendia/statab/>, Table 553.
2. Judith Havemann, "Welfare Reform Success Cited in L.A.," *The Washington Post*, Aug. 20, 1998, p. A1.

After years of discussion and study, the NIT has not gained wide support. The NIT system is perceived as a political liability because voters perceive it as a "give-away" of taxpayers' money. These critics believe in-kind welfare is preferable to cash assistance. When a recipient is given food stamps or a housing subsidy, he or she acquires food and housing, rather than, say, buying drugs and gambling. NIT proponents point out, however, it is known that some food stamps are sold illegally for cash, which is used to buy drugs, alcohol, or whatever. Finally, some critics argue that a generous guaranteed minimum income paid in cash might create a disincentive to work rather than an incentive to work.

CHECKPOINT

Does a Negative Income Tax Discourage Work?

Under a negative income system, people who work receive reduced payments from the government. Even worse, beyond the break-even income, workers must pay taxes. This means there is no basis in an NIT system to argue that the poor will have an incentive to work. Explain why you agree or disagree. (Hint: Construct a table using Exhibit 9, and consider after-tax income.)

And while Soria still shuffles a lot of paperwork, her job as well as the jobs of welfare caseworkers across the state and nation have changed. They have had to master hundreds of new rules and regulations under welfare reform and take on new responsibilities as guidance counselor, job finder, cheerleader, and taskmaster.³

The following article argues that the states must do more to avoid racial bias:

Under the 1996 law, states have the option to enforce time limits of their choosing. Because of this flexibility, states are left open to discriminate freely. Across the board, race was the determining factor

affecting time limit lengths and their application. Observation of the enforcement of time limits shows that states with a higher proportion of African-Americans or Latinos possess shorter time limits than the five-year guideline of the law. Over 20 states have opted to not allow exemptions to these time limits. Over 50 percent of African-American families under welfare are subject to time limits shorter than the federal cutoff, as opposed to 30 percent of whites under welfare.⁴

A 2008 article in the *Chronicle of Higher Education* reported that a new federal rule would make it easier for some welfare recipients to attend college by counting a year's worth of study, including homework time, as

work. The amount of time welfare recipients can spend in basic education and language courses was also expanded. The rule requires colleges to track recipients' class attendance, which some argue stigmatizes these students.⁵

ANALYZE THE ISSUE

The current approach to welfare reform is to cut the growth of welfare by shifting control from the federal government to the states. The idea is that because state and local officials are closer to the people, welfare programs will improve. Analyze the results presented above based on work disincentives, inefficiencies, and inequities.

3. Carla Rivera, "Welfare Reform's Enforcers," *Los Angeles Times*, May 28, 2002, p. A1.

4. Gordon Hurd, "Safety Net Sinking," *ColorLines Magazine*, Summer 2002, p. 17.

5. Elyse Ashburn "New Federal Rule Could Help Welfare Recipients Stay Longer in College," *Chronicle of Higher Education*, Feb. 9, 2008, p. A26.

Workfare

The 1996 welfare reform bill titled the *Personal Responsibility and Work Opportunity Act* created TANF, and gave the states block grants to run welfare programs. To overcome the disincentive to work characteristic of earlier welfare programs based on entitlement, the current approach is to increase the work performed by welfare recipients and encourage their participation in job-training programs. To keep their benefits, welfare recipients must perform some work activities within two years of receiving welfare or risk losing benefits. This idea is called *workfare*. Workfare programs require able-bodied adults to work for the local government or any available private-sector employer in order to be eligible for welfare benefits. The paramount question thus becomes how to create jobs for welfare recipients who often lack basic literacy skills. A large public job plan would be costly and politically unpopular, especially among public employees who fear losing their jobs. Another option is for the government to pay employers to hire welfare recipients. A variation on this idea is for the government to hire personnel firms that would earn a fee for each person placed in a job.

There are potential problems with providing subsidies for companies that hire welfare recipients. One problem is that subsidies can stigmatize welfare recipients

and reduce their long-term employment prospects. Another potential problem is that subsidies could be a windfall payment to employers for hiring people who would have been hired without the subsidies. Finally, there is a displacement problem because a subsidized welfare-recipient worker can take the job of an unsubsidized worker who has never received welfare benefits.

DISCRIMINATION

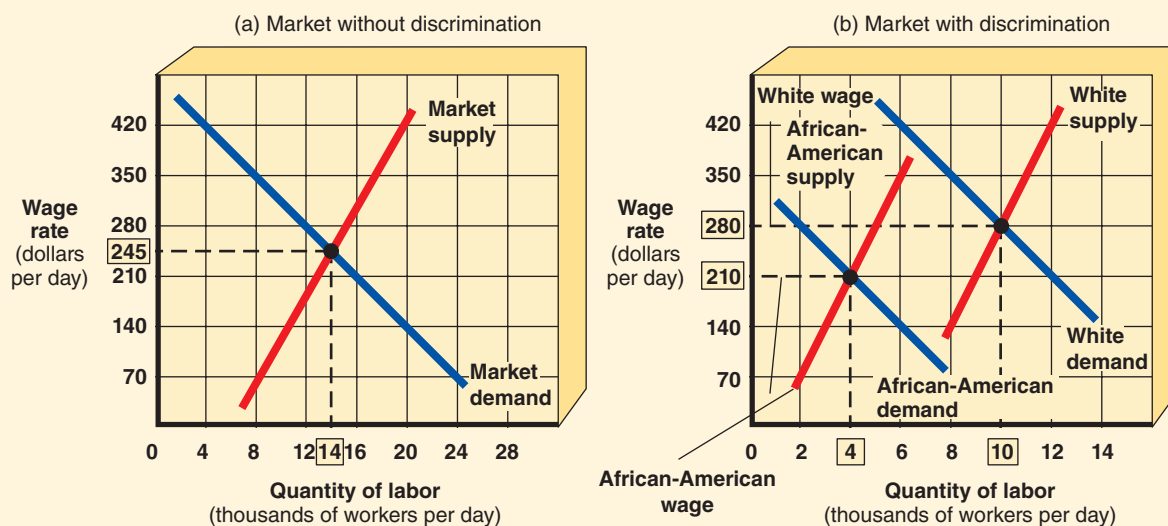
Poverty and discrimination in the workplace are related. Nonwhites and females earn less income when employer prejudice prevents them from receiving job opportunities. Discrimination also occurs when nonwhites and females earn less, but do basically the same work as whites and males. Exhibit 10 uses labor market theory to explain how discrimination can cause the equilibrium wage to be lower for nonwhites than for whites.

Exhibit 10(a) assumes that employers do not discriminate. This means employers hire workers regardless of race—that is, on the basis of their contribution to revenue (their marginal revenue products, *MRPs*). Hence, the intersection of the market demand curve, *D*, and the market supply curve, *S*, determines the equilibrium wage

Exhibit 10

Labor Markets without and with Racial Discrimination

In part (a), there is no labor market discrimination against African Americans. In this case, the equilibrium wage for all labor is \$245 per day. Under discrimination in part (b), the labor demand and labor supply curves for white and African-American workers differ. As a result, the equilibrium wage rate for white workers, \$280, is higher than that for African Americans, \$210.



rate of \$245 per day paid by nondiscriminating employers. The total number of African American and white workers hired is 14,000 workers.

Now assume for the sake of argument that employers do practice job discrimination against African-American workers. The result, shown in Exhibit 10(b), is two different labor markets—one for whites and one for African Americans. Because discrimination exists, the demand curve for labor for African Americans is to the left of the demand curve for labor for whites, reflecting unjustified restricted employment practices. The supply curve of labor for African Americans is also to the left of the supply curve of labor for white workers because there are fewer African Americans seeking employment than whites.

Given the differences in the labor market demand and supply curves, the equilibrium wage rate for white workers of \$280 is higher than the \$210 paid to African Americans. Comparison of these wage rates with the labor market equilibrium wage rate of \$245 reveals that the effect of discrimination is to change the relative wages of white and African-American workers. Whites earn a higher wage rate than they would earn in a labor market that did not favor hiring them. Conversely, the African-American wage rate is lower as a result of discrimination.

Comparable Worth

A controversial public policy aimed at eliminating labor market pay inequities is a concept called **comparable worth**. Comparable worth is the principle that employees who work for the same employer must be paid the same wages when their jobs, even if different, require similar levels of education, training, experience, and responsibility. Comparable worth is a nonmarket wage-setting remedy to the situation where jobs dominated by women pay less than jobs dominated by men. Because women's work is alleged to be undervalued, the solution is equal pay for jobs evaluated as having "comparable worth" according to point scores assigned to different jobs. In essence, comparable worth replaces labor-market-determined wages with bureaucratic judgments about the valuation of different jobs. For example, compensation paid to an elevator inspector and a nurse can be computed based on quantitative scores in a job-rating scheme. If the jobs' point totals are equal, the average elevator inspector and nurse must be paid equally by law.

Comparable worth

The principle that employees who work for the same employer must be paid the same wage when their jobs, even if different, require similar levels of education, training, experience, and responsibility. A nonmarket wage-setting process is used to evaluate and compensate jobs according to point scores assigned to different jobs.

CHECKPOINT

Should the Law Protect Women?

Do you want women mining coal and building skyscrapers? Suppose laws are enacted that protect women by keeping them out of jobs deemed "too strenuous" or "too dangerous." Would the likely effect of such laws be to decrease wages in male-dominated occupations, increase wages in female-intensive occupations, or decrease wages in female-intensive occupations?



You're The Economist Is Pay for Females Fair? *Applicable*

Concept: comparable worth



Women working full time earn on average about 20 percent less than men.

Discrimination in wages and employment on the basis of sex was made illegal in 1963 by the Equal Pay Act (EPA), which outlawed pay discrimination between men and women doing substantially the same job. This does not mean that unequal pay for the same work cannot exist, but if it does, the differential must be due to factors other than gender.

Proponents of comparable worth argue that the equal-pay-for-equal-work idea has failed. They maintain that women crowd into such female-dominated occupations as secretarial work, nursing, school teaching, and social work because of discrimination against women in male-dominated occupations such as engineering. The increased supply of female labor in female-crowded professions lowers the prevailing wage. If the courts follow the comparable worth principle, they will not consider whether employers intentionally pay less for “women’s jobs,” but only whether the employers are in compliance with a quantitative rating scheme. The best-known case occurred in the 1980s, when the American Federation of State, County, and

Municipal Employees won the first federal court case against the state of Washington. The state was found guilty of wage discrimination against women because it had not followed a comparable worth point system. According to the point system, male-dominated jobs often paid more than female-dominated jobs even though the female jobs had greater “worth” and therefore, “underpaid” female job classes should be raised rather than lowering the “overpaid” male job classes. The court ordered Washington to upgrade nearly 15,000 female employees and award backpay estimated at \$377 million. The decision was appealed to higher courts, and the union ultimately lost the case.

Critics of comparable worth argue that it is nearly impossible to measure all of the factors that determine compensation for jobs, and the fact that female occupations earn less than male occupations is not necessarily evidence of discrimination. For example, women often seek occupations more compatible with childrearing. Over the years it appeared that comparable worth had faded into a golden oldie until the Fair Pay Act of 2007 was introduced by Senator Tom Harkin (D-Iowa) and included then Senator Barack

Obama (D-Illinois) as one of the cosponsors. The premise is that the government has the duty to decide a job’s worth. Under its provisions, employers must send the Equal Employment Opportunity Commission (EEOC) annual reports of how pay is determined in any job dominated by one gender. The goal is for the EEOC to decide pay for workers in dissimilar but “equivalent” jobs based on criteria established by the EEOC. Such calculations would serve as a basis for workers to sue their employers based on not being paid the same for “equivalent” work. Although this bill was not enacted, the Lilly Ledbetter Fair Pay Act of 2009 was passed to reset the statute of limitation for pay discrimination.

ANALYZE THE ISSUE

Suppose the EEOC uses a job-scoring system and determines that the wage rate for a secretary is \$50 per hour, while the competitive labor market wage rate is \$10 per hour. What would be the effect of such a comparable worth law?

Key Concepts

Lorenz curve
Poverty line
In-kind transfers

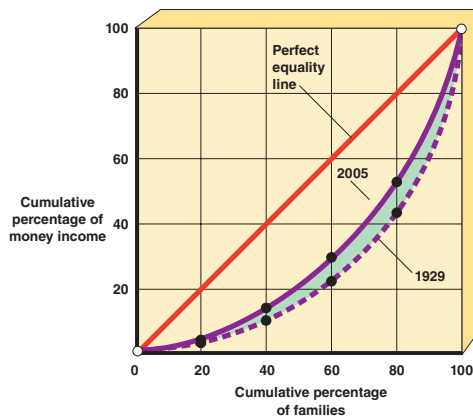
Means test
Unemployment compensation
Negative income tax (NIT)

Comparable worth

Summary

- The **Lorenz curve** is a measure of inequality of income. Since 1947, the share of money income for each fifth of families ranked according to their income has been quite stable. Also, the degree of income inequality among families in the United States has changed little since 1929. In recent decades, the richest families have become richer; however, the median income of all groups has increased.

Lorenz Curve

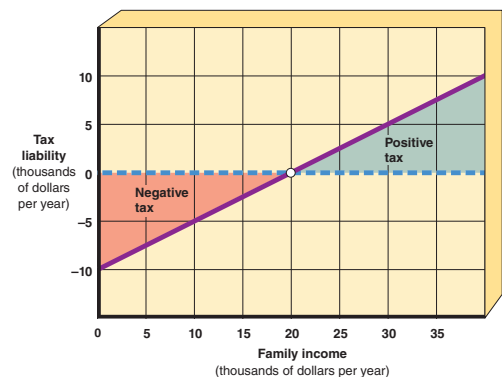


- The **poverty line** is a level of cash income below which a family is classified as poor. The poverty income threshold is three times the cost of a minimal diet for a family. Today, about 13 percent of the U.S. population is officially classified as poor.
- In-kind transfers** are payments to the poor in the form of goods and services, rather than cash. Calculation of the poverty line counts only cash income. In-kind transfers, such

as food stamps, Medicaid, and housing, do not count as income for families classified as officially poor. Government cash transfers counted in calculating the poverty line include payments from Social Security, unemployment compensation, and Temporary Assistance to Needy Families.

- Welfare criticisms** include three major arguments: (1) Welfare reduces the incentive to work for the poor and taxpayers. (2) Welfare is inefficient because much of the money covers administrative costs, rather than providing benefits for the poor. (3) Because many antipoverty programs are controlled by the state, welfare benefits vary widely.
- The **negative income tax** is a plan to guarantee a certain amount of income for all families. As a low-income family earns income, government payments (negative income tax) are phased out. After reaching a break-even income, families become taxpayers instead of being on the welfare rolls.

Negative Income Tax



- *Comparable worth* is the theory that workers in jobs determined to be of equal value by means of point totals should be paid equally. Instead of allowing labor markets to set wages, independent consultants award points to different jobs on the basis of such criteria as knowledge, experience, and working conditions.

Summary of Conclusion Statements

- Measured by distribution of family money income, the richest families have become a little richer and the rest of the family groups a little poorer in recent decades.
- The Lorenz curve has shifted only slightly inward and therefore closer to the perfect equality line, between 1929 and 2008.
- The negative income tax is the reverse of a positive income tax system, in which people pay the government an amount that varies directly with their income.

Study Questions and Problems

1. The following table contains data on the distribution of income in the countries of Alpha and Beta:

Percentage of families	Alpha		Beta	
	Percentage share	Cumulative share	Percentage share	Cumulative share
Lowest fifth	17.7%	—	9.0%	—
Second-lowest fifth	19.9	—	14.2	—
Middle fifth	20.4	—	17.5	—
Second-highest fifth	20.7	—	21.9	—
Highest fifth	21.3	—	37.4	—

- a. Compute the cumulative distribution of income for each country.
- b. Construct the Lorenz curve for each country.
- c. For which country is the distribution of income more equal?
- 2. Suppose each family in the United States earned an equal money income. What would be the effect?
- 3. Explain the difference between poverty defined absolutely and poverty defined relatively. Which definition is the basis of the poverty line?
- 4. Calculate the official poverty threshold annual income for a family of four. Assume the minimally acceptable diet is estimated to be \$5 per person per day and the minimum wage is \$5 per hour. Will a head of a family of four earn the poverty threshold you have calculated?

5. What are in-kind transfers? Give examples. How are in-kind transfers considered in determining whether a family is below the poverty income threshold?
6. Would free health care reduce poverty, as measured by the government? Would free public housing, day care, and job training for the poor reduce the poverty rate? Explain.
7. What percentage of families in the United States is classified as poor? Which demographic groups have higher poverty rates?
8. List the major government cash assistance and in-kind transfer programs to assist the poor. Which of the programs are not exclusively for the poor?
9. What are three major criticisms of welfare?
10. Assume the government implements a negative income tax plan with a guaranteed minimum income of \$5,000 and a phase-out rate for

payments of 50 percent. Provide the missing data in the following table:

A Negative Income Tax Plan

Family income	Negative tax	Total after-tax income
\$ 0	—	—
2,000	—	—
4,000	—	—
6,000	—	—
8,000	—	—
10,000	—	—

11. Critics of welfare argue that the role of government should be to break down legal barriers to employment rather than using programs that directly provide cash or goods and services. For example, advocates of this approach would remove laws mandating minimum wages, comparable worth, union power, professional licensing, and other restrictive practices. Do you agree or disagree? Why?

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Does a Negative Income Tax Discourage Work?

The following table is interpreted from Exhibit 9. Even though payments from the government decrease, total after-tax income increases from the combination of the income earned and the negative tax. After the break-even income of \$20,000, total after-tax income continues to rise. If you said the NIT system assumes the poor are rational people who are motivated to earn more total after-tax income by working, **YOU ARE CORRECT.**

Family income	Negative tax	Positive tax	Total after-tax income
\$ 0	\$10,000	\$ 0	\$10,000
5,000	7,000	0	12,000
10,000	5,000	0	15,000
15,000	2,500	0	17,500
20,000	0	0	20,000
25,000	0	−2,500	22,500
30,000	0	−5,000	25,000
35,000	0	−7,500	27,500



Should the Law Protect Women?

A law that limits women's access to certain occupations results in their crowding into the remaining occupations. The obstacles facing women in male-dominated occupations artificially restrict competition with men. If you said the increased

labor supply in female-intensive occupations decreases their wages, while the decreased labor supply in male-intensive occupations increases wages for males, **YOU ARE CORRECT.**

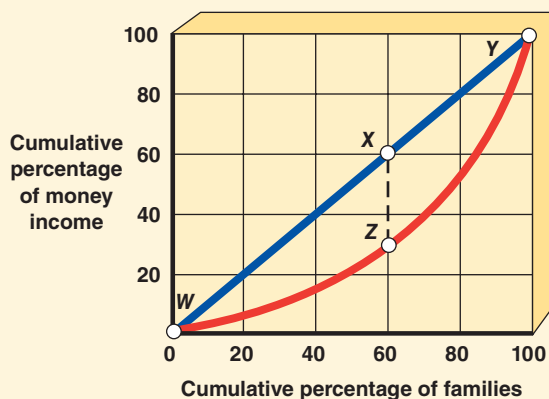
Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- Currently, the wealthiest 5 percent of all U.S. families earned what percentage of total annual money income among families?
 - More than 20 percent
 - Less than 10 percent
 - More than 25 percent
 - More than 50 percent
- A figure that measures the relationship between the cumulative percentage of money income on the vertical axis and the cumulative percentage of families on the horizontal axis is called the
 - family-income curve.
 - Washington curve.
 - Lorenz curve.
 - Gini curve
- As shown in Exhibit 11, the perfect equality line is drawn between points
 - W and Y along the curve.
 - X and Z.
 - W and Y along the straight line.
 - W and X.
- As shown in Exhibit 11, 20 percent of families earned a cumulative share of about _____ percent of income.
 - 5
 - 10
 - 30
 - 50
- As shown in Exhibit 11, 40 percent of families earned a cumulative share of about _____ percent of income.
 - 5
 - 15
 - 30
 - 50
- Since 1929, the overall family income distribution in the United States has become
 - much more unequal.
 - much less unequal.
 - slightly more unequal.
 - slightly more equal.

Exhibit 11

Lorenz Curve

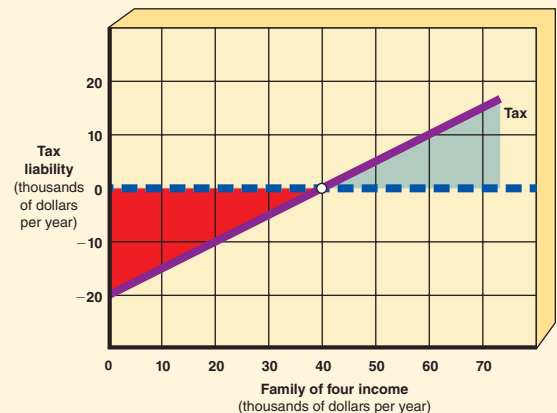


Practice Quiz Continued

7. Comparing the family income distributions of the United States, the Czech Republic, and Brazil, the conclusion is that income is distributed
 - a. most equally in Brazil.
 - b. most equally in the United States.
 - c. about the same in all three countries.
 - d. most equally in the Czech Republic.
8. To establish the poverty line that divides poor and nonpoor families, the government
 - a. multiplies the cost of a minimal diet by three.
 - b. multiplies the cost of a minimal diet by five.
 - c. adds 50 percent to the cost of a minimal diet.
 - d. adds 100 percent to the cost of a minimal diet.
9. The poverty line
 - a. is defined as one-half average family income.
 - b. includes in-kind transfers.
 - c. includes Medicaid benefits.
 - d. has been attacked for overstating poverty.
10. Which of the following is an in-kind transfer?
 - a. Social Security payments
 - b. Unemployment compensation
 - c. Food stamps
 - d. Welfare payments
11. Which of the following is a cash assistance (not an in-kind transfer) program?
 - a. Temporary Assistance to Needy Families (TANF)
 - b. Medicare
 - c. Medicaid
 - d. Food stamps
12. The negative income tax (NIT) is a plan under which families
 - a. above a level of income pay no tax.
 - b. pay the same tax rate except for the poor.
 - c. below a level of income pay no tax.
 - d. below a level of income receive a cash payment.
13. Which of the following might decrease the supply curve of labor?
 - a. Discrimination against African Americans
 - b. Discrimination against women
 - c. Difficult licensing requirements
 - d. All of the above
14. As shown in Exhibit 12, a family of four pays income taxes at
 - a. an income of \$5,000.
 - b. any income between zero and \$40,000.
 - c. all levels of income.
 - d. any income above \$40,000.
15. As shown in Exhibit 12, a family of four with no earned income receives _____ from the government.
 - a. zero payment
 - b. the break-even income of \$40,000
 - c. a \$20,000 payment
 - d. a \$20,000 tax deferment

Exhibit 12

Negative Income Tax





Antitrust and Regulation

People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.¹

—Adam Smith

When Microsoft dominated the personal computer software industry, the U.S. government charged the firm and Bill Gates, its founder, with anticompetitive business practices. The media compared the case to John D. Rockefeller's Standard Oil monopoly and the robber barons of the 1890s. In the past, antitrust laws have been successfully used against the nation's largest corporations. This threat of the high legal costs of defending against an antitrust suit serves as a powerful deterrent, discouraging monopolies from engaging in unfair actions intended to eliminate rivals. Here you will explore and form opinions on the Microsoft case, the Standard Oil case, and other major antitrust cases.

1. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776, reprint, New York: Random House, The Modern Library, 1937), p. 128.

When antitrust policy is successful, consumers benefit from lower prices and more output. As you study antitrust policy in this chapter, you will learn that antitrust is somewhat of an art form that blends economic theory and politics—perhaps more politics than economic theory. Interestingly, certain industries and organizations are exempt from antitrust legislation: labor unions, professional baseball teams, public utilities, public transit companies, schools, hospitals, and suppliers of military equipment.

The second half of this chapter turns to government regulation, which affects virtually every business and consumer. Our food is regulated, our environment is regulated, airline safety is regulated, and most industries must deal with some form of regulation. What are the reasons for regulation, and what are its consequences? The explanation begins with a brief survey of regulation in the United States. In the last section, we discuss the rationale for three different types of regulation justified on the basis of market failure.

In this chapter, you will learn to solve these economics puzzles:

- Can universities and colleges improve education by engaging in price-fixing?
- Why doesn't the water company or electric company compete?
- Why is market failure an economic rationale for regulation?



ANTITRUST

Before the Civil War, industries were populated by small firms, and few economic problems were caused by monopoly. After the Civil War, during the rapid industrialization of the 1870s and 1880s, the railroads and telegraph linked diverse regions of the country and enabled firms to expand into national markets. To gain more control of expanding industries, many competing companies merged or formed a **trust**. A trust is a combination or cartel consisting of firms that place their assets in the custody of a board of trustees. The trust allows firms that have not actually merged to form a cartel, or a cohesive group of firms that controls an industry in order to charge monopoly prices and earn higher profits. The long list of trusts formed during this period included the iron trust, sugar trust, copper trust, steel trust, coal trust, oil trust, tobacco trust, and even the paper-bag trust. The organizers of many of these trusts became widely known as *robber barons* because they exploited and bullied anyone in their way.

During the last decades of the nineteenth century, many trusts used various tactics to avoid competition. Recall from Chapter 9 on monopoly that Standard Oil acquired oil fields, railroads, pipelines, and ships and then denied access to rivals. Thus, competing firms had to merge with Standard Oil or go out of business. With the competition eliminated, John D. Rockefeller, the best-known so-called robber baron, raised Standard Oil's prices and limited production, and consumers suffered along with Standard Oil's competitors.

Another anticompetitive strategy used by the industrial giants was **predatory pricing**. Predatory pricing is the practice of one or more firms temporarily reducing prices in order to eliminate competition and then raising prices. Often trusts would sell a product below cost until their weaker competitors were unable to withstand mounting losses and were forced from the industry. Perhaps even more alarming, some trusts resorted to political corruption. For example, the railroad and petroleum trusts employed corrupt legislators and judges to gain a competitive edge.

By the end of the nineteenth century, the threat of continuing economic and political abuses created a public opinion quite hostile to big business. Newspapers regularly printed news of the trusts' questionable business practices. The numerous and politically influential farmers blamed the trusts for the high railroad charges that were making farming unprofitable. Consumers and labor unions also raised their voices against monopoly power. The influence of the trusts was discussed constantly in the halls of Congress. In 1888, both major political parties added antimonopoly planks to their campaign platforms. Hatred and distrust of the centralization of economic and political power originated in the Jeffersonian tradition of the United

Trust

A combination or cartel consisting of firms that place their assets in the custody of a board of trustees.

Predatory pricing

The practice of one or more firms temporarily reducing prices in order to eliminate competition and then raising prices.

States. Against this background of populist (pro-people) fear of big business and its political power, Congress passed laws aimed at preventing firms from engaging in anticompetitive activities.

The following is a brief description of the major antitrust legislation that constitutes basic antitrust law.

Sherman Act

The federal antitrust law enacted in 1890 that prohibits monopolization and conspiracies to restrain trade.

The Sherman Act

The first antitrust law was the **Sherman Act**. The Sherman Act of 1890 is the federal antitrust law that prohibits monopolization and conspiracies to restrain trade. Today, this act remains the cornerstone of antitrust policy in the United States. It has two main provisions:

Section 1: Every contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce among the several States, or with foreign nations, is hereby declared to be illegal. . . .

Section 2: Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by a fine not exceeding five thousand dollars, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.²

In response to the public outcry, Congress intended to craft this law with sweeping language against the trusts. But what does the Sherman Act really say? It is unclear exactly which business practices constitute a “restraint of trade” and therefore a violation of the law. As a result of the extremely vague language, there were numerous court battles, and the act was ineffective for years. For example, the federal government did not win its first notable cases against Standard Oil and American Tobacco until 1911.

The serious consequences of violating the Sherman Act are reflected in the more recent case of Archer Daniels Midland Company (ADM). In 1995, this agribusiness giant pleaded guilty to price-fixing involving lysine and citric acid. It paid a \$100 million fine. In 1998, a federal jury convicted three past and present executives of conspiring with competitors to fix the prices of these products. They were sentenced to serve two years in prison and to pay fines of \$350,000 each.

The Clayton Act

As explained above, the Sherman Act initially proved to be little more than a legislative mandate for the courts to spell out the meaning of antitrust laws. To define anticompetitive acts more precisely, Congress passed the **Clayton Act**. The Clayton Act of 1914 is an amendment that strengthened the Sherman Act by making it illegal for firms to engage in certain anticompetitive business practices. Under this act, the following business practices are illegal with the important controversial

Clayton Act

A 1914 amendment that strengthens the Sherman Act by making it illegal for firms to engage in certain anticompetitive business practices.

2. In 1974, the act was amended so that violations would be treated as felonies.

condition that the effect must be to “substantially lessen competition or tend to create a monopoly”:

1. **Price Discrimination:** A firm charges different customers different prices for the same product with the price differences not related to cost differences. (Recall the discussion of this topic in the chapter on monopoly.)
2. **Exclusive Dealing:** A manufacturer requires a retailer to sign an agreement stipulating the condition that the retailer will not carry any rival products of the manufacturer.
3. **Tying Contracts:** The seller of one product requires the buyer to purchase some other product(s). For example, movie distributors cannot force theaters to purchase projection rights to a blockbuster movie only on the condition that they pay for a bundle of films with much less box office potential.
4. **Stock Acquisition of Competing Companies:** One firm buys the stock of a competing firm.
5. **Interlocking Directorates:** The directors of one company serve on the board of directors of another company in the same industry. Interlocking directorates are illegal, whether or not the effect may be to “substantially lessen competition.”

Although more specific than the Sherman Act, the Clayton Act is also vague and leaves a key question unanswered: Exactly when does a situation or action “substantially lessen competition”? To this day, the task of interpreting this ambiguous phrase remains with the courts, and the interpretation changes over time.

The Federal Trade Commission Act

Since the federal government faced a growing antitrust responsibility in the early 1900s, an agency was needed to investigate alleged anticompetitive practices and reach judgments. The **Federal Trade Commission Act** was enacted for this purpose. The Federal Trade Commission Act of 1914 established the Federal Trade Commission (FTC) to investigate unfair competitive practices of firms. This act contains perhaps the most general language of any antitrust act. It declares illegal “unfair methods of competition in commerce.” The act established a five-member commission appointed by the president to determine the exact meaning of “unfair methods.” Today, the FTC is concerned primarily with (1) enforcing consumer protection legislation, (2) prohibiting deceptive advertising, and (3) preventing collusion. When a complaint is filed with the FTC, the commission investigates. If there is a violation, the FTC can negotiate a settlement, issue a cease-and-desist order, or initiate a lawsuit.

Federal Trade Commission Act

The federal act that in 1914 established the Federal Trade Commission (FTC) to investigate unfair competitive practices of firms.

The Robinson-Patman Act

The Clayton Act has been amended twice. Although price discrimination became illegal under the Clayton Act, that section was not widely enforced at first. This situation changed with the passage of the **Robinson-Patman Act**. The Robinson-Patman Act of 1936 is an amendment to the Clayton Act that strengthens the Clayton Act’s provisions against price discrimination. The Robinson-Patman Act is complex and controversial. Its basic purpose is to prevent large sellers from offering different prices to different buyers where the effect is to harm even a single small firm. In fact, the Robinson-Patman Act is often called the “Chain Store Act” because it was an outgrowth of the competition between small independent sellers and chain stores that developed after World War I.

Robinson-Patman Act

A 1936 amendment to the Clayton Act that strengthens the Clayton Act against price discrimination.

The Robinson-Patman Act encourages lawsuits by small independent firms because it broadens the list of illegal price discrimination practices. This act, for example, makes it illegal for a firm to offer quantity discounts, free advertising, or promotional allowances to one buyer if the firm does not offer the same concessions to all buyers. Be careful to note that the prohibition on price discrimination in the Robinson-Patman Act is limited to situations where the effect is to “substantially lessen competition or tend to create a monopoly.” The first You’re The Economist offers the opportunity to debate issues concerning this act.

The Celler-Kefauver Act

Prior to 1950, the U.S. Supreme Court interpreted the Sherman Act as prohibiting mergers between competing firms by stock acquisition, but not prohibiting mergers by the sale of physical assets (plant, equipment, and so on). The **Celler-Kefauver Act** was the second amendment to the Clayton Act and it was enacted to address this problem. The Celler-Kefauver Act of 1950 is an amendment to the Clayton Act that prohibits one firm from merging with a competitor by purchasing its physical assets if the effect is to substantially lessen competition. Consequently, this act is sometimes called the “Antimerger Act” because it closed the loophole in the Clayton Act and thereby prohibited anticompetitive mergers, which were the target of the original Clayton Act.

The five major antitrust laws are summarized in Exhibit 1.

Celler-Kefauver Act

A 1950 amendment to the Clayton Act that prohibits one firm from merging with a competitor by purchasing its physical assets if the effect is to substantially lessen competition.

Exhibit 1

Summary of Major Antitrust Laws

Law (date enacted)	Key provisions
Sherman Act (1890)	Prohibits interstate price fixing and other conspiracies and combinations that restrain trade and attempt to monopolize.
Clayton Act (1914)	Bolsters and clarifies the Sherman Act by prohibiting specific business practices, including exclusive dealing, tying contracts, stock acquisition of competitors, and interlocking directorates.
Federal Trade Commission Act (1914)	Established an agency (the FTC) to help enforce antitrust laws by investigating unfair and deceptive business practices.
Robinson-Patman Act (1936)	Amends the Clayton Act by broadening the list of illegal price discrimination practices to include quantity discounts, free advertising, and promotional allowances offered to large buyers and not to small buyers. The Robinson-Patman Act is often called the “Chain Store Act.”
Celler-Kefauver Act (1950)	Amends the Clayton Act by closing the loophole that permitted a firm to merge by buying assets of a rival, rather than by acquisition of stocks, as outlawed in the original Clayton Act. The Celler-Kefauver Act is often called the “Antimerger Act.”

You're The Economist Is Utah Pie's Slice of the Pie Too Small? *Applicable Concept: Robinson-Patman Act*



The following is a classic and controversial case: In the 1950s, the market for frozen dessert pies was small, but growing. The Salt Lake City market was supplied by distant plants in California that were owned by Carnation, Continental Baking, and Pet Milk. Until 1957, these three firms accounted for almost all the frozen fruit pies sold in the Salt Lake City market.

The Utah Pie Company had been baking dessert pies in Salt Lake City and selling them fresh for 30 years. This family-owned-and-operated business entered the frozen pie market in 1957. It was immediately successful and grabbed a huge share of the Salt Lake City market. During the relevant years, the market shares of the various competitors were as follows:

Utah Pie's strategy for penetrating the market was to set its prices below those of its competitors. Due to its immediate success, it built a new plant in 1958. Its local plants gave Utah Pie a locational advantage over its competitors. For most of the time in question, Utah Pie's prices were the lowest in the Salt Lake City market. The incumbent firms, of course, responded to Utah Pie's entry and lower prices by reducing their own prices. As a result, all the larger firms sold frozen pies in Salt Lake City at prices lower than those charged for pies of like grade and quality in other geographic markets considerably closer to their California plants.

Utah Pie sued these three firms, claiming price discrimination. Ultimately, the case was reviewed by the Supreme Court [in 1967], which

took a dim view of such pricing behavior: "Sellers may not sell like goods to different purchasers at different prices if the result may be to injure competition in either the sellers' or the buyers' market unless such discriminations are justified as permitted by the Act." Consequently, the Supreme Court found the defendants guilty of price discrimination. Inasmuch as no competitors had been forced from the market, it appears that price discrimination does not have to have an obviously predatory impact to be ruled illegal. All the Court saw in this case was a pattern of falling prices. It feared that such a pattern could result in a lessening of competition if one or more competitors dropped out of the market.

ANALYZE THE ISSUE

Utah Pie sued its three outside competitors under the Robinson-Patman Act. Some have criticized this case because it is an example of the type of bizarre result that can be produced by antitrust policy. Do you agree? Explain.

	1958	1959	1960	1961
Utah Pie	67%	34%	46%	45%
Pet	16	36	28	29
Carnation	10	9	12	9
Continental	1	3	2	8
All others	6	18	12	9

SOURCE: David L. Kaserman and John W. Mayo, *Government and Business: The Economics of Antitrust and Regulation* (Fort Worth: Dryden Press, 1995), p. 282.

KEY ANTITRUST CASES

Antitrust policy can be compared to the rules of baseball or other sports. The House and Senate of the U.S. Congress set the "rules of the game" for antitrust cases, just as the American and National Leagues set the rules of baseball. For example, the rules of baseball say that a player hitting a homer must run from first base to home

plate, rather than from third base to home plate. Similarly, the Sherman Act forbids monopolization through predatory pricing by businesses. This brings us to the role of the umpire. After a game, a Little League player asked the first base umpire, “What do you call when the runner and the ball reach first base at exactly the same time?” The umpire replied, “There’s no such thing as a tie. It’s always the way I call it.” That’s how it is with court decisions on antitrust laws and just like many of the umpire’s calls, all the courts’ decisions are not “crowd pleasers.” With this point in mind, let’s look at some important “calls” of courts on antitrust cases.

The Standard Oil Case (1911)

President Theodore Roosevelt’s administration took action to break up Standard Oil under the Sherman Act. After 10 years of litigation, the Supreme Court ruled in 1911 that Standard Oil had achieved its monopoly position in the oil refining industry through illegal business practices. John D. Rockefeller’s trust had used railroad rebates, discounts, espionage, control of supplies to rivals, and predatory pricing to gain a monopoly. The remedy was for the Standard Oil Trust to be broken into competing companies: Standard Oil of New York became Mobil, Standard Oil of California became Chevron, Standard Oil of Indiana became Amoco, and Standard Oil of New Jersey became Exxon.

The Standard Oil Trust case established a standard for antitrust rulings. The Supreme Court ruled that (1) Standard Oil was a monopoly with a 90 percent share of the refined oil market and (2) Standard Oil achieved its monopoly through illegal business behavior intended to exclude rivals. The Court stated that point (2) was critical to its decision and not point (1). This doctrine became known as the **rule of reason**. The rule of reason is the antitrust doctrine that the existence of monopoly alone is not illegal unless the monopoly engages in illegal business practices. Stated differently, monopoly *per se* is not illegal. Thus, “big is not necessarily bad.” Standard Oil and other dominant firms would be broken up not merely because of their dominance, but also because of their abusive behavior.

Between 1911 and 1920, the courts applied the rule of reason in breaking up the American Tobacco Trust and other trusts. In 1920, the Supreme Court also applied the rule of reason when it decided that U.S. Steel was not guilty under the Sherman Act. Although U.S. Steel controlled almost 75 percent of the domestic iron and steel industry, the Supreme Court ruled that it is not *size* that violates the law. Since there was no evidence of unfair pricing practices, U.S. Steel was a “good citizen” not in violation of the Sherman Act.

The Alcoa Case (1945)

Thirty-four years after the Standard Oil case, the courts did a “flip flop” on the rule of reason. In 1940, the Aluminum Company of America (Alcoa) was the only producer of aluminum in the United States. Alcoa’s monopoly was primarily the result of its patents and its ownership of a unique resource, bauxite. Moreover, Alcoa kept its prices low to avoid competition and prosecution, behaving as a “good citizen” despite its size. A federal appeals court ruled that Alcoa had violated the Sherman Act and declared:

Having proved that Alcoa had a monopoly of the domestic ingot market the government had gone far enough. . . . Congress did not condone “good trusts” and condemn “bad” ones; it forbade all.³

3. U.S. v. Aluminum Co. of America, 148 F.2d 416 (2d Cir. 1945).

Rule of reason

The antitrust doctrine that the existence of monopoly alone is not illegal unless the monopoly engages in illegal business practices.

With the Alcoa decision, the courts turned from “big is not necessarily bad” to “big is bad.” The rule of reason was transformed into the **per se rule**. The per se rule is the antitrust doctrine that the existence of monopoly alone is illegal, regardless of whether or not the monopoly engages in illegal business practices. Instead of judgments based on the performance of a monopoly, antitrust policy in the United States was switched by the court’s interpretation to judgments based solely on the market structure. Interestingly, the court’s solution was not to break up Alcoa. Instead, the federal government subsidized its competitors. War plants were sold at bargain prices to Reynolds Aluminum and Kaiser Aluminum, and later more rivals entered the aluminum industry.

Per se rule

The antitrust doctrine that the existence of monopoly alone is illegal, regardless of whether or not the monopoly engages in illegal business practices.

The IBM Case (1982)

In 1969, the U.S. Department of Justice brought antitrust action against IBM because of its dominance in the mainframe computer market. The government argued that IBM had a 72 percent share of the electronic digital computing industry. IBM argued that the relevant market was broader and included programmable calculators and other information-processing products. After 13 years of litigation, IBM had spent over \$100 million on its defense and had constructed an entire building to store case documents. Finally, in 1982, the government dropped the case. One reason was that Digital Equipment, Apple Computer, and Japanese companies were competing with IBM. Another reason illustrates the mix of politics and antitrust policy. In 1982, Ronald Reagan was president, and he believed in a much less restrictive interpretation of antitrust laws. In any event, the IBM case represented a shift in the general sentiment among those enforcing the antitrust laws from the per se rule back to the rule of reason.

The AT&T Case (1982)

In 1978, the U.S. Department of Justice brought an antitrust suit against AT&T and the Bell System. The issue was complicated. At this time, AT&T was a *natural monopoly* regulated by the government. (Regulation of a natural monopoly will be explained later in this chapter; see Exhibit 4.) The government allowed AT&T to have a monopoly in long-distance and local telephone service and in the production of telephones. The Federal Communications Commission (FCC) regulated long-distance rates, and state utility commissioners regulated local rates. What was the objective of giving one company the exclusive right to provide telephone services in the United States? In order to provide everyone with low-cost local services, the regulatory commissions set AT&T’s local charges low and its long-distance rates high to cover the lower local rates.

In the 1970s, advances in technology changed the nature of the long-distance telephone industry. Telephone service was no longer a natural monopoly because fiber optics and satellites made cable connections obsolete. Competitors developed, and the government alleged that these rivals were being charged unfairly high fees for access to AT&T’s local telephone lines.

On the same day the IBM case ended in 1982, AT&T and the Department of Justice announced this case was settled. AT&T (“Ma Bell”) divested itself of 22 local companies (“Baby Bells”), but retained its long-distance telephone service, its research facilities (Bell Laboratories), and its manufacturing facilities (Western Electric Company). As a result, local companies became regulated monopolies in their areas,

and local phone rates rose sharply. In nationwide long-distance telephone service, AT&T's competition with MCI and Sprint lowered the price of long-distance telephone service. Moreover, individual customers became responsible for buying their own phones, rather than using only AT&T phones. The result has been a highly competitive market, offering a wide range of phone prices and a wide variety of phones.

The MIT Case (1992)

For years, the presidents of many of the nation's top universities—Cornell, Harvard, Yale, Columbia, Brown, Princeton, The University of Pennsylvania, Dartmouth, and MIT—attended annual meetings to discuss tuition, faculty salaries, and financial aid packages. After such meetings, these schools often adjusted tuition charges, salary increases, and even fees for room and board. For example, one year Dartmouth planned to raise faculty salaries by 8.5 percent. The other schools wanted to hold the line at 6.5 percent, so Dartmouth was persuaded to cave in. At other meetings, the group's goal was to make sure each student who applied to more than one of the schools would be offered the same financial aid. At another meeting, Harvard and Yale accused Princeton of offering excessively generous scholarships to top students.

The U.S. Justice Department investigated and charged the eight Ivy League universities and MIT with an illegal conspiracy to fix prices. The Ivy League schools settled the case with a consent decree. This agreement required these schools to cease colluding on tuition, salaries, and financial aid in the future, and in return, none of the schools admitted guilt for a price conspiracy. MIT refused to sign the consent order, and in 1992, a federal district judge ruled that MIT had violated antitrust laws and concluded that students and parents have the right to compare prices when choosing a university. In 1993, an appeals court ordered a new trial and the Justice Department dropped charges with the agreement that MIT would cease comparing financial packages.



CHECKPOINT

Does Price-Fixing Improve Your Education?

Price-fixing agreements are among the monopolistic restraint-of-trade practices prohibited by Section 1 of the Sherman Act. The Supreme Court has concluded that a formal agreement is not necessary to prove conspiracy. Instead, conspiracy may be inferred from the acts of the accused even if the consequences might be considered socially desirable. The presidents of the universities charged with price-fixing in the MIT case defended their business practices with the argument that they openly met to fix prices in order to improve education. With tuition and the amount of financial aid fixed, students and parents will choose their university on the basis of academic quality alone. Consider the discussion of pricing strategies for an oligopoly discussed in Chapter 10. Can you give the presidents a better argument for their defense?

The Microsoft Case (2001)

Microsoft Corporation dominated the personal computer (PC) software industry with about a 90 percent share of the PC operating system software and Internet browser markets. And Microsoft had tied its Windows operating systems at

zero price (predatory pricing) to its Internet Explorer browser in order to eliminate competition and establish a monopoly in the browser market. The remedies discussed included both conduct and structural remedies. A conduct remedy was a judicial instruction against engaging in specific behavior. For example, Microsoft could be required to include major rival browsers with its browser. Bill Gates likened this proposal to “requiring Coca-Cola to include three cans of Pepsi in every six-pack it sells.” Moreover, Microsoft claimed that by integrating Internet Explorer with Windows it was creating one product and not tying two products. In short, no one using the Windows operating system needed a separate browser.

A structural remedy is a “surgical fix” aimed at permanently altering a company so substantially that further violations are not possible. For example, Microsoft could be split into three companies. One company would have operating systems, such as Windows. A second company could have applications, such as Word, Excel, and PowerPoint. The third company would get Internet Explorer and related Internet business. A major concern with this remedy was that a three-headed monopoly monster might destroy innovation and a seamless transition between Windows and other software applications. Another fear was that prices might rise and software would become much more complicated.

In 2001, a federal appeals court ruled that Microsoft did violate antitrust law to protect a monopoly for its Windows operating system. However, the court ruled the government had failed to prove Microsoft illegally attempted to monopolize the Internet browser market. In response, Microsoft announced that it would allow PC manufacturers to continue adding icons of other technology companies to Microsoft’s operating system. In 2002, a federal judge approved most of the provisions of the antitrust settlement reached the previous year with Microsoft.

The major antitrust cases are summarized in Exhibit 2.

Exhibit 2

Summary of Major Antitrust Cases

Case (date)	Key provision
Standard Oil (1911)	This case established the rule of reason, allowing a monopoly unless it engages in illegal practices.
Alcoa (1945)	This case overturned the rule of reason and established the per se rule, under which all monopolies are illegal.
IBM (1982)	The government dropped its case after 13 years and shifted antitrust policy back to the rule of reason.
AT&T (1982)	Technology made this government-regulated natural monopoly obsolete, and AT&T was found guilty of anticompetitive pricing.
MIT (1992)	Eight Ivy League schools agreed to stop colluding to fix prices, and MIT was found guilty of price-fixing while attending open meetings. MIT and the Justice Department reached an agreement after an appeals court ordered a new trial.
Microsoft (2001)	Microsoft and the government reached a settlement after an appeals court held that the firm illegally protected its Windows monopoly.

MERGERS AND GLOBAL ANTITRUST POLICY

The decades of the 1980s and 1990s were characterized by a wave of mergers. Mergers are a concern to antitrust regulators because firms can avoid charges of price-fixing by merging into one firm. The antitrust policy toward mergers depends on the type of merger and its likely effect on the relevant market.

Types of Mergers

Horizontal merger

A merger of firms that compete in the same market.

A **horizontal merger** is a merger of firms that compete in the same market. The mergers of Coca-Cola and PepsiCo, Ford Motor Company and General Motors, and Anheuser-Busch and Coors would be hypothetical examples of horizontal mergers. Horizontal mergers raise a “red flag” because they decrease competition in a market. For example, in 1986, the government blocked the proposed merger between Coca-Cola and Seven Up.

Vertical merger

A vertical merger is a merger of a firm with its suppliers.

A **vertical merger** is a merger of a firm with its suppliers. This type of merger occurs between companies at different stages of a production process. Hypothetical examples of vertical mergers would be General Motors merging with a major tire company and Ford Motor Company merging with a large number of car dealerships. Although the government often challenges vertical mergers, global competition has reduced antitrust scrutiny of vertical mergers. If this type of merger lowers costs by eliminating unnecessary supplier charges, U.S. firms will be more competitive in world markets.

Conglomerate merger

A merger between firms in unrelated markets.

A **conglomerate merger** is a merger between firms in unrelated markets. Suppose an insurance company buys a computer software company or a cigarette company merges with a hotel chain. Actual examples are Philip Morris merging with Miller Brewing Company and General Motors merging with Electronic Data Systems Corporation. No antitrust action was taken to prevent these mergers because the products of the two firms were considered to be unrelated. Conglomerate mergers are generally allowed because they do not significantly decrease competition.

Antitrust Policies in Other Countries

Early antitrust laws were aimed at the domestic economy with little concern for global competitiveness. Because of the internationalization of competition in recent decades, some economists call for a relaxation of antitrust laws to allow firms to merge and compete more effectively in the world economy. Other economists disagree and argue that strong antitrust laws are necessary because small firms create most jobs and innovations.

One reason firms in other countries are so competitive with U.S. firms is that other countries' antitrust laws are weak in comparison to U.S. antitrust laws. For example, no other country breaks up companies for antitrust violations. There are two basic explanations. First, most other countries have smaller populations than the United States. Because other countries have fewer potential customers, they view the global market as the target and design weak antitrust laws accordingly. Stated

differently, other countries must sell their products globally in order to achieve economies of scale and be competitive.

Second, other countries have weak antitrust laws based on their culture and history. In the United States, there is a strong belief in Adam Smith's individualistic competition among small firms. This "big is bad" ideology is the foundation of U.S. antitrust laws, but this belief is not prevalent in other countries. In other countries, "big is better," and in countries such as Japan and Germany, government and business work together to compete globally. In contrast, there is a general mistrust of big government working directly with big businesses in the United States.

REGULATION

The same distrust of big business that is the basis of antitrust laws also led to the evolution of regulation and federal regulatory agencies in the United States. The regulatory process in the United States has gone through several phases. In the first phase, from 1887 to the Great Depression, the railroads were the primary target. During the 1930s, the Great Depression created a favorable environment in which regulation spread to the communications, financial, and other industries. After 1970, regulation increased steadily in the areas of health, safety, and environment until the 1980s, when a deregulation movement began and it continued to have momentum in the early 2000s.

Historical Origins of Regulation

The Early Years The railroads came under regulation in the late nineteenth century as a result of their unfair pricing practices. At that time in history, railroads faced little competition from other carriers, so there was little to prevent railroads from overcharging. Railroads also practiced price discrimination against isolated rural customers by charging them higher rates for short hauls than they charged city customers for long hauls. In 1887, the Interstate Commerce Commission (ICC) was established to regulate rail prices and to cut the costs of rail transportation by reducing duplicate trains, depots, and tracks.

The Great Depression Era During the 1930s, regulation was extended to other industries. The Food and Drug Administration (FDA) was established in 1931 to oversee the safety of food and drugs. All surface transportation, including trucks, barges, and oil pipelines came to be regulated by the ICC. The Civil Aeronautics Board (CAB) was created in 1938 to regulate air travel, and the Federal Communications Commission (FCC) was established in 1934 to regulate telephones, telegraphs, and broadcasting industries. In 1934, as a result of the stock market crash of 1929, the Securities and Exchange Commission (SEC) was created to combat fraud and malpractice in the securities industry.

The Health, Safety, and Environment Era The Occupational Safety and Health Administration (OSHA) was created in 1970 to reduce the incidence of injury and death in the workplace. This agency cites and fines employers who violate safety and health rules. In the same year, the Environmental Protection Agency (EPA) was

established to set and enforce pollution standards. In 1972, the Consumer Product Safety Commission (CPSC) was established to protect the public against injury from unsafe products. The CPSC has the power to ban the sale of hazardous products.

The Deregulation Trend

In the 1970s, the higher production costs resulting from regulation generated widespread dissatisfaction with government regulation. The result was a movement toward **deregulation** in the late 1970s and 1980s. Deregulation is the elimination or phasing out of government restrictions on economic activity. Initially, the major thrust of deregulation was in the transportation and telecommunications industries. The Airline Deregulation Act of 1978 removed regulated airfares and restrictions against competition in air travel markets. The Staggers Rail Act of 1980 deregulated the railroads, the Motor Carrier Act of 1980 deregulated trucking, and the Bus Regulatory Reform Act of 1982 deregulated bus transportation. The Civil Aeronautics Board (CAB), established in 1938 to regulate airline fares and air routes, was abolished in 1984. The You're the Economist at the end of the chapter examines the effects on the airline industry.

In telecommunications, the most important case was the deregulation and dismantling of AT&T. As explained above, technological innovations made competition in telecommunications possible and as a result of an antitrust lawsuit, AT&T was broken up and forced to compete with MCI, Sprint, and other companies for long-distance service. In 1996, Congress passed a telecommunications bill that made additional changes in U.S. telecommunications. This bill deregulated cable television rates, while allowing local and long-distance telephone companies and cable companies to compete. This bill also required television manufacturers to equip new sets with a computer chip to block shows parents do not wish their children to watch.

For nearly 100 years, electricity was a regulated industry in the United States. Privately held utility companies obtained the right to operate a monopoly in exchange for government regulations that set rates and capped profits. In 1992, Congress started the deregulation movement for power companies when it approved the Energy Policy Act, which opened competition at the wholesale level. By 2001, 24 states and the District of Columbia had approved deregulation plans, but the California power shortage created a deregulation backlash (see You're the Economist on California electricity deregulation).

The principal functions of the federal regulatory agencies discussed are summarized in Exhibit 3.

THREE CASES FOR GOVERNMENT REGULATION

Government regulation involves political, social, and economic factors, and the general justification for regulation is to protect the public. In this section, we examine three basic situations in which regulation is often imposed: (1) natural monopoly, (2) externalities, and (3) imperfect information. In each of these cases, the argument in favor of regulation is *market failure*. Recall from Chapter 4 that market failure is a situation in which the market operating on its own fails to lead to an efficient allocation of resources.

Deregulation

The elimination or phasing out of government restrictions on economic activity.

Exhibit 3

Federal Regulatory Agencies

Agency	Year created	Function
Interstate Commerce Commission (ICC)	1887*	Regulated interstate ground transportation, including the railroad, trucking, bus, and water carrier industries.
Food and Drug Administration (FDA)	1931	Protects the health of the nation against impure and unsafe foods, drugs, and cosmetics. Develops policy regarding labeling of all drugs.
Securities and Exchange Commission (SEC)	1934	Provides for complete financial disclosure and protects investors in stock and other securities against fraud.
Federal Communications Commission (FCC)	1934	Regulates television, radio, telephone, and telegraph services; satellite transmissions; and cable TV.
Civil Aeronautics Board (CAB)	1938†	Regulated airline fares and routes.
Occupational Safety and Health Administration (OSHA)	1970	Enforces rules in cases involving safety and health violations in the workplace.
Environmental Protection Agency (EPA)	1970	Regulates pollution in the areas of air, water, waste, noise, radiation, and toxic substances.
Consumer Product Safety Commission (CPSC)	1972	Protects the public against unreasonable risks of injury from consumer products.

*Abolished in 1995.

†Abolished in 1984.

Natural Monopoly

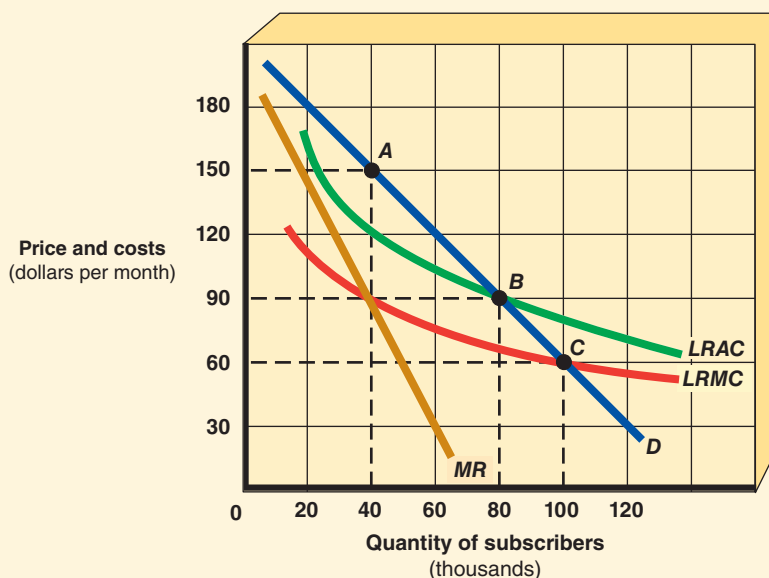
The objective of antitrust policy is to create a level playing field for competing firms. Depending on the case, antitrust policy can result in breaking up a monopoly, preventing formation of a monopoly, and/or punishing anticompetitive business practices of a monopoly. But, what happens when it is inefficient for more than one company to operate in a particular market? Stated another way, creation of a level playing field for competitors may not be in the best interest of economic efficiency. This situation exists in a *natural monopoly*. As explained earlier in Exhibit 1 in Chapter 9 on monopoly, a natural monopoly is an industry in which long-run average cost is minimized when only one firm serves the market. Recall that the services of such public utilities as local telephone, gas, electric, cable TV, and water companies are natural monopolies subject to government regulation. To avoid abuse of this type of monopoly, the prices or rates these public utilities can charge are determined by a federal, state, or local regulatory commission or board.

Exhibit 4 illustrates the demand curve, long-run marginal cost curve (*LRMC*), and long-run average cost curve (*LRAC*) for a natural monopoly in the cable TV market—say, a company called Vision Cable. Because of *economies of scale*, the *LRAC* curve is negatively sloped. Following the *marginal-average rule* explained in Chapter 7, the *LRMC* curve is below the falling *LRAC* curve. Given this condition, the firm's demand curve intersects the *LRAC* curve at a quantity of 80,000 subscribers and a

Exhibit 4

A Regulated Monopoly

If an unregulated monopolist serves the cable TV market, it will set $MR = LRMC$, charge a price of \$150 per month, and provide service to only 40,000 customers (point A). To improve the efficiency of the market by taking advantage of the lower costs of a natural monopoly, government regulators could set the price at \$60, which equals long-run marginal cost (point C). This policy is efficient, but losses require public subsidies. The typical solution is to set a “fair-return” price of \$90, which allows the monopolist to earn zero economic profit and serve 80,000 customers at point B. This condition does not fully correct the underallocation of resources caused by an unregulated natural monopoly.



cost of \$90 per month equal to the price (point B). Suppose this output is divided equally between Vision Cable and another cable company. As discussed earlier in Exhibit 1 of Chapter 9, the result of competition between cable TV companies is that the cost per subscriber is much higher—and even higher if output is divided among more than two cable companies.

To take advantage of the lower cost, the policy prescription is to create a cable TV market served by only one producer—Vision Cable. The policy problem now is how to keep this unregulated natural monopoly from enjoying a substantial monopoly profit. Instead of providing services for 80,000 customers, Vision Cable will service only 40,000 customers by following the $MR = MC$ rule to maximize profits. The price that corresponds to this output is \$150 per month at point A. Because the profit-maximizing price exceeds the $LRAC$ curve, monopoly pricing creates too high a price and too small an output. Stated differently, the result is an inefficient cable TV market in which there is an underallocation of resources to produce cable TV service.



You're The Economist Who Turned Out the Lights in California? *Applicable Concept: price ceiling regulation*



In order to keep electricity cheap for its state, the California legislature in 1996 set a retail ceiling price of 10 cents per kilowatt-hour. Moreover, no new power-generating plants were built during the 1990s. The plan was to require utilities to sell their power plants and import electricity as needed from the “spot market” through high-speed transmission lines from other states. In the deregulated wholesale electricity market, a spot market is one in which the price of electricity is determined by supply and demand conditions each hour.

The stage was set for the forces of supply and demand to “turn out the lights.” First, demand soared during a heat wave in the summer of 2000 as consumers turned on their air conditioners. Second, there was a leftward shift in supply. High natural gas prices increased the cost of producing electricity in all states. Also, low snowpacks and a drought in the Pacific Northwest reduced the capacity of hydroelectric dams in this region.

Facing shortages from both increased demand and decreased supply, California utilities had no choice but to buy electricity on the spot market as prices soared tenfold over their normal levels. Since customer rates were capped, the price paid by consumers did not cover what the utilities were paying for electricity. The utilities quickly found themselves facing bankruptcy, and this threat caused additional spot rate increases. Duke Power Company of North Carolina, for example, stated that 8 percent of its spot price was a premium to cover the risk of selling to California utilities that might not pay their bills. A subsequent investigation by the Federal Energy Regulatory Commission (FERC) reported evidence that power companies, such as Enron, developed strategies to drive up prices.

Faced with this crisis, Gray Davis, who was governor of California at the time, called for more price caps. He convinced the FERC to cap wholesale prices in the West during hours

of highest demand, combined with a daily regime of rolling blackouts, and calls for conservation. In April 2001, Davis abandoned the 1996 price ceiling, thus sharply increasing the retail electricity price.

ANALYZE THE ISSUE

Draw a graph illustrating California's electricity crisis. Put the label “Price of electricity (cents per kilowatt-hour)” on the vertical axis and “Quantity of electricity (megawatts per hour)” on the horizontal axis. As explained in Chapter 4, draw the changes in demand and supply for electricity in California described above. [Hint: Begin the graph in equilibrium below the price ceiling.]

For the cable television market to be efficient, regulators must set a price ceiling at \$60 per month, which is equal to long-run marginal cost at point C on the demand curve. This pricing strategy follows the competitive principle of **marginal cost pricing**. Marginal cost pricing is a system of pricing in which the price charged equals the marginal cost of the last unit produced. At a price of \$60, Vision Cable suffers a loss because although the price covers long-run marginal cost, the price is not high enough to cover long-run average cost. This means the firm can survive in the long run only if the government subsidizes the loss.

What to do? Is there an option that does not require taxpayers' money? Yes! In practice, regulatory commissions have relaxed the objective of efficiency and have focused on establishing a “fair-return” price to be charged by the monopolist.

Marginal cost pricing

A system of pricing in which the price charged equals the marginal cost of the last unit produced.

In Exhibit 4, the commission would establish the fair-return price at \$90 per month at point *B*, where the demand curve intersects the *LRAC* curve. Because the price ceiling equals long-run average cost, Vision Cable earns zero economic profit and serves 80,000 customers in the long run. However, remember from the chapter on production costs that in economics cost includes a normal profit, which is just enough to keep the firm in the cable industry.

CONCLUSION *Government regulators can achieve efficiency for a natural monopoly by setting a price ceiling equal to the intersection of the demand and the marginal cost curves, but this policy results in losses. An alternative is to set a price ceiling, called the fair-return price, that yields a normal profit, but is somewhat inefficient.*



CHECKPOINT

Why Doesn't the Water Company Compete?

The local water company is considered to be a natural monopoly, and the government prohibits other firms from competing with it. If a natural monopoly can produce water at a lower price than other firms, then why would the government protect the water company from competitors?

Externalities

The case of pollution was treated in detail in Exhibit 8(a) in Chapter 4. To refresh your memory, recall that the individual firm in a competitive market has no incentive to eliminate pollution voluntarily. Pollution is an *external cost* imposed on *third parties* who neither produce nor consume a good. Pollution causes polluting firms to overproduce, while causing firms that pay the cost of cleaning up the pollution to underproduce. Therefore, expenditures on pollution control would place firms at a competitive disadvantage with respect to firms that do not pay the cost of controlling pollution. If society wants less pollution, this type of market failure justifies government regulation from, say, the EPA. The exact nature of the regulation, however, may take a variety of forms ranging from direct controls requiring specific pollution-control equipment to taxation.

Without repeating the explanation given in Exhibit 8(b) in Chapter 4, note that the *external benefits* of a good, such as a vaccination, can lead to underproduction of the good. Again, regulation is necessary if society is to respond to externalities. In this case, the government solution can take various forms including requiring consumption or providing special subsidies.

Imperfect Information

In some cases, consumers lack important information about a product and they cannot make rational decisions. Without complete and reliable information, consumers may be unaware of the dangers of unsafe drugs, hazardous chemicals, and defective products. The source of imperfect information about products may be

You're The Economist

Does Airline Deregulation Mean Friendlier Skies?

Applicable Concept: regulation versus deregulation



A much publicized case of deregulation is the airline industry. Under regulation by the Civil Aeronautics Board (CAB), airfare competition and the incentive to control costs were reduced or eliminated. The CAB set both fares and routes for carriers. Unable to compete with price, the carriers could compete only with costly nonprice competition such as advertising. Once the CAB authorized a carrier to provide service between two cities, the frequency of service remained unregulated. When carriers purchased fleets of planes and provided too many flights for their protected routes, profits were squeezed because the percentage of seats filled with passengers (load factor) fell, and the average cost rose. Carriers would then attempt to boost profits by lobbying the CAB for higher fares. In addition to eliminating price competition between established carriers, the CAB restricted entrants into the industry. From 1938 until 1977, the CAB never awarded a major route to any new airline.

Successful deregulation of an industry would be expected to provide the following three results:

- The average price of the service falls.
- The volume and variety of services rise.
- New firms enter the industry, and other firms fail and exit the industry.

The Airline Deregulation Act of 1978 provided these results by

changing the structure and business behavior of the airline industry. Although the Federal Aviation Administration (FAA) would still regulate the safety of air service, the CAB was eliminated under this act in 1984, and price competition produced the expected results of lower fares and greater quantity of service. The average passenger price per mile for a flight declined from 1978 to less than half that rate in 2008 on an inflation-adjusted basis, saving consumers billions of dollars in lower fares.¹ Over this same period, the fall in fares contributed to more than a tripling of passenger miles flown per year from 227 billion to 811 billion.²

The airline deregulatory movement is not without criticism. One concern is that lots of airlines went “belly up,” and these exits from the industry increased the percentage of all domestic air travel controlled by the industry’s largest carriers. Moreover, under the pressure of competition, carriers searched for ways to cut costs, and they created the hub-and-spoke delivery system. This system allows carriers to gather passengers from the “spoke” routes by using smaller, less efficient planes and fly them from the hub in fully occupied, bigger planes at lower cost. Many carriers have gained near monopoly power in “hub” airports. These dominant hub carriers can control access to terminal gates, takeoff time slots, and baggage service, and they can charge smaller lines high rates for using these airport rights.



© Image copyright Dmitrijs Dmitrijevs, 2009. Used under license from Shutterstock.com

Today, deregulation continues to exert downward pressure on fares, and old-guard carriers scramble to compete with low-cost carriers such as Southwest and Jet Blue. Low-fare tickets, cyberfares, and frequent flyer miles are popular. Quality of service is higher measured by fewer consumer complaints today than in the regulation era.³ Should the airlines remain deregulated or return to a government-enforced cartel? Critics point to airlines that are in financial trouble. Defenders of deregulation argue that growth of market concentration and its abuses can be controlled by enforcing antitrust laws and allowing global competition.

ANALYZE THE ISSUE

Prior to deregulation, critics argued that airline safety would suffer. Instead, although the Federal Aviation Administration’s budget was cut following deregulation, the accident rate involving fatalities has fallen. Give a rationale for why the critics’ prediction did not come to pass.

1. Annual Passenger Yields: U.S. Airlines, http://www.airlines.org/economics/DataAnalysis/Pages_Admin/DataAnalysis.aspx.

2. Statistical Abstract of the United States, 2010, <http://www.census.gov/compendia/statab>, Table 1037.

3. Ibid., Table 1045.

a company error. Much worse, companies may be able to boost sales by withholding valuable information about a problem with their products.

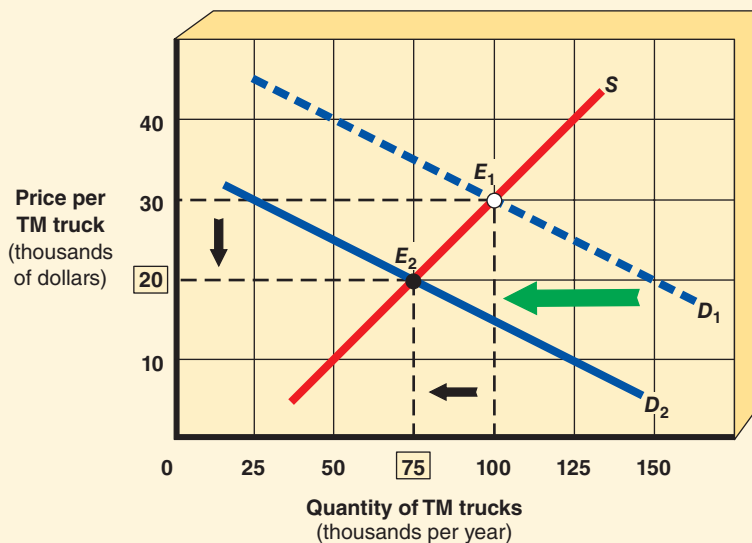
Let's consider a hypothetical case in which an unsafe Tucker Motors (TM) truck is sold. Suppose the safety defect is a gas tank that is located too close to the side of the truck. As a result, another vehicle can crash into the side of the TM truck and hit the gas tank. Such an accident can cause a deadly explosion. Assume further that TM is aware of this safety problem but the cost of recalling and fixing the trucks exceeds the estimated cost of lawsuits caused by the defective gas tanks. The market incentive is therefore for TM to withhold knowledge of this defect from uninformed consumers.

Exhibit 5 illustrates this case. With consumers unaware of the defect, the interaction of the supply and demand curves for TM trucks yields an equilibrium at E_1 , with 100,000 trucks being sold per year at a price of \$30,000 per truck. Next,

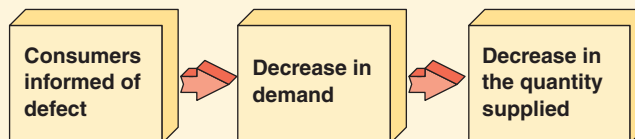
Exhibit 5

The Impact of Imperfect Information on the Market for TM Trucks

An initial equilibrium is established at point E_1 , with 100,000 TM trucks purchased each year for \$30,000 per truck. This equilibrium is reached without consumers having knowledge of a safety defect. Once consumers are informed of the safety defect, the demand curve shifts leftward from D_1 to D_2 . At the new equilibrium point of E_2 , 75,000 TM trucks are purchased each year for \$20,000 per truck. Thus, imperfect information has resulted in a waste of the resources used to produce 25,000 TM trucks.



CAUSATION CHAIN



suppose the Consumer Product Safety Commission (CPSC) exposes the problem and the media report stories about crash victims who have been severely burned or even killed by the flames from the exploding gas tanks in TM trucks. Once the consuming public is aware of the defect, consumers' preferences for TM trucks change, and the demand curve decreases from D_1 to D_2 . The result is a new equilibrium at E_2 , with 75,000 TM trucks being sold per year at a price of \$20,000 per truck. In other words, this case is an application of market supply and demand analysis as presented in Chapter 4.

CONCLUSION *Deficient information on unsafe products can cause consumers to overconsume a product.*

In the TM truck example, resources were used to produce 25,000 trucks that consumers would not purchase when given complete information. These resources were misallocated because they could have been used to produce other goods and services. The solution is for government to prevent companies from making false or deceptive claims by gathering and disseminating accurate information to consumers. This is the rationale for the safety testing of cars, EPA mileage ratings on cars, and warning labels on cigarettes. In extreme cases, a product may be deemed too unsafe, and it is outlawed from sale. Others disagree with this view and argue that the government should only provide information. Once consumers have sufficient information, they should be free to choose.

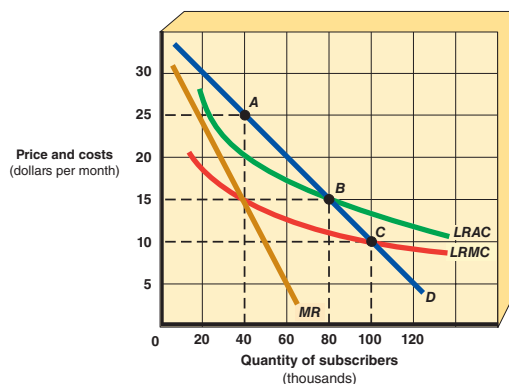
Key Concepts

Trust	Robinson-Patman Act of 1936	Conglomerate merger
Predatory pricing	Celler-Kefauver Act of 1950	Deregulation
Sherman Act of 1890	Rule of reason	Marginal cost pricing
Clayton Act of 1914	Per se rule	
Federal Trade Commission Act of 1914	Horizontal merger	
	Vertical merger	

Summary

- A **trust** is a cartel that places the assets of competing companies in the custody of a board of trustees. During the last decades of the nineteenth century, trusts engaged in anticompetitive strategies, such as *predatory pricing*, to eliminate competition and raise prices.
- The **Sherman Act of 1890** and the **Clayton Act of 1914** are the two most important antitrust laws. The Sherman Act marked the first attempt of the U.S. government to outlaw monopolizing behavior. Because this act was vague, the Clayton Act was passed to define anticompetitive behavior more precisely. The Clayton Act prohibited (1) price discrimination, (2) exclusive dealing, (3) tying contracts, (4) stock acquisition of competing companies, and (5) interlocking directorates.
- The **Federal Trade Commission Act of 1914** established the Federal Trade Commission (FTC) to investigate unfair competitive practices of firms.
- The **Robinson-Patman Act of 1936** strengthened the Clayton Act by prohibiting certain forms of price discrimination. This law is called the “Chain Store Act” because it was aimed at large retail chain stores that were obtaining volume discounts.
- The **Celler-Kefauver Act of 1950** strengthened the Clayton Act by declaring illegal the acquisition of the assets of one firm by another firm if the effect is to lessen competition.
- The **rule of reason** and the **per se rule** are the two main doctrines the courts have used in interpreting antitrust law. Under the rule of reason, monopolists were not subject to prosecution unless they acted in an anticompetitive manner. The court’s decision in the Alcoa case of 1945 replaced the rule of reason with the per se rule, which states that the mere existence of monopoly is illegal. Today, the trend is in favor of dominant firms because of global competition.
- A **horizontal merger** is a merger of two competing firms. A **vertical merger** is a merger of two firms in which one produces an input used by the other firm. A **conglomerate merger** is a merger of two firms producing unrelated products.
- **Deregulation** is a movement that began in the late 1970s and the 1980s to eliminate regulations primarily in the transportation and telecommunications industries. Today, the movement to further deregulate electric utilities is being questioned.
- **Marginal cost pricing** is a competitive pricing strategy for a regulated natural monopoly. Using this approach, regulators set the monopolist’s price equal to its marginal cost. Another method is for regulators to establish a fair return price equal to long-run average cost, and the monopolist earns zero economic profit. Regulation of a natural monopoly is justified on the basis of market failure. Two other cases based on market failure include externalities and imperfect information.

Marginal Cost Pricing



Summary of Conclusion Statements

- Government regulators can achieve efficiency for a natural monopoly by setting a price ceiling equal to the intersection of the demand and the marginal cost curves, but this policy results in losses. An alternative is to set a price ceiling, called the fair-return price, which yields a normal profit, but is somewhat inefficient.
- Deficient information on unsafe products can cause consumers to overconsume a product.

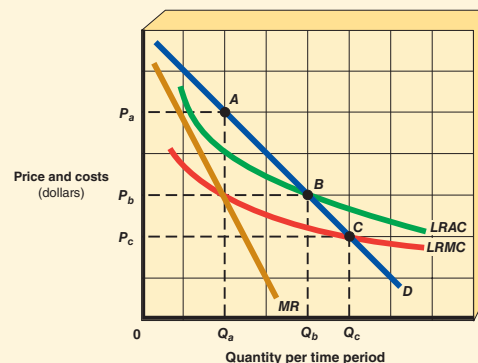
Study Questions and Problems

1. Describe the major provisions of the Sherman Act and the Clayton Act. Who is responsible for enforcing these laws?
2. Two business practices outlawed by the Clayton Act are tying contracts and interlocking directorates. Explain the condition required for these two practices to be a violation of this antitrust law.
3. Distinguish between the Robinson-Patman Act of 1936 and the Celler-Kefauver Act of 1950.
4. Using cases presented in the text, explain the issue in the courts' interpretation of "monopoly versus monopolizing."
5. A controversy in many antitrust court cases involves the definition of the relevant market for a firm's product. How would you argue in the Alcoa case that the government's claim of the firm's high market share was in error?
6. In the MIT case, which students are harmed by the Ivy League schools' coordination of scholarship policy? Professional baseball is exempt from antitrust laws. Should colleges and universities also be exempt from antitrust laws?
7. Based on the antitrust laws, how would you expect the federal government to react to the following situations?
 - a. A college bookstore deliberately reduces prices until its only rival is driven out of business. The bookstore then raises its prices.
 - b. Real estate firms meet in an open meeting and agree to charge 6 percent commission on sales.
 - c. Microsoft merges with Apple by a stock acquisition.
 - d. A small tax preparation company merges with a regional grocery store chain.

8. Based on the cases discussed in the chapter, is the following statement correct? “The antitrust laws in reality deal less with monopolies than with oligopolies.”
9. Assume a regulatory agency is given authority over prices and entry conditions for a given industry. Also assume the agency decides to allow new entry, as the CAB actually did before deregulation, only when it is proven to be “necessary.” Would this condition be expected to favor (a) existing regulated firms, (b) new entrants, or (c) consumers? Explain.
10. Exhibit 6 represents a natural monopolist.
 - a. If the monopolist is not regulated, what price will it charge, and what quantity will it produce?
 - b. If the monopolist is required to use marginal cost pricing, what price will it charge, and what quantity will it produce? Why will the monopolist stay in business?
 - c. Assume regulators set a fair return price at P_b . Why would the monopolist stay in business?
11. Assume a natural monopolist is required to use marginal cost pricing and a government subsidy covers the loss. What problems might be associated with a public subsidy?
12. Do you agree that “cost does not really matter” as a principle for safety regulation, or do you believe that the cost of a safety device must be justified on the basis of the value of human life protected from a hazard?

Exhibit 6

Natural Monopolist



For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Does Price-Fixing Improve Your Education?

Accepting the schools' argument that they improve quality by price-fixing makes no more sense than allowing General Motors, Ford, DaimlerChrysler, and Japanese automakers to fix prices in order to improve quality. However, there is often a thin line

between price-fixing and price leadership. Price leadership is not illegal as long as the price followers are not coerced. If you said price leadership is defensible and price fixing is not, **YOU ARE CORRECT.**



Why Doesn't the Water Company Compete?

Suppose new firms are allowed to compete with the water company, which is a natural monopolist. The concern is that the rivals will be outcompeted. New water companies must build plants, dig up the streets, and lay new water pipes and duplicate other resources in the same neighborhood. Because the competitors cannot produce

water at a lower cost, they will leave the industry, and the resources used to compete with the natural monopolist will be wasted. If you said the government is not protecting the natural monopolist from competition so much as it is protecting against inefficient competitors wasting resources, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- Which of the following is illegal under the Sherman Act?
 - Attempts to monopolize
 - Price-fixing
 - Formation of cartels
 - All of the above are illegal.
- Officers of five large building-materials companies meet and agree that none of them will submit bids on government contracts lower than an agreed-upon level. This is an example of
 - price-fixing.
 - vertical restriction.
 - a tying contract.
 - an interlocking directorate.
- A fabric shop cannot sell Singer sewing machines if it also sells other brands of sewing machines. This is an example of
 - resale price maintenance.
 - territorial restrictions.
 - a tying agreement.
 - an exclusive dealing.
- Under the Clayton Act, horizontal mergers by stock acquisition were
 - not considered.
 - illegal if they could be shown to lessen competition.
 - illegal under any circumstances.
 - legal if they could be shown not to lessen competition.
- Under the Clayton Act, which of the following was illegal even if it was *not* shown to lessen competition substantially?
 - Price discrimination
 - Tying contracts
 - Horizontal mergers by stock acquisition
 - Interlocking directorates
- The importance of the Federal Trade Commission Act of 1914 is that it
 - set up an independent antitrust agency with the power to investigate complaints.
 - strengthened the law against mergers.
 - strengthened the law against price discrimination.
 - did none of the above.
- Which of the following is concerned primarily with price discrimination?
 - Sherman Act
 - Clayton Act
 - Robinson-Patman Act
 - Celler-Kefauver Act
- Which of the following is concerned primarily with mergers?
 - Sherman Act
 - Clayton Act
 - Robinson-Patman Act
 - Celler-Kefauver Act
- The Utah Pie case was brought under which of the following laws?
 - Sherman Act
 - Federal Trade Commission Act
 - Robinson-Patman Act
 - Celler-Kefauver Act

Practice Quiz Continued

10. Although U.S. Steel controlled nearly 75 percent of the domestic iron and steel industry, in 1920 the Supreme Court ruled that the firm was *not* in violation of the Sherman Act because there was no evidence of abusive behavior. What antitrust doctrine was the Court applying in this case?
- The rule of reason
 - The per se rule
 - The marginal cost pricing rule
 - The natural monopoly rule
11. In which antitrust case did the courts first apply the per se rule to determine whether a firm was in violation of the Sherman Act?
- Standard Oil case
 - Alcoa case
 - IBM case
 - MIT case
12. The Interstate Commerce Commission (ICC) was established in
- 1887.
 - 1890.
 - 1929.
 - 1933.
13. Today, the Civil Aeronautics Board (CAB) regulates
- airline ticket prices.
 - airline routes.
 - airline safety.
 - all of the above.
 - none of the above; the CAB was abolished in 1984.
14. Which of the following provides the basis for regulation?
- Natural monopoly
 - Externalities
 - Imperfect information
 - All of the above
15. Consider a regulated natural monopoly. If the regulatory commission wants to establish a fair return price, then it should set a price ceiling where the demand curve crosses the monopoly's long-run
- marginal revenue curve.
 - average revenue curve.
 - marginal cost curve.
 - average cost curve.

Environmental Economics



The United States is the envy of many of the world's citizens for its quality of life. Americans can choose from an almost unlimited number of goods and services. When it comes to transportation, for example, the typical family may own two or three cars. This same family may own touring bikes, mountain bikes, and hybrid bikes that incorporate features of each. Some U.S. citizens own boats, and others own jet skis. Those in colder climates may get around on skis, snowshoes, or snowmobiles. Some families even own their own planes. The choice of what to buy in the United States is a private decision. I will choose a snowmobile over snowshoes if I want to travel fast and am willing to spend the money. I will choose a jet ski over a kayak if I find high-speed travel more exciting than paddling along quietly. While my choice is private, my decision has consequences for others.

My jet ski may create waves that threaten to tip your kayak. The noise I make may spoil your desire for peace and quiet. It may also scare wildlife. And the fuel I use to power the jet ski not only adds to fuel consumption, but can contribute to water pollution. Engine exhaust may even make a small contribution to carbon emissions, which may contribute to climate change. Many fear that global warming is causing melting of the polar ice caps, resulting in rising ocean levels and massive

flooding of coastal areas throughout the world, as well as climate shifts that could render today's farms tomorrow's deserts.

Up to this point, the competitive market has been shown to be the best engine to generate what consumers want at the lowest possible price. Yet the unbridled use of many of these goods, from jet skis and snowmobiles to Coke cans and cigarettes, may not be the best choice for society or the planet. Competitive markets work well when producers and consumers consider all costs in their decisions. But for some goods and services, decision makers fail to include the cost to others of their decision, such as revving the jet ski or snowmobile to the detriment of others, or throwing the Coke can or cigarette butt out the car window. Although these are local problems, other problems are global in scale, such as carbon emissions from gasoline-burning engines that many believe cause global warming. This chapter will begin by showing why competitive markets may fail to sufficiently protect the environment. First, we will see that competitive markets result in market failure by producing "too much pollution." Then we will see how we might correct the market failure. Finally, we will consider the pros and cons of government intervention to improve our environment.



In this chapter, you will learn to solve these economics puzzles:

- Why do competitive markets produce too many hogs and charge too low a price for those hogs?
- How can government legislation, taxes, and permits help society achieve its environmental goals?
- Can government intervention actually reduce environmental quality?

COMPETITIVE MARKETS AND ENVIRONMENTAL EFFICIENCY

While society values goods and services produced in markets, it also values air, water, and other environmental amenities. Air and water are shared resources that generally are not priced in the marketplace. The result is that markets often treat these resources as if they were free, resulting in their overuse. Competitive markets, which are the ideal in efficiently allocating many goods and services, fail to achieve preferred levels of output when they treat valuable resources such as air and water as if they were free.

The competitive market has been shown in earlier chapters to achieve *economic efficiency*. This efficiency exists when the price to consumers, reflecting marginal benefit, equals marginal cost. Consumers, such as jet ski buyers, consider purchase price, styling, and performance features, such as speed, when comparing models. Producers choose what type of jet ski to make based on profit maximization. Assuming perfect competition, profit maximization occurs where price equals marginal cost.

Buyers and sellers consider only their personal or **private benefits and costs**. Private benefits and costs are benefits and costs to the decision maker, ignoring benefits and costs to third parties. Third parties are people outside the market transaction who are affected by the product. As explained in Chapter 4, benefits and costs to third parties are known by a variety of names, including third-party effects, spillovers, and most commonly *external benefits and costs* or *externalities*. Recall that externalities are benefits or costs that are not considered by market buyers and sellers. Noise pollution is an externality that affects third parties not powering jet skis.

Other externalities that degrade the environment include sulfur emissions from coal-burning electric power plants and the emission of chlorofluorocarbons (CFCs) associated with aerosol sprays and air conditioners. Sulfur emissions are widely thought to contribute to acid rain, resulting in tree deaths and fish kills. CFCs may be linked to a hole in the atmosphere's ozone layer, which increases the chance of skin cancer from the sun's ultraviolet rays. While CFCs have declined greatly as a result of a worldwide agreement known as the Montreal Protocol, the ozone hole is not expected to disappear before 2050. Automobile emissions contribute to air pollution, which reduces visibility and impairs health.

Private benefits and costs

Benefits and costs to the decision maker, ignoring benefits and costs to third parties. Third parties are people outside the market transaction who are affected by the product.

Everyday externalities include the secondhand effects of cigarette smoke on the health of nonsmokers, as well as cigarette butts tossed out of car windows, farmers' use of pesticides that wash into soil and water with detrimental health effects, and even noise from your next-door neighbor who is having a loud party while you are trying to study for an economics exam. Externalities can be positive as well as negative. You benefit from your classmate's decision to get a flu vaccine.

When externalities are present, competitive markets are not likely to achieve economic efficiency. In competitive markets, price, which reflects marginal private benefit, equals marginal private cost. Efficiency for society requires consideration of both private and **social benefits and costs**. Social benefits are the sum of benefits to everyone in society, including both private benefits and external benefits. Social costs are the sum of costs to everyone in society, including both private costs and external costs. The condition for economic efficiency occurs when each unit of a good that is produced creates at least as much benefit to society as it does social cost. As a society, we do not want to produce any units of a good that creates more in additional social cost than it creates in extra social benefit. In other words, we do not want our scarce resources used up on items that will not enhance our collective well-being. A succinct way of stating this condition for maximizing social welfare is to produce units of any good up to the point where

$$\text{Marginal social benefit} = \text{Marginal social cost}$$

Environmental regulations force market participants to include externalities in their decision making. For example, United States regulations prohibit the use of CFCs in air conditioners, aerosol cans, and other products. Although regulations like the ban on CFCs reduce emissions, they are not necessarily the most efficient approach to achieving less pollution.

Alternatively, instead of mandating the technology to achieve the goal, the government can specify the goal, but leave the method to achieve the goal up to the firm. Suppose businesses wish to expand in areas with high levels of pollution. As an alternative to reducing their own emissions, they can pay another party to reduce its emissions to meet the regulation. For example, a steel company wishing to expand can buy up old cars and retire them as a way of reducing emissions. It may be cheaper for the company to pay someone else to reduce emissions than to achieve an in-house reduction. While the primary purpose of the government's 2009 Cash for Clunkers program was to stimulate car sales, a secondary purpose was to substitute new, high-mileage, low-polluting vehicles. We discuss this approach in more detail later in the chapter in the section on emissions trading.

Private and Social Costs

When a producer of jet skis or any other product chooses a production method, the producer is motivated by profit maximization. To maximize profit, the firm must choose the most efficient, least costly production method. Production costs include the costs of capital, labor, natural resources (such as land or energy), and entrepreneurship. External costs to others, such as pollution, are not included in production costs because the firm considers only its private costs. Social costs include private costs and external costs.

Social benefits and costs

The sum of benefits to everyone in society, including both private benefits and external benefits. Social costs are the sum of costs to everyone in society, including both private costs and external costs.

Competition and External Costs

Suppose large amounts of carbon emissions are produced by gasoline-powered lawn mowers. To reduce pollution, the manufacturer must redesign the engine. Also, suppose there is a lawn mower manufacturer, GreenAcres, that considers social costs. It will choose a different production method for lower-emissions lawn mowers. This production method for lower-emissions lawn mowers must have a higher cost than the method used by other, more polluting lawn mowers produced by other firms. If this were not the case, other companies would already be using this method.

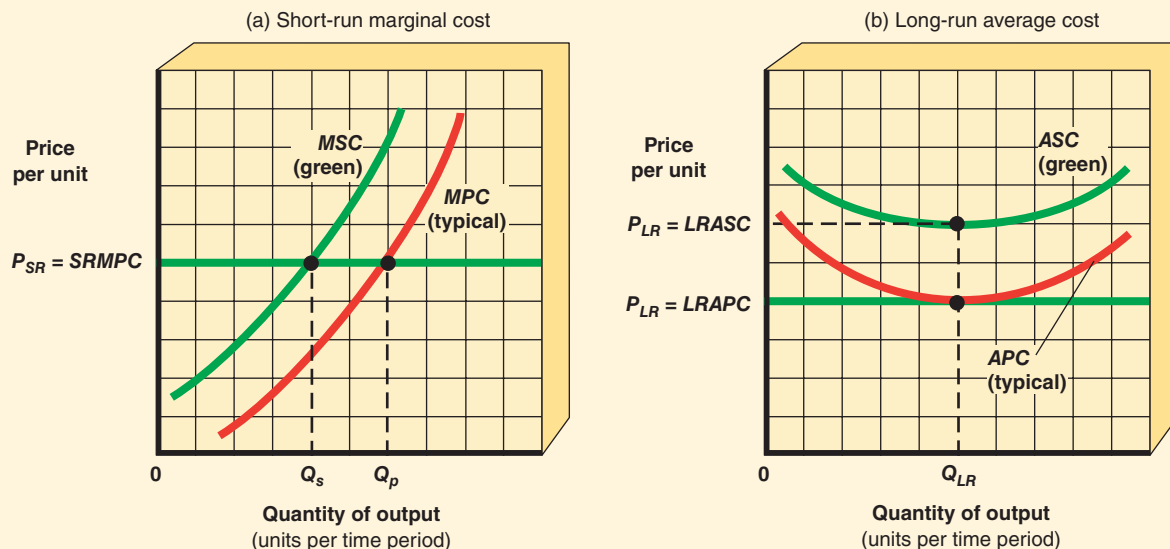
In a perfectly competitive market, consumers perceive all products as identical. While there may be exceptions, the typical consumer will pay no more for an environmentally friendly GreenAcres mower than for other lawn mowers. In the short run, GreenAcres will earn less than other firms because its costs are higher. In the long run, GreenAcres will lose money and eventually go out of business. Only the lowest-cost firms will survive in the long run. Since price exactly equals minimum private average (and marginal) cost in the long run, average cost for the environmentally conscious company will lie above price, resulting in losses and eventual exit from the industry.

Exhibit 1(a) compares the typical and the “green” lawn mower companies in the short run. Exhibit 1(b) compares the two companies in the long run.

Exhibit 1

A Comparison of Costs for Typical and “Green” Firms

A “green” firm has higher costs in both the short run and the long run. The typical firm considers only private costs, as shown by *MPC* (marginal private cost) in part (a) and *APC* (average private cost) in part (b). The “green” firm includes both private and external costs, as shown by *MSC* (marginal social cost) in part (a) and *ASC* (average social cost) in part (b). These curves reflect social costs. In the short run, price in a competitive industry equals marginal private cost. The “green” firm produces a smaller quantity than the competitive firm. In the long run, price equals minimum long-run average private cost in a competitive industry. Minimum cost for the “green” firm is above price, so the “green” firm loses money and eventually leaves the industry.



The typical company chooses the lowest-cost method of production considering *private cost* only. Its marginal private cost and average private cost are shown as MPC and APC , respectively. The “green” company chooses the production method that has the lowest marginal and average *social cost*, shown as MSC and ASC , respectively. In the short run, MSC lies above MPC , so that the “green” company produces less. In the long run, ASC lies above APC , so the “green” company loses money and eventually exits the industry.

Competitive Market Inefficiency When Externalities Exist

In competition, only firms that choose the lowest-cost method of production will survive. Firms that choose higher-cost methods will lose money and eventually exit the industry. There is no room for GreenAcres or any firm that does not minimize cost.

Rewarding firms that ignore externalities while punishing firms that recognize externalities is not socially efficient. Efficiency requires that price reflect marginal social benefit and equal marginal social cost. Competition results in a price that reflects marginal private benefit and equals marginal private cost. Efficiency requires that all relevant opportunity costs be included in marginal social cost, while competition forces firms to consider only private costs if they are to survive. If they are allowed to, competitive firms will ignore harmful by-products of their products, such as pollution, climate change, and congestion.

Exhibit 2 shows lawn mower market equilibrium in a competitive market of traditional firms compared to a market of environmentally sensitive “green” firms. Competitive industry supply, S_p , sums the *marginal private costs* of “typical” individual firms that ignore externalities, while “green” industry supply, S_g , sums the *marginal social costs* of GreenAcres and other firms that recognize external costs in their engine design.

When externalities are present, competition leads to a lower price and a larger quantity than the socially efficient point (also see Exhibit 8(a) in Chapter 4). By ignoring external costs, competitive firms produce “too much,” and the market equilibrium price is “too low,” compared to a socially efficient industry. Competition leads to too many lawn mowers bought and sold because neither the buyers nor the sellers take into account the external cost of lawn mower engines that release emissions when used for mowing. When there are external costs, the efficient point is at the intersection of the demand curve and the social supply curve, S_g .

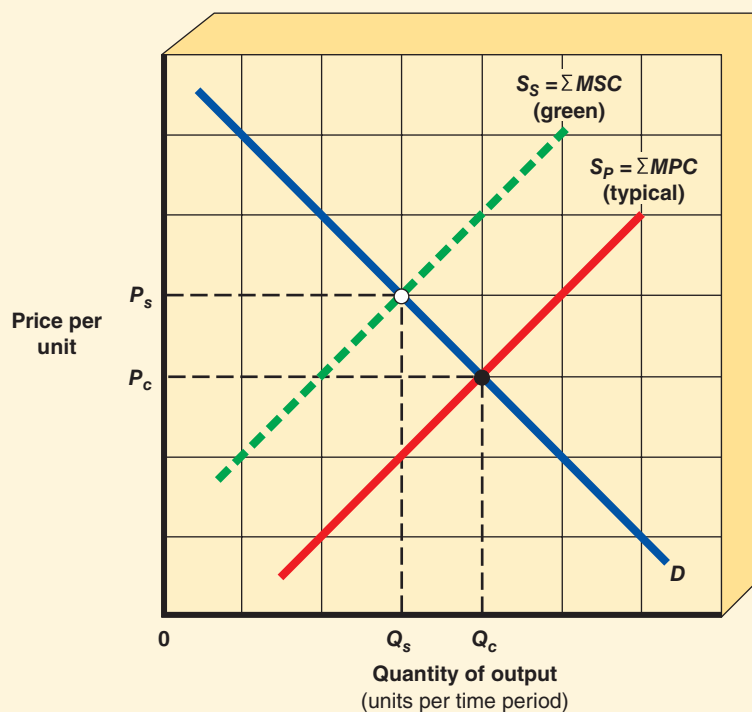
From society’s point of view, the efficient outcome is an equilibrium quantity of Q_s lawn mowers sold at price P_s . Associated with this outcome is a smaller quantity of pollution than the quantity at the competitive equilibrium. The quantity of pollution associated with quantity Q_s of lawn mowers is the efficient quantity of pollution.

If left to the competitive market, profit-maximizing producers would have no reason to reduce emissions. Emissions reductions, if they occurred at all, would be only an unintended by-product of technological change. For example, if manufacturers substitute a smaller engine so as to reduce lawn mower fuel use, the smaller engine would emit fewer pollutants. The emissions reduction is a by-product of the market reward for a more fuel-efficient mower, which consumers want and are willing to pay for. For emissions reduction to be worthwhile in its own right in a competitive market, it is necessary that consumers be willing to pay for a lower-emissions mower.

Exhibit 2

A Comparison of Equilibriums for Typical Competitive and “Green” Industries

A typical competitive industry operates at price P_c , below the socially efficient price P_s , which would be charged by “green” firms, including all social costs. The competitive industry produces too large a quantity Q_c , compared to the socially efficient quantity Q_s , and charges too low a price, P_c , compared to the socially efficient “green” industry price, P_s .



Why won't consumers offer more for a cleaner mower, just as they might for a more fuel-efficient one? First, consider choosing between two mowers that are identical except that one mower uses one gallon of gas per acre, while the other uses two gallons per acre. You will be willing to pay more for the first mower because you will get to keep the full monetary benefit of reduced fuel purchases.

Now suppose you must choose between two identical mowers except that the “green” mower emits only half as much pollution as the other one. The typical consumer will not be willing to pay more for the “green” mower because individually he or she will get only a negligible benefit. Benefits will extend to everyone, in the form of cleaner air and reduced global warming. Furthermore, if others buy “green” mowers, you will get the benefits whether or not you purchase a low-emissions machine. You are better off being a *free rider*. Recall from the definition of a public good in Chapter 4 that a **free rider** is someone who enjoys benefits without paying the cost. You will get the same benefit of cleaner air whether or not you buy the clean mower. So you will choose to be a free rider and pay nothing for cleaner air,

Free rider

An individual who enjoys benefits without paying the costs.

rather than paying extra to get a low-emissions machine and still breathing the same cleaner air.

The end result is that no one buys a low-emission mower. Each individual chooses to free-ride, hoping to benefit from others who choose the “green” model. Once again, competitive markets are unlikely to be efficient.

CONCLUSION *Unregulated competitive markets will oversupply and underprice products that pollute.*

Efficient Quantity of Pollution

The efficient production level for society is where marginal social benefit equals marginal social cost. The efficient amount of pollution is the amount generated at the socially efficient output level. It is of utmost importance to recognize that the efficient quantity of pollution is not zero. Zero pollution would require zero lawn mowers. Unless society is willing to abandon the American ideal of a neatly trimmed, emerald green lawn, there will continue to be lawn mowers. Nor is it likely that many Americans will return to manual push mowers that do not require fuel, but are slower and take more effort to use than gasoline-engine mowers.

Other alternatives to consider are reduced-emission or emission-free lawn mowers, such as electric mowers. For a parallel situation, consider alternatives to conventional gasoline-engine automobiles. Alternatives include solar and electric vehicles, as well as other transport modes, such as bus, rail, and bicycle. Solar cars, powered by photovoltaic cells, and hydrogen-powered cars are among the virtually emission-free alternatives. But a fundamental concept in economics is that there are trade-offs. Currently, the cost of solar and hydrogen cars is too high given society’s unwillingness to pay for reduced emissions. Performance may suffer as well; solar cars, for example, are slower and less able to climb mountainous terrain than gasoline-powered cars.

ACHIEVING ENVIRONMENTAL EFFICIENCY

Competitive markets fail to produce the socially efficient quantity when there are externalities. Externalities are a cause of **market failure**. As explained in Chapter 4, market failure occurs when the private market fails to produce society’s preferred outcome.

When there is market failure, we must consider alternatives to the market to achieve efficiency. Government has a potential role when market failure occurs. Just as government can apply antitrust laws when an industry is not competitive, government can apply environmental laws when an industry ignores external costs. Not only are cars required to have catalytic converters, but many states also require annual inspections to make sure the converters are working properly (and also to check that consumers have not removed the converters in order to improve gas mileage!).

Market failure

A situation in which market equilibrium results in too few or too many resources used in the production of a good or service.

Government failure
Government intervention or lack of intervention that fails to correct market failure.
Incentive-based regulations
Government regulations that set an environmental goal, but are flexible as to how buyers and sellers achieve the goal.
Command-and-control regulations
Government regulations that set an environmental goal and dictate how the goal will be achieved.

In the environmental arena, as in other areas of government intervention, there is always the possibility of **government failure**. Government failure occurs when the government fails to correct market failure. Government officials may fail to achieve an efficient outcome either by doing too little about pollution or by doing too much.

Government officials motivated to keep their jobs may be influenced by large campaign contributors as well as by voter desires. A Michigan legislator is likely to be sympathetic to the concerns of the auto industry and will also be aware of the autoworker layoffs and unemployment that accompany reduced car production. The official may be less motivated by externalities that are borne by third parties who do not vote in Michigan. On the other hand, a New York legislator may support an overly strict emissions standard for automobiles. New York voters benefit from cleaner air and are less concerned about auto-industry job losses.

Much of the effort of environmental economists has gone toward improving the odds that government will help, rather than hinder attempts to reach environmental goals. Economists generally favor **incentive-based regulations** over **command-and-control regulations**. Incentive-based (IB) regulations set an environmental goal, but are flexible as to how buyers and sellers achieve the goal. Incentive-based regulations can make it profitable for firms to reduce emissions. Command-and-control (CAC) regulations set an environmental goal and also dictate how the goal will be achieved. Firms unable to meet the goal are penalized, and those that exceed it are not rewarded.

The advantage of IB over CAC regulations is comparable to the advantages of a market system over a command system. Market systems are more efficient because they allow gains from comparative advantage. Businesses can pursue activities with low opportunity costs. Similarly, allowing firms to choose how to achieve environmental goals encourages firms that can improve at low cost to reduce emissions more than firms less able to achieve lower emissions.

More efficiency gains are obtainable from IB regulations than from CAC regulations in both the short run and long run. In the short run, allowing firms to choose how they will reduce emissions is more efficient than prescribing a single approach because firms incur different opportunity costs to lower emissions. In the long run, firms have an incentive to further reduce emissions by improving their technology. It is possible, though unlikely, that CAC regulations will be as efficient as IB regulations in the short run, just as it is possible, though unlikely, that a command system will happen to choose the lowest-cost method of production. In the long run, however, command systems do not encourage innovative technology. There is no reward for improving, only a penalty for not meeting the standard. Let's consider how CAC and IB regulations reduce auto emissions.

Command-and-Control Regulations

In the 1970s, the U.S. government mandated the use of catalytic converters to reduce auto pollutants. The converter results in reduced hydrocarbon emissions associated with the burning of gasoline. While the catalytic converter undoubtedly reduces pollution, it suffers from several inefficiencies.

First, the requirement that cars have catalytic converters is uniform throughout the country. The marginal car in a high-pollution region, such as Los Angeles, has a much higher external cost than the same car driven across the prairies of Kansas. Efficiency calls for stricter regulations in automobile-intensive regions, such as

Los Angeles. Second, there may be other technologies that can achieve the same reduced emissions at a lower cost. Finally, automakers have little incentive to invest in better future technology because the regulations require the firm to meet, but not beat, the standard.

A more subtle inefficiency is that CAC regulations may act as a barrier to entry to other firms, both domestic and international. The U.S. auto industry initially resisted environmental controls, knowing that controls would drive up costs. Foreign manufacturers, such as the Japanese automakers, already met the proposed U.S. standards, but achieved their goal with a different technology. Catalytic converters put the Japanese at a temporary cost disadvantage. Japanese cars were required to have catalytic converters even though they already met the air quality standard.

Another example of CAC regulations is the use of Corporate Average Fuel Economy (CAFE) standards. These oft-discussed standards require each automaker to achieve a minimum number of miles per gallon (mpg) for its fleet. For example, Ford's cars might be required to achieve at least 27 mpg. When this standard was imposed, Ford and other manufacturers invented minivans and sport utility vehicles (SUVs), which were classified as trucks and therefore not subject to the standard. Until the recent upswing in gas prices, consumers shifted to minivans and SUVs despite their lower fuel efficiency. In the end, Ford met the higher fuel standard, while the average mpg of vehicles actually on the road decreased!

Incentive-Based Regulations

Effluent Taxes The simplest type of incentive-based (IB) regulation is an **effluent tax**. An effluent tax is a tax on the pollutant. If car manufacturers face a tax that depends on emissions, they can no longer ignore externalities. They must consider the tax based on emissions in addition to private resource costs. Exhibit 3 shows how an effluent tax can achieve efficiency.

A less direct way of reducing pollutants is a gasoline tax. By increasing the price of gasoline to car owners, the tax results in a smaller quantity demanded of gasoline and, in turn, lower emissions. Over time, consumers faced with high gas prices seek more fuel-efficient cars, lowering emissions even more.

Taxes can achieve efficiency directly or indirectly and can be placed on buyers or sellers. Although the tax approach may appear simple in theory, some important practical difficulties limit the use of pollution taxes. First, how do we measure external cost? There is no market that buys and sells air pollution or climate change. So the tax is at best an approximation of external cost. Second, studies that have attempted to measure external cost find it to be quite large, requiring a substantial tax. It is widely thought that the price of a gallon of gasoline would have to increase by \$1 to approximate the external costs of auto emissions. Such a \$1 tax, added to the approximately 40 cents in gasoline taxes that are already imposed to pay for roads, would be unpopular with voters and as a consequence is unattractive to politicians.

Those who favor the effluent tax approach propose that its revenues could be used for a variety of purposes, one of which could be a reduction in income taxes. If so, this approach is referred to as a *double dividend*. Lower pollution is one dividend, and lower taxes on income is another dividend because lower income taxes encourage work effort. But there is no guarantee that the funds from the effluent tax will be used to reduce income taxes.

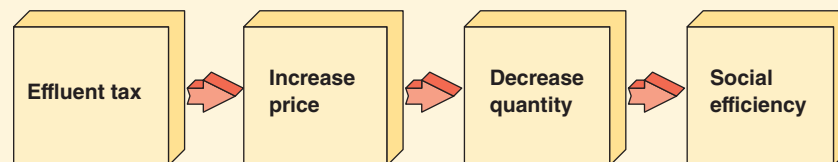
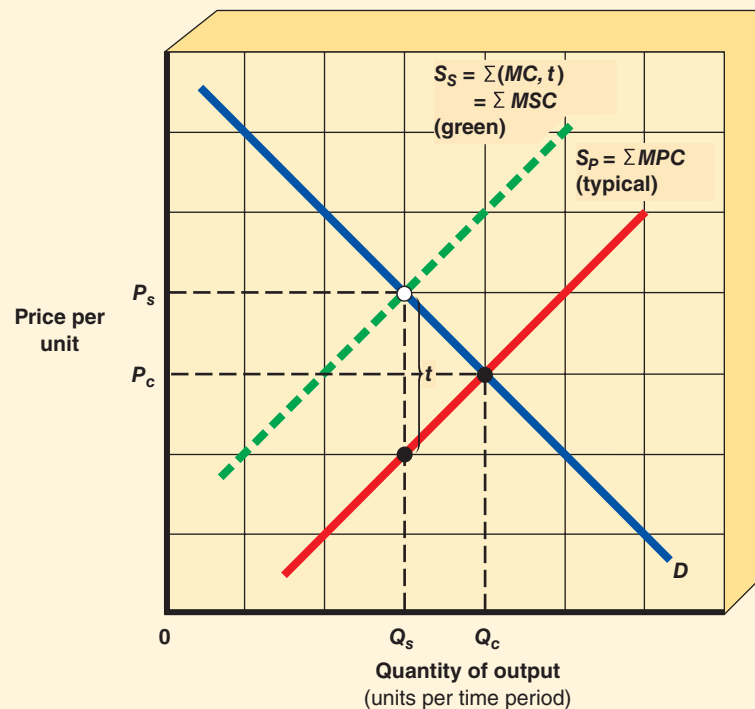
Effluent tax

A tax on the pollutant.

Exhibit 3

Using an Effluent Tax to Achieve Environmental Efficiency

An effluent tax can achieve efficiency. The tax, t , equals marginal external cost, which is the difference between marginal social cost (MSC) and marginal private cost (MPC) at the socially efficient quantity (Q_s). The firm's production costs now include both its private costs and the effluent tax, so it makes production decisions as if it considered marginal social cost.



Emissions Trading What if there were a market in which air pollution or climate change could be traded? As a result of the 1990 amendments to the Clean Air Act, there are markets for **emissions trading**. Emissions trading allows firms to buy and sell the right to pollute. The most active market so far is for sulfur emissions. Sulfur dioxide causes increased rain acidity. Acid rain can cause damage to lakes, trees, and even cars. It can also contribute to air pollution.

There are markets for air pollution rights. A firm that wishes to build new factories that would add to pollution in an already polluted area may have to find *offsets*

Emissions trading

Firms buying and selling the right to pollute.

before it can relocate. An **offset** is a reduction in an existing pollution source that offsets a new pollution source. For example, U.S. Generating Company, an independent power producer, offered in 1992 to buy up automobile “clunkers” in return for permission to expand a coal-fired generating facility that would use the Delaware River and pollute the air. Under this program, the company offered to pay \$500 to owners of cars that were at least 16 years old. The factory scraps the old clunkers, thereby offsetting its new source of pollution. The clunker approach makes use of the fact that a small percentage of cars are responsible for a disproportionate share of pollution.

To set up trading for lawn mower or car emissions, the government could require manufacturers to buy permits for each unit of emissions. In the short run, firms would include the cost of permits along with private costs as a component of price. The price would increase most for the dirtiest machines. In the long run, firms would have an incentive to build cleaner products. Firms with the cleanest products would need the fewest permits and might even profit by selling permits to companies that cannot improve as quickly. Whereas GreenAcres lawn mowers would go out of business in an unfettered competitive lawn mower industry, the company would now be in a position to succeed.

Alternatively, emissions trading for cars could be attached to CAFE standards. Auto manufacturers would have to possess permits based on gasoline use. This system would allow manufacturers with more fuel-efficient fleets to sell permits to manufacturers relying on larger less fuel-efficient cars.

A simple example can demonstrate the cost savings of an IB approach, such as emissions trading, compared to a CAC approach. Suppose two coal-fired electric plants each emit 100 tons of sulfur into the air. Plant A can reduce sulfur at a constant cost of \$100/ton, while plant B can do so at a cost of \$200/ton. The Environmental Protection Agency (EPA) announces that it wishes to cut sulfur emissions in half. Under CAC regulations, each plant will reduce its emissions to 50 tons, a reduction of 100 tons. The cost to plant A is $\$100/\text{ton} \times (50 \text{ tons}) = \$5,000$. The cost to plant B is $\$200/\text{ton} \times (50 \text{ tons}) = \$10,000$. The total cost to society of achieving a 100-unit reduction in sulfur emissions is \$15,000.

Now suppose the EPA announces that it will give away 100 emissions permits, 50 to plant A and 50 to plant B. Each plant now is allowed to emit 50 units of sulfur. If the two plants do nothing more, each will have to reduce emissions from 100 to 50 tons, and each will do so at the same cost as with CAC regulations. However, there is a lower-cost solution. Plant A is willing to sell its 50 permits at any price above \$100/ton because it can reduce its emissions in-house for \$100/ton. Plant B is willing to buy emissions permits at any price below \$200/ton, the marginal cost of reducing its own emissions. Both plants can gain by plant A selling an additional 50 permits to plant B at a price between \$100 and \$200.

Suppose they agree to a price of \$150/ton. Plant A now finds it profitable to eliminate all its emissions. Its marginal cost of reducing emissions is \$100/ton. By reducing its emissions to zero, plant A no longer needs any permits. It can sell its 50 permits for \$150/ton, making a profit of \$50 per ton by reducing its emissions to zero (at a cost of \$100/ton) and selling its permits to plant B (at a gain of \$150/ton). In turn, plant B finds it cheaper to buy permits for \$150/ton than to reduce emissions at a cost of \$200/ton.

In sum, the net cost to reduce emissions by 100 tons for plant A is $\$100/\text{ton} \times (100 \text{ tons}) - \$150/\text{ton} \times (50 \text{ tons}) = \$2,500$. The cost to plant B, now that it no longer reduces emissions, is $\$150/\text{ton} \times (50 \text{ tons}) = \$7,500$. The cost to society of achieving a 100-unit reduction in emissions is \$10,000, which is \$5,000 less than under the original CAC method.

Offset

Reduction in an existing pollution source to counteract pollution from a new source.

New-source bias

Bias that occurs when regulations provide an incentive to keep assets past the efficient point.

The real world helps us see problems that textbook theory does not always reveal. Emissions trading has the theoretical potential to achieve environmental goals at the lowest cost, but, so far, real-world trading has fallen short of efficiency. There are a number of obstacles to efficient trading, some minor and some major.

Taking the factory and clunker example, one minor problem is a **new-source bias**. A new-source bias occurs when regulations provide an incentive to keep assets past the efficient point. A firm faced with the need to find offsets if it builds a new factory may stick with an older and dirtier factory rather than paying for offsets. If there were no offset program, it might have been economical to retire the old factory in favor of a less-polluting new factory. But if the new factory cannot meet the air quality standard without offsets, the lowest-cost solution becomes extending the life of the old plant. Electric utilities are also finding it worthwhile to continue to operate old coal-fired plants that are exempt from stringent regulations known as New Source Performance Standards that can only be met by newer technology. There also may be a type of free-rider problem. Car owners about to junk their 15-year-old clunkers for \$500 may keep them another year if a firm or the government might be willing to pay \$4,000 for them. These minor problems are just growing pains of emissions trading, and future emissions markets will find ways to reduce these undesirable outcomes.

Other growing pains include small numbers of buyers or sellers, imperfect information about the value of a permit, and concerns about permit value in the future. Firms will trade actively only if trading is a better alternative than other alternatives. Some firms may shut down or perhaps relocate in other countries where permits are not needed. Also, emissions may be higher in regions where electric utilities buy permits rather than reduce emissions, known as the **hot spot problem**. The hot spot problem applies to emissions that do not disperse uniformly, and therefore emissions may be higher in locations where firms buy permits that allow them to increase emissions. The Tennessee Valley Authority has been a buyer of permits. Not only does Tennessee's air quality suffer, but North Carolina believes its air quality is also compromised as pollution drifts east.

Nevertheless, emissions trading, increasingly referred to as cap and trade, is here to stay. The government may initiate emissions trading by giving away permits according to production or pollution over a designated period, or it may sell permits through an auction to the highest bidders. Were the government to give away permits to emit carbon, businesses would receive an asset likely worth billions, as compared to what they would pay if the government auctioned off the permits. Buyers may be electric utilities, or they may be environmentalists. Environmentalists can achieve pollution reduction by outbidding utilities for permits and then refusing to sell them to utilities, thereby forcing the utilities to reduce pollution.

The Chicago Board of Trade, or "Smog" Exchange, allows trading in pollution permits much like trading on the New York Stock Exchange. Companies are required to own a permit for each unit of emissions. Clean companies need fewer permits and offer to sell their extra permits on the exchange. Dirty companies need additional permits and are buyers on the exchange. They will only buy if the permit price is less than what it would cost them to reduce pollution by one more unit. Sellers of permits will charge at least what it costs them to reduce pollution by one more unit.

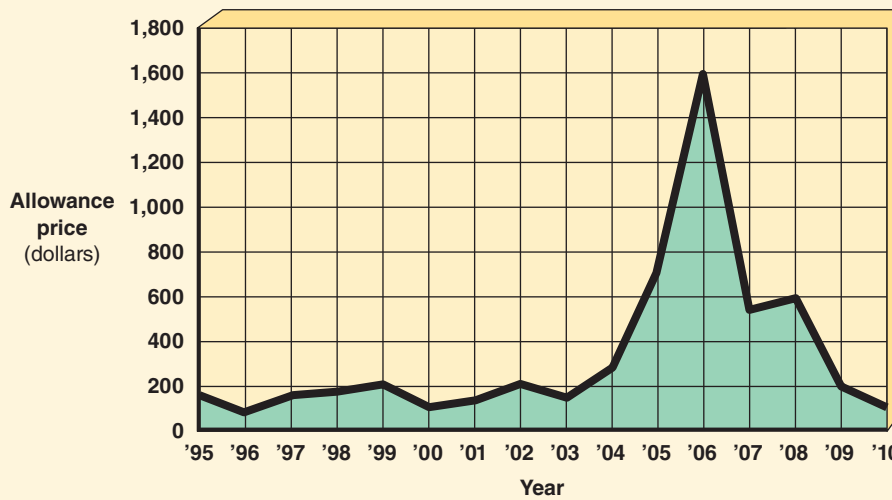
Exhibit 4 shows the permit price per ton of sulfur dioxide allowances since trading began in 1994. Over the years, the permit price has fluctuated widely from as low as \$60 to a high of almost \$1,600 after a sharp reduction in permits with the passage by the EPA of the Clean Air Interstate Act on March 10, 2005. The Act

Hot spot problem

For emissions that do not disperse uniformly, emissions may be higher in locations where firms buy permits that allow them to increase emissions.

*Exhibit 4***Monthly Average Price of Sulfur Dioxide Allowances under the Acid Rain Program**

The Chicago Board of Trade allows trading in pollution permits much like trading on the New York Stock Exchange. This figure shows the sulfur dioxide allowance prices.



SOURCES: <http://www.ferc.gov/market-oversight/othr-mkts/emiss-allow/othr-emns-no-so-pr.pdf> and <http://www.epa.gov/airmarkets/progress/arp06.html>.

was vacated in early 2009, with a consequent drop in price to \$200 in 2009 and \$100 in early 2010. Recently, the EPA has introduced a market for the trading of nitrogen oxides (NO_x), an emission that contributes to smog. That price has also fluctuated enormously. Initially traded at approximately \$800 per ton, it quickly rose to \$1,400 before collapsing to \$100 by early 2010.

There is concern that the benefits of emissions trading will be diminished by lack of trading and lingering opposition to the idea of creating a market for pollution rights, especially when permits are given away rather than auctioned, particularly if rights are given away for carbon emissions. There is even a revival of interest in command-and-control regulation. If the government happens to pick the right approach and rewards cleaner technology, some economists favor CAC over the imperfect emissions trading to date. For example, there are supporters of California's approach to reducing auto emissions. California considered a requirement that 10 percent of the cars sold within California must be emissions free. They anticipated that the mandate would be met with electric vehicles (EVs). However, California then modified the requirement that a similar percentage of cars be hybrids rather than EVs. It may well be that the requirement will be modified further, or eventually abandoned. One of the problems of the CAC approach is trying to second-guess the movements of the market. Just as California assumed electric cars would be a viable alternative, the U.S. government subsidized solar power in the late 1970s. Solar power did not develop as an attractive alternative then, and now lags wind and other alternatives as a renewable source of energy.

Furthermore, critics of the California approach point out that EVs are not emissions free if they require electricity from a power plant. Certainly, power plants also pollute, although there may be an advantage to transferring pollution away from the most densely populated areas. EVs powered by photovoltaic cells (PVCs) that use solar energy are closer to being emissions free, but there is still pollution in the PVC production process. Perhaps the greatest drawback to EVs is their poor performance to date. They suffer from poor acceleration, limited range, and limited ability to climb hills. Critics maintain that inferior products continue to be the legacy of CAC approaches. In response to rising gas prices, Toyota and other car manufacturers responded with gas-electric hybrid vehicles. Critics suggest that the market has a superior ability to innovate, such as a hybrid vehicle with low emissions, as compared to CAC requiring zero emissions that could not be met by a gas-electric hybrid. However, even hybrid electricity use is not pollution free. Battery production is likely to lead to pollution. If the hybrid is recharged by plugging it in, there is still pollution at the electricity plant where the power is generated. And solar power requires the use of large silicon glass panels, potentially requiring massive amounts of land, as well as silicon waste disposal problems.

CONCLUSION *Economists generally believe that incentive-based regulations are more efficient than command-and-control regulations.*

Still, much of the public seems more comfortable with controls and rules than with prices and trading. There are a number of possible explanations for the public's view. First, people have difficulty accepting that any pollution is efficient. Nobody wants to think about a higher risk of cancer due to a leak from a nuclear power plant.

Another possible reason for the public's view is a mistrust of experts. People were told by experts that nuclear power would be safe, that hazardous waste disposal sites would not leak, and that people living near Yucca Mountain, Nevada, would accept that location as a safe site for burial of nuclear radioactive wastes. When outcomes differ from what experts promise, the public favors safety over efficiency. No one wants to take a chance on illness or death if the experts are wrong again. And yet would you give up your car or favor a law that set the speed limit at 20 miles per hour? These laws might increase safety, but they would certainly be inefficient.

Government and Environmental Efficiency

Market failure is likely for products with external costs. To achieve efficiency, buyers and sellers must consider external costs. Government has the power to establish laws, taxes, or permit systems so that market participants pay for external costs.

Although government policy can potentially improve efficiency, there is no guarantee. The countries that emerged from the Soviet Union, where government played a far more dominant role than in the United States, have environmental problems that dwarf those in the United States. In these countries, air and water quality borders on ecocide, with high rates of illness due to environmental degradation. The Chernobyl disaster in which a nuclear plant malfunctioned and released radioactivity, has caused thousands of premature deaths. In China, another nation where the

government plays a major role in the economy, the Beijing weather report frequently calls for “smoky” skies.

In the United States, large numbers of U.S. Department of Defense sites are among the biggest environmental challenges. Hazardous wastes from the production of weapons left behind toxic burial sites, including Oak Ridge, Tennessee, and Richland, Washington. The U.S. Forest Service frequently permits lumber companies to harvest trees from national forests at subsidized prices. Government environmental officials have even gone to prison for illegally meeting with industry representatives to weaken environmental regulations. And government has tended to ignore the cost to firms of complying with hundreds of thousands of pages of environmental legislation, a set of regulations more voluminous than the U.S. Tax Code. For all these reasons, as well as the widespread dissatisfaction with government in general, there is concern about the effectiveness of government policy in achieving environmental goals. Government officials may pursue self-interest, which could favor polluting industries over societal interests as a whole, especially if industry executives are major campaign contributors.

The Coase Theorem Ronald Coase, an economist at the University of Chicago and the winner of the 1991 Nobel Prize in economics, was among the first to caution against the assumption that government intervention in the environmental arena would improve upon private-sector environmental performance. In his famous 1960 paper, “The Problem of Social Cost,” he even questioned the fundamental assumption of market failure. According to the **Coase Theorem**, the private sector could achieve social efficiency with minimal government intervention. The role of the government should be limited to the legal establishment of property rights, with environmental disputes resolved with the help of the court. The Coase Theorem is the proposition that private market negotiations can achieve social efficiency regardless of the initial definition of property rights.

As an example of how the Coase Theorem works, consider a train that throws off sparks and occasionally burns a farmer’s crops. Exhibit 5 shows railroad profits increasing and farm profits decreasing as more trains run.

Coase Theorem

The proposition that private market negotiations can achieve social efficiency regardless of the initial definition of property rights.

Exhibit 5		Choosing the Efficient Amounts of Spark-Emitting Trains and Farm Crops			
Number of Trains	Total Railroad Profit	Marginal Railroad Profit	Number of Crops	Total Farm Profit	Marginal Farm Profit
0	\$ 0		10.5	\$105	
1	20	\$20	10	100	\$ -5
2	40	20	9	90	-10
3	60	20	7	70	-20
4	80	20	4	40	-30
5	100	20	0	0	-40

Global Economics

How Should Carbon Emissions Be Reduced: Cap and Trade or Carbon Taxes? *Applicable Concepts: emissions trading and effluent taxes*

With the great success of emissions trading in sulfur dioxide, and the emergence of trading in nitrous oxides, we may well turn to emissions trading to reduce carbon emissions in the United States. In fact, Europe has already instituted such an exchange. In 2005, the European Union instituted a carbon permit system for electric utilities and other major emitters such as steel companies. However, smaller emitters such as smaller industries and non-point sources such as automobiles are not covered.

In some ways, carbon would seem ideally positioned for emissions trading. To the extent that it contributes to global warming, the effect is the same regardless of where that emission takes place. Whether carbon is emitted in France, Spain, or for that matter the United States or China, its effect on the global atmosphere is the same. In this way, carbon is a better candidate for trading than sulfur, which has a greater impact in the vicinity of its release.

But there is increasing questioning of whether or not carbon trading is preferable to a tax on carbon. One contributing argument is the European experience to date, which has been disappointing. Early projections anticipated that carbon contracts would trade for about \$50/ton, given the high cost to



© Image copyright Lane V. Erickson, 2009. Used under license from Shutterstock.com

industry of reducing carbon. By mid-2006, the price of contracts had collapsed to €8/ton (approximately \$12). The primary factor for the lower-than-expected price was that numerous national governments had issued enough permits that covered producers did

Each train has an external cost. Emitted sparks can cause fires, which reduce the farmer's crops. If the railroad ignores external cost, it appears that the railroad would choose to run five trains so as to maximize profit, leaving the farmer with no crops. It also appears that to protect the farmer, there should be a law requiring the railroad to find a spark-free technology.

Suppose the courts establish a law that farmers have the right to spark-free trains. How could the railroad meet this tougher environmental standard? The railroad could change to a new, higher-cost technology. The cost must be higher, or the railroad would have chosen this environmentally friendly technology in the first place. If the cost is too high, the railroad might go out of business or relocate its tracks away from farms. Alternatively, it may be less expensive to offer the farmer money for any burned crops.

If the trains continue to throw off sparks, the first train will reduce the farmer's profits by \$5 and will add \$20 to the railroad's profits. The two parties will be able to negotiate a deal, with the farmer receiving a payment of between \$5 and \$20 from the railroad. What about a second train? This train will add another \$20 to

not find it necessary to buy permits. In fact, carbon emissions increased in many countries during the first year of the carbon trading regime.

Since that time, there have been reforms in the trading system, and prices have risen. While price jumped to €30 by the end of 2007, it was back down to €14 (US \$21) by the end of 2009. The possibility that an emissions trading system might not reduce carbon emissions has given impetus to those who argue for a carbon tax.

For those who prefer the tax approach, perhaps the most widespread reason is that the tax will raise revenue. The revenue could provide a double dividend, if it is used to reduce taxes that discourage productive activities, such as the income tax. Of course, the revenues could go toward research and development into carbon-reducing technologies, or reduction of the national debt. (Or, tax opponents would point out, it could simply be wasted on pork barrel projects.) While permits could raise revenue if they were auctioned off rather than given away, the auction would negate one of the main reasons for favoring permits that industry is willing to support the permit approach because they do not have to pay for the permits.

Other reasons to favor the tax approach include its ability to be more comprehensive, covering all carbon emissions rather than being limited primarily to large point sources. It could also be fashioned to include other greenhouse gases, such as methane; farmers, for example, would pay a tax based on the number of cows they owned, and perhaps other

animals that emit methane.¹ Some prefer the carbon tax on equity grounds. Particularly if coupled with a reduction in income taxes, the tax could offer relief to lower-income households. In contrast, the main beneficiaries of giving away permits are stockholders, which may represent wealthier citizens.²

The latest twist is that cap and trade has come under withering fire in the U.S. from both the political left and right. The left in particular chastises it as potentially the biggest giveaway of wealth in history, while the right calls it a disguised tax that will show up in higher prices for all carbon-emitting goods. Given the unwillingness of politicians to increase taxes at least since Ronald Reagan and the mounting opposition to cap and trade, the question of whether anything will be done to counteract carbon emissions in the U.S. is truly “up in the air.”

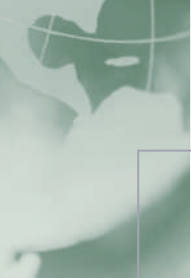
ANALYZE THE ISSUE

1. What are the advantages and disadvantages of carbon trading, as compared to sulfur dioxide trading?
2. What are the advantages and disadvantages of a tax system, as compared to carbon trading?
3. If a carbon tax is preferable to a trading system on economic grounds, why might we adopt a trading system anyway?

1. Jonathan A. Lesser, “Control of Greenhouse Gases Difficult with Cap-and-Trade or Tax-and-Spend,” *Natural Gas and Electricity*, December 2007, Wiley Periodicals Inc., <http://www3.interscience.wiley.com/cgi-bin/jhome/105559587>.
2. Ian W. H. Parry, “Should We Abandon Cap and Trade in Favor of a CO₂ Tax?” *Resources*, Summer 2007, 6–10, Resources for the Future, http://www.rff.org/RFF/Documents/RFF-Resources-166_ShouldWeAbandonCapAndTrade.pdf.

railroad profits, but will reduce farm profits by \$10. Again, the farmer will permit the railroad to run a second train as long as the railroad pays the farmer at least \$10. If a third train runs, marginal social benefit will equal marginal social cost. Society will benefit from more train service, but will lose from fewer crops. The third train will be marginally worthwhile, but additional trains will not run. The fourth train will add \$20 to railroad profits, but will reduce farm profit by \$30. Thus, the railroad will lose money if it runs the fourth train. By clearly establishing the farmer's right to spark-free trains, the number of trains will be decreased from five to three trains.

Notice that the farmer will be better off if he or she allows sparks as long as the railroad compensates the farmer for damage than if the government requires a spark-free technology. The farmer earns \$105 when there are no sparks. With



Global Economics Why Is the Climate Change Problem So Hard to Solve? *Applicable Concepts: emissions trading and effluent taxes*

With much ado, representatives from 192 countries traveled to Copenhagen, or Hopenhagen, as it was referred to, in late 2009, hoping to build upon the Kyoto Conference to reach agreement on steps to reduce carbon emissions, which the participants believe are contributing to global warming. Two weeks later, they came away with little more than a non-binding agreement brokered between the U.S. and China that five countries agreed to mitigate their carbon emissions, and that the U.S. would be able to monitor China's compliance with the agreement. In short, the conference produced almost no progress on greenhouse gas emissions.

Why is this problem proving so difficult to solve? There has now been widespread, although far from universal, agreement that human activity is contributing to a warming planet, which could lead to flooding, desertification, weather events such as stronger hurricanes, and the spread of tropical diseases to warming countries.

First, consider Copenhagen. Participants came from both developed and developing countries. Developing countries threatened to walk out on the meetings. Kyoto set a precedent that only developed countries would be expected to pay the cost of reducing emissions. Developing countries would either be exempt, or would expect to receive subsidies or technology transfer from developed countries to

reduce emissions. At Copenhagen, developing countries sought millions of dollars to reduce emissions.¹

Another controversy is over whether countries, developed and developing, should receive credit for offsets. Brazil, for example, wants credit for slowing or reversing the rate at which it is cutting down its rainforests. Trees store carbon. Countries could receive carbon credits for planting trees, or possibly even slowing the rate at which trees are being cut. Brazil and other developing countries want developed countries to pay them, as they claim they are slowing their own development by growing new forests or slowing the conversion of existing forest to agricultural uses.

Further, there is not even agreement over which countries are still developing. At Kyoto, China was still classified as developing, exempt from taking action at its own expense. After growing its GDP at nearly a 10 percent annual rate for the last three decades, and becoming the world's largest greenhouse gas emitter in the process, is it still a developing country? For purposes of avoiding the cost of slowing emissions, never mind reducing them, it is advantageous to claim you are still developing. The argument goes, developed countries were able to grow and emit greenhouse gases with impunity; it is only fair that developing countries be able to do the same. Developed countries have benefited from

1. A comprehensive summary of the issues faced by delegates to Copenhagen was contained in a special section of the *Wall Street Journal*, entitled "If It Warms Up, Who's Going to Pay?" Monday, December 7, 2009.

sparks, the farmer will earn at least \$105, receiving between \$5 and \$20 for permitting the first train, at least \$10 (and possibly as much as \$20) for permitting the second train, and another \$20 for the third train. With three trains, the farmer will still earn \$70 from crops, in addition to a minimum of \$35 for allowing trains, for a total of at least \$105.

This outcome is similar to the government solutions examined earlier. Efficiency leads to the efficient amount of pollution, which is typically not zero. No sparks may mean no trains. But Coase asks, Why assume that society is best served by assuming the railroad is the polluter and the farmer the victim? In the 1800s, sparking

industrialization without having to pay for their emissions, so it is fair that they should do so now.

If countries at an international conference do agree to be financially responsible for reducing emissions, they may face problems when they bring those proposals home. First, they face opposition from those who do not accept the argument that human activities contribute to global warming. Recent surveys of the U.S. population showed a decline in those who were convinced that human activities contribute to global warming. And this was even before the incident that has become known as Climategate, whereby intercepted emails of climate change scientists showed the likely suppression of evidence not favorable to their view, and obstacles put in the way of those more skeptical of climate science. Some of the intercepted emails had been written by members of the International Panel on Climate Change (IPCC), a Nobel Prize-winning group containing thousands of scientists, including Nobel laureates in Economics. Even more recently, their work was found to have numerous errors, not the least of which was predicting the melting of Himalayan glaciers by 2035, when the actual studies had arrived at 2350.

But perhaps most fundamentally, a solution will have to address the problems of externalities and public goods. Consumers and producers of carbon-emitting products, such as coal-burning power plants and gasoline-burning automobiles, will, in the absence of government intervention, ignore emissions. Furthermore, any global agreement to reduce emissions will benefit everyone, whether or not an individual has borne the expense of reducing emissions, a classic example of a public good. Benefits are non-rival and

non-excludable. And agreeing on whether we will actually reduce emissions, or simply slow them down, will be contentious. Nor is CO₂ the only greenhouse gas. Methane, of which cows are a major emitter, is smaller in volume, but more potent in effect.

So in sum, taking action to slow or stop climate change is one of the most difficult problems humans have faced. There is disagreement on whether humans have contributed to the problem, what countries are responsible for paying for the solution, and how to develop a mechanism that can overcome externalities and public goods problems. In the end, we may find ourselves left to adapt to climate change, abandoning low-lying lands, accepting millions of immigrants from those countries, switching to hot weather crops, and losing flora and fauna that cannot adapt, unless we can develop new approaches to addressing this challenge.

ANALYZE THE ISSUE

1. Give an example of an equity (fairness) issue that arises in working toward a global agreement to limit greenhouse gas emissions.
2. Give an example of an efficiency (market failure) issue that arises in working toward a global agreement to limit greenhouse gas emissions.
3. Many countries argue that they should get credit for offsets, such as planting trees. Explain whether the case for offsets is based on efficiency or equity arguments.

engines may have been the best available technology, and an occasional fire may have been a natural consequence.

So consider the outcome if property rights to produce sparks are given to the railroads so that trains are allowed to throw off sparks. If the farmer does nothing, the railroad will run five trains, and the farmer will end up with no crops and no profit. The farmer will increase profit by \$40 if only four trains run. Since the fifth train will add only \$20 to railroad profit, the farmer can afford to pay as much as \$40 (or as little as \$20) to stop the fifth train. Similarly, the farmer will gain \$30 by stopping the fourth train, more than enough to pay the railroad for forgoing \$20 in profit. Once again, negotiations will stop at three trains, the efficient number.

This example demonstrates the Coase Theorem: As long as the courts clearly establish property rights, markets may achieve social efficiency *regardless of the initial assignment of property rights*. Coase's great contribution was to focus attention on property rights, a focus that foreshadowed the emissions-trading approach that allows firms to negotiate by buying and selling the right to pollute. But Coase argues for an even more limited role for government. In his view, the government should establish courts and then let markets negotiate.

Some Limitations on the Coase Theorem Coase was instrumental in raising concern about government solutions. It might then seem a simple step to accept his claim that private markets would efficiently resolve environmental problems. In actuality, only a small number of environmental problems readily qualify for Coase Theorem solutions.

First, there are no **transactions costs** in the Coase Theorem. Transactions costs are the costs of negotiating and enforcing a contract. Turning to the courts is a costly process, in terms of both time and money. And dealing with the source of the externality has its own costs. Have you ever tried to negotiate with a noisy neighbor at 2 a.m.? However, there are also transactions costs associated with government solutions. So Coasean negotiations may be preferable to government intervention even when there are substantial private transactions costs.

Second, there are no differences in willingness to pay (WTP) and willingness to accept (WTA) in the Coase Theorem. Many studies have found that people's willingness to pay to acquire a property right, such as an improvement in air quality, is less than the compensation they require to give up a property right, such as accepting lower air quality. If the farmer has the right to spark-free air, he or she may require \$50 to allow sparks. Alternatively, if the farmer has to buy that right, he/she may only be willing to pay \$20. In other words, people may not view giving up an environmental right you already own as equivalent to buying a right you do not currently own.

Third, Coase assumes there are only two parties in the negotiation. Externalities are typically third-party problems, and there may be many third parties. Do all the farmers get together to negotiate with the railroad, and do all the neighbors get together to reduce noise from the party? With many participants, there is once again a **free-rider problem**. If noise levels decrease, I get the benefit whether or not I contribute to the negotiations. So why contribute? Stated as a concept, if some individuals benefit while others pay, the free-rider problem is that few will be willing to pay for improvement of the environment or other public goods. As a result, these goods are underproduced.

A related debate is taking place regarding "The Tragedy of the Commons." **Tragedy of the Commons** occurs when individuals use an open access resource to the point of exhaustion, basing their use on private benefits, while disregarding external costs to others. Ecologist Garrett Hardin maintained that for open access resources such as fisheries or grazing lands where there are no private property rights, the resources will be overused to the point of collapse. An additional fisher or cattle farmer will consider the private benefit to fishing or grazing, but not the externality of reduced fish or grass to other users of the resource. But political scientist Elinor Ostrom, who was one of the winners of the 2009 Nobel Prize in Economics, finds that private parties will design institutions to sustain the resource. The group will define common property rights, rather than allowing open access, where no one has

Transactions costs

The costs of negotiating and enforcing a contract.

Free-rider problem

The problem that if some individuals benefit, while others pay, few will be willing to pay for improvement of the environment or other public goods. As a result, these goods are underproduced.

Tragedy of the Commons

Individuals will use an open access resource to the point of exhaustion, basing their use on private benefits while disregarding external costs to others.

rights. In some circumstances such as the commons, common property may be preferable to open access or private property rights.

CONCLUSION *Neither government nor the markets can be asserted to be the best solution to environmental problems. On balance, though, the effort to work toward improved government solutions seems worthwhile, given the outcome for the environment of purely self-interested markets. But alternatives including private ownership and common-property ownership may be preferable where transactions costs are low enough to allow individual or group negotiations over resource use.*

CHECKPOINT

Is It Efficient to Buy Odor-Reducing Technology If You Live Next to a Hog Farm?

You live next door to a hog farm. It is estimated that the smell from the hog farm reduces the value of your home by \$7,000. For \$5,000, you can purchase technology that reduces the hog smell by half, so your house value would decrease by only \$3,500. Assuming the hog farm has the property right to locate next door and that it is not required to reduce the hog smell, what will you do? Will you do nothing or buy the new technology?



Key Concepts

Private benefits and costs
Social benefits and costs
Free rider
Market failure
Government failure
Incentive-based regulations

Command-and-control
regulations
Effluent tax
Emissions trading
Offset
New-source bias

Hot spot problem
Coase Theorem
Transactions costs
Free-rider problem
Tragedy of the Commons

Summary

- **Externalities** are benefits or costs that fall on third parties who are neither buyers nor sellers. Pollution is a negative externality or an external cost that is a by-product of many industrial production processes.
- **Market failure** is present when the market produces a socially inefficient outcome. For example, when there are externalities. All firms, including competitive firms, consider private costs but disregard external costs in making decisions.
- **Government failure** occurs when public-sector actions or lack of actions move us away from desired outcomes, such as efficiency. Government officials seeking campaign contributions and votes may choose environmental measures that favor wealthy contributors over society's best interests.
- **Command-and-control regulations** occur when the government dictates the approach to achieving an environmental goal. Command-and-control regulations are generally inefficient on three grounds: they do not distinguish between high- and low-pollution areas, they do not allow firms to choose lower-cost technologies that could achieve the environmental standard, and they do not encourage investment in improved technology to lower future emissions.
- **Incentive-based regulations** build on markets to achieve environmental efficiency. **Effluent taxes** are taxes that reflect external costs. **Emissions trading** allows firms to buy and sell the "right to pollute."
- The **hot spot problem** applies to emissions that do not disperse uniformly, and therefore emissions may be higher in locations where firms buy permits that allow them to increase emissions.
- The **Coase Theorem** maintains that markets can be efficient in the presence of externalities with minimal government intervention. Even in the presence of externalities, markets may produce efficient outcomes so long as property rights are clearly established.
- **Transactions costs**, **income effects**, and **free-rider problems** are obstacles to achieving environmental efficiency through markets. Transactions costs are the costs of negotiating an agreement, income effects are present when limited income prevents one party from being able to afford the efficient solution, and free-rider problems are present when participants are better off hiding than revealing their willingness to pay for an environmental improvement.
- **Tragedy of the Commons** predicts that individuals will use fisheries and grazing areas to exhaustion, as they base their use on their private benefits, disregarding the effects of their use on others. The "tragedy" has been questioned by Elinor Ostrom, who finds individuals will establish institutions converting open access property to common property so that the resource can be sustained over time.

Summary of Conclusion Statements

- Unregulated competitive markets will oversupply and underprice products that pollute.
- Economists generally believe that incentive-based regulations are more efficient than command-and-control regulations.
- Neither government nor the markets can be asserted to be the best solution to environmental problems. On balance,

though, the effort to work toward improved government solutions seems worthwhile, given the outcome for the environment of purely self-interested markets. But alternatives including private ownership and common-property ownership may be preferable where transaction costs are low enough to allow individual or group negotiations over resource use.

Study Questions and Problems

1. Compare price and quantity in a competitive industry to those of a “green” industry for a product that generates pollution.
2. Suppose a car sells for \$20,000 in a market with no pollution restrictions. Will the car sell for more than \$20,000, less than \$20,000, or \$20,000 when there are pollution restrictions? Explain.
3. You are considering whether to buy one house for \$100,000 or another identical house located near high-voltage electric power lines for \$90,000. Assume that it has been established that living near high-voltage lines increases the risk of cancer due to electromagnetic fields (EMFs). If you choose the \$90,000 house, is the radiation from EMFs an externality? Explain.
4. Restaurants have observed that large parties (eight or more) leave a lower average tip than smaller parties. Identify the effect, which also makes it more difficult to reach global environmental agreements responsible for this phenomenon.
5. Suppose your instructor gives eight homework assignments during the semester. She indicates that anyone who does not turn in all eight assignments will automatically fail the course. Is this an example of a command-and-control or an incentive-based regulation? Explain any inefficiencies of your instructor’s approach.
6. Environmentalists in Tennessee brought suit against the Champion Paper Company of North Carolina for polluting the Pigeon River, which flows from North Carolina into eastern Tennessee. Tennessee claimed that the coffee-colored water smelled bad and would not support fishing or swimming. Environmentalists requested that the river be restored to its pristine state, whereby water quality is restored to the level before the coming of industry. The Environmental Protection Agency heard the suit and applied an efficiency standard. Is pristine water an efficiency standard? Explain.
7. Draw a graph to demonstrate your answer to question 6.
8. California once proposed legislation that would have required 10 percent of its car fleet to be nearly emissions-free by the year 2005. This mandate spurred electric vehicle research. Such vehicles could be powered by photovoltaic cells or by batteries that are recharged using an electrical outlet. Would you agree that it is correct to conclude that electric vehicles that use electrical outlets are emissions-free? What about electric vehicles powered by photovoltaic cells?
9. Explain why consumers would not be willing to pay the full costs of a less-polluting car in the absence of government regulations.

10. Evaluate the following statement: “When products pollute, government solutions are more efficient than market solutions.”
11. Provide an example of a market where you think the Coase Theorem applies. Explain why you think the market satisfies assumptions regarding transactions costs, income effects, and free riders.
12. In a study of ranching laws in the 1800s, an economic researcher found that as these laws restricted the ability of cattle to roam freely, agricultural output increased. Does this researcher’s findings support the Coase Theorem? Explain.
13. If we are to take action against global warming, we must reduce carbon emissions. Explain how to reduce carbon emissions by using
 - a. command-and-control regulation.
 - b. an effluent tax.
 - c. emissions trading.
14. A global agreement known as the Montreal Protocol led to the phase out of chlorofluorocarbons (CFCs), chemical compounds found in aerosol cans and refrigerants. CFCs may have contributed to the growing hole in the ozone layer. With a diminished ozone layer, there is an increased chance of skin cancer. Explain the effect of this agreement on the price of deodorants and air-conditioning. Also, is a ban on CFCs an efficient approach to the ozone hole problem?
15. Explain the “Tragedy of the Commons,” as described by Garrett Hardin. Why does Elinor Ostrom disagree with Hardin’s prediction that fisheries and other “commons” will collapse?

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWER

Is It Efficient to Buy Odor-Reducing Technology If You Live Next to a Hog Farm?

It is not efficient to purchase the new odor-reducing technology. It would cost \$5,000, but would increase your house value by only \$3,500. It is not efficient to cut the odor by half if the market will not compensate you sufficiently for reduced hog odors. If your only options are to

do nothing or to buy the new technology, and you said do nothing, **YOU ARE CORRECT**. (A third option is to pay the hog farm to locate elsewhere. You would be willing to pay up to \$7,000 to avoid the \$7,000 lost due to the smell of the nearby farm.)



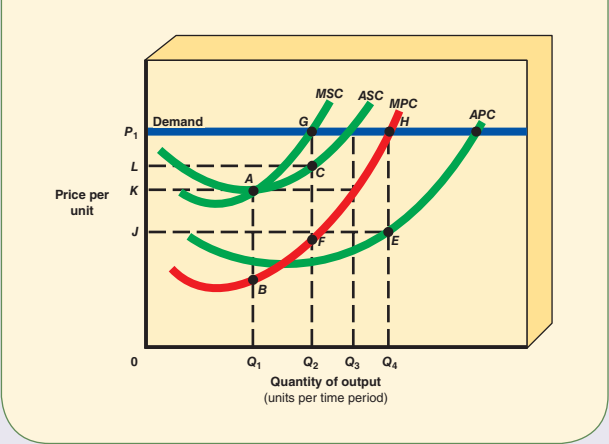
Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

1. Suppose the city of New Orleans discovered chemical compounds in its drinking water that may cause cancer. Since New Orleans's drinking water comes from the Mississippi River, the source of these chemicals is the waste discharges of industrial plants upstream from New Orleans. This is an example of
 - a. an external cost imposed on the citizens of New Orleans by the industrial plants upstream.
 - b. a market failure where the market price of the output of these industrial plants does not fully reflect the social cost of producing these goods.
 - c. an externality where the marginal social costs of producing these industrial goods differ from the marginal private costs.
 - d. all of the above.
2. A government policy that charges steel firms a fee per ton of steel produced (an "effluent charge") where the fee is determined by the amount of pollutants discharged into the air or water will lead to
 - a. a decrease in the market equilibrium quantity of steel produced.
 - b. a decrease in the market equilibrium price of steel.
 - c. an increase in the market equilibrium price of steel.
 - d. the results in (a) and (b).
 - e. the results in (a) and (c).
3. Social costs are
 - a. the full resource costs of an economic activity.
 - b. usually less than private costs.
 - c. the costs of an economic activity borne by the producer.
 - d. all of the above.
4. As a general rule, if pollution costs are external, firms will produce
 - a. too much of a polluting good.
 - b. too little of a polluting good.
 - c. an optimal amount of a polluting good.
 - d. an amount that cannot be determined without additional information.
5. Many economists would argue that
 - a. the optimal amount of pollution is greater than zero.
 - b. all pollution should be eliminated.
 - c. the market mechanism can handle pollution without any government intervention.
 - d. central planning is the most efficient way to eliminate pollution.
6. Which of the following used marketable pollution permits as an incentive for reducing pollution?
 - a. The Clean Air Act of 1970
 - b. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980
 - c. The Clean Air Act amendments of 1990
 - d. The Water Quality and Improvement Act of 1970
7. The disposable diaper industry is perfectly competitive. Which of the following is *true*?
 - a. Since the industry is perfectly competitive, price and quantity are at the socially efficient levels.
 - b. Competitive price is higher and competitive quantity lower than the socially efficient point.
 - c. Competitive price is higher and competitive quantity higher than the socially efficient point.
 - d. Competitive price is lower and competitive quantity higher than the socially efficient point.
8. An example of the command-and-control approach to environmental policy is
 - a. placing a tax on high-sulfur coal to reduce its use and the corresponding sulfur emissions (which contribute to acid rain).
 - b. requiring electric utilities to install scrubbers to reduce sulfur dioxide emissions (which contribute to acid rain).
 - c. allowing coal producers to buy and sell permits to allow sulfur emissions.
 - d. allowing individuals to sue coal producers if sulfur emissions exceed a government-set standard.

Practice Quiz Continued

Exhibit 6 Profit-Maximizing Firm



9. The profit-maximizing firm in Exhibit 6 creates water and air pollution as a consequence of producing its output of beef cattle. If pollution costs are borne by third parties, the firm will maximize economic profit by choosing to
- a. voluntarily incur costs to reduce its pollution.
 - b. produce at output rate Q_3 .
 - c. produce at output rate Q_2 .
 - d. produce at output rate Q_4 .
10. To maximize social welfare, the firm in Exhibit 6 should produce at output rate
- a. Q_1 .
 - b. Q_2 .
 - c. Q_3 .
 - d. Q_4 .
11. As shown in Exhibit 7, if Orville has the property right to fly over Wilbur's house, but Wilbur is allowed to negotiate with Orville on the number of flights, what will be the number of flights?
- a. 2
 - b. 3
 - c. 4
 - d. 5

Exhibit 7 Impact of Flights on House Value

Number of flights	Total profits	Marginal profits	Value of Wilbur's house
1	\$10,000	\$10,000	\$100,000
2	18,000	8,000	95,000
3	24,000	6,000	90,000
4	28,000	4,000	85,000
5	30,000	2,000	80,000

12. As shown in Exhibit 7, if Wilbur has the property right to have no planes flying over his house, but Orville is allowed to negotiate with Wilbur, what will be the number of fights?
- a. 2
 - b. 3
 - c. 4
 - d. 5
13. As shown in Exhibit 7, at the socially efficient number of flights, what will be the market value of Orville's house?
- a. \$100,000
 - b. \$95,000
 - c. \$90,000
 - d. \$85,000
 - e. \$80,000
14. The Tragedy of the Commons is said to arise because:
- a. individuals will fish so long as the marginal private costs equal the marginal private benefits.
 - b. individuals will fish so long as the marginal social costs equal the marginal private benefits.
 - c. individuals will convert open access property into private property.
 - d. individuals will convert open access property into common property.

Road Map

Microeconomic Policy Issues

This road map feature helps you tie material in the part together as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The key concept in each question is given for emphasis, and each question or set of questions concludes with an interactive game to reinforce the concepts. Click on the Tucker Web site at www.cengage.com/economics/tucker, select the chapter, and play the visual causation chain game designed to make learning fun. Enjoy the cheers when correct and suffer the jeers if you miss. The correct answers to the multiple-choice questions are given in Appendix C of the text.

part 4

Chapter 13. Antitrust and Regulation

1. Key Concept: Imperfect information

Overconsumption of a product can be caused by

- a. excessive resources devoted to producing a product.
- b. consumers paying too low a price for a product.
- c. lack of knowledge about a product.
- d. all of the above are true.
- e. none of the above are true.

2. Key Concept: Imperfect information

Which of the following may be the result of a higher equilibrium price for a product?

- a. Advertising
- b. Expectations
- c. Imperfect information
- d. All of the above are true.
- e. None of the above are true.

3. Key Concept: Imperfect information

Deficient information on unsafe products can cause

- a. overconsumption of a product.
- b. waste of resources used to produce a product.
- c. consumers to pay a higher price for a product.
- d. all of the above are true.
- e. none of the above are true.



Causation Chain Game

The Impact of Imperfect Information on the Market—Exhibit 5

Chapter 14. Environmental Economics

4. Key Concept: Effluent Tax

Incentive-based regulations

- a. set an environmental goal, but are flexible on how to achieve the goal.
- b. obtain more efficiency gains than is obtainable from CAC regulations.
- c. include effluent taxes.
- d. All of the above are true.
- e. None of the above are true.

5. Key Concept: Effluent Tax

In order to increase society's total welfare (social efficiency), a production process that produces a negative externality should be

- a. taxed.
- b. provided by the government.
- c. ignored.
- d. subsidized.

6. Key Concept: Effluent Tax

A government policy that charges coal producers a fee per ton of coal produced (an "effluent charge") where the fee is determined by the amount of pollutants discharged into the air or water, will lead to a (an)

- a. decrease in the market equilibrium quantity of coal produced.
- b. decrease in the market equilibrium price of coal.
- c. increase in the market equilibrium price of coal.
- d. (a) and (c) are correct.

7. Key Concept: Effluent Tax

In order to achieve efficiency, the size of an effluent tax should be based on

- a. the external cost created by the pollutant.
- b. people's willingness to pay for a cleaner environment.
- c. the expense of installing new "green" equipment.
- d. the number of free riders in the industry.



Causation Chain Game

Environmental Efficiency and Effluent Taxes—Exhibit 3

The International Economy



© Getty Images

The final part of this text is devoted to global topics. The first chapter explains the importance of free trade and the mechanics of trade bookkeeping and exchange rates. Here you will find a feature on the birth of the euro. The second chapter takes a historical look at the theoretical debate over capitalism and the transition of Cuba, Russia, and China toward this system. In the opposite direction, there is a discussion of nationalization in the United States. The final chapter provides comparisons of advanced and developing countries. The chapter concludes with the fascinating economic success story of Hong Kong.



International Trade and Finance

Just imagine your life without world trade. For openers, you could not eat bananas from Honduras or chocolate from Nigerian cocoa beans. Nor could you sip French wine, Colombian coffee, or Indian tea. Also forget about driving a Japanese motorcycle or automobile. In addition, you could not buy Italian shoes and most DVDs, televisions, fax machines, and personal computers because they are foreign made. Taking your vacation in London would also be ruled out if there were no world trade. And the list goes on and on, so the point is clear. World trade is important because it gives consumers more power by expanding their choices. Today, the speed of transportation and communication means producers must compete on a global basis for the favor of consumers.

Trade is often highly controversial. Regardless of whether it is a World Trade Organization (WTO)

meeting or a G8 summit meeting, trade talks face protesters in the streets complaining that globalization has triggered a crisis in the world, such as global warming, poverty, soaring oil prices, or food shortages. And in the United States, outsourcing jobs to lower paid workers overseas continues to be a hotly debated issue.

The first part of this chapter explains the theoretical reason why countries should specialize in producing certain goods and then trade them for imports. Also, you will study arguments for and against the United States protecting itself from “unfair” trade practices by other countries. In the second part of the chapter, you will learn how nations pay each other for world trade. Here you will explore international bookkeeping and discover how supply and demand forces determine that, for example, 1 dollar is worth 100 yen.

In this chapter, you will learn to solve these economics puzzles:

- How does Babe Ruth's decision not to remain a pitcher illustrate an important principle in global trade?
- Is there a valid argument for trade protectionism?
- Should the United States return to the gold standard?



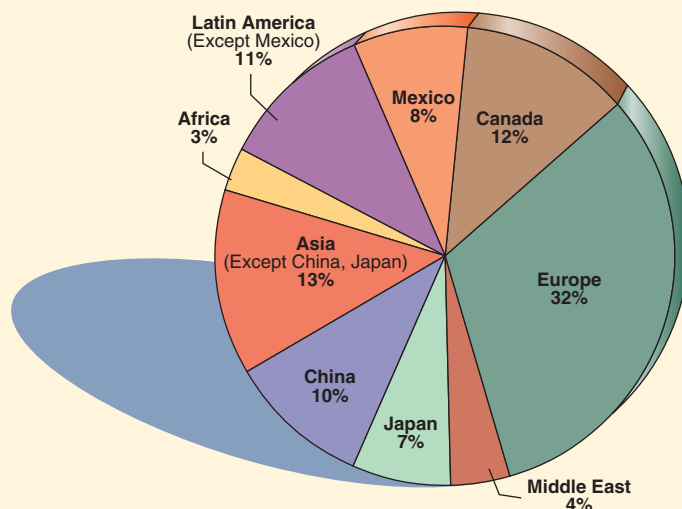
WHY NATIONS NEED TRADE

Exhibit 1 reveals which regions are our major trading partners (exports plus imports). Leading the list of nations is Canada, our largest trading partner, followed by China, Mexico, and Japan. Leading U.S. exports are chemicals, machinery, agricultural products, computers, and automobiles. Major imports include petroleum, cars, trucks, clothing, and electronics. Why does a nation even bother to trade with the rest of the world? Does it seem strange for the United States to import goods it could produce for itself? Indeed, why doesn't the United States become self-sufficient by growing all its own food, including bananas, sugar, and coffee, making all its own cars, and prohibiting sales of all foreign goods? This section explains why specialization and trade are a nation's keys to a higher standard of living.

Exhibit 1

U.S. Trading Partners, 2009

In 2009, Canada, China, Mexico, and Japan accounted for 37 percent of U.S. trade (exports plus imports).



SOURCE: Bureau of Economic Analysis, U.S. International Transactions by Area, <http://www.bea.gov/international/index.htm>, Table 12.

The Production Possibilities Curve Revisited

Consider a world with only two countries—the United States and Japan. To keep the illustration simple, also assume *both* countries produce only two goods—grain and steel. Accordingly, we can construct in Exhibit 2 a *production possibilities curve* for each country. We will also set aside the *law of increasing opportunity costs*, explained in Chapter 2, and assume workers are equally suited to producing grain or steel. This assumption transforms the bowed-out shape of the production possibilities curve into a straight line.

Comparing parts (a) and (b) of Exhibit 2 shows that the United States can produce more grain than Japan. If the United States devotes all its resources to this purpose, 100 tons of grain is produced per day, represented by point A in Exhibit 2(a). The maximum grain production of Japan, on the other hand, is only 40 tons per day because Japan has less labor, land, and other factors of production than the United States. This capability is represented by point D in Exhibit 2(b).

Now consider the capacities of the two countries for producing steel. If all their respective resources are devoted to this output, the United States produces

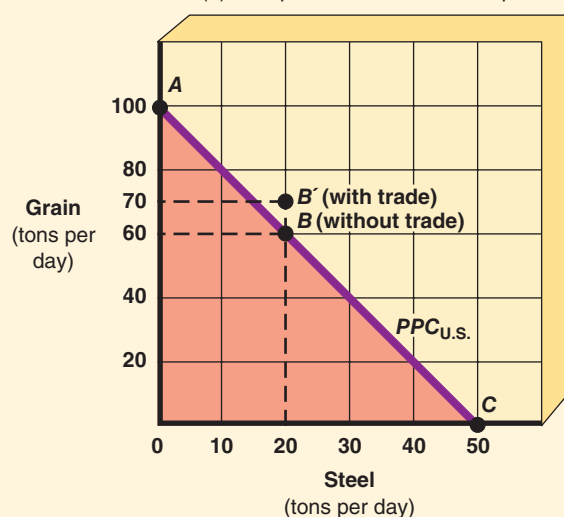
Exhibit 2

The Benefits of Trade

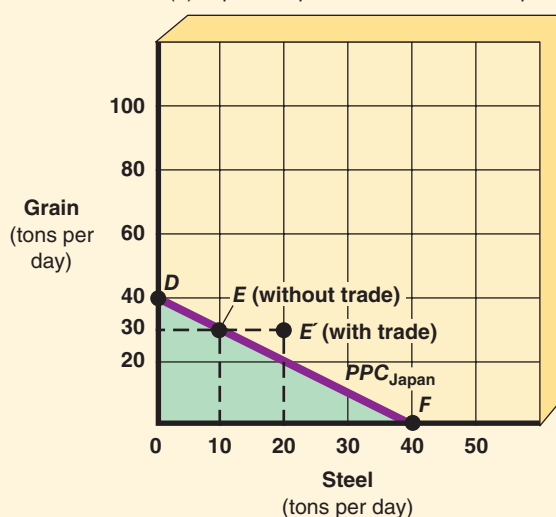
As shown in part (a), assume the United States chooses point B on its production possibilities curve, $PPC_{U.S.}$. Without trade, the United States produces and consumes 60 tons of grain and 20 tons of steel. In part (b), assume Japan also operates along its production possibilities curve, PPC_{Japan} , at point E. Without trade, Japan produces and consumes 30 tons of grain and 10 tons of steel.

Now assume the United States specializes in producing grain at point A and imports 20 tons of Japanese steel in exchange for 30 tons of grain. Through specialization and trade, the United States moves to consumption possibility point B', outside its production possibilities curve. Japan also moves to a higher standard of living at consumption possibility point E', outside its production possibilities curve.

(a) U.S. production and consumption



(b) Japanese production and consumption



50 tons per day (point C), and Japan produces only 40 tons per day (point F). Again, the greater potential maximum steel output of the United States reflects its greater resources. Both countries are also capable of producing other combinations of grain and steel along their respective production possibilities curves, such as point B for the United States and point E for Japan.

Specialization without Trade

Assuming no world trade, the production possibilities curve for each country also defines its *consumption possibilities*. Stated another way, we assume that both countries are *self-sufficient* because without imports they must consume only the combination chosen along their production possibilities curve. Under the assumption of self-sufficiency, suppose the United States prefers to produce and consume 60 tons of grain and 20 tons of steel per day (point B). Also assume Japan chooses to produce and consume 30 tons of grain and 10 tons of steel (point E). Exhibit 3 lists data corresponding to points B and E and shows that the total world output is 90 tons of grain and 30 tons of steel.

Now suppose the United States specializes by producing and consuming at point A, rather than point B. Suppose also that Japan specializes by producing and consuming at point F, rather than point E. As shown in Exhibit 3, specialization in each country increases total world output per day by 10 tons of grain and 10 tons of steel. Because this extra world output has the potential for making both countries better off, why wouldn't the United States and Japan specialize and produce at points A and F, respectively? The reason is that although production at these points is clearly possible, neither country wants to consume these combinations of output. The United States prefers to consume less grain and more steel at point B compared to point A. Japan, on the other hand, prefers to consume more grain and less steel at point E, rather than point F.

CONCLUSION *When countries specialize, total world output increases, and, therefore, the potential for greater total world consumption also increases.*

Exhibit 3

Effect of Specialization on World Output

	Grain Production (tons per day)	Steel Production (tons per day)
<i>Before specialization</i>		
United States (at point B)	60	20
Japan (at point E)	30	10
Total world output	90	30
<i>After specialization</i>		
United States (at point A)	100	0
Japan (at point F)	0	40
Total world output	100	40

Specialization with Trade

Now let's return to Exhibit 2 and demonstrate how world trade benefits countries. Suppose the United States agrees to specialize in grain production at point *A* and to import 20 tons of Japanese steel in exchange for 30 tons of its grain output. Does the United States gain from trade? The answer is Yes. At point *A*, the United States produces 100 tons of grain per day. Subtracting the 30 tons of grain traded to Japan leaves the United States with 70 tons of its own grain production to consume. In return for grain, Japan unloads 20 tons of steel on U.S. shores. Hence, specialization and trade allow the United States to move from point *A* to point *B'*, which is a consumption possibility *outside* its production possibilities curve in Exhibit 2(a). At point *B'*, the United States consumes the same amount of steel and 10 more tons of grain compared to point *B* (without trade).

Japan also has an incentive to specialize by moving its production mix from point *E* to point *F*. With trade, Japan's consumption will be at point *E'*. At point *E'*, Japan has as much grain to consume as it had at point *E*, plus 10 more tons of steel. After trading 20 tons of the 40 tons of steel produced at point *F* for grain, Japan can still consume 20 tons of steel from its production, rather than only 10 tons of steel at point *E*. Thus, point *E'* is a consumption possibility that lies *outside* Japan's production possibilities curve.

CONCLUSION *Global trade allows a country to consume a combination of goods that exceeds its production possibilities curve.*

COMPARATIVE AND ABSOLUTE ADVANTAGE

Why did the United States decide to produce and export grain instead of steel? Why did Japan choose to produce steel, rather than grain? Here you study the economic principle that determines specialization and trade.

Comparative Advantage

Engaging in world trade permits countries to escape the prison of their own production possibilities curves by producing bread, cars, or whatever goods they make best. The decision of the United States to specialize in and export grain and the decision of Japan to specialize in and export steel are based on **comparative advantage**. Comparative advantage is the ability of a country to produce a good at a lower opportunity cost than another country. Continuing our earlier example, we can calculate opportunity costs for the two countries and use comparative advantage to determine which country should specialize in grain and which in steel. For the United States, the opportunity cost of producing 50 tons of steel is 100 tons of grain not produced, so 1 ton of steel costs 2 tons of grain. For Japan, the opportunity cost of producing 40 tons of steel is 40 tons of grain, so 1 ton of steel costs 1 ton of

Comparative advantage

The ability of a country to produce a good at a lower opportunity cost than another country.

grain. Japan's steel is therefore cheaper in terms of grain forgone. This means Japan has a comparative advantage in steel production because it must give up less grain to produce steel than the United States. Stated differently, the opportunity cost of steel production is lower in Japan than in the United States.

The other side of the coin is to measure the cost of grain in terms of steel. For the United States, 1 ton of grain costs 1/2 ton of steel. For Japan, 1 ton of grain costs 1 ton of steel. The United States has a comparative advantage in grain because its opportunity cost in terms of steel forgone is lower. Thus, the United States should specialize in grain because it is more efficient in grain production. Japan, on the other hand, is relatively more efficient at producing steel and should specialize in this product.

CONCLUSION *Comparative advantage refers to the relative opportunity costs between different countries of producing the same goods. World output and consumption are maximized when each country specializes in producing and trading goods for which it has a comparative advantage.*

Absolute Advantage

So far, a country's production and global trade decisions depend on comparing what a country gives up to produce more of a good. It is important to note that comparative advantage is based on opportunity costs, regardless of the absolute costs of resources used in production. We have not considered how much labor, land, or capital either the United States or Japan uses to produce a ton of grain or steel. For example, Japan might have an **absolute advantage** in producing *both* grain and steel. Absolute advantage is the ability of a country to produce a good using fewer resources than another country. In our example, Japan might use fewer resources per ton to produce grain and steel than the United States. Maybe the Japanese work harder or are more skilled. In short, the Japanese may be more productive producers, but their absolute advantage does not matter in specialization and world trade decisions. If the United States has a comparative advantage in grain, it should specialize in grain even if Japan can produce both grain and steel with fewer resources.

Perhaps another example will clarify the difference between absolute advantage and comparative advantage. When Babe Ruth played for the New York Yankees, he was the best hitter and the best pitcher, not only on the team, but in all of major league baseball. In fact, before Ruth was traded to the Yankees and switched to the outfield, he was the best left-handed pitcher in the American League for a few seasons with the Boston Red Sox. His final record was 99-46. In other words, he had an *absolute advantage* in both hitting and throwing the baseball. Stated differently, Babe Ruth could produce the same home runs as any other teammate with fewer times at bat. The problem was that if he pitched, he would bat fewer times because pitchers need rest after pitching. The coaches decided that the Babe had a *comparative advantage* in hitting. A few pitchers on the team could pitch almost as well as Babe, but no one could touch his hitting. In terms of opportunity costs, the Yankees would lose fewer games if Babe specialized in hitting.

Absolute advantage

The ability of a country to produce a good using fewer resources than another country.



CHECKPOINT

Do Nations with an Advantage Always Trade?

Comparing labor productivity, suppose the United States has an absolute advantage over Costa Rica in the production of calculators and towels. In the United States, a worker can produce 4 calculators or 400 towels in 10 hours. In Costa Rica, a worker can produce 1 calculator or 100 towels in the same time. Under these conditions, are specialization and trade advantageous?

FREE TRADE VERSUS PROTECTIONISM

Free trade

The flow of goods between countries without restrictions or special taxes.

Protectionism

The government's use of embargoes, tariffs, quotas, and other restrictions to protect domestic producers from foreign competition.

Embargo

A law that bars trade with another country.

Tariff

A tax on an import.

In theory, global trade should be based on comparative advantage and **free trade**. Free trade is the flow of goods between countries without restrictions or special taxes. In practice, despite the advice of economists, every nation protects its own domestic producers to some degree from foreign competition. Behind these barriers to trade are special interest groups whose jobs and incomes are threatened, so they clamor to the government for **protectionism**. Protectionism is the government's use of embargoes, tariffs, quotas, and other restrictions to protect domestic producers from foreign competition.

Embargo

Embargoes are the strongest limit on trade. An embargo is a law that bars trade with another country. For example, the United States and other nations in the world imposed an arms embargo on Iraq in response to its invasion of Kuwait in 1990. The United States also maintains embargoes against Iran, Cuba, and North Korea.

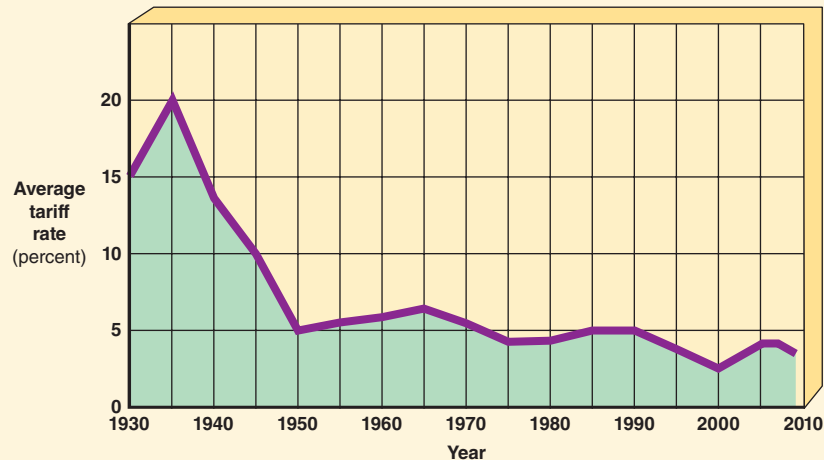
Tariff

Tariffs are the most popular and visible measures used to discourage trade. A tariff is a tax on an import. Tariffs are also called customs duties. Suppose the United States imposes a tariff of 2.9 percent on autos. If a foreign car costs \$40,000, the amount of the tariff equals \$1,160 ($\$40,000 \times 0.029$), and the U.S. price, including the tariff, is \$41,160. The current U.S. tariff code specifies tariffs on nearly 70 percent of U.S. imports. A tariff can be based on weight, volume, or number of units, or it can be *ad valorem* (figured as a percentage of the price). The average U.S. tariff is less than 5 percent, but individual tariffs vary widely. Tariffs are imposed to reduce imports by raising import prices and to generate revenues for the U.S. Treasury. Exhibit 4 shows the trend of the average tariff rate since 1930.

During the worldwide depression of the 1930s, when one nation raised its tariffs to protect its industries, other nations retaliated by raising their tariffs. Under the Smoot-Hawley tariffs of the 1930s, the average tariff in the United States reached a peak of 20 percent. Durable imports, which were one-third of imports, were subject to an unbelievable tariff rate of 60 percent. In 1947, most of the world's industrialized nations mutually agreed to end the tariff wars by signing the *General Agreement on Tariffs and Trade* (GATT). Since then, GATT nations have met periodically to negotiate lower tariff rates. GATT agreements have significantly reduced tariffs over the years among member nations. In the 1994 *Uruguay round*, member nations signed a GATT agreement that decreased tariffs and reduced other trade barriers. The most divisive element

*Exhibit 4***The United States Average Tariff Rate, 1930–2009**

Under the Smoot-Hawley Act of 1930, the average tariff rate peaked at 20 percent. Since the GATT in 1947 and other trade agreements, tariffs have declined to less than 5 percent.



SOURCES: Economic Report of the President, 1989, <http://www.gpoaccess.gov/eop/>, p. 151; United States International Trade Commission, *The Economic Effect of Significant U.S. Import Restraints*, June 2002, p. 146, <http://www.USITC.gov/>, and Trade Profiles, http://stat.wto.org/CountryProfiles/US_e.htm.

of this agreement was the creation in 1995 of the Geneva-based **World Trade Organization (WTO)** to enforce rulings in global trade disputes. The WTO has 150 members and a standing appellate body to render final decisions regarding disputes between WTO members. Critics fear that the WTO might be far more likely to rule in favor of other countries in their trade disputes with the United States. Some people argue that the WTO is unaccountable, and these critics reject free trade and globalization.

To illustrate an interesting case, the United States imposed tariffs in 2002 on steel imports to protect jobs in the struggling U.S. steel industry against foreign competition. The WTO ruled these tariffs were illegal, and countries in Europe and Asia prepared a list of retaliatory tariffs. These levies targeted products such as citrus fruit grown in Florida and apparel produced in southern states crucial to President Bush's reelection. Meanwhile, U.S. automakers and other steel-consuming industries complained because the tariffs increased their costs. Facing these threats, the United States removed the tariffs on steel imports in 2003. It is interesting to compare this case to the Global Economics Feature titled *World Trade Slips on Banana Peel*.

World Trade Organization (WTO)

An international organization of member countries that oversees international trade agreements and rules on trade disputes.

Quota

Another way to limit foreign competition is to impose a **quota**. A quota is a limit on the quantity of a good that may be imported in a given time period. For example, the United States may allow 10 million tons of sugar to be imported over a one-year period. Once this quantity is reached, no more sugar can be imported for the year. About 12 percent of U.S. imports are subject to import quotas. Examples include import quotas on sugar, dairy products, textiles, steel, and even ice cream. Quotas can limit imports from all foreign suppliers or from specific countries. In 2005, for example, global quotas were lifted from Chinese imports. The United States and

Quota

A limit on the quantity of a good that may be imported in a given time period.

other European countries demanded quotas to protect their countries from Chinese textiles. Critics argue that, like all barriers to trade, quotas invite nations to retaliate with their own measures to restrict trade, and consumers are harmed by higher prices because of the lack of competition from lower-priced imports. In addition to embargoes, tariffs, and quotas, some nations use subtler measures to discourage trade, such as setting up an overwhelming number of bureaucratic steps that must be taken in order to import a product.

ARGUMENTS FOR PROTECTION

Free trade provides consumers with lower prices and larger quantities of goods from which to choose. Thus, removing import barriers might save each family a few hundred dollars a year. The problem, however, is that imports could cost some workers their jobs and thousands of dollars per year from lost income. Thus, it is no wonder that, in spite of the greater total benefits from free trade to consumers, trade barriers exist. The reason is primarily because workers and owners from import-competing firms have more at stake than consumers, so they go to Washington and lobby for protection. The following are some of the most popular arguments for protection. These arguments have strong political or emotional appeal, but weak support from economists.

Infant Industry Argument

As the name suggests, the *infant industry argument* is that a new domestic industry needs protection because it is not yet ready to compete with established foreign competitors. An infant industry is in a formative stage and must bear high start-up costs to train an entire workforce, develop new technology, establish marketing channels, and reach economies of scale. With time to grow and protection, an infant industry can reduce costs and “catch up” with established foreign firms.

Economists ask where one draws the arbitrary line between an “infant” and a “grown-up” industry. It is also difficult to make a convincing case for protecting an infant industry in a developed country, such as the United States, where industries are well established. The infant industry argument, however, may have some validity for less-developed countries. Yet, even for these countries, there is a danger. Once protection is granted, the new industry will not experience the competitive pressures necessary to encourage reasonably quick growth and participation in world trade. Also, once an industry is given protection, it is difficult to take it away.

National Security Argument

Another common argument is that defense-related industries must be protected with embargoes, tariffs, and quotas to ensure national security. By protecting critical defense industries, a nation will not be dependent on foreign countries for the essential defense-related goods it needs to defend itself in wartime. The *national defense argument* has been used to protect a long list of industries, including petrochemicals, munitions, steel, and rubber.

This argument gained validity during the War of 1812. Great Britain, the main trading partner of the United States, became an enemy that blockaded our coast. Today, this argument makes less sense for the United States. The government stockpiles missiles, sophisticated electronics, petroleum, and most goods needed in wartime.

Employment Argument

The *employment argument* suggests that restricting imports increases domestic jobs in protected industries. According to this protectionist argument, the sale of an imported good comes at the expense of its domestically produced counterpart. Lower domestic output therefore leads to higher domestic unemployment than would otherwise be the case.

It is true that protectionism can increase output and save jobs in some industries at home. Ignored, however, are the higher prices paid by consumers because protectionism reduces competition between domestic goods and imported goods. In addition, there are employment reduction effects to consider. For example, suppose a strict quota is imposed on steel imported into our nation. Reduced foreign competition allows U.S. steelmakers to charge higher prices for their steel. As a result, prices rise and sales fall for cars and other products using steel, causing production and employment to fall in these industries. Thus, the import quota on steel may save jobs in the steel industry but at the expense of more jobs lost in the steel-consuming industries. Also, by selling U.S. imports, foreigners earn dollars that they can use to buy U.S. exports. Import quotas cause foreigners to have fewer dollars to spend on U.S. exports, resulting in a decrease in employment in U.S. export industries. In short, protectionism may cause a net reduction in the nation's total employment.

Cheap Foreign Labor Argument

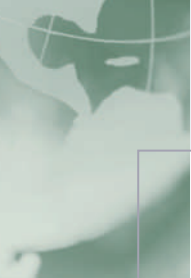
Another often heard popular claim is the *cheap labor argument*. It goes something like this: “How can we compete with such unfair competition? Labor costs \$10 an hour in the United States, and firms in many developing countries pay only \$1 an hour. Without protection against outsourcing our jobs, U.S. wages will be driven down, and our standard of living will fall.”

A major flaw in this argument is that it neglects the reason for the difference in the wage rates between countries. A U.S. worker has more education, training, capital, and access to advanced technology. Therefore, if U.S. workers produce more output per hour than workers in another country, U.S. workers will earn higher wages without a competitive disadvantage. Suppose textile workers in the United States are paid \$10 per hour. If a U.S. worker takes 1 hour to produce a rug, the labor cost per rug is \$10. Now suppose a worker in India earns \$1 per hour, but requires 20 hours to produce a rug on a handloom. In this case, the labor cost per rug is \$20. Although the wage rate is 10 times higher in the United States, U.S. productivity is 20 times higher because a U.S. worker can produce 20 rugs in 20 hours, while the worker in India produces only 1 rug in the same amount of time.

Sometimes U.S. companies move their operations to foreign countries where labor is cheaper. Such moves are not always successful because the savings from paying foreign workers a lower wage rate are offset by lower productivity. Other disadvantages of foreign operations include greater transportation costs to U.S. markets and political instability.

FREE TRADE AGREEMENTS

The trend in recent years has been for nations to negotiate a reduction in trade barriers. In 1993, Congress approved the *North American Free Trade Agreement (NAFTA)*, which linked the United States to its first- and third-largest trading partners, Canada and Mexico. Under NAFTA, which became effective January 1, 1994,



Global Economics World Trade Slips on Banana Peel

Applicable Concept: protectionism

Growing bananas for European markets was a multibillion-dollar bright spot for Latin America's struggling economies. In fact, about half of this region's banana exports traditionally were sold to Europe. Then, in 1993, the European Union (EU) adopted a package of quotas and tariffs aimed at cutting Europe's banana imports from Latin America. The purpose of these restrictions was to give trade preference to 66 banana-growing former colonies of European nations in Africa, the Caribbean, and the Pacific. Ignored was the fact that growers in Latin America grow higher-quality bananas at half the cost of EU-favored growers because of their low labor costs and flat tropical land near port cities.¹

In 1999, the World Trade Organization (WTO) ruled that the EU was discriminating in favor of European companies importing the fruit and the WTO imposed \$191.4 million per year in punitive tariffs on European goods. This was the first time in the four years the WTO had been in existence that such

retaliation had been approved, and only the second time going back to its predecessor, the General Agreement on Tariffs and Trade. When the EU failed to comply with the WTO findings, the United States enforced its WTO rights by imposing increased duties on EU imports, including goods ranging from cashmere sweaters and Italian handbags to sheep's milk cheese, British biscuits, and German coffeemakers. The effect of the U.S. sanctions was to double the wholesale prices of these items. Denmark and the Netherlands were exempt from the U.S. tariffs because they were the only nations that voted against the EU banana rules.

Critics charged that the United States was pushing the case for political reasons. American companies, including Chiquita Brands International and Dole Food Company, grow most of their bananas in Latin America. With America's trade deficit running at a record level, U.S. trade experts also argued that the United States had little choice but to act against

1. James Brooke, "Forbidden Fruit in Europe: Latin Bananas Face Hurdles," *New York Times*, April 5, 1993, p. A1.

tariffs were phased out, and other impediments to trade and investment were eliminated among the three nations. For example, elimination of trade restrictions allows the United States to supply Mexico with more U.S. goods and to boost U.S. jobs. On the other hand, NAFTA was expected to raise Mexico's wages and standard of living by increasing Mexican exports to the United States. Note that NAFTA made no changes in restrictions on labor movement, and workers must enter the United States under a limited immigration quota or illegally. The success of NAFTA remains controversial. At the conclusion of this chapter, we will use data to examine its impact.

The United States and other countries are considering other free trade agreements. In Europe, 27 nations have joined the *European Union (EU)*, which is dedicated to removing all trade barriers within Europe and thereby creating a single European economy almost as large as the U.S. economy. See the Birth of the Euro box insert in this chapter.

The *Asian-Pacific Economic Cooperation (APEC)* was formed in 1989 and today has 21 member nations, including China, Hong Kong, Russia, Japan, and Mexico. This organization is based on a nonbinding agreement to reduce trade barriers between member nations.

In 2003, trade ministers from 34 nations met in Miami to create a plan for the world's largest free-trade area that would tear down trade barriers from Alaska to Argentina. The Free Trade Area of the Americas (FTAA) would span the Western Hemisphere except Cuba. In 2005, the *Central American Free Trade Agreement*

the EU for failing to abide by the WTO's ruling. Moreover, with increasing voices in the United States questioning the wisdom of global trade and globalization, it was important that the WTO prove that it could arbitrate these disputes.

In 2001, it appeared that the banana dispute might be resolved. The EU agreed to increase market access for U.S. banana distributors, and the United States lifted its retaliatory duties on EU products. The agreement also provided that the United States could reimpose the duties if the EU did not complete its phased-in reductions in restrictions on banana imports.²

And the banana story just kept "slipping along."

*European Union anti-fraud officials say that illegal banana trafficking is proving more lucrative than that in cocaine. A recently exposed scheme saw Italian banana importers use false licences to pay greatly reduced customs duties on non-quota fruit. The fraud netted smugglers hundreds of millions of euros over a two-year period. Italian public prosecutor, Fabio Scavone, says more is being made from simple customs fraud than from serious crimes such as narcotics trafficking.*³

And in 2004, Latin American growers again complained that the EU was discriminating against their bananas in favor of producers from African and Caribbean countries. Under the 2001 WTO ruling, the EU was compelled to replace its complex quota and tariff system on bananas with a tariff-only regime. So the EU placed a 176 euro tariff per ton on Latin American suppliers to get into the EU market, while bananas from African and Caribbean countries can export up to 775,000 tons duty-free. A memorandum issued by the Swedish government attacked the "considerable overprice" European consumers pay for banana protection.⁴ The banana war continued in 2008 when a WTO dispute panel ruled for the third time that the EU tariff/quota banana regime was unfair.

ANALYZE THE ISSUE

Make an argument in favor of the European import restrictions. Make an argument against this plan.

2. "U.S. Lifts Sanctions in Banana War," *Food Institute Report*, July 9, 2001, p. 9.

3. "Banana Scam Beats Cocaine," *Australian Business Intelligence*, July 24, 2002.

4. "Bananas: Commission Proposes New Import Tariff at Euro 230 a Ton," *European Report*, Oct. 30, 2004, p. 506.

(CAFTA) extended the free-trade zone to six Central American countries that signed, including Costa Rica, Guatemala, El Salvador, Honduras, Nicaragua, and Dominican Republic. The success or failure of CAFTA will have an impact on future negotiation for FTAA.

Critics are concerned that regional free trade accords will make global agreements increasingly difficult to achieve. Some fear that trading blocs may erect new barriers, creating "Fortress North America," "Fortress Europe," and similar impediments to the worldwide reduction of trade barriers.

THE BALANCE OF PAYMENTS

When trade occurs between the United States and other nations, many types of financial transactions are recorded in a summary called the **balance of payments**. The balance of payments is a bookkeeping record of all the international transactions between a country and other countries during a given period of time. This summary is the best way to understand interactions between economies because it records the value of a nation's spending inflows and outflows made by individuals, firms, and governments. Exhibit 5 presents a simplified U.S. balance of payments for 2009.

Balance of payments

A bookkeeping record of all the international transactions between a country and other countries during a given period of time.

Birth of the Euro

In 1958, several European nations formed a Common Market to eliminate trade restrictions among member countries. The Common Market called for gradual removal of tariffs and import quotas on goods traded among member nations. Later the name was changed to the *European Economic Community (EEC)*, and it is now called the *European Union (EU)*. This organization established a common system of tariffs for imports from nonmember nations and created common policies for economic matters of joint concern, such as agriculture and transportation. The EU now comprises the 27 nations listed in the table.

In 1999, 11 European countries, joined later by Greece, followed the United States as an example and united in the *European Economic and Monetary Union, (EMU)*. In the United States, 50 states are linked with a common currency, and the Federal Reserve serves as the central bank by conducting monetary policy for the nation. Among the states, trade, labor, and investment enjoy freedom of movement. In 2002, the EMU members replaced



© Image copyright Matt Trommer, 2009. Used under license from Shutterstock.com

their national currencies with a single currency, the euro. The objective was to remove exchange rate fluctuations that impede cross-border transactions. This is why the U.S. Congress created a national currency in 1863 to replace state and private bank currencies.

The EU faces many unanswered questions. Unlike the states of the United States, the EU's member nations do not share a common language or government. This makes maintaining common macro policies difficult. France, for example, might seek to control inflation, while

Note the pluses and minuses in the table. A transaction that is a payment to the United States is entered as a positive amount. A payment by the United States to another country is entered with a minus sign. As our discussion unfolds, you will learn that the balance of payments provides much useful information.

Current Account

The first section of the balance of payments is the *current account*, which includes trade in goods and services. The most widely reported part of the current account is the **balance of trade**, also called the trade balance. The balance of trade is the value of a nation's imports subtracted from its exports, and it can be expressed in terms of goods, services, or goods and services. As shown in lines 1–2, the United States had a goods or merchandise (cars, computers) *balance of trade deficit* of –\$518 billion in 2009. A trade deficit occurs when the value of a country's imports exceeds the value of its exports. When a nation has a trade deficit, it is called an *unfavorable balance of trade* because more is spent for imports than is earned from exports. Recall that net exports can have a positive (favorable) or negative (unfavorable) effect on $GDP = C + I + G + (X - M)$.

Exhibit 6 charts the annual balance of trade for the United States from 1975 through 2009. Observe that the United States experienced a *balance of trade surplus*

Balance of trade

The value of a nation's imports subtracted from its exports. Balance of trade can be given in terms of goods, services, or goods and services.

Germany has reducing unemployment as its highest priority. Coordinating monetary policy among EU nations is also difficult. Although the EU has established the *European Central Bank* headquartered in Frankfurt, Germany, with sole authority over the supply of euros, the central banks of member nations still function. But these national central banks operate similar to the district banks of the Federal Reserve System

in the United States. Only time will tell whether EU nations will perform better with a single currency than with separate national currencies. It is possible that the euro could become a strong alternative to the U.S. dollar as a key currency for the global financial systems. Currently, the United Kingdom, Denmark, and Sweden still use their own currencies.

European Union (EU) Members

Austria	Finland	Latvia	Romania
Belgium	France	Lithuania	Slovakia
Bulgaria	Germany	Luxembourg	Slovenia
Cyprus	Greece	Malta	Spain
Czech Republic	Hungary	Netherlands	Sweden
Denmark	Ireland	Poland	United Kingdom
Estonia	Italy	Portugal	

in 1975. A trade surplus arises when the value of a country's merchandise exports is greater than the value of its merchandise imports. This is called a *favorable balance of trade* because the United States earned more from exports than it spent for imports. Since 1975, however, sizable trade deficits have occurred. These trade deficits have attracted much attention because in part they reflect the popularity of foreign goods and the lack of competitiveness of goods "Made in U.S.A." In 2001, the U.S. trade deficit narrowed slightly due to the recession and then an upward trend continued. In 2008, the U.S. trade deficits reached the record-breaking level of over \$800 billion due in part to the rising price of oil imports. Between 2001 and 2008, the price per barrel grew steadily until reaching a peak in 2008, and the U.S. trade deficit with OPEC countries grew from \$40 billion to \$179 billion. Also, our trade deficit with China tripled over the same time period from \$83 billion to \$268 billion. During 2009, oil import prices plunged sharply, the United States experienced deflation, and U.S. trade deficits with OPEC countries and China fell. These factors contributed to the fall in the U.S. balance of trade in 2009.

Lines 3–6 of the current account in Exhibit 5 list ways other than goods to move dollars back and forth between the United States and other countries. Services include insurance, banking, transportation, and tourism. For example, a Japanese tourist who pays a hotel bill in Hawaii buys an export of services, which is a plus or credit to our current account (line 3). Similarly, an American visitor to foreign lands

*Exhibit 5***U.S. Balance of Payments, 2009 (billions of dollars)**

Type of Transaction	
Current account	
1. Goods exports	\$ +1,045
2. Goods imports	-1,563
Trade balance (lines 1–2)	-518
3. Service exports	+509
4. Service imports	-371
5. Investment income (net)	+89
6. Unilateral transfers (net)	-130
Current account balance (lines 1–6)	-421
Capital account	
7. U.S. capital inflow	+435
8. U.S. capital outflow	-237
Capital account balance (lines 7–8)	+198
9. Statistical discrepancy	+223
Net balance (lines 1–9)	0

SOURCE: Bureau of Economic Analysis, click on “Detailed Estimates” for U.S. International Transactions, <http://www.bea.gov/international/index.htm>, Table 1.

buys an import of services, which is a minus or debit to our services and therefore a minus to our current account (line 4). Income flowing back from U.S. investments abroad, such as plants, real estate, and securities, is a payment for use of the services of U.S. capital. Foreign countries also receive income flowing from the services of their capital owned in the United States. In 2009, line 5 of the table reports a net flow of \$89 billion to the United States.

Finally, we consider line 6, unilateral transfers. This category includes gifts made by our government, charitable organizations, or private individuals to other governments or private parties elsewhere in the world. For example, this item includes U.S. foreign aid to other nations. Similar unilateral transfers into the United States must be subtracted to determine the *net* unilateral transfers. Net unilateral transfers for the United States were -\$130 billion in 2009.

Adding lines 1–6 gives the current account balance deficit of -\$421 billion in 2009. This deficit means that foreigners sent us more goods and services than we sent to them. Because the current account balance includes *both* goods and services, it is a broader measure than the trade balance. Since 1982, the trend in the current account balance has followed the swing into the red shown by the goods trade balance in Exhibit 6.

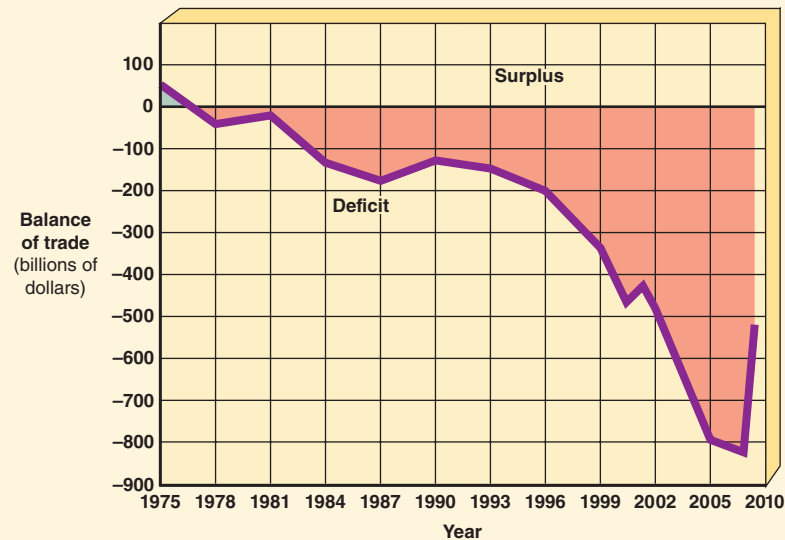
Capital Account

The second section of the balance of payments is the *capital account*, which records payment flows for financial capital, such as real estate, corporate stocks, bonds, government securities, and other debt instruments. For example, when Chinese investors

Exhibit 6

U.S. Balance of Trade, 1975–2009 (billions of dollars)

Since 1975, the United States has experienced trade deficits, in which the value of goods imports has exceeded the value of goods exports. These goods trade deficits attract much attention because in part they reflect the popularity of foreign goods in the United States. During the recession in 2001, the U.S. trade deficit narrowed briefly before continuing an upward trend. The deficits continued to grow until reaching an all-time high of over \$800 billion in 2008. In 2009, falling oil prices and other factors contributed to a sharp fall in the U.S. balance of trade.



SOURCE: Bureau of Economic Analysis, click on "Detailed Estimates" for U.S. International Transactions, <http://www.bea.gov/international/index>, Table 1.

buy U.S. Treasury bills, or Japanese investors purchase farmland in Hawaii, there is an inflow of dollars into the United States. As Exhibit 5 shows, foreigners made payments of \$435 billion to our capital account (line 7). This exceeded the -\$237 billion outflow (line 8) from the United States to purchase foreign-owned financial capital.

An important feature of the capital account is that the United States finances any deficit in its current account through this account. The capital account balance in 2009 was \$198 billion. This surplus indicates that there was more foreign investment in U.S. assets than U.S. investment in foreign assets during this year.

CONCLUSION *A current account deficit is financed by a capital account surplus.*

The current account deficit should equal the capital account surplus, but line 9 in the exhibit reveals that the balance of payments is not perfect. The capital account balance does not exactly offset the current account balance. Hence, a credit amount is simply recorded as a statistical discrepancy; therefore, the balance of payments always balances, or equals zero.

The International Debt of the United States

If each nation's balance of payments is always zero, why is there so much talk about a U.S. balance of payments problem? The problem is with the *composition* of the balance of payments. Suppose the United States runs a \$500 billion deficit in its current account. This means that the current account deficit must be financed by a net annual capital inflow in the capital account of \$500 billion. That is, foreign lenders, such as banks and businesses, must purchase U.S. assets and grant loans to the United States that on balance equal \$500 billion. For example, a Chinese bank could buy U.S. Treasury bonds. Recall from Exhibit 7 in the chapter on federal deficits and the national debt that the portion of the national debt owed to lenders outside the United States is called *external debt*.

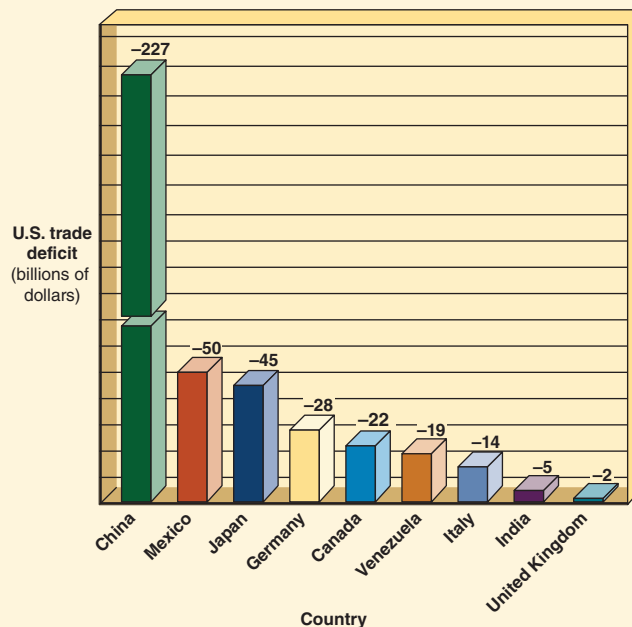
In 1984, the United States became a net debtor for the first time in about 70 years. This means that investments in the United States accumulated by foreigners—stocks, bonds, real estate, and so forth—exceeded the stock of foreign assets owned by the United States. In fact, during the decade of the 1980s, the United States moved from being the world's largest creditor nation to being the largest debtor nation.

Exhibit 7 shows that the United States has its largest trade deficits with China, Japan, Canada, and Mexico respectively. The concern over continuing trade deficits and the rising international debt that accompanies them is that the United States is artificially enjoying a higher standard of living. When the United States continues to purchase more goods and services abroad than it exports, it might find itself “enjoying now and paying later.” Suppose the Chinese and other foreigners decide not to

Exhibit 7

U.S. Balance of Trade with Selected Countries, 2009 (billions of dollars)

The United States has its greatest trade deficits with China, Japan, Canada, and Mexico.



SOURCE: Bureau of Economic Analysis, U.S. International Transactions by Area, <http://www.bea.gov/international/index.htm>, Table 12.

make new U.S. investments and loans. In this case, the United States will be forced to eliminate its trade deficit by bringing exports and imports into balance. In fact, if other countries not only refuse to provide new capital inflows, but also decide to liquidate their investments, the United States would be forced to run a trade surplus. Stated differently, we would be forced to tighten our belts and accept a lower standard of living. How a change in foreign willingness to purchase U.S. assets also affects the international value of the dollar is the topic to which we now turn.

CHECKPOINT

Should Everyone Keep a Balance of Payments?

Nations keep balances of payments and calculate accounts such as their merchandise trade deficit or surplus. If nations need these accounts, the 50 states should also maintain balances of payments to manage their economies. Or should they? What about cities?



EXCHANGE RATES

Each transaction recorded in the balance of payments requires an exchange of one country's currency for that of another. Suppose you buy a Japanese car made in Japan, say, a Mazda. Mazda wants to be paid in yen and not dollars, so dollars must be traded for yen. On the other hand, suppose Pink Panther Airline Company in France purchases an airplane from Boeing in the United States. Pink Panther has euros to pay the bill, but Boeing wants dollars. Consequently, euros must be exchanged for dollars.

The critical question for Mazda, Pink Panther, Boeing, and everyone involved in world trade is, "What is the **exchange rate**?" The exchange rate is the number of units of one nation's currency that equals one unit of another nation's currency. For example, assume 1.81 dollars can be exchanged for 1 British pound. This means the exchange rate is 1.81 dollars = 1 pound. Alternatively, the exchange rate can be expressed as a reciprocal. Dividing 1 British pound by 1.81 dollars gives 0.552 pounds per dollar. Now suppose you are visiting England and want to buy a T-shirt with a price tag of 10 pounds. Knowing the exchange rate tells you the T-shirt costs \$18.10 (10 pounds $\times$ \$1.81/pound).

Exchange rate

The number of units of one nation's currency that equals one unit of another nation's currency.

CONCLUSION *An exchange rate can be expressed as a reciprocal.*

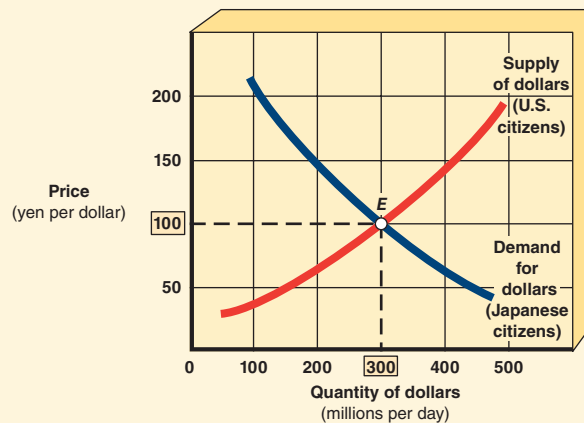
Supply and Demand for Foreign Exchange

The exchange rate for dollars, or any nation's currency, is determined by global forces of supply and demand. For example, consider the exchange rate of yen to dollars, shown in Exhibit 8. Like the price and the quantity of any good traded in markets, the quantity of dollars exchanged is measured on the horizontal axis, and the price per unit is measured on the vertical axis. In this case, the price per unit is the value of the U.S. dollar expressed as the number of yen per dollar.

Exhibit 8

The Supply of and Demand for Dollars

The number of Japanese yen per dollar in the foreign exchange market is determined by the demand for dollars by Japanese citizens and the supply of dollars by U.S. citizens. The equilibrium exchange rate is 100 yen per dollar, and the equilibrium quantity is \$300 million per day.



The demand for dollars in the world currency market comes from Japanese individuals, corporations, and governments that want to buy U.S. exports. Because the Japanese buyers must pay for U.S. exports with dollars, they *demand* to exchange their yen for dollars. As expected, the demand curve for dollars or any foreign currency is downward sloping. A decline in the number of yen per dollar means that one yen buys a larger portion of a dollar. This means U.S. goods and investment opportunities are less expensive to Japanese buyers because they must pay fewer yen for each dollar. Thus, as the yen price of dollars decreases, the quantity of dollars demanded by the Japanese to purchase Fords, stocks, land, and other U.S. products and investments increases. For example, suppose a CD recording of the hottest rock group has a \$20 price tag. If the exchange rate is 200 yen to the dollar, a Japanese importer would pay 4,000 yen. If the price of dollars to Japanese buyers falls to 100 yen each, the same \$20 CD will cost Japanese importers only 2,000 yen. This lower price causes Japanese buyers to increase their orders, which, in turn, increases the quantity of dollars demanded.

The supply curve of dollars is upward sloping. This curve shows the amount of dollars offered for exchange at various yen prices per dollar in the world currency exchange market. Similar to the demand for dollars, the supply of dollars in this market flows from individuals, corporations, and governments in the United States that want to buy Mazdas, stocks, land, and other products and investments from Japan. Because U.S. citizens must pay for the Japanese goods and services in yen, they must exchange dollars for yen. An example will illustrate why the supply curve of dollars slopes upward. Suppose a Nikon camera sells for 100,000 yen in Tokyo and the exchange rate is 100 yen per dollar or 0.01 dollar per yen (\$1/100 yen). Therefore, the camera costs an American tourist \$1,000. Now assume the exchange rate rises to 250 yen per dollar or 0.004 dollar per yen (\$1/250 yen). The camera will now cost the American

buyer only \$400. Because the prices of the Nikon camera and other Japanese products fall when the number of yen per dollar rises, Americans respond by purchasing more Japanese imports, which, in turn, increases the quantity of dollars supplied.

The foreign exchange market in Exhibit 8 is in equilibrium at an exchange rate of 100 yen for \$1. As you learned in Chapter 3, if the exchange rate is above equilibrium, there will be a surplus of dollars in the world currency market. Citizens of the United States are supplying more dollars than the Japanese demand, and the exchange rate falls. On the other hand, below equilibrium, there will be a shortage of dollars in the world currency market. In this case, the Japanese are demanding more dollars than Americans supply, and the exchange rate rises.

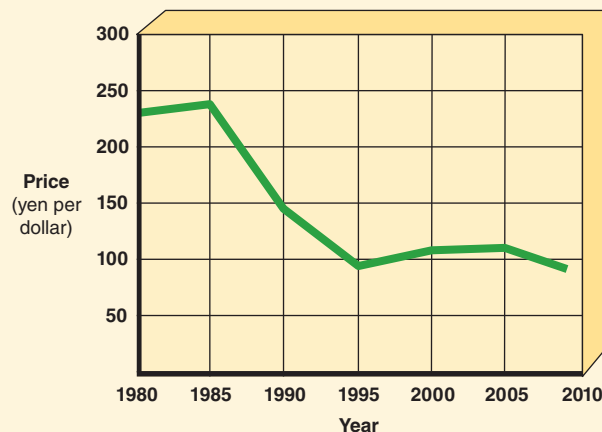
Shifts in Supply and Demand for Foreign Exchange

For most of the years between World War II and 1971, currency exchange rates were *fixed*. Exchange rates were based primarily on gold. For example, the German mark was fixed at about 25 cents. The dollar was worth 1/35 of an ounce of gold, and 4 German marks were worth 1/35 of an ounce of gold. Therefore, 1 dollar equaled 4 marks, or 25 cents equaled 1 mark. In 1971, Western nations agreed to stop fixing their exchange rates and to allow their currencies to *float* according to the forces of supply and demand. Exhibit 9 illustrates that these rates can fluctuate widely. For example, in 1980, 1 dollar was worth about 230 Japanese yen. After gyrating up and down over the years, the exchange rate hit a postwar low of 93 yen per dollar in 2009.

Exhibit 9

Changes in the Yen-per-Dollar Exchange Rate, 1980–2009

Today, most economies are on a system of flexible exchange rates. As the demand and supply curves for currencies change, exchange rates change. In 1980, 1 dollar was worth about 230 Japanese yen. By 2009, the exchange rate had dropped to a postwar low of 93 yen per dollar.



SOURCE: Federal Reserve Statistical Release, <http://www.federalreserve.gov/releases/G5A/current/>.

Recall from Chapter 3 that the equilibrium price for products changes in response to shifts in the supply and demand curves. The same supply and demand analysis applies to equilibrium exchange rates for foreign currency. There are four important sources of shifts in the supply and demand curves for foreign exchange. Let's consider each in turn.

Depreciation of currency

A fall in the price of one currency relative to another.

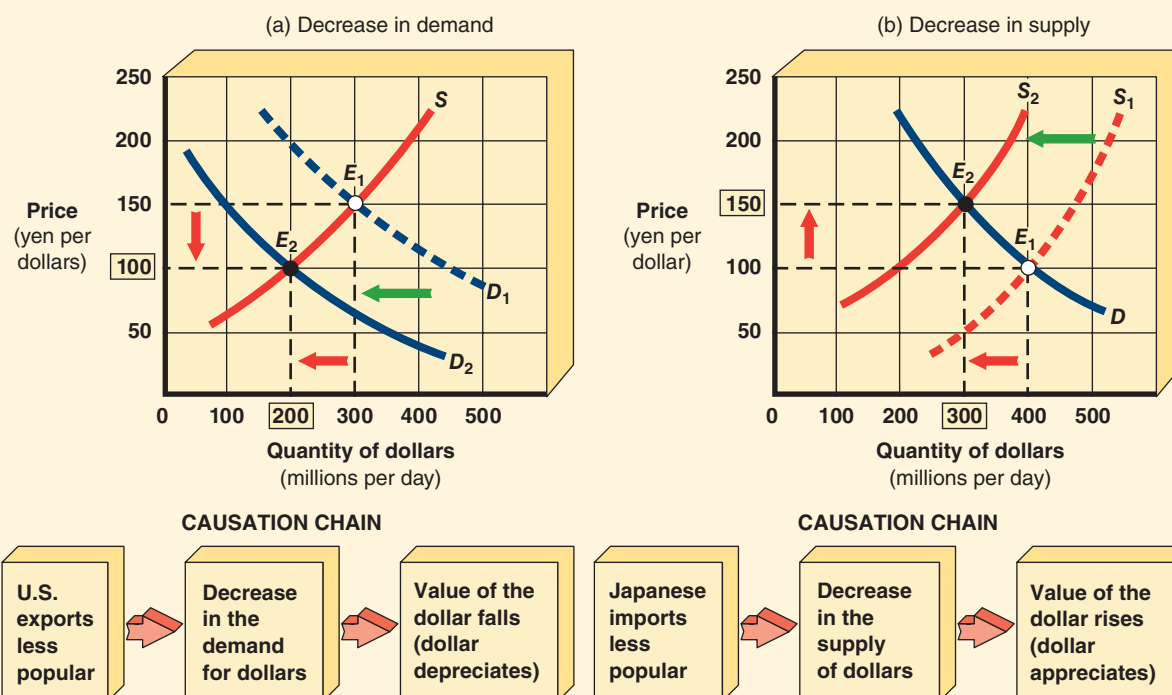
Tastes and Preferences Exhibit 10(a) illustrates one important factor that causes the demand for foreign currencies to shift. Suppose the Japanese lose their “taste” for tobacco, U.S. government bonds, and other U.S. products and investment opportunities. This decline in the popularity of U.S. products in Japan decreases the demand for dollars at each possible exchange rate, and the demand curve shifts leftward from D_1 to D_2 . This change causes the equilibrium exchange rate to fall from 150 yen to the dollar at E_1 to 100 yen to the dollar at E_2 . Because the number of yen to the dollar declines, the dollar is said to *depreciate* or become *weaker*. **Depreciation of currency** is a fall in the price of one currency relative to another.

Exhibit 10

Changes in the Supply and Demand Curves for Dollars

In part (a), U.S. exports become less popular in Japan. This change in tastes for U.S. products and investments decreases the demand for dollars, and the demand curve shifts leftward from D_1 to D_2 . As a result, the equilibrium exchange rate falls from 150 yen to the dollar at E_1 to 100 yen to the dollar at E_2 .

Part (b) assumes U.S. citizens are influenced by the “Buy American” idea. In this case, our demand for Japanese imports decreases, and U.S. citizens supply fewer dollars to the foreign currency market. The result is that the supply curve shifts leftward from S_1 to S_2 , and the equilibrium exchange rate rises from 100 yen per dollar at E_1 to 150 yen per dollar at E_2 .



What happens to the exchange rate if the “Buy American” idea changes our tastes and the demand for Japanese imports decreases? In this case, U.S. citizens supply fewer dollars at any possible exchange rate, and the supply curve in Exhibit 10(b) shifts leftward from S_1 to S_2 . As a result, the equilibrium exchange rate rises from 100 yen to the dollar at E_1 to 150 yen to the dollar at E_2 . Because the number of yen per dollar rises, the dollar is said to *appreciate* or become *stronger*. **Appreciation of currency** is a rise in the price of one currency relative to another.

Relative Incomes Assume income in the United States rises, while income in Japan remains unchanged. As a result, U.S. citizens buy more domestic products and more Japanese imports. The results are a rightward shift in the supply curve for dollars and a decrease in the equilibrium exchange rate. Paradoxically, growth of U.S. income leads to the dollar depreciating, or becoming weaker, against the Japanese yen.

CONCLUSION *An expansion in relative U.S. income causes a depreciation of the dollar.*

Relative Price Levels Now we consider a more complex case, in which a change in a factor causes a change in both the supply and the demand curves for dollars. Assume the foreign exchange rate begins in equilibrium at 100 yen per dollar, as shown at point E_1 in Exhibit 11. Now assume the price level increases in Japan, but remains constant in the United States. The Japanese therefore want to buy more U.S. exports because they have become cheaper relative to Japanese products. This willingness of the Japanese to buy U.S. goods and services shifts the demand curve for dollars rightward from D_1 to D_2 . In addition, U.S. products are cheaper for U.S. citizens compared to Japanese imports. As a result, the willingness to import from Japan is reduced at each exchange rate, which means the supply curve of dollars decreases from S_1 to S_2 . The result of the shifts in both the demand and the supply curves for dollars is to establish a new equilibrium at point E_2 , and the exchange rate reaches 200 yen per dollar.

CONCLUSION *A rise in a trading partner's relative price level causes the dollar to appreciate.*

Relative Real Interest Rates Changes in relative real (inflation-adjusted) interest rates can have an important effect on the exchange rate. Suppose real interest rates in the United States rise, while those in Japan remain constant. To take advantage of more attractive yields, Japanese investors buy an increased amount of bonds and other interest-bearing securities issued by private and government borrowers in the United States. This change increases the demand for dollars, which increases the equilibrium exchange rate of yen to the dollar, causing the dollar to appreciate (or the yen to depreciate).

There can also be an effect on the supply of dollars. When real interest rates rise in the United States, our citizens purchase fewer Japanese securities. Hence, they offer fewer dollars at each possible exchange rate, and the supply curve for dollars shifts leftward. As a result, the equilibrium exchange rate increases, and the dollar appreciates from changes in both the demand for and the supply of dollars.

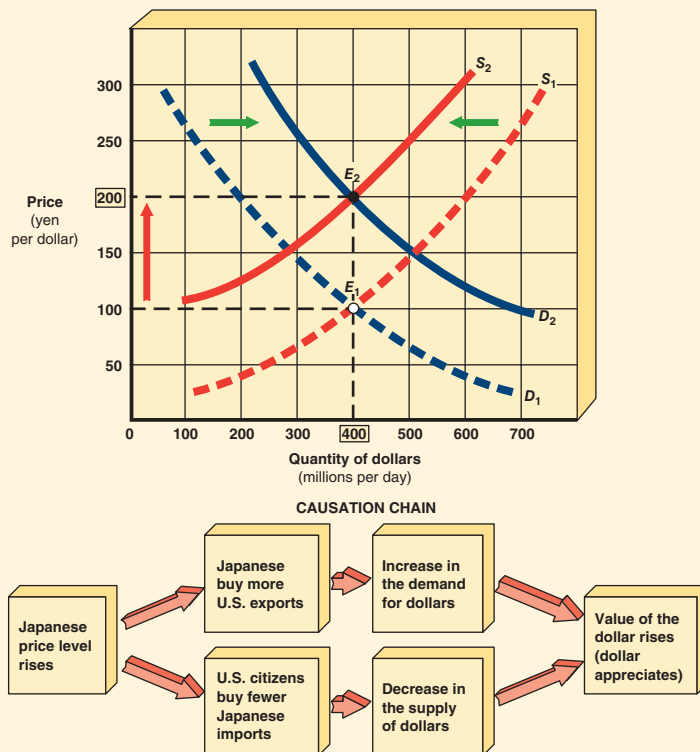
Appreciation of currency

A rise in the price of one currency relative to another.

Exhibit 11

The Impact of Relative Price Level Changes on Exchange Rates

Begin at E_1 , with the exchange rate equal to 100 yen per dollar. Assume prices in Japan rise relative to those in the United States. As a result, the demand for dollars increases, and the supply of dollars decreases. The new equilibrium is at E_2 when the dollar appreciates (rises in value) to 200 yen per dollar.



The Impact of Exchange Rate Fluctuations

Now it is time to stop for a minute, take a breath, and draw some important conclusions. As you have just learned, exchange rates between most major currencies are flexible. Instead of being pegged to gold or another fixed standard, their value is determined by the laws of supply and demand. Consequently, shifts in supply and demand create a weaker or a stronger dollar. But it should be noted that exchange rates do not fluctuate with total freedom. Governments often buy and sell currencies to prevent wide swings in exchange rates. In summary, the strength or weakness of any nation's currency has a profound impact on its economy.

A weak dollar is a "mixed blessing." Ironically, a weak dollar makes U.S. producers happy because they can sell their less expensive exports to foreign buyers. As export sales rise, jobs are created in the United States. On the other hand, a weak dollar makes foreign producers and domestic consumers unhappy because the prices of Japanese cars, French wine, and Italian shoes are higher. As U.S. imports fall, jobs are lost in foreign countries.

CONCLUSION *When the dollar is weak or depreciates, U.S. goods and services cost foreign consumers less, so they buy more U.S. exports. At the same time, a weak dollar means foreign goods and services cost U.S. consumers more, so they buy fewer imports.*

A strong dollar is also a “mixed blessing.” A strong dollar makes our major trading partners happy because the prices of Japanese cars, French wine, and Italian shoes are lower. A strong dollar, contrary to the implication of the term, makes U.S. producers unhappy because their exports are more expensive and related jobs decline. Conversely, a strong dollar makes foreign producers happy because the prices of their goods and services are lower, causing U.S. imports to rise.

CONCLUSION *When the dollar is strong or appreciates, U.S. goods and services cost foreign consumers more, so they buy fewer U.S. exports. At the same time, a strong dollar means foreign goods and services cost U.S. consumers less, so they buy more foreign imports.*

Finally, as promised earlier in this chapter, we return to the discussion of NAFTA in order to illustrate the impact of this free trade agreement and the effect of a strong dollar. Recall that in January 1994, NAFTA began a gradual phaseout of tariffs and other trade barriers. Exhibit 12 provides trade data for the United States

Exhibit 12

U.S. Trade Balances with Mexico, 1993–2009

Year	U.S. Exports to Mexico (billions of dollars)	U.S. Imports from Mexico (billions of dollars)	Exchange Rate (pesos per dollar)	U.S. Trade Surplus (+) or Deficit (–) (billions of dollars)
1993	\$ 42	\$ 40	3.12	\$ +2
1995	46	63	6.45	–17
1997	71	87	7.92	–16
1999	87	111	9.55	–24
2001	101	132	9.34	–31
2003	97	139	10.79	–42
2005	120	173	10.89	–53
2007	136	214	10.93	–78
2009	129	179	13.50	–50

SOURCES: Bureau of Economic Analysis, U.S. International Transactions by Area, <http://www.bea.gov/international/index.htm>, Table 12 and Federal Reserve Statistical Release, <http://www.federalreserve.gov/releases/G5A/current/>.

Global Economics Return to the Yellow Brick Road?

Applicable Concept: exchange rates

Gold is always a fascinating story: *The Wonderful Wizard of Oz* was first published in 1900 and this children's tale has been interpreted as an allegory for political and economic events of the 1890s. For example, the Yellow Brick Road represents the gold standard, Oz in the title is an abbreviation for ounce, Dorothy is the naive public, Emerald City symbolizes Washington, D.C., the Tin Woodman represents the industrial worker, the Scarecrow is the farmer, and the Cyclone is a metaphor for a political revolution. In the end, Dorothy discovers magical powers in her *silver* shoes (changed to ruby in the 1939 film) to find her way home and not the fallacy of the Yellow Brick Road. Although the author of the story, L. Frank Baum, never stated it was his intention, it can be argued that the issue of the story concerns the election of 1896. Democratic presidential nominee William Jennings Bryan (the Cowardly Lion) supported fixing the value of the dollar to both gold and silver (bimetallism), but Republican William McKinley (the Wicked Witch) advocated using only the gold standard. Since McKinley won, the United States remained on the Yellow Brick Road.¹

The United States adopted the gold standard in 1873 and until the 1930s, most industrial countries were on the gold standard. The gold standard served as an international monetary system in which currencies were defined in terms of gold. Under the gold standard, a nation with a balance of payments deficit was required to ship gold to

other nations to finance the deficit. Hence, a large excess of imports over exports meant a corresponding outflow of gold from a nation. As a result, that nation's money supply decreased, which, in turn, reduced the aggregate demand for goods and services. Lower domestic demand led to falling prices, lower production, and fewer jobs. In contrast, a nation with a balance of payments surplus would experience an inflow of gold and the opposite effects. In this case, the nation's money supply increased, and its aggregate demand for goods and services rose. Higher aggregate spending, in turn, boosted employment and the price level. In short, the gold standard meant that governments could not control their money supplies and thereby conduct monetary policy.

The gold standard worked fairly well as a fixed exchange rate system so long as nations did not face sudden or severe swings in flows from their stocks of gold. The Great Depression marked the beginning of the end of the gold standard. Nations faced with trade deficits and high unemployment began going off the gold standard, rather than contracting their money supplies by following the gold standard.

In 1933, President Franklin D. Roosevelt took the United States off the gold standard and ordered all 1933 gold double eagle coins already manufactured to be melted down and not circulated. Through a long twisted story worthy of a Sherlock Holmes mystery novel involving the Smithsonian Institution,

1. Bradley A. Hansen, "The Fable of the Allegory," *Journal of Economic Education*, Summer 2002, pp. 254–264.

and Mexico for the years surrounding NAFTA. As the exhibit shows, both exports and imports of goods increased sharply after NAFTA. On the other hand, a small U.S. trade surplus of \$2 billion with Mexico in 1993 turned into a huge trade deficit of \$50 billion in 2009.

Before blaming this trade deficit entirely on NAFTA, you must note that the exchange rate rose from 3.12 to 13.50 pesos per dollar. Since 1995, the peso was

the former king of Egypt, the Treasury Department, the Justice Department, the U.S. Mint, and a long list of intriguing supporting characters, one 1933 double eagle surfaced and was sold for \$7.59 million in 2002. This was double the previous record for a coin.

Once the Allies felt certain they would win World War II, the finance ministers of Western nations met in 1944 at Bretton Woods, New Hampshire, to establish a new international monetary system. The new system was based on fixed exchange rates and an international central bank called the *International Monetary Fund (IMF)*. The IMF makes loans to countries faced with short-term balance of payments problems. Under this system, nations were expected to maintain fixed exchange rates within a narrow range. In the 1960s and early 1970s, the Bretton Woods system became strained as conditions changed. In the 1960s, inflation rates in the United States rose relative to those in other countries, causing U.S. exports to become more expensive and U.S. imports to become less expensive. This situation increased the supply of dollars abroad and caused an increasing surplus of dollars, thus putting downward pressure on the exchange rate. Monetary authorities in the United States worried that central banks would demand gold for their dollars, the U.S. gold stock would diminish sharply, and the declining money supply would adversely affect the economy.

Something had to give, and it did. In August 1971, President Richard Nixon announced that the United States would no longer honor its obligation to sell gold at \$35 an ounce. By 1973, the gold standard was dead, and most of our trading partners

were letting the forces of supply and demand determine exchange rates.

Today, some people advocate returning to the gold standard. These gold buffs do not trust the government to control the money supply without the discipline of a gold standard. They argue that if governments have the freedom to print money, political pressures will sooner or later cause them to increase the money supply too much and let inflation rage.

One argument against the gold standard is that no one can control the supply of gold. Big gold discoveries can cause inflation and have done so in the past. On the other hand, slow growth in the stock of mined gold can lead to slow economic growth and a loss of jobs. Governments therefore are unlikely to return to the gold standard because it would mean turning monetary policy over to uncontrollable swings in the stock of gold.

ANALYZE THE ISSUE

Return to Exhibit 8, and assume the equilibrium exchange rate is 150 yen per dollar and the equilibrium quantity is \$300 million. Redraw this figure, and place a horizontal line through the equilibrium exchange rate to represent a fixed exchange rate. Now use this figure to explain why a country would abandon the gold standard.

devalued and the stronger dollar has put the price of U.S. goods out of reach for many Mexican consumers. This is one reason U.S. exports to Mexico have been lower than they would have been otherwise. At the same time, Mexican goods became less expensive for U.S. consumers, so U.S. imports from Mexico have risen.

Key Concepts

Comparative advantage
Absolute advantage
Free trade
Protectionism
Embargo

Tariff
World Trade Organization (WTO)
Quota
Balance of payments

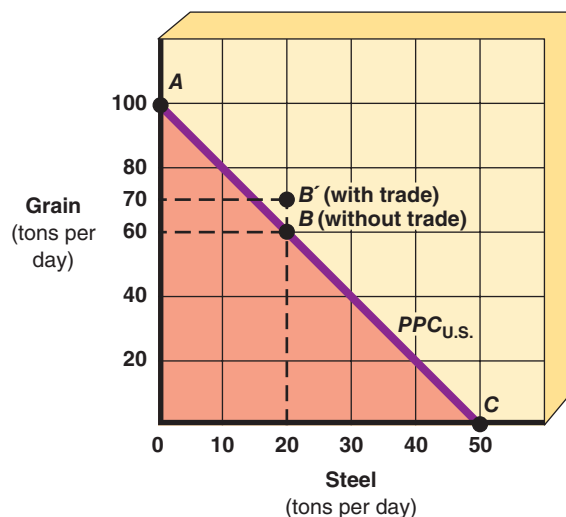
Balance of trade
Exchange rate
Depreciation of currency
Appreciation of currency

Summary

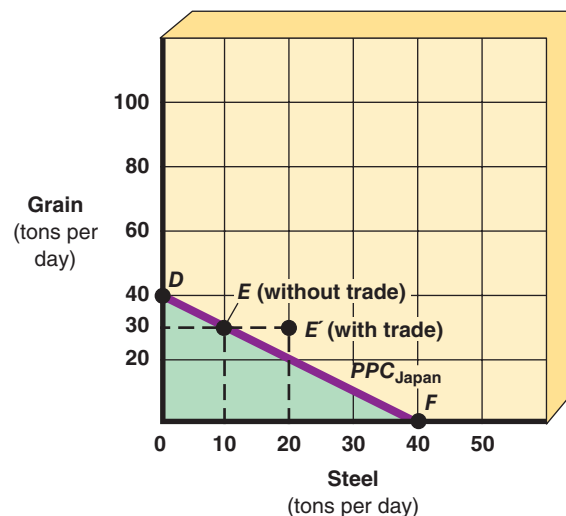
- **Comparative advantage** is a principle that allows nations to gain from trade. Comparative advantage means that each nation *specializes* in a product for which its opportunity cost is lower in terms of the production of another product, and then nations trade. When nations follow this principle, they gain. The reason is that world output increases, and each nation ends up with a higher standard of living by consuming more goods and services than would be possible without specialization and trade.

Comparative Advantage

(a) U.S. production and consumption



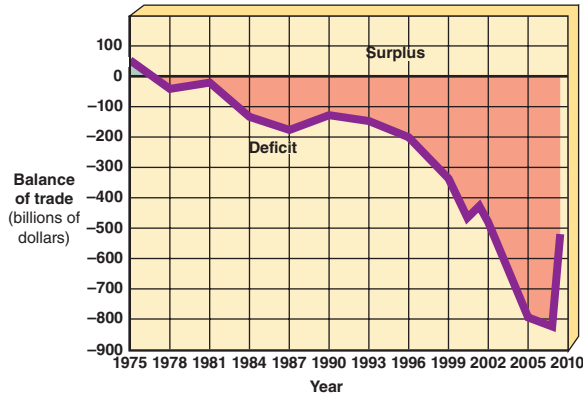
(b) Japanese production and consumption



- **Free trade** benefits a nation as a whole, but individuals may lose jobs and incomes because of the competition from foreign goods and services.
- **Protectionism** is a government's use of embargoes, tariffs, quotas, and other methods to impose barriers intended to both reduce imports and protect particular domestic industries. *Embargoes* prohibit the import or export of particular goods. *Tariffs* discourage imports by making them more expensive. *Quotas* limit the quantity of imports or exports of certain goods. These trade barriers often result primarily from domestic groups that exert political pressure on government in order to gain from these barriers.

- The *balance of payments* is a summary bookkeeping record of all the international transactions a country makes during a year. It is divided into different accounts, including the *current account*, the *capital account*, and the *statistical discrepancy*. The current account summarizes all transactions in currently produced goods and services. The overall balance of payments is always zero after an adjustment for the statistical discrepancy.
- The *balance of trade* measures only goods (not services) that a nation exports and imports. A balance of trade can be in deficit or in surplus. The balance of trade is the most widely reported and largest part of the current account. Since 1975, the United States has experienced balance of trade deficits.

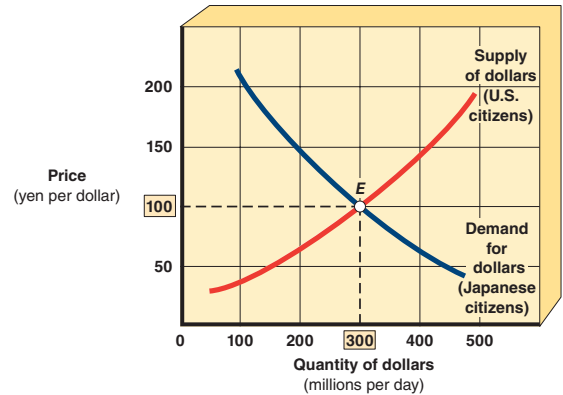
Balance of Trade



- An *exchange rate* is the price of one nation's currency in terms of another nation's currency. Foreigners who wish to purchase U.S. goods, services, and financial assets demand dollars.

The supply of dollars reflects the desire of U.S. citizens to purchase foreign goods, services, and financial assets. The intersection of the supply and demand curves for dollars determines the number of units of a foreign currency per dollar.

Exchange Rate



- *Shifts in supply and demand for foreign exchange* result from changes in such factors as tastes, relative price levels, relative real interest rates, and relative income levels.
- *Depreciation of currency* occurs when one currency becomes worth fewer units of another currency. If a currency depreciates, it becomes weaker. Depreciation of a nation's currency increases its exports and decreases its imports.
- *Appreciation of currency* occurs when one currency becomes worth more units of another currency. If a currency appreciates, it becomes stronger. Appreciation of a nation's currency decreases its exports and increases its imports.

Summary of Conclusion Statements

- When countries specialize, total world output increases, and, therefore, the potential for greater total world consumption also increases.
- Global trade allows a country to consume a combination of goods that exceeds its production possibilities curve.
- Comparative advantage refers to the relative opportunity costs between different countries
- of producing the same goods. World output and consumption are maximized when each country specializes in producing and trading goods for which it has a comparative advantage.
- A current account deficit is financed by a capital account surplus.
- An exchange rate can be expressed as a reciprocal.

- An expansion in relative U.S. income causes a depreciation of the dollar.
- A rise in a trading partner’s relative price level causes the dollar to appreciate.
- When the dollar is weak or depreciates, U.S. goods and services cost foreign consumers less, so they buy more U.S. exports. At the same time, a weak dollar means foreign goods and

services cost U.S. consumers more, so they buy fewer imports.

- When the dollar is strong or appreciates, U.S. goods and services cost foreign consumers more, so they buy fewer U.S. exports. At the same time, a strong dollar means foreign goods and services cost U.S. consumers less, so they buy more foreign imports.

Study Questions and Problems

1. The countries of Alpha and Beta produce diamonds and pearls. The production possibilities schedule below describes their potential output in tons per year:

Points on Production Possibilities Curve	Alpha		Beta	
	Diamonds	Pearls	Diamonds	Pearls
A	150	0	90	0
B	100	25	60	60
C	50	50	30	120
D	0	75	0	180

paint either three walls or two window frames. To minimize the time spent painting, who should specialize in painting walls, and who should specialize in painting window frames?

- Using the data in the table, answer the following questions:
- What is the opportunity cost of diamonds for each country?
 - What is the opportunity cost of pearls for each country?
 - In which good does Alpha have a comparative advantage?
 - In which good does Beta have a comparative advantage?
 - Suppose Alpha is producing and consuming at point B on its production possibilities curve and Beta is producing and consuming at point C on its production possibilities curve. Use a table such as Exhibit 3 to explain why both nations would benefit if they specialize.
 - Draw a graph, and use it to explain how Alpha and Beta benefit if they specialize and Alpha agrees to trade 50 tons of diamonds to Beta and Alpha receives 50 tons of pearls in exchange.
2. Bill can paint either two walls or one window frame in one hour. In the same time, Frank can

- Consider this statement: “The principles of specialization and trade according to comparative advantage among nations also apply to states in the United States.” Do you agree or disagree? Explain.
- Would the U.S. government gain any advantage from using tariffs or quotas to restrict imports?
- Suppose the United States passed a law stating that we would not purchase imports from any country that imposed any trade restrictions on our exports. Who would benefit and who would lose from such retaliation?
- Now consider question 5 in terms of the law’s impact on domestic producers that export goods. Does this policy adversely affect domestic producers that export goods?
- Consider this statement: “Unrestricted foreign trade costs domestic jobs.” Do you agree or disagree? Explain.
- Do you support a constitutional amendment to prohibit the federal government from imposing any trade barriers, such as tariffs and quotas, except in case of war or national emergency? Why or why not?
- Discuss this statement: “Because each nation’s balance of payments equals zero, it follows that there is actually no significance to a balance of payments deficit or surplus.”
- For each of the following situations, indicate the direction of the shift in the supply

curve or the demand curve for dollars, the factor causing the change, and the resulting movement of the equilibrium exchange rate for the dollar in terms of foreign currency:

- American-made cars become more popular overseas.
- The United States experiences a recession, while other nations enjoy economic growth.
- Inflation rates accelerate in the United States, while inflation rates remain constant in other nations.
- Real interest rates in the United States rise, while real interest rates abroad remain constant.
- The Japanese put quotas and high tariffs on all imports from the United States.
- Tourism from the United States increases sharply because of a fare war among airlines.

11. The following table summarizes the supply and the demand for euros:

	U.S. Dollars per Euro				
	\$0.05	\$0.10	\$0.15	\$0.20	\$0.25
Quantity demanded (per day)	500	400	300	200	100
Quantity supplied (per day)	100	200	300	400	500

Using the above table:

- Graph the supply and demand curves for euros.
- Determine the equilibrium exchange rate.
- Determine what the effect of a fixed exchange rate at \$0.10 per euro would be.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Do Nations with an Advantage Always Trade?

In the United States, the opportunity cost of producing 1 calculator is 100 towels. In Costa Rica, opportunity cost of producing 1 calculator is 100 towels. If you said, because the opportunity cost is

the same for each nation, specialization and trade would not boost total output, and therefore Costa Rica would not trade these products, **YOU ARE CORRECT.**

Should Everyone Keep a Balance of Payments?

The principal purpose of the balance of payments is to keep track of payments of national currencies. Because states and cities within the same nation use the same national currency, payments for goods and services traded between these parties

do not represent a loss (outflow) or gain (inflow). If you said only nations need to use the balance of payments to account for flows of foreign currency across national boundaries, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- With trade, the production possibilities for two nations lie
 - outside their consumption possibilities.
 - inside their consumption possibilities.
 - at a point equal to the world production possibilities curve.
 - none of the above.
- Free trade theory suggests that when trade takes place
 - both nations will be worse off.
 - one nation must gain at the other nation's expense.

Practice Quiz Continued

- c. both nations will be better off.
 - d. one nation will gain and the other nation will be neither better nor worse off.
3. Which of the following is *true* when two countries specialize according to their comparative advantage?
 - a. It is possible to increase their total output of all goods.
 - b. It is possible to increase their total output of some goods only if both countries are industrialized.
 - c. One country is likely to gain from trade, while the other loses.
 - d. None of the above is true.
4. According to the theory of comparative advantage, a country should produce and
 - a. import goods in which it has an absolute advantage.
 - b. export goods in which it has an absolute advantage.
 - c. import goods in which it has a comparative advantage.
 - d. export goods in which it has a comparative advantage.
5. In Exhibit 13, which country has the comparative advantage in the production of potatoes?
 - a. The United States because it requires fewer resources to produce potatoes
 - b. The United States because it has the lower opportunity cost of potatoes
 - c. Ireland because it requires fewer resources to produce potatoes
 - d. Ireland because it has the lower opportunity cost of potatoes
6. In Exhibit 13, the opportunity cost of wheat is
 - a. 1/3 ton of potatoes in the United States and 1/2 ton of potatoes in Ireland.
 - b. 2 tons of potatoes in the United States and 1 1/2 tons of potatoes in Ireland.
 - c. 8 tons of potatoes in the United States and 4 tons of potatoes in Ireland.
 - d. 1/2 ton of potatoes in the United States and 2/3 ton of potatoes in Ireland.
7. In Exhibit 13, the opportunity cost of potatoes is
 - a. 1/2 ton of wheat in the United States and 2/3 ton of wheat in Ireland.
 - b. 2 tons of wheat in the United States and 1 1/2 tons of wheat in Ireland.
 - c. 16 tons of wheat in the United States and 6 tons of wheat in Ireland.
 - d. 3 tons of wheat in the United States and 2 tons of wheat in Ireland.
8. If the countries in Exhibit 13 follow the principle of comparative advantage, the United States should
 - a. buy all of its potatoes from Ireland.
 - b. buy all of its wheat from Ireland.
 - c. buy all of its potatoes and wheat from Ireland.
 - d. produce both potatoes and wheat and not trade with Ireland.
9. A tariff increases
 - a. the quantity of imports.
 - b. the ability of foreign goods to compete with domestic goods.
 - c. the prices of imports to domestic buyers.
 - d. all of the above.
10. The infant industry argument for protectionism is based on which of the following views?
 - a. Foreign buyers will absorb all of the output of domestic producers in a new industry.
 - b. The growth of an industry that is new to a nation will be too rapid unless trade restrictions are imposed.
 - c. Firms in a newly developing domestic industry will have difficulty growing if they face strong competition from established foreign firms.
 - d. It is based on none of the above.

Exhibit 13

Potatoes and Wheat Output (tons per hour)

Country	Potatoes	Wheat
United States	1	3
Ireland	1	2

Practice Quiz Continued

11. The figure that results when goods imports are subtracted from goods exports is
 - a. the capital account balance.
 - b. the balance of trade.
 - c. the current account balance.
 - d. always less than zero.
12. Which of the following international accounts records payments for exports and imports of goods, military transactions, foreign travel, investment income, and foreign gifts?
 - a. The capital account
 - b. The merchandise account
 - c. The current account
 - d. The official reserve account
13. Which of the following international accounts records the purchase and sale of financial assets and real estate between the United States and other nations?
 - a. The balance of trade account
 - b. The current account
 - c. The capital account
 - d. The balance of payments account
14. If a Japanese radio priced at 2,000 yen can be purchased for \$10, the exchange rate is
 - a. 200 yen per dollar.
 - b. 20 yen per dollar.
 - c. 20 dollars per yen.
 - d. none of the above.
15. The United States
 - a. was on a fixed exchange rate system prior to late 1971, but now is on a flexible exchange rate system.
 - b. has been on a fixed exchange rate system since 1945.
 - c. has been on a flexible exchange rate system since 1945.
 - d. was on a flexible exchange rate system prior to late 1983, but now is on a fixed exchange rate system.
16. Suppose the exchange rate changes so that fewer Japanese yen are required to buy a dollar. We would conclude that
 - a. the Japanese yen has depreciated in value.
 - b. U.S. citizens will buy fewer Japanese imports.
 - c. Japanese will demand fewer U.S. exports.
 - d. none of the above will occur.
17. Which of the following would cause a decrease in the demand for euros by those holding U.S. dollars?
 - a. Inflation in France, but not in the United States
 - b. Inflation in the United States, but not in France
 - c. An increase in the real rate of interest on investments in France above the real rate of interest on investments in the United States
 - d. None of the above
18. An increase in the equilibrium price of a nation's money could be caused by a (an)
 - a. decrease in the supply of money curve.
 - b. decrease in the demand for money curve.
 - c. increase in the supply of money curve.
 - d. increase in the quantity of money demanded.
19. If the dollar appreciates (becomes stronger), this causes
 - a. the relative price of U.S. goods to increase for foreigners.
 - b. the relative price of foreign goods to decrease for Americans.
 - c. U.S. exports to fall and U.S. imports to rise.
 - d. a balance of trade deficit for the United States.
 - e. all of the above to occur.
20. Which of the following would cause the U.S. dollar to depreciate against the Japanese yen?
 - a. Greater popularity of U.S. exports in Japan
 - b. A higher price level in Japan
 - c. Higher real interest rates in the United States
 - d. Higher incomes in the United States



Economies in Transition

The inherent vice of capitalism is the unequal sharing of blessings. The inherent virtue of communism is the equal sharing of miseries.

—Winston Churchill

The emergence of the market system in Russia, China, and other countries continues while leaders of these countries that used to be devoted followers of Marxist ideology now say they believe that capitalism, private property, and profit are ideas superior to the communist system. The failure of communism and the transformation toward a market system is personified by the success of McDonald's in Russia and Wal-Mart in China. Today, Russia and other countries continue to experience economic problems during their

restructuring, but the commitment to free-market reforms remains. And in 2009, the media reported the astonishing news that the United States was nationalizing banks and General Motors. What caused this astonishing turn of events?

To understand how the pieces of the global economic puzzle fit together, this chapter begins with a discussion of the three basic types of economies. Then you will examine the pros and cons of the “isms”—capitalism, socialism, and communism. Here you will explore the worldwide clash between the ideas of Adam Smith and Karl Marx and study their current influence on economic systems. Finally, you will examine economic reforms in Cuba, Russia, and China.

In this chapter, you will learn to solve these economics puzzles:

- Why did drivers in the former Soviet Union remove the windshield wipers and side mirrors whenever they parked their cars?
- What did Adam Smith mean when he said that an “invisible hand” promotes the public interest?
- If the Soviet Union was foolish to run its economy on five-year plans, why do universities, businesses, and governments in a capitalistic economy plan?



BASIC TYPES OF ECONOMIC SYSTEMS

North Korea and South Korea share the same language and historical background. However, South Korea today is a modern economy and people starve in North Korea. This difference relates to their differing economic systems. An **economic system** consists of the organizations and methods used to determine what goods and services are produced, how they are produced, and for whom they are produced. As explained earlier in Chapter 2, scarcity forces each economic system to decide what combination of goods to produce, how to produce such goods, and who gets the output once produced. The decision-making process involves interaction among many aspects of a nation's culture, such as its laws, form of government, ethics, religions, and customs. Economist Robert L. Heilbroner established a simple way to look at the basic methods society can employ. Each economic system can be classified into one of three basic types: (1) *traditional*, (2) *command*, and (3) *market*.

Economic system

The organizations and methods used to determine what goods and services are produced, how they are produced, and for whom they are produced.

The Traditional Economy

Why does England have a king or queen? Tradition is the answer. Historically, the **traditional economy** has been a common system for making economic decisions. The traditional economy is a system that answers the *What*, *How*, and *For Whom* questions the way they have always been answered. People in this type of society learn that copying the previous generation allows them to feel accepted. Anyone who changes ways of doing things asks for trouble from others. This is because people in such a society believe that what was good yesterday, and years ago, must still be a good idea today.

Although most traditional economies have switched to keep pace with modern economic trends, traditional systems are used today, for example, by the Ainu of Japan, the native people of Brazil's rain forest, the pygmies of Central Africa, and the Amish of Pennsylvania. In these societies, the way past generations decided what crops are planted, how they are harvested, and to whom they are distributed remains unchanged over time. People perform their jobs in the manner established by their ancestors. The Amish are well known for rejecting tractors and using horse-drawn plows. Interestingly, the Amish reject Social Security because their society voluntarily redistributes wealth to members who are needy.

Traditional economy

A system that answers the *What*, *How*, and *For Whom* questions the way they always have been answered.

The Traditional Economy's Strengths and Weaknesses

The benefit of the traditional approach is that it minimizes friction among members because relatively little is disputed. Consequently, people in this system may cooperate more freely with one another. In today's industrial world, the Amish and other traditional economies appear very satisfied with their relatively uncomplicated systems. However, critics argue that the traditional system restricts individual initiative and therefore does not lead to the production of advanced goods, new technology, and economic growth.

The Command Economy

Command economy

A system that answers the *What*, *How*, and *For Whom* questions by central authority.

In a **command economy**, a dictator or group of central planners makes economic decisions for society. In this system, the *What*, *How*, and *For Whom* questions are answered by planners with central authority. The former Soviet Union and China in the past and Cuba, North Korea, and Burma today are examples of nations with command economies using national economic plans implemented through powerful government committees. Politically selected committees decide on everything, including the number, color, size, quality, and price of autos, brooms, sweaters, and tanks. The state owns the factors of production and dictates answers to the three basic economic questions. The authorities might decide to produce modern weapons instead of schools, or they might decide to devote resources to building huge monuments like the pyramids, built by the rulers of ancient Egypt to honor their dead kings and queens.

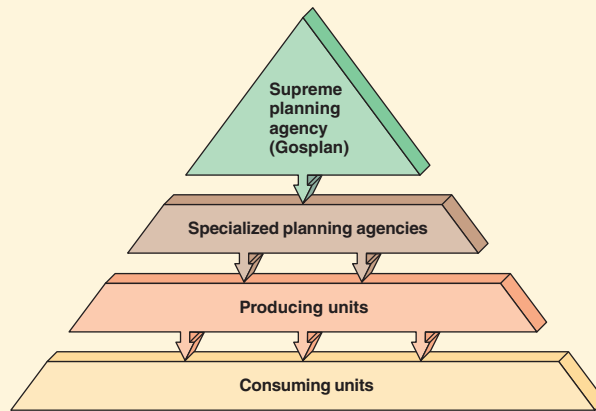
In the old Soviet economy, for example, the three basic economic questions were answered by a central planning agency called the *Gosplan*. Following the policies of the political authority (the Politburo), the Gosplan set production quotas and prices for farms, factories, mines, housing construction, medical care, and other producing units. What should the cows be fed? If it is hay, how much land can be used to grow it? How much milk should the cows give? How many people will be dairy farmers? What wages should a dairy farmer earn? Should milk be given to everyone, to a few, or to any persons chosen by the leaders? If there was a shortage of goods in the shops, then goods would be rationed through queuing. The Gosplan tried to make all these decisions. Today, in Russia and the other former Soviet republics, the Gosplan is a distant memory of the discarded Soviet command system.

The pyramid shown in Exhibit 1 represents the command economy. At the top of the pyramid is a supremely powerful group of central planners, such as the old Soviet Gosplan. That agency established production targets and prices for goods and services. Then the Gosplan transmitted this information to a second layer of specialized state planning agencies. One of these specialized government bureaucracies purchased raw materials, another agency established fashion trends, another set prices, and another government bureaucracy made decisions based on employment and wages.

Production objectives were transmitted from the upper authority layers to the individual producing units, represented by the third layer of the pyramid in Exhibit 1. These producers supplied goods and services to the consumers, as commanded by the central authorities. The bottom portion of the pyramid illustrates the distribution, according to the master plan, of output to consuming units of individuals and households.

*Exhibit 1***The Command Economy Pyramid**

The principal feature of a command economy is the central planning board at the top, which transmits economic decisions down to the various producing and consuming units below. This process begins with an overall plan from a supreme planning board, such as the old Soviet Gosplan. The Gosplan established production targets and was the ultimate authority over a layer of specialized planning agencies, which authorized capital expansion, raw material purchases, prices, wages, and all other production decisions for individual producing units. Finally, the factories, farms, mines, and other producers distributed the specified output to consumers according to the approved master plan.



The Command Economy's Strengths and Weaknesses

Believe it or not, the command system can be defended. Proponents argue that economic change occurs much faster than in a traditional economy. This is one reason those dissatisfied with a traditional society might advocate establishment of a command system. The central authorities can ignore custom and order new ways of doing things. Another reason for adopting a command economy is the controversial belief that the government will provide economic security and equity. It is alleged that central authorities ensure that everyone is provided food, clothing, shelter, and medical care regardless of their ability to contribute to society.

The absolute power of central authorities to make right decisions is also the power to be absolutely wrong. Often the planners do not set production goals accurately, and either shortages or surpluses of goods and services are the result. For example, at one point the planners miscalculated and produced too few windshield wipers and side mirrors for Soviet cars. Faced with shortages of these parts, Soviet drivers removed windshield wipers and side mirrors whenever they parked their cars to prevent theft. On the other hand, the Gosplan allocated some collective farms far more fertilizer than they could use. To receive the same amount of fertilizer again the next year, farmers simply burned the excess fertilizer. As a result of such decision-making errors, people waited

in long lines or stole goods. How does any decision-making group really know how many windshield wipers to produce each year and how much workers making them should earn?

Because profit is not the motive of producers in a command economy, quality and variety of goods also suffer. If the Gosplan ordered a state enterprise to produce 400,000 side mirrors for cars, for example, producers had little incentive to make the extra effort required to create a quality product in a variety of styles. The easiest way to meet the goal was to produce a low-quality product in one style regardless of consumer demand.

Exhibit 2 illustrates how the pricing policy of central planners causes shortages. The demand curve for side mirrors conforms to the law of demand. At lower prices in rubles, the quantity demanded increases. The supply curve is fixed at 400,000 side mirrors because it is set by the central planners and is therefore unresponsive to price variations.

Suppose one of the principal goals of the command economy is to keep the price low. To reach this goal, the central planners set the price of side mirrors at 20 rubles, which is below the equilibrium price of 40 rubles. At 20 rubles, more people can afford a side mirror than at the equilibrium price set by an uncontrolled marketplace. The consequence of this lower price set by the planners is a shortage. The quantity demanded at 20 rubles is 800,000 side mirrors, and the quantity supplied is only 400,000 mirrors. Thus, the model explains why side mirrors disappeared from stores long before many who were willing to buy them could do so.

The same graphical analysis applies to centrally planned rental prices for apartments. The central planners in the former Soviet Union set rents below the equilibrium rental prices for apartments. As the model predicts, low rents resulted in a shortage of housing. Meanwhile, the planners promised that improvements in housing would come in time.

CONCLUSION *When central planners set prices below equilibrium for goods and services, they create shortages, which mean long lines, empty shelves, and black markets.¹*

The Market Economy and the Ideas of Adam Smith

Market economy

An economic system that answers the *What, How, and For Whom* questions using prices determined by the interaction of the forces of supply and demand.

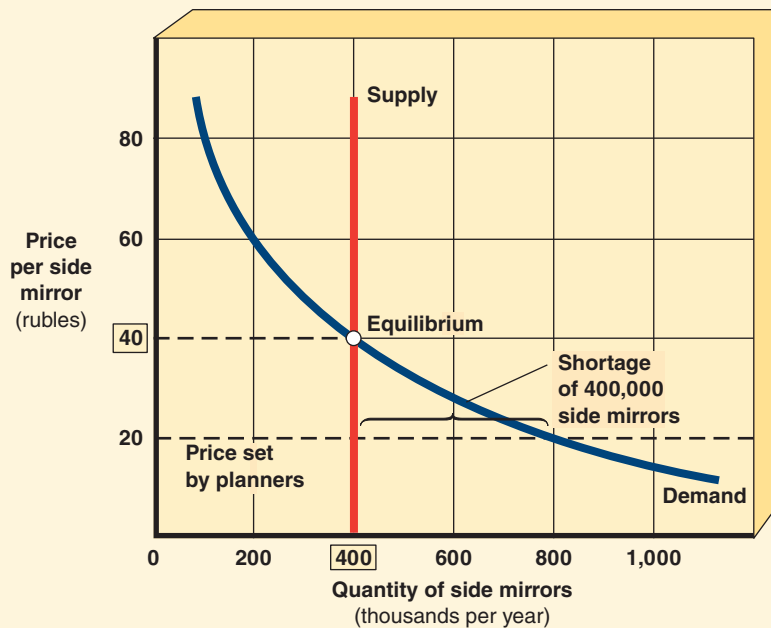
In a **market economy**, neither customs nor a single person or group of central planners answers the three basic economic questions facing society. The market economy is an economic system that answers the *What, How, and For Whom* questions using prices determined by the interaction of the forces of supply and demand. One of the first people to explain the power of a market economy was the Scottish economist Adam Smith. In the same year that the American colonies declared their political independence, Smith's *An Inquiry into the Nature and Causes of the Wealth of Nations* presented the blueprint for employing markets to improve economic performance. Smith spent over 10 years observing the real world and writing about how nations could best improve their material well-being. He concluded that the answer

1. Recall from Exhibit 5 of Chapter 4 that a black market is an illegal market that emerges when a price ceiling is imposed in a free market.

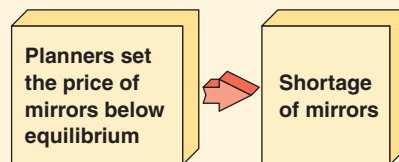
Exhibit 2

Central Planners Fixing Prices

The central planners' goal is to keep prices low, so they set the price of a side mirror for a car at 20 rubles, which is below the market-determined equilibrium price of 40 rubles. At the set price, however, the quantity demanded is 800,000 side mirrors per year. Also set by the planners, the quantity supplied is 400,000 per year. Thus, the shortage at the government-established price is 400,000 side mirrors per year. As a result, long lines form to buy side mirrors, and black markets appear.



CAUSATION CHAIN



was to use free markets because this mechanism provides the incentive for everyone to follow his or her *self-interest*.

Adam Smith is the *father of modern economics*. He intended to write a book that would influence popular opinion and, unlike many famous works, his book was an immediate success.

The basic philosophy of his book is “the best government is the least government.” This belief is known as *laissez faire*, a French expression meaning “allow to act.” As Smith stated, the role of the government should be limited to providing



Adam Smith (1723–1790) The father of modern economics, who wrote *The Wealth of Nations* published in 1776.

Prints & Photographs Division,
Library of Congress, LC-USZ62-1740

national defense, providing education, maintaining infrastructure, enforcing contracts, and little else. Smith also advocated free trade among nations and rejected the idea that nations should impose trade barriers.

During Smith's lifetime, European nations such as England, France, and Spain intervened to control economic activities. In *The Wealth of Nations*, he argued that economic freedoms are "natural rights" necessary for the dignity of humankind. He believed that free competition among people who follow their self-interest would best benefit society because markets free of government interference produce the greatest output of goods and services possible. As noted above, Smith was an advocate of free international trade and asked the question implied in the full title of his book: Why are some nations richer than others? He explained that the source of any nation's wealth is not really the amount of gold or silver it owns. This was an idea popular during Smith's time called *mercantilism*. Instead, he argued that it is the ability of people to produce products and trade in free markets that creates a nation's wealth.

The importance of markets is that they harness the power of self-interest to answer the *What*, *How*, and *For Whom* questions. Without central planning, markets coordinate the actions of millions of consumers and producers. Smith said that the market economy seemed to be controlled by an **invisible hand**. The invisible hand is a phrase that expresses the belief that the best interests of a society are served when individual consumers and producers compete to achieve their own private interests. Guided by an invisible hand, producers must compete with one another to win consumers' money. The *profit motive* in a competitive marketplace provides profits as a reward for efficient producers, while losses punish inefficient producers. Smith saw profit as the necessary driving force in an individualistic market system. The profit motive leads the butcher, the baker, and other producers to answer the *What*, *How*, and *For Whom* questions at the lowest prices. Consumers also compete with one another to purchase the best goods at the lowest price. Competition automatically regulates the economy and provides more goods and services than a system in which government attempts to accomplish the same task in the *public interest*. In Smith's own words:

Every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By . . . directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.²

The Market Economy's Strengths and Weaknesses

In a market system, if consumers want Beanie Babies, they can buy them because sellers seek to profit from the sale of Beanie Babies. No single person or central planning board makes a formal decision to shift resources and tell firms how to produce what many might view as a frivolous product. Because no central body or set of customs interferes, the market system provides a wide variety of goods and services that buyers and sellers exchange at the lowest prices.

2. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776; reprint, New York: Random House, 1937), p. 423.

Invisible hand

A phrase that expresses the belief that the best interests of a society are served when individual consumers and producers compete to achieve their own private interests.

CONCLUSION *A market economy answers the What to produce and How to produce questions very effectively.*

Those who attack the market economy point out the market failure problems of lack of competition, externalities, public goods, and income inequality, discussed in Chapter 4. For example, critics contend that competition among buyers and sellers results in people who are very wealthy and people who are very poor. In a market economy, output is divided in favor of people who earn higher incomes and own property. Some people will dine on caviar in a fine restaurant, while others will wander the street and beg for food and shelter. Supporters of the market system argue that this inequality of income must exist to give people incentives or rewards for the value of their contributions to others.

The Mixed Economy

In the real world, no nation is a pure traditional, command, or market economy. Even primitive tribes employ a few markets in their system. For example, members of a tribe may exchange shells for animal skins. In China, the government allows many private shops and farms to operate in free markets. Although the United States is best described as a market economy, it is also a blend of the other two systems. As mentioned earlier, the Amish operate a well-known traditional economy in our nation. The draft during wartime is an example of a command economy in which the government obtains involuntary labor. In addition, taxes “commanded” from taxpayers fund government programs, such as national defense and Social Security. If the economic systems of most nations do not perfectly fit one of the basic definitions, what term best describes their economies? A more appropriate description is that most countries employ a blend of the basic types of economic systems, broadly called a **mixed economy**. A mixed economy is a system that answers the *What, How, and For Whom* questions through a mixture of traditional, command, and market systems.

The traditional, command, and market economies can exist in a wide variety of political situations. For instance, the United States and Japan are politically “free” societies in which the market system flourishes. But China uses the market system to a limited degree in spite of its lack of political freedom. Moreover, some of the Western democracies engage in central economic planning. French officials representing government, business, and labor meet annually to discuss economic goals for industry for the next five-year period, but compliance is voluntary. In Japan, a government agency called the *Ministry of Economy, Trade and Industry* (METI) engages in long-term planning. One of the goals of the METI is to encourage exports so that Japan can earn the foreign currencies it needs to pay for oil and other resources.

Mixed economy

An economic system that answers the *What, How, and For Whom* questions through a mixture of traditional, command, and market systems.

THE “ISMS”

What type of economic system will a society choose to answer the *What, How, and For Whom* questions? We could call most economies “mixed,” but this would be too imprecise. In the real world, economic systems are labeled with various forms of the popular “isms”—capitalism, socialism, and communism—which are based on the basic types of systems.

Global Economics

Choosing an Economic System on Another Planet

Applicable Concept: basic types of economic systems

Suppose we discover life on a new planet and the chief of their society learns of the successful economy of the United States and summons an economist to learn the secret. Sitting at the head of a huge oval table, the chief addresses the adviser seated at the other end saying, “Our economic system depends on tradition and command. It works, but not nearly so well as the U.S. economy. Our men and women lead a highly tradition-bound way of life. Men farm and hunt like their forefathers. Women work only in the home and care for children following the role approved by their elders. There is no confusion over how things are done, and there is no chaos over what work, or what output will be produced. People are simply assigned jobs by their leaders and told how much to produce. Likewise, people are told to work on community projects for our planet’s benefit. If anyone refuses to follow instructions, they are shunned or banished. Tell me, how could there possibly be a better way to organize our economy?” The economist confidently responds, “Yes, there is definitely a better way. Replace tradition and command systems with the ‘invisible hand’ of the market system. This idea was explained long ago by a scholar named Adam Smith, the father of modern economics.”

The chief is puzzled. “I have never heard of Adam Smith or the market economy. In a nutshell, explain to me how it differs from our system.”

“Very well,” says the economist. “In a market economy, each person is allowed to decide for himself or herself what to do based on price signals.”

The chief is horrified and takes umbrage. “But what happens when they do not choose correctly? Let’s talk about something specific, like computer production. Unless we designate people to make

computers, how do we know the right number will select this job? What if women want to work in this industry? Who decides how much these workers should be paid and how many computers should be produced to satisfy the demand for them?”

“You may rest assured,” says the economist. “Using prices determined in markets free from intervention will answer all your questions better than if leaders try to control everything.”

The chief interrupts triumphantly. “Do you really expect me to believe that without instructions from the leaders, too few or too many products will not be bought and sold?”

“Ah, exactly!” the economist quickly answers. “The market will automatically do all these wonderful things. People will be more motivated by their own rational self-interest than by tradition or central authority. In short, the system runs itself.”

“The economy runs without my leaders’ directions!” says the chief. “That’s absurd, and you have wasted my time. I thought you had a meaningful proposal. Good day!”

ANALYZE THE ISSUE

1. Describe how a traditional or a command system would make employment and production decisions compared to a market system.
2. Why might the leader find a market system inconceivable? Is it possible for economic activities not based on self-interest to take place in a market economy?

SOURCE: Adapted from Robert L. Heilbroner, *The Making of Economic Society*, 1993.

Capitalism

An economic system characterized by private ownership of resources and markets.

Capitalism

The popular term for the market economy discussed previously is capitalism. **Capitalism** is an economic system characterized by private ownership of resources and markets. *Capitalism* is also called the *free enterprise system*. Regardless of its political system, a capitalist economic system must possess two

characteristics: (1) private ownership of resources and (2) decentralized decision making using markets.

Private Ownership Ownership of resources determines to a great degree who makes the *What*, *How*, and *For Whom* decisions. In a capitalist system, resources are primarily *privately* owned and controlled by individuals and firms, rather than having property rights be *publicly* held by government on behalf of society. In the United States, most capital resources are privately owned, but the term *capitalism* is somewhat confusing because it stresses private ownership of factories, raw materials, farms, and other forms of *capital* even though public ownership of land exists as well.

Decentralized Decision Making This characteristic of capitalism allows buyers and sellers to exchange goods in markets without government involvement. A capitalist system operates on the principle of **consumer sovereignty**. Consumer sovereignty is the freedom of consumers to cast their dollar votes to buy, or not to buy, at prices determined in competitive markets. As a result, consumer spending determines what goods and services firms produce. In a capitalist system, most allocative decisions are coordinated by consumers and producers interacting through markets and making their own decisions guided by Adam Smith's invisible hand. Friedrich von Hayek, an Austrian economist who was a 1974 recipient of the Nobel Prize and author of *The Road to Serfdom*, argued that political and economic freedoms are inseparable.

In the real world, many U.S. markets are not perfectly open or free markets with the consumer as sovereign. For example, consumers cannot buy illegal drugs or body organs. In Chapter 4, you learned that the U.S. government sets minimum prices (support prices) for wheat, milk, cheese, and other products. These markets are free only if the market price is above the support price. Similarly, the minimum-wage law forces employers to pay a wage above some dollar amount per hour regardless of market conditions.

CONCLUSION *No nation in the world precisely fits the two criteria for capitalism; however, the United States comes close.*

Consumer sovereignty

The freedom of consumers to cast their dollar votes to buy, or not to buy, at prices determined in competitive markets.

Capitalism's Strengths and Weaknesses

One of the major strengths of capitalism is its capacity to achieve *economic efficiency* because competition and the profit motive force production at the lowest cost. Another strength of pure capitalism is *economic freedom* because economic power is widely dispersed. Individual consumers, producers, and workers are free to make decisions based on their own self-interest. Economist Milton Friedman makes a related point: Private ownership limits the power of government to deny goods, services, or jobs to its adversaries.

Critics of capitalism cite several shortcomings. First, capitalism tends toward an unequal distribution of income. This inequality of income among citizens results for several reasons. Private ownership of capital and the other factors of production can cause these factors to become concentrated in the hands of a few individuals or firms. Also, people do not have equal labor skills, and the marketplace rewards those with greater skills. These inequalities may be perpetuated because the rich can provide better education, legal aid, political platforms, and wealth to their heirs. Second, pure

Socialism

An economic system characterized by government ownership of resources and centralized decision making.

capitalism is criticized for its failure to protect the environment. The pursuit of profit and self-interest can take precedence over damage or pollution to the air, rivers, lakes, and streams. Recall the graphical model used in Chapter 4 to illustrate the socially unacceptable impact of producers who pollute the environment.

Socialism

The idea of socialism has existed for thousands of years. Its basis is the command system. **Socialism** is an economic system characterized by government ownership of resources and centralized decision making. Socialism is also called *command socialism*. Under a socialist economy, a command system owns and controls in the *public interest* the major industries, such as steel, electricity, and agriculture. However, some free markets can exist in farming, retail trade, and certain service areas. Just as no pure capitalist system exists in the real world, none of the socialist countries in the world today practices pure socialism. In fact, there are as many variants of socialism as there are countries called socialist.

Before discussing socialism further, you must realize that socialism is an economic system, and politics should not be confused with economics. Great Britain, France, and Italy have representative democracies, but many of their major industries are or have been nationalized. In the United States, the federal government owns and operates the Tennessee Valley Authority (TVA), the National Aeronautics and Space Administration (NASA), and the U.S. Postal Service, while at the same time allowing private utilities and mail service firms to operate.

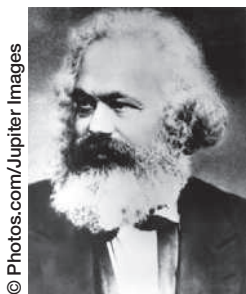
The Ideas of Karl Marx

Despite the transition to capitalism in Russia and Eastern Europe, socialism still prevails in China, Cuba, and many less-developed countries. The theory for socialism and *communism* can be traced to Karl Marx. Marx was a nineteenth-century German philosopher, revolutionary, and economist. Unlike other economists of the time who followed Adam Smith, Marx rejected the concept of a society operating through private interest and profit.

Karl Marx was born in Germany, the son of a lawyer. He was an outstanding student at Berlin University. In 1841, after receiving a doctorate in philosophy, he turned to journalism. In 1843, Marx married the daughter of a wealthy family and moved to Paris, but his political activities forced him to leave Paris for England. From the age of 31, he lived and wrote his books in London. In London, Marx lived an impoverished life while he and his lifelong friend Friedrich Engels wrote the *Communist Manifesto*, published in 1848. A massive work followed, titled *Das Kapital*, which was published in three volumes in 1867, 1884, and 1885.

These two works made Karl Marx the most influential economist in the history of socialism. In fact, he devoted his entire life to a revolt against capitalism. As Marx read *The Wealth of Nations*, he saw profits as unjust payments to owners of firms—the capitalists. Marx predicted that the market system would destroy itself because wealthy owners would go too far and exploit workers because unrelenting greed for profits would lead the owners to pay starvation wages. Moreover, the owners would force laborers to work in unsafe conditions, and many would not have a job at all.

Marx believed that private ownership and exploitation would produce a nation driven by a class struggle between a few “haves” and many “have-nots.” As he



© Photos.com/Jupiter Images

Karl Marx (1818–1883)
His Criticism of capitalism advanced communism. He wrote *Communist Manifesto* and *Das Kapital*.

stated in the *Communist Manifesto*, “The history of all existing society is the history of class struggle. Freeman and slave, patrician and plebeian, lord and serf, guild-master and journeyman, in a word, oppressor and oppressed.”³ In Marx’s vision, capitalists were the modern-day oppressors, and the workers were the oppressed proletariat. Someday, Marx predicted, the workers would rise up in a spontaneous bloody revolution against a system benefiting only the owners of capital. Marx believed **communism** to be the ideal system, which would evolve in stages from capitalism through socialism. Communism is a stateless, classless economic system in which all the factors of production are owned by the workers and people share in production according to their needs. This is the highest form of socialism toward which the revolution should strive.

Under communism, no private property exists to encourage self-interest. There is no struggle between classes of people, and everyone cooperates. In fact, there is no reason to commit crime, and police, lawyers, and courts are unnecessary. Strangely, Marx surpassed Adam Smith in advocating a system with little central government. Marx believed that those who work hard, or are more skilled, will be public spirited. Any “haves” will give voluntarily to “have-nots” until everyone has exactly the same material well-being. In Marx’s own words, people would be motivated by the principle “from each according to his ability, to each according to his need.” World peace would evolve as nation after nation accepted cooperation and rejected profits and competition. Under the idealized society of communism, there would be no state. No central authority would be necessary to pursue the interests of the people.

Today, we call the economic systems that existed in the former Soviet Union and Eastern Europe, and still exist in China, Cuba, and other countries, *communist*. However, the definition for *socialism* given in this chapter more accurately describes their real-world economic systems. Actually, no nation has achieved the ideal communist society described by Marx, nor has capitalism self-destructed as he predicted. The 1917 communist revolution in Russia did not fit Marx’s theory. At that time, Russia was an underdeveloped country, rather than an industrial country filled with greedy capitalists who exploited workers.

Communism

A stateless, classless economic system in which all the factors of production are owned by the workers, and people share in production according to their needs. In Marx’s view, this is the highest form of socialism toward which the revolution should strive.

Characteristics of Socialism

Regardless of a society’s political system, a socialist economy has two basic characteristics: (1) public ownership and (2) centralized decision making.

Public Ownership Under socialism, the government owns most of the factors of production, including factories, farms, mines, and natural resources. Agriculture in the old Soviet Union illustrates how even this real-world socialist country deviated from total public ownership. In the Soviet Union, there were three rather distinct forms of agriculture: state farms, collective farms, and private plots. In both the state farm and the collective-farm sectors, central planning authorities determined prices and outputs. In contrast, the government allowed those holding small private plots on peasant farms to operate primarily in free markets that determined price and output levels. Reforms now allow farmers to buy land, tractors, trucks, and other resources from the state. If these reforms continue, they will dramatically end the collectivization of agriculture begun under Josef Stalin.

3. Karl Marx and Friedrich Engels, *The Communist Manifesto* (New York: International Press, 1848), p. 31.

Centralized Decision Making Instead of the pursuit of *private interest*, the motivation of pure socialism is the *public interest* of the whole society. For instance, a factory manager cannot decide to raise or lower prices to obtain maximum profits for the factory. Regardless of inventory levels or the opportunity to raise prices, the planners will not permit this action. Instead of exploiting the ups and downs of the market, the goal of the socialist system is to make centralized decisions that protect workers and consumers from decentralized market decisions. Critics argue that the main objective of this centralization is to perpetuate the personal dictatorships of leaders such as Stalin in the old Soviet Union and Fidel Castro in Cuba.

Before the open market reforms, Soviet planners altered earnings to attract workers into certain occupations and achieve planned goals. For example, if space projects needed more engineers, then the state raised the earnings of engineers until the target number of people entered the engineering profession.

As shown earlier in Exhibit 2, central planners in the Soviet Union also manipulated consumer prices. If consumers desired more cars than were available, the authorities increased the price of cars. If people wished to purchase less of an item than was available, planners lowered prices. The problem was that this decision process took time. And while the market awaited its orders from the Soviet planners, excess inventories of some items accumulated, and consumers stood in line for cheap products that never seemed to be available. There was an old Soviet saying, “If you see a line, get in it. Whatever it is, it’s scarce, and you will not see it tomorrow.”

The Soviet factory system did not adhere completely to the command system. The government rewarded successful managers with bonuses that could be substantial. Better apartments, nice vacations, and medals were incentives for outstanding performance. Under economic reforms, plant managers now make decisions based on profitability instead of centralized controls.

CHECKPOINT

To Plan or Not to Plan—That Is the Question

You make plans. You planned to go to college. You plan which career to follow. You plan to get married, and so on. Businesses plan. They plan to hire employees, expand their plants, increase profits, and so forth. Because individuals and businesses plan in a market economy, there is really no difference between our system and a command economy. Or is there?

Socialism’s Strengths and Weaknesses

Proponents of the socialism model argue that this system is superior in achieving an equitable distribution of income. This is because government ownership of capital and other resources prevents a few individuals or groups from acquiring a disproportionate share of the nation’s wealth. Also, supporters argue that rapid economic growth is achieved when planners have the power to direct more resources to producing capital goods and fewer resources to producing consumer goods (see Exhibit 5 of Chapter 2).

National goals may seem to be easily formulated and pursued under state directives, but there are problems. For example, proponents of such an economy

can claim there is no unemployment because the government assigns all workers a job and allocates resources to complete their production goals. However, economic inefficiency results because the government often uses many workers to perform work requiring only one or two workers. Critics also point out that the absence of the profit motive discourages entrepreneurship and innovation and thus suppresses economic growth.

Socialism is particularly vulnerable to the charge that it ignores the goal of economic freedom and instead creates a privileged class of government bureaucrats who assume the role of “capitalists.” Central planners are the key translators of information about consumer preferences and production capabilities flowing to millions of economic units. This complex and cumbersome process is subject to errors and unresponsiveness to the wants of the majority of the population. Critics also question whether the distribution of income under socialism is more equitable than under capitalism. In the socialist system, “perks” for government officials, nepotism, and the illegal use of markets create disparities in income.

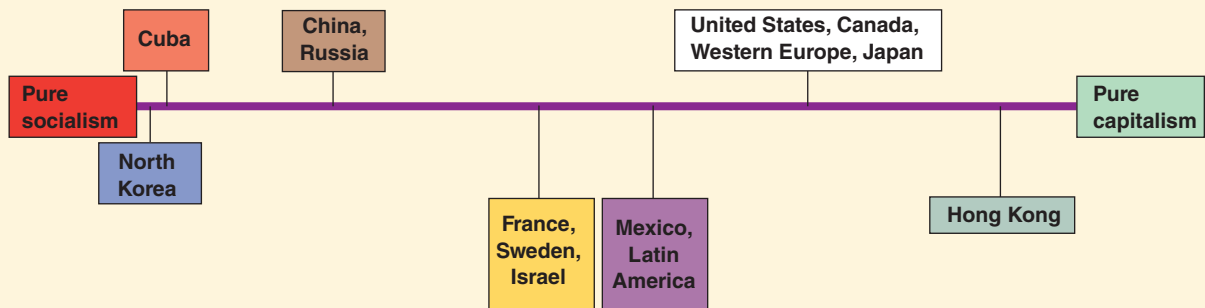
COMPARING ECONOMIC SYSTEMS

In reality, all nations operate economic systems that blend capitalism and socialism. Exhibit 3 presents a continuum that attempts to place countries between the two extremes of pure socialism on the left and pure capitalism on the right. Economies characterized by a high degree of both private ownership and market allocation are closest to pure capitalism. Hong Kong (now part of China), Japan, the United States, and Canada fall at the capitalism end of the line. Conversely, economies characterized by much government ownership of resources and central planning are closest to pure socialism. North Korea and Cuba fall close to the pure socialism end of the spectrum, with China and Russia further away from pure socialism.

Exhibit 3

A Classification of Economic Systems

No nation has an economic system that is pure socialism or pure capitalism. All nations mix government ownership and reliance on markets. North Korea and Cuba are closest to pure socialism, while Hong Kong comes closest to pure capitalism. Other real-world economies are placed between these two extremes on the basis of their use of government ownership versus markets.



ECONOMIES IN TRANSITION

By the early 1990s, the centrally planned economies in the old Soviet Union and Eastern Europe had collapsed. After more than 70 years in the Soviet Union and over 40 years in Eastern Europe and China, the failed communist economies made a startling switch to embrace capitalism. Faced with severe shortages of food, housing, cars, and other consumer goods, communism could no longer claim better living standards for its citizens. The following is a brief discussion of reforms aimed at introducing market power into the economic systems of Cuba, Russia, and China.

Cuba

Cuba often experiences daily power blackouts, fuel shortages, housing shortages, and other economic hardships. But regardless of its economic woes, Cuba remains wedded to the communist system. Nevertheless, the collapse of Soviet bloc aid coupled with the effects of the U.S. trade embargo have forced Fidel Castro and the country's new leader, Raul Castro, die-hard Marxists, to reluctantly adopt limited free market reforms. To earn foreign exchange, the dollar has been legalized, and the Cuban government has poured capital into tourism by building several new state-owned hotels and restoring historic sections of Havana. Interestingly, Cuba operates special medical tourist hospitals that treat foreigners and diplomats, while excluding Cubans. Cuba has also set up quasi-state enterprises that accept only hard currency. Because few Cubans have dollars or other hard currency, many are earning it by turning to illegal schemes, such as driving gypsy cabs, engaging in prostitution, or selling Cuba's famous cigars and coffee on the black market. Other Cubans have abandoned state jobs and opened small businesses under these new rules. However, these small-scale businesses cannot employ anyone beyond the family of the owner. Also, spare rooms in houses can be rented, and artisans can sell their work to tourists. In addition, state farm enterprises have been broken into worker-owned units, and the government allows farmers to sell produce leftover after they have met the state's quota. As a result of this free market, some farmers have become venture capitalists, and more food, and a greater variety of food are becoming available. In 2008, a series of changes opened access to cell phones, computers, and DVD players. Cubans are now also allowed to patronize tourist hotels. However, such luxuries are prohibitive for most Cubans. And in 2009, to improve its woeful transportation system, Cuban owners of classic American cars were recruited by the government to apply for taxi licenses and set their own fares subject to price floors.

In spite of the private enterprise reforms, Cuba remains essentially a communist system. Workers receive free education, housing, health care, low state salaries in pesos, and rations of staples, such as a monthly allowance of rice, beans, and milk. Profits from hotels and shops go directly into the central bank and help finance Castro's government. The state also discourages private enterprises by taxing them heavily on expected earnings, rather than on actual sales. In addition, there are highly restrictive regulations. For example, restaurants in Havana are limited to 12 seats and cannot expand regardless of demand. And Cuba has halted new licenses for some types of self-employment, including jewelers, mousetrap makers, and magicians or clowns. Currently, Hugo Chavez, president of Venezuela, is using his country's tremendous oil reserves to throw Cuba an economic lifeline and counter the U.S. embargo against Cuba.

Russia

In 1991, communist rule ended in Russia. To function efficiently, markets must offer incentives, so workers, the public, and even foreign investors were permitted to buy state property. This meant individuals could own the factors of production and earn profits. Such market incentives were a dagger thrust into the heart of a system previously devoted to rejecting capitalism. A key reform for Russia was to allow supply and demand to set higher prices for basic consumer goods. As shown earlier in Exhibit 2, without central planners, when prices rise to their equilibrium level, the quantity supplied increases and the quantity demanded decreases. At the beginning of 1992, the Russian government removed direct government price controls on most market goods. As the model predicts, average prices rose, leaping 1,735 percent in 1992, and a greater variety of goods started appearing on the shelves. Although workers had to pay more for basic consumer goods, they could at least find goods to buy.

Since 1992, Russia has established an independent central bank and implemented anti-inflationary monetary policies. Cities throughout Russia now have restaurants, megamalls, decent hotels, and streets choked with foreign cars. Russian entrepreneurial spirit and acceptance of it in society is in an embryonic stage, and corruption, including the legal system, is a frequent way of life. Today, Russia's economy is heavily dependent on oil and natural gas exports. Russia holds the world's largest natural gas reserves, and the eighth largest oil reserves. Although Russia is far from a successful market economy, the nation is struggling to achieve an amazing economic transition. Russian privatization plans are being implemented and steps are continuing to create a dynamic economy embracing capitalism. And *Forbes* magazine reports that there are now over 30 billionaires who reside in Russia.

The People's Republic of China

Unlike Russia, China has sought economic reform under the direction of its Communist Party. Fundamental economic reforms began in China after the death of Mao Zedong in 1976. Much of this reform was due to the leadership of Deng Xiaoping. Mao was devoted to the egalitarian ideal of communist ideology. Under his rule, thoughts of self-interest were counterrevolutionary, and photographs of Marx, Lenin, and Mao hung on every street corner and in every office and factory. Deng shifted priorities by increasing production of consumer goods and steering China toward becoming a global economic power. And the results have been dramatic. International trade expanded from less than 1 percent of U.S. trade in 1975 to 10 percent in 2009, and the label "Made in China" is common throughout the world. China joined the WTO in 2001 and agreed to open some markets closed to foreigners. China's real GDP growth rate averaged 9.8 percent between 2001 and 2009, making it the world's fastest-growing economy.

To make China an industrial power in the twenty-first century, Chinese planners introduced a two-tier system for industry and agriculture in 1978. Each farm and state enterprise was given a contract to produce a quota. Any amount produced over the quota could be sold in an open market. The Chinese government also encouraged the formation of nonstate enterprises owned jointly by managers and their workforces and special economic zones open to foreign investment. In other words, a blend of capitalism and socialism would provide the incentives needed to increase output. As Deng Xiaoping explained, "It doesn't matter whether the cat is black or

Global Economics China's Quest for Free Market Reform

Applicable Concept: comparative economic systems

For more than 2,000 years, China had a “self-reliance” policy that caused its economy to lag far behind advanced economies. After 1949, the communists under Chairman Mao Zedong abolished private property, executed landlords, and put farmers to work in collectives where members shared equally. These reforms are referred to as *The Great Leap Forward*, which in reality became *The Great Leap Backward*. Without the self-interest motive, communal property created low incentives to work that resulted in widespread famine and millions of deaths. After the death of Mao Zedong in 1976, China adopted new economic reforms that are continuing to transform one of the poorest economies in the world into one of the fastest growing. Under this reform system, households operate in a mixed world of state controls and free markets. A two-track pricing system still exists for some key goods and services, such as coal, petroleum, steel, transportation, and agriculture. The rural economy is central to China’s economic reforms. In the past, when farmers worked collectively in people’s communes, the government told the farmers what to produce and how much to produce. They could sell their products only to the state at a price fixed by the government, rather than in markets. A so-called household contract responsibility system was created as a



Gavin Heller/Jupiter images

reform to assign land owned by the state to farmers. The farmers must pay an annual share of their profits to the government, and the state does not cover losses. Farmers, however, have the authority to decide what to produce and the price at which to sell in open markets. As a result, both farmers and consumers are noticeably better off because everyone can find and afford more food.

As farming productivity rose sharply, fewer farmers were needed to work on the land, and this surplus labor moved into emerging township and village nonstate enterprises. These enterprises were

white as long as it catches mice.” These reforms worked, leading to huge increases in farm and industrial output in the 1980s. In fact, some peasant farmers became the wealthiest people in China. After Deng’s death in the mid-1990s, leadership of China passed to leaders who continued the policy of free market reforms. Today, forests of glossy skyscrapers, expressways, upscale apartments, and enormous shopping malls in Beijing, Shanghai, and other cities attest to the market-oriented reforms begun years ago. And life in China’s fast lane now includes the opportunity of dining at Kentucky Fried Chicken and McDonald’s restaurants located in cities throughout the country. Also, despite government censorship, China has the largest number of Internet users in the world. (See Global Economics: China’s Quest for Free Market Reform.)

Today, China is a huge nation transforming itself swiftly into a powerful player in the global economy. U.S. exporters are overjoyed at the prospect of selling products to over a billion Chinese consumers. For example, swarms of bicyclists once synonymous with urban China are being pushed off the road by consumers who now can afford cars and trucks. Rolls-Royce and Bentley, the ultra-luxury cars, have expanded into China, and it is estimated that by 2030 China will have more cars

mostly in light industry and owned collectively by townships or villages. As a result, the composition of rural output has changed. When the reforms began in the late 1970s, farming accounted for 70 percent of the total output and industry for 20 percent. Currently, the structure of the economy has changed dramatically. In 2009, agriculture accounted for only 11 percent of GDP and industry's share had risen to 49 percent.¹

A 1993 article in the *Boston Globe* provides an interesting observation on China's economic transformation:

*Stuffing the genie back into the bottle might prove difficult. The flood of money has created a bubble, particularly in stocks and property, making some people in China very rich, very fast. The China Daily, China's official English-language newspaper, recently heralded the existence of 1 million millionaires. . . . These millionaires, many of whom just five years ago were still wearing Mao outfits and following the party's socialist dictates, now sport stylish Western-style suits with the label ostentatiously left on the cuff.*²

A 2001 *Time* article described China's controversial womb police, who have spent two decades attempting to control the nation's population by fining citizens with more than one child. They have succeeded remarkably well. Today, the average Chinese

woman has two children, compared with six 30 years ago. "For all the bad press, China has achieved the impossible," says Sven Burmester, the U.N. Population Fund representative in Beijing. "The country has solved its population problem." In fact, China's population will actually start declining in 2042, according to U.N. projections.³

At the sixteenth Communist Party Congress in 2003, President Hu Jintao and Communist Party leaders announced "another turning point and a new starting point in China's reform process." A key debate concerned reforms that would move China closer to capitalism including the first-ever guarantee of private property under communist rule.⁴ In 2009, *Forbes* reported that China has 28 billionaires, and Rupert Hoogewerf, CEO of *Hurun Report*, says China's recent surge in mega-wealth is "comparable to the U.S. at the end of the 19th century, when you had the Rockefellers and Carnegies."

ANALYZE THE ISSUE

1. Why would China abandon the goal of income equality and shift from a centrally planned system to a more market-oriented economy?
2. Which groups in China are likely to resist the reforms?

1. The World Bank, Key Development Data & Statistics, <http://web.worldbank.org/>.

2. Maggie Farley, "China's Economic Boom Energizing Inflation," *Boston Globe*, Aug. 13, 1993, p. 1A.

3. "China's Lifestyle Choice: Changes to the Famous One-Child Policy Miss the Point," *Time*, Aug. 6, 2001, p. 32.

4. Joe McDonald, "China Debates Private Property," *Sun News*, Oct. 12, 2003, p. 14A.

on the road than the United States. Also, more Chinese are traveling by air. Consequently, the Chinese are buying more Boeing airplanes and American-made cars. The other side of the coin is the threat of what goods the industrious Chinese workers, with increasing training and foreign investment, might produce and sell abroad. For example, China manufactures most of the world's copiers, microwave ovens, DVD players, and shoes. A ballooning U.S. trade deficit with China is often cited as evidence that China is not playing fair, and the political rhetoric has intensified on both sides of the issue. Other countries fear that China will eliminate their export business with the United States. Moreover, there is concern that lowering trade barriers under free trade agreements will increase Chinese imports into domestic markets and eliminate jobs. In 2007, one Chinese-made product after another was removed from U.S. shelves, for example, lethal pet food, toxic toothpaste, and other contaminated products. This prompted calls for more stringent safety regulations for imports.

Currently, China's leaders are dealing with an economy that is experiencing overheating. Factories suffer electricity shortages, while ports and railways cannot handle all the cargo flowing in and out of the country. China is consuming huge quantities of crude oil, copper, steel, and aluminum. Moreover, there is discontent over labor issues, pollution, and income inequality. While some dig through trash bins, there are now wealthy private business owners. Despite the unease, China remains a market of great profit and promise as it continues its transition from a communist command economy to capitalism. In 2008, China announced the largest stimulus package in its history to counter the impact of the global economic downturn. And the debate continues over whether China, a socialist economy, is a strategic trading partner or an emerging rival that will dominate the world economy.

PRIVATIZATION VERSUS NATIONALIZATION

Privatization

is the process of turning a government enterprise into a private enterprise.

Nationalization

is the act of transforming a private enterprise's assets into government ownership.

The above discussions of Cuba, Russia, and China provide examples of **privatization**. Privatization is the process of turning a government enterprise into a private enterprise. It is the opposite of **nationalization**, which is the act of transforming a private enterprise's assets into government ownership. The motives for nationalization are political as well as economic. Proponents believe that government ownership enables the state on behalf of the people to exercise more effective control and equitable redistribution of wealth and income. Critics argue that government ownership suppresses incentives, entrepreneurship, and private investment that are essential for an enterprise to prosper. During a financial crisis, the argument in favor of nationalization is that a brief period of nationalization is needed to prevent the largest corporations and banks from a downward spiral that affects the entire economy. This is the "too big to fail" argument.

In recent years, Venezuelan President Hugo Chavez has received much press coverage for nationalizing a list of industries including oil, cement, and steel, and ordering the army to take over all rice processing and packaging plants. Chavez stated in a 2007 speech in Caracas, "We're heading toward socialism, and nothing and no one can prevent it."

The United States also has a history of nationalization—most of which was temporary. But one that has endured: Amtrak is a government-owned corporation created in 1971 after railroads had petitioned repeatedly to abandon unprofitable passenger service. As discussed at the conclusion of the chapter on Money and the Federal Reserve System, the Resolution Trust Corporation (RTC) was established in 1989 to take over more than 1,000 failed savings and loans institutions with bad loans and foreclosed homes. After fulfilling its mission to sell the assets of these S&Ls, the RTC was closed in 1995. The current financial crisis has generated several nationalizations that only in the future will it be known if they are temporary. General Motors provides a prime case. With GM facing bankruptcy in 2009, the U.S. government replaced the CEO and took a 60 percent controlling share, with Canada a 12.5 percent share, United Auto Workers (UAW) 17.5 percent, and bondholders ending up with the remaining 10 percent. Existing stockholders were given zero shares. Will GM emerge to become successful and nationalization be given credit, or will the reverse be the result?

Key Concepts

Economic system
Traditional economy
Command economy
Market economy

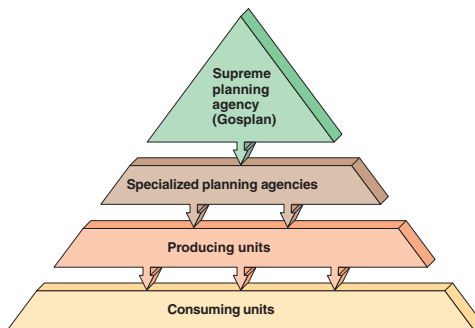
Invisible hand
Mixed economy
Capitalism
Consumer sovereignty

Socialism
Communism
Privatization
Nationalization

Summary

- An **economic system** is the set of established procedures by which a society answers the *What, How, and For Whom* to produce questions.
- **Three basic types of economic systems** are the traditional, command, and market systems. The **traditional system** makes decisions according to custom, and the **command system**, shown in the figure below, answers the three economic questions through some powerful central authority. In contrast, the **market system** uses the impersonal mechanism of the interaction of buyers and sellers in markets to answer the *What, How, and For Whom* questions.

Command Economy



- **Capitalism** is an economic system in which the factors of production are privately owned and economic choices are made

by consumers and firms in markets. As prescribed by Adam Smith, government plays an extremely limited role, and self-interest is the driving force, held in check, or regulated, by competition.

- **Consumer sovereignty** is the freedom of consumers to determine the types and quantities of products that are produced in an economy by choosing to buy or not to buy.
- **Socialism** is an economic system in which the government owns the factors of production. The central authorities make the myriad of society's economic decisions according to a national plan. The collective good, or public interest, is the intended guiding force behind the central planners' decisions.
- **Communism** is an economic system envisioned by Karl Marx to be an ideal society in which the workers own all the factors of production. Marx believed that workers who work hard will be public spirited and voluntarily redistribute income to those who are less productive. Such a communist nation described by Marx does not exist.
- **Privatization** is the process of turning a government enterprise into a private enterprise. It is the opposite of **nationalization**, which is the act of transforming a private enterprise's assets into government ownership.

Summary of Conclusion Statements

- When central planners set prices below equilibrium for goods and services, they create shortages, which mean long lines, empty shelves, and black markets.
- A market economy answers the *What* to produce and *How* to produce questions very effectively.
- No nation in the world precisely fits the two criteria for capitalism; however, the United States comes close.

Study Questions and Problems

1. Give an example of how a nation's culture affects its economic system.
2. Explain the advantages and the disadvantages of any two of the three basic types of economic systems.
3. Suppose a national program of free housing for the elderly is paid for by a sizable increase in income taxes. Explain a tradeoff that might occur between economic security and efficiency.
4. "The schools are not in the business of pleasing parents and students, and they cannot be allowed to set their own agendas. Their agendas are set by politicians, administrators, and various constituencies that hold the keys to political power. The public system is built to see to it that the schools do what their government wants them to do—that they conform to the higher-order values their governors seek to impose."⁴ Relate this statement to Exhibit 1.
5. Suppose you are a farmer. Explain why you would be motivated to work in traditional, command, and market economies.
6. Karl Marx believed the market system was doomed. Why do you think he was right or wrong?
7. If all real-world economies are mixed economies, why is the U.S. economy described as capitalist, while the Cuban economy is described as communist?
8. Suppose you are a factory manager. Describe how you might reach production goals under a system of pure capitalism and under a system of pure socialism.

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

4. John Chubb and Terry More, *Politics, Markets, and the Nation's Public Schools* (Washington, D.C.: Brookings Institution, 1990), p. 38.

CHECKPOINT ANSWER

To Plan or Not to Plan—That Is the Question

When an individual or a business plans in a market economy, other individuals are free to make and follow their own plans. Suppose Hewlett-Packard decides to produce X number of laser printers and sell them at a certain price. The decision does not prohibit IBM from producing Y number of laser printers and selling them for less than Hewlett-Packard's printers. If either firm makes a mistake, only that firm suffers, and

other industries are for the most part unaffected. Under a command system, a central economic plan would be made for all laser printer manufacturers. If the central planners order the wrong quantity or quality, there could be major harm to other industries and society. If you said there is a major difference between individual planning and central planning for all society, **YOU ARE CORRECT.**

Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

- The economic system in which all of the basic decisions are made through a centralized authority, such as a government agency, is termed a
 - market economy.
 - capitalistic economy.
 - command economy.
 - traditional economy.
- Command economies typically suffer from
 - unemployment, but not underemployment.
 - neither unemployment nor underemployment.
 - both unemployment and underemployment.
 - underemployment, but not unemployment.
- Adam Smith stated that the role of government in society should be to
 - provide defense.
 - enforce contracts.
 - do absolutely nothing.
 - do both (a) and (b).
- When making economic decisions, Adam Smith urged society to
 - follow the principle of self-interest.
 - follow the principle of public interest.
 - transfer wealth according to need.
 - provide equal income for all citizens.
- The doctrine of *laissez faire*
 - advocates an economic system with extensive government intervention and little individual decision making.
 - was advocated by Adam Smith in his book *The Wealth of Nations*.
 - was advocated by Karl Marx in his book *Das Kapital*.
 - is described by none of the above.
- In Adam Smith's competitive market economy, the question of what goods to produce is determined by the
 - "invisible hand" of the price system.
 - "invisible hand" of government.
 - "visible hand" of public interest.
 - "visible hand" of laws and regulations.
- Adam Smith wrote that the
 - economic problems of eighteenth-century England were caused by free markets.
 - government should control the economy with an "invisible hand."
 - pursuit of private self-interest promotes the public interest in a market economy.
 - public or collective interest is not promoted by people pursuing their self-interest.

Practice Quiz Continued

8. Adam Smith, in his book *The Wealth of Nations*, advocated
 - a. socialism.
 - b. an economy guided by an “invisible hand.”
 - c. government control of the “invisible hand.”
 - d. the adoption of mercantilism.
9. The economic system in which private individuals own the factors of production is
 - a. a planned economy.
 - b. capitalism.
 - c. collectivism.
 - d. socialism.
10. Which of the following is *not* a basic characteristic of capitalism?
 - a. Economic decisions occur in markets.
 - b. Factors of production are privately owned.
 - c. Income is distributed on the basis of need.
 - d. Businesses make their own product and price decisions.
11. According to Karl Marx, under capitalism,
 - a. profits would be shared fairly.
 - b. incomes would be distributed equally.
 - c. workers would be exploited and revolt against owners of capital.
 - d. workers would actually own the factors of production.
12. Karl Marx predicted which of the following?
 - a. The market system would self-destruct.
 - b. The “haves” would revolt against the “have-nots.”
 - c. The wealthy were entitled to profits as their reward for risk taking.
 - d. None of the above
13. How many nations in the world today operate totally according to Karl Marx’s theory of communism?
 - a. None
 - b. Several
 - c. Only the United States
 - d. Many
14. In Marx’s ideal communist society, the state
 - a. actively promotes income equality.
 - b. follows the doctrine of *laissez faire*.
 - c. owns resources and conducts planning.
 - d. does not exist.
15. Karl Marx was a (an)
 - a. nineteenth-century German philosopher.
 - b. eighteenth-century Russian economist.
 - c. fourteenth-century Polish banker.
 - d. nineteenth-century Russian journalist.

Growth and the Less-Developed Countries



How would your life be different if you lived in Rwanda or Haiti instead of the United States? It is unlikely that anyone in your family would have a telephone or a car. You surely would not own a personal computer or an iPod. You would not have new clothes and be enrolled in a college or university studying economics. You would not be going out to restaurants or movies. You would be fortunate to have shoes and one full meal each day. You would receive little or no medical care and live in unsanitary surroundings. Hunger, disease, and squalor would engulf you. In fact, the World Bank estimates that over 20 percent of people in developing countries survive on less than \$1 per day.

It is exceedingly difficult for Americans to grasp that one-fifth of the world's population lives at such a meager subsistence level. This

chapter's important task is unraveling the secrets of economic growth and development. Why do some countries prosper while others decline?

At different times in history, Egypt, China, Italy, and Greece were highly developed by the standards of their time. On the other hand, at one time the United States was a struggling, relatively poor country on the path to becoming a rich country. Its growth came in three stages: First, was the agricultural stage. Then came the manufacturing stage when industries such as railroads, steel, and automobiles were driving forces toward economic growth. And, finally, there has been a shift toward service industries. This is the U.S. success story, but it is not the only road countries can follow to lift themselves from the misery of poverty.



In this chapter, you will learn to solve these economics puzzles:

- Is there a difference between economic growth and economic development?
- Why are some countries rich and others poor?
- Is trade a better “engine of growth” than foreign aid and loans?

GDP per capita

The value of final goods produced (GDP) divided by the total population.

Industrially advanced countries (IACs)

High-income nations that have market economies based on large stocks of technologically advanced capital and well-educated labor. The United States, Canada, Australia, New Zealand, Japan, and most of the countries of Western Europe are IACs.

Less-developed countries (LDCs)

Nations without large stocks of technologically advanced capital and well-educated labor. LDCs are economies based on agriculture, such as most countries of Africa, Asia, and Latin America.

COMPARING DEVELOPED AND LESS-DEVELOPED COUNTRIES

Income disparity exists not only among families within the United States but also among nations. In this section, the great inequality of income between the families of nations will be used to classify nations as rich or poor.

Classifying Countries by GDP per Capita

There are about 225 countries in the world. Exhibit 1 shows a ranking of selected countries from high to low **GDP per capita**. GDP per capita is the value of final goods produced (GDP) divided by the total population. Although any system of defining rich versus poor countries is arbitrary, GDP per capita or average GDP is a fundamental measure of a country’s economic well-being. At the top of the income ladder are 27 developed countries called the **industrially advanced countries (IACs)**. Industrially advanced countries are high-income nations that have market economies based on large stocks of technologically advanced capital and well-educated labor. The United States, Canada, Australia, New Zealand, Japan, and most of the countries of Western Europe are IACs. Excluded from the IACs are countries with high incomes whose economies are based on oil under the sand, and not on widespread industrial development. The United Arab Emirates is an example of such a country.

Countries of the world other than IACs are classified as underdeveloped or **less-developed countries (LDCs)**. Less-developed countries are nations without large stocks of technologically advanced capital and well-educated labor. Their economies are based on agriculture, as in most countries of Africa, Asia, and Latin America. Most of the world’s population live in LDCs and share widespread poverty.

A closer examination of Exhibit 1 reveals that the differences in living standards between the IACs and LDCs are enormous. For example, the GDP per capita in the United States was \$46,025 greater than the average income in Ethiopia. Stated differently, the 2009 average income in the United States was about 111 times larger than the average income in Ethiopia (\$46,443/\$418). What a difference! Imagine trying to live on only \$418 for a year in the United States. You probably would not survive.

Exhibit 2 compares GDP per capita for IACs to LDCs by regions of the world for 2009. The average citizen in the IACs enjoyed an income of \$41,623, which was 42 times that of the average citizen in South Asia (\$41,623/\$986). South Asia includes countries such as Afghanistan, Bangladesh, and Pakistan. The exhibit also reveals that the greatest concentrations of world poverty are located in the rural

*Exhibit 1***Annual GDP per Capita for Selected Countries, 2009**

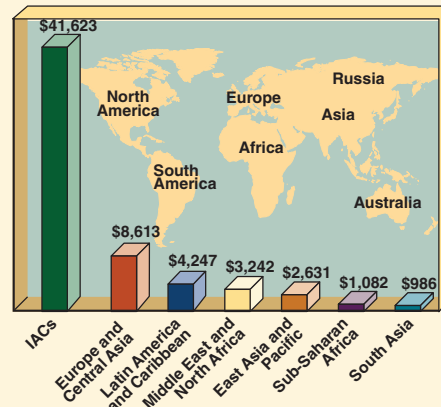
Country	GDP per capita	Country	GDP per capita
Industrially Advanced Countries (IACs)			
Luxembourg	\$94,418	Germany	39,442
Norway	76,692	Canada	39,217
Switzerland	66,127	United Kingdom	35,728
Denmark	55,942	Italy	34,955
Ireland	51,129	Singapore	34,346
Netherlands	47,042	Spain	31,142
United States	46,443	Greece	30,305
Finland	45,876	Israel	29,672
Austria	45,091	Hong Kong	29,559
Australia	45,090	New Zealand	25,354
Sweden	43,147	Portugal	20,655
Belgium	42,965	South Korea	16,450
France	42,091	Taiwan	15,373
Japan	39,573		
Less-Developed Countries (LDCs)			
Russia	8,874	Ukraine	2,538
Chile	8,853	Georgia	2,496
Turkey	8,427	Egypt	2,450
Mexico	8,040	Indonesia	2,224
Brazil	7,737	Bolivia	1,716
Romania	7,503	Vietnam	1,052
Panama	7,145	India	1,033
South Africa	5,635	Pakistan	1,017
Iran	4,477	Haiti	772
Thailand	3,973	Bangladesh	559
Jordan	3,766	Rwanda	512
China	3,566	Mozambique	456
Morocco	2,847	Ethiopia	418

SOURCE: International Monetary Fund, World Economic Outlook Database, <http://www.imf.org/external/ns/cs.aspx?id=28>.

areas of South Asia and Sub-Saharan Africa. The East Asia and Pacific region has many countries characterized by bleak and pervasive poverty, but there are notable exceptions, nicknamed the “Four Tigers” of East Asia—Hong Kong, Singapore, South Korea, and Taiwan. These Pacific Rim countries are newly industrialized economies, which we discuss at the end of this chapter.

*Exhibit 2***Average GDP per Capita for IACs and LDCs by Region, 2009**

This exhibit shows average GDP per capita by regions of the world for 2009. The differences between the rich, industrially advanced countries (IACs) and the poor, less-developed countries (LDCs) in the various regions of the world are enormous. For example, the average citizen in the IACs had an income 42 times that of the average citizen in the LDCs of South Asia.



SOURCE: World Bank Group, Key Development Data & Statistics, <http://www.worldbank.org/>.

Problems with GDP per Capita Comparisons

Several problems are associated with using GDP per capita to compare rich versus poor countries. First, there is a measurement problem because countries tabulate GDP with differing degrees of accuracy. LDCs in general do not use sophisticated methods of gathering and processing GDP and population data. For example, in countries whose economies are based largely on agriculture, a family is more likely to produce goods and services outside the price system. In LDCs, families often grow their own food, make their own clothes, and build their own homes. Estimating the value of this output at market prices is difficult.

CONCLUSION *LDCs' GDP per capita is subject to greater measurement errors than data for IACs.*

Second, GDP per capita comparisons among countries can be misleading because they ignore the relative income distribution. Some countries have very high per capita incomes, yet most of the income goes to just a few wealthy families. The United Arab Emirates' GDP per capita is higher than that of several IACs. However, the United Arab Emirates earns its income from oil exports, and its income is actually distributed disproportionately to a relatively small number of wealthy families.

CONCLUSION *GDP per capita comparisons among nations can be misleading because GDP per capita does not measure income distribution.*

Third, GDP per capita comparisons between nations are subject to conversion problems. Making these data comparisons requires converting one nation's currency, say, Japan's yen, into a common currency, the U.S. dollar. Because, as explained in the chapter on international trade and finance, the value of a country's currency can rise or fall for many reasons, the true value of a nation's output can be distorted. For example, during a given year, one government might maintain an artificially high exchange rate and another government might not.

CONCLUSION *A conversion problem may widen or narrow the GDP per capita gap between nations because the fluctuations in exchange rates do not reflect actual differences in the value of goods and services produced.*

Quality-of-Life Measures of Development

GDP per capita measures market transactions, but this measure does not give a complete picture of differences in living standards among nations. Exhibit 3 presents other selected socioeconomic indicators of the quality of life. These are variables such as life expectancy at birth, infant mortality rate, literacy rate, per capita energy consumption, and economic freedom ranking. Take a close look at the statistics in Exhibit 3. These data reflect the dimensions of poverty in many of the LDCs. For example, a person born in Japan has a life expectancy that is much longer than a person born in Mozambique, and the infant mortality rate is dramatically higher in Mozambique. Per capita energy consumption measures the use of nonhuman energy to perform work. In IACs, most work is done by machines, and in LDCs, virtually all work is done by people. For example, the average American uses 7,768 kilograms of (oil-equivalent) energy per year, while the average person in Mozambique

Exhibit 3

Quality-of-Life Indicators for Selected Countries, 2009

	(1)	(2)	(3)	(4)	(5)	(6)
Country	GDP per capita	Life expectancy at birth (years)	Infant mortality rate ¹	Literacy rate ²	Per capita energy consumption ³	Economic freedom rank ⁴
United States	\$46,443	78	8%	99%	7,768	8
Japan	39,573	83	4	99	4,129	27
China	3,566	73	22	81	1,433	93
Egypt	2,450	71	36	71	843	75
India	1,033	65	72	61	510	77
Bangladesh	559	64	61	43	161	108
Mozambique	456	42	168	48	420	116

1. Per 1,000 live births.

2. Percentage age 15 and over who can read and write.

3. Kilograms of oil equivalent.

4. The Fraser Institute.

SOURCES: The CIA World Factbook, <https://www.cia.gov/library/publications/the-world-factbook/index.html>, World Bank Group, Key Development Data & Statistics, <http://www.worldbank.org/>, The Fraser Institute, <http://www.freetheworld.com>.

uses only 420 kilograms. Finally, it is interesting to note that GDP per capita and other quality-of-life indicators are related to the ranking in economic freedom.

How good an indicator of the quality of life is GDP per capita? Exhibit 3 reflects the principle that lower GDP per capita is highly correlated with measures of the quality of life.

CONCLUSION *In general, GDP per capita is highly correlated with alternative measures of quality of life.*

ECONOMIC GROWTH AND DEVELOPMENT AROUND THE WORLD

Economic growth and development are major goals of IACs and LDCs. People all over the world strive for a higher quality of life for their generation and future generations. However, growth is closer to a life-or-death situation for many LDCs, such as Bangladesh and Mozambique.

Economic growth and economic development are somewhat different, but related, concepts. As shown in Exhibit 4, recall from Chapter 2 that economic growth is the ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve (PPC). Thus, economic growth is defined on a *quantitative* basis using the percentage change in GDP per capita. When a nation's GDP rises more rapidly than its population, GDP per capita rises, and the nation experiences economic growth. Conversely, if GDP expands less than the population of a nation, GDP per capita falls, and the nation experiences negative economic growth.

Economic development is a broader concept that is more *qualitative* in nature. Economic development encompasses improvement in the quality of life, including economic growth in the production of goods and services. In short, continuous economic growth is necessary for economic development, but economic growth is not the only consideration. For example, as explained earlier, GDP per capita does not measure the distribution of income or the political environment that provides the legal, monetary, education, and transportation structures necessary for economic growth.

Economic growth and development involve a complex process that is determined by several interrelated factors. Like the performance of an NBA basketball team, success depends on the joint effort of team players, and one or two weak players can greatly reduce overall performance. However, there is no precise formula for winning. If your team has a player like former NBA great Michael Jordan, it can win even with a few weak players. The remainder of this section examines the key factors, or players, that operate together to produce a nation's economic well-being.

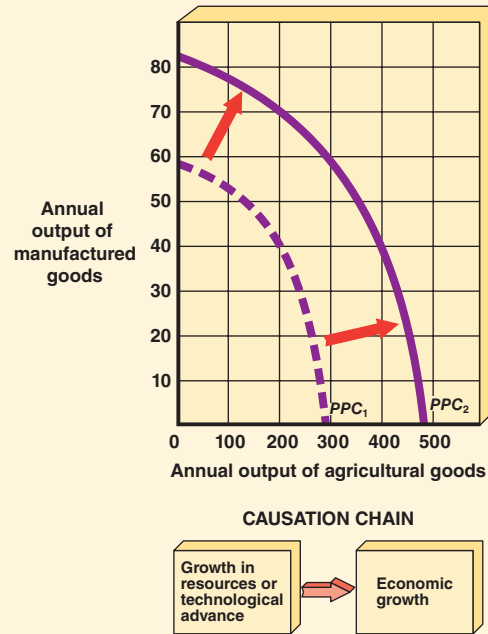
Endowment of Natural Resources

Most of the LDCs have comparatively limited bases of natural resources, including mineral deposits and arable land resources. In these countries, most of the available land is used for agricultural production, and clearing tropical forests to obtain more land can cause soil erosion. Also, tropical climates prevail in Central and South America, Africa, the Indian subcontinent, and Southeast Asia. The hot, humid climate in these regions is conducive to weed and insect infestations that plague agriculture.

Exhibit 4

Economic Growth

The economy begins with the capacity to produce combinations along production possibilities curve PPC_1 . Growth in the resource base or technological advance shifts the production possibilities curve outward from PPC_1 to PPC_2 . Points along PPC_2 represent new production possibilities that were previously impossible. The distance that the curve shifts represents an increase in the nation's productive capacity.



Although a narrow base of resources does pose a barrier to economic growth and development, no single conclusion can be drawn. For example, how have Hong Kong, Japan, and Israel achieved high standards of living in spite of limited natural resource bases? Each has practically no minerals, little fertile land, and no domestic sources of energy. Nonetheless, these economies have become prosperous. In contrast, Argentina, Venezuela, and Brazil have abundant fertile land and minerals. Yet these and other countries have been growing slowly or not at all. Venezuela, for example, is one of the most oil-rich countries in the world. Ghana, Kenya, and Bolivia are also resource-rich countries that are poor, with little or no economic growth.

CONCLUSION *Natural resource endowment can promote economic growth, but a country can develop without a large natural resource base.*

Investment in Human Resources

A low level of human capital can also present a barrier to economic growth and development. Recall that human capital is the education, training, experience, and health that improve the knowledge and skills of workers to produce goods

and services. In most of the LDCs, investment in human capital is much less than in the IACs. Look back at column 4 in Exhibit 3. Consider how the literacy rate falls for the poorer countries. A country with a lower literacy rate has less ability to educate its labor force and create a basic foundation for economic growth. In fact, often the skills of workers in the poor countries are suited primarily to agriculture, rather than being appropriate for a wide range of industries and economic growth. Further complicating matters is a “brain drain” problem because the best educated and trained workers of poor countries pursue their education in wealthier countries. Column 2 of Exhibit 3 also gives a measure of health among countries with varying levels of GDP per capita. As the GDP per capita falls, the life expectancy at birth falls. Thus, richer countries have the advantage of a better educated and healthier workforce.

CONCLUSION *Investment in human capital generally results in increases in GDP per capita.*

Thus far, the discussion has been about the quality of labor. We must also talk about the quantity of labor because productivity is related to both the quality and the quantity of labor. Overpopulation is a problem for LDCs. In a nutshell, here is why: Other factors held constant, population (labor force) growth can increase a country's GDP. Yet rapid population growth can convert an expanding GDP into a GDP per capita that is stagnant, slow growing, or negative. Stated another way, there is no gain if an increase in output is more than matched by an increase in the number of mouths that must be fed. Suppose the GDP of an LDC grows at, say, 3 percent per year. If there is no growth in population, GDP per capita also grows at 3 percent per year. But what if the population also grows at 3 percent per year? The result is that GDP per capita remains unchanged. If the population growth is instead only 1 percent per year, GDP per capita rises 2 percent per year. Obstacles to population control are great and include strong religious and sociocultural arguments against birth control programs.

CONCLUSION *Rapid population growth combined with low human capital investment explains why many countries are LDCs.*

CHECKPOINT

Does Rapid Growth Mean a Country is Catching Up?

Suppose country Alpha has a production possibilities curve closer to the origin than the curve for country Beta. Now assume Alpha experiences a 3 percent growth rate in GDP for 10 years and Beta experiences a 6 percent growth rate in GDP for 10 years. At the end of five years, which of the following is the best prediction for the standard of living? (1) Alpha's residents are better off. (2) Beta's residents are better off. (3) Which country's residents are better off cannot be determined.



Accumulation of Capital

It did not take long for Robinson Crusoe on a deserted island to invest in a net in order to catch more fish than he could catch with his hands. Similarly, farmers working with modern tractors can cultivate more acres than farmers working with horse-drawn plows. Recall from Chapter 1 that capital in economics means factories, tractors, trucks, roads, computers, irrigation systems, electricity-generating facilities, and other human-made goods used to produce goods and services.

LDCs suffer from a critical shortage of capital. A family in Somalia owns little in the way of tools except a wooden plow. To make matters worse, roads are terrible, there are few plants generating electricity, and telephone lines are scarce. As shown in Exhibit 5, recall from Chapter 2 that a high-investment country can shift its production possibilities curve outward, but investment in capital goods is not a “free lunch.” When more resources are used to produce more factories and machines, there is an opportunity cost of fewer resources available for the production of current consumer goods. This means that LDCs are often caught in a **vicious circle of poverty**. A vicious circle of poverty is the trap in which countries are poor and cannot afford to save. And low savings translate into low investment. Low investment results in low productivity, which, in turn, keeps incomes low. Any savings that do exist among higher-income persons in poor LDCs are often invested in IACs. This phenomenon is often called “capital flight.” These wealthy individuals are afraid to save in their own countries because they fear that their governments may be overthrown and their savings could be lost.

The United States and other nations have attempted to provide LDCs with foreign aid so that they might grow. These countries desperately need more factories

Vicious circle of poverty

The trap in which countries are poor because they cannot afford to save and invest, but they cannot save and invest because they are poor.

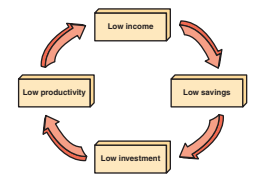
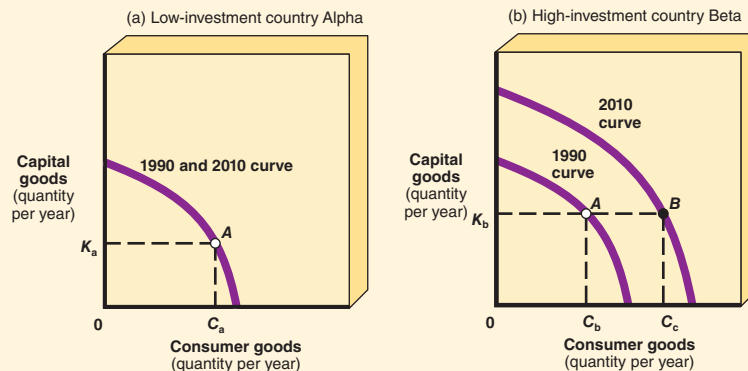


Exhibit 5

Alpha's and Beta's Present and Future Production Possibilities Curves

In part (a), each year Alpha produces only enough capital (K_a) to replace existing capital that is worn out. Without greater capital and assuming other resources remain fixed, Alpha is unable to shift its production possibilities curve outward. In part (b), each year Beta produces K_b capital, which is more than the amount required to replenish its depreciated capital. In 2010, this expanded capital provides Beta with the extra production capacity to shift its production possibilities curve to the right. If Beta chooses point B on its curve, it has the production capacity to increase the amount of consumer goods from C_b to C_c without producing fewer capital goods.



Infrastructure

Capital goods usually provided by the government, including highways, bridges, waste and water systems, and airports.

and **infrastructure**. Infrastructure is capital goods usually provided by the government, including highways, bridges, waste and water systems, and airports. Unfortunately, the amount of capital given to the LDCs is relatively small, and, as explained above, workers in the LDCs lack the skills necessary to use the most modern forms of capital. More specifically, LDCs face a major obstacle to capital accumulation because of the lack of entrepreneurs to assume the risks of capital formation.

The trap in which countries are poor because they cannot afford to save and invest, but they cannot save and invest because they are poor.

CONCLUSION *There is a significant positive relationship between investment and economic growth and development.*

Technological Progress

As explained earlier in Chapter 2, holding natural resources, labor, and capital constant, advancing the body of knowledge applied to production shifts the production possibilities curve of a country. In fact, technological advances have been at the heart of economic growth and development in recent history. During the last 250 years, brainpower has invented new power-driven machines, advanced communication devices, new energy sources, and countless ways to produce more output with the same resources. How have innovative products improved your productivity? Consider, to name just a few products, the impact of CD-ROMs, fax machines, DVDs, personal computers, word processing software, cell phone photography, and the Internet. In contrast, in many poor countries, waterwheels still bring water to the surface, cloth is woven on handlooms, and oxcarts are the major means of transportation. Consequently, large inputs of human effort are used relative to capital resources.

The United States and other IACs have provided the world with an abundant accumulation of technological knowledge that might be adopted by those LDCs without the resources to undertake the required cost of research and development. However, the results of this transfer process have been mixed. For example, countries such as China, Hong Kong, Singapore, Taiwan, South Korea, and Japan have surely achieved rapid growth in part from the benefit of technological borrowing. Currently, Russia and other Eastern European nations are attempting to apply existing technological knowledge to boost their rates of growth.

The other side of the coin is that much available technology is not suited to LDCs. The old saying “You need to learn to walk before you can run” often applies to the LDCs. For example, small farms of most LDCs are not suited for much of the agricultural technology developed for IACs’ large farms. And how many factories in the LDCs are ready to use the most modern robotics in the production process? Stated differently, LDCs need appropriate technology, rather than necessarily the latest technology.

CONCLUSION *Many LDCs continue to experience low growth rates even though IACs have developed advanced technologies that the world can utilize.*

Political Environment

The discussion above leads to the generalization that in order for LDCs to achieve economic growth and development, they must wisely use natural resources, invest

in human and physical capital, and adopt advanced technology. This list of policies is not complete. LDC governments must also create a political environment favorable to economic growth. All too often a large part of the problem in poor countries is that resources are wasted as a result of war and political instability. Political leaders must not be corrupt and/or incompetent. Instead of following policies that favor a small elite ruling class, LDC governments must adopt appropriate domestic and international economic policies, discussed under the following three headings of law and order, infrastructure, and international trade.

Law and Order A basic governmental function is to establish domestic law and order. This function includes many areas, such as a stable legal system, stable money and prices, competitive markets, and private ownership of property. In particular, expropriation of private property rights among LDCs is a barrier to growth. Well-defined private property rights have fostered economic growth in the IACs because this institutional policy has encouraged an entrepreneurial class. Private ownership provides individuals with the incentive to save money and invest in businesses. A stable political environment that ensures private ownership of profits also provides an incentive for individuals in other countries to invest in developing poor countries.

Infrastructure Assuming an LDC government maintains law and order and the price system is used to allocate goods and services, it is vital that wise decisions be made concerning infrastructure. Indeed, inadequate infrastructure is one of the greatest problems of LDCs. Without such public goods as roads, schools, bridges, and public health and sanitation services, poor countries are unable to generate the substantial external benefits that are an important ingredient in economic growth and development. From the viewpoint of individual firms, government must provide infrastructure because these public goods projects are too costly for a firm to undertake.

International Trade In general, LDCs can benefit from an expanding volume of trade. This is the theory behind the North American Free Trade Agreement (NAFTA), the General Agreement on Tariffs and Trade (GATT), and the World Trade Organization (WTO) discussed in the chapter on international trade and finance. As explained earlier in this chapter, policies such as tariffs and quotas restrain international trade and thereby inhibit economic growth and development. These trade policies are antigrowth because they restrict the ability of people in one country to trade with people in other countries. Similarly, a country that fixes the exchange rate of its own currency above the market-determined exchange rate makes that country's exports less attractive to foreigners. This means, in turn, that domestic citizens sell less of their goods to foreigners and earn less foreign currency with which to buy imports.

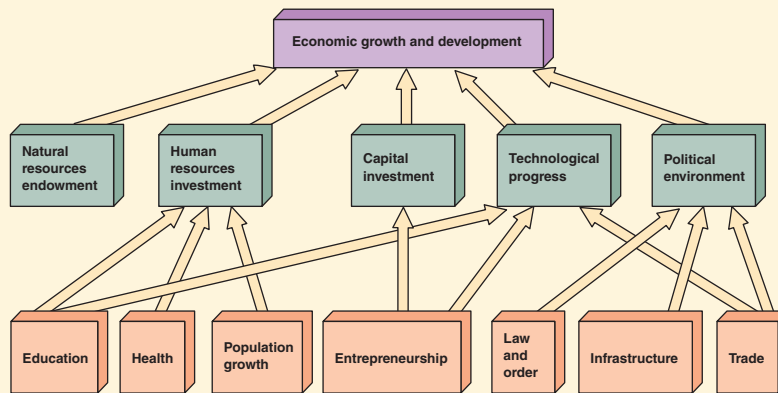
CONCLUSION *Exchange rate controls artificially set by government above the market exchange rates reduce the volume of both exports and imports (international trade).*

Exhibit 6 summarizes the key factors explained above that determine the economic growth and development of countries. Analysis of this exhibit reveals that economic growth and development are the result of a multidimensional process. This means that it is difficult for countries to break the poverty barrier because they must follow various avenues and improve many factors in order to increase their economic well-being.

Exhibit 6

Key Categories That Determine Economic Growth and Development

There are five basic categories that interact to determine the economic growth and development of countries: natural resources, human resources, capital, technological progress, and the political environment. The exhibit also indicates important factors that influence investment in human resources, capital, technological advances, and the political environment. LDCs are faced with a formidable task. Because economic growth and development are multidimensional, LDCs must improve many factors in order to achieve economic progress.



But it is important to remember that lack of one or more key factors, such as natural resources, does not necessarily keep an LDC in the trap of underdevelopment.

CONCLUSION *There is no single strategy for economic growth and development.*

THE HELPING HAND OF ADVANCED COUNTRIES

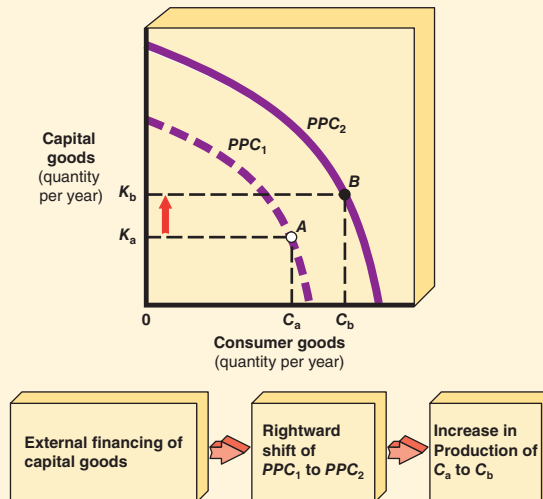
How can poor countries escape the vicious circle of poverty? Low GDP per capita leads to low savings and investment, which lead, in turn, to low growth. Although there is no easy way for poor countries to become richer, the United States and other advanced countries can be an instrument of growth. The necessary funds can come from the LDCs' own domestic savings, or it can come from external sources that include foreign private investment, foreign aid, and foreign loans.

Exhibit 7 illustrates how external funds can shift a country's production possibilities curve outward. Here you should look back and review Exhibit 5. Suppose country Alpha is trapped in poverty and produces only enough capital (K_a) to replace the existing capital being worn out. Alpha's consumption level is at C_a , corresponding to point A on production possibilities curve PPC_1 . Because C_a is at the subsistence level, Alpha cannot save and invest by substituting capital for current consumption and move upward along PPC_1 . This inability to increase capital means Alpha cannot use internal sources of funds to increase its production possibilities curve in the future.

Exhibit 7

The Effect of External Financing on an LDC's Production Possibilities Curve

The poor country of Alpha is initially operating at point A on production possibilities curve PPC_1 , with only enough capital (K_a) to replace depreciation. If C_a is the consumption level of subsistence, Alpha's economy cannot grow by reducing consumption. An inflow of external funds from abroad permits the LDC to increase its capital from K_a to K_b and its production possibilities curve shifts outward to PPC_2 . At PPC_2 , Alpha is able to increase its production of consumer goods from C_a to C_b .



There is a way out of the trap using external sources. Now assume Alpha receives an inflow of funds from abroad and buys capital goods that increase its rate of investment from K_a to K_b . At K_b , the rate of capital formation exceeds the value of capital depreciated, and Alpha's production possibilities curve shifts rightward to PPC_2 . Economic growth made possible by external investment means Alpha can improve its standard of living by increasing its consumption level from C_a at point A on PPC_1 to C_b at point B on PPC_2 .

Foreign Private Investment

Many countries' development benefits from private-sector foreign investment from private investors. For example, Microsoft might finance construction of a plant in the Philippines to manufacture software, or Bank of America may make loans to the government of Haiti. These large multinational corporations and commercial banks supply scarce capital to the LDCs. A multinational corporation is a firm with headquarters in one country and one or more branch plants in other countries. Multinational firms often seek new investment opportunities in LDCs because these poor countries offer abundant supplies of low-wage labor and raw materials. But the political environment in the LDCs must be conducive to investment. Multinational corporations often become the largest employers, largest taxpayers, and largest exporters in the LDCs.

Foreign Aid

Foreign aid

The transfer of money or resources from one government to another for which no repayment is required.

Agency for International Development (AID)

The agency of the U.S. State Department that is in charge of U.S. aid to foreign countries.

About 1 percent of the U.S. federal budget is spent on **foreign aid**. Foreign aid is the transfer of money or resources from one government to another with no repayment required. These transfers may be made as outright grants, technical assistance, or food supplies. Foreign aid flows from country to country through governments and voluntary agencies, such as the Red Cross, CARE, and Church World Relief. The United States distributes most of its official development assistance through the **Agency for International Development (AID)**, established in 1961. The AID is the agency of the U.S. State Department that is in charge of U.S. aid to foreign countries.

One reason that countries like the United States provide foreign aid to LDCs is the belief that it is a moral responsibility of richer countries to share their wealth with poorer countries. A second reason is that it is in the best economic interest of the IACs to help the LDCs. When these countries become more prosperous, the IACs have more markets for their exports, and thereby all countries benefit from trade.

The LDCs often complain that foreign aid comes with too many economic and political strings attached. Loans are often offered on a “take it or leave it” basis, tied to policies other than basic trade policies, such as human rights, politics, or the military. Consequently, many LDCs argue for “trade, not aid.” If the IACs would simply buy more goods from the LDCs, the LDCs could use their gains in export earnings to purchase more capital and other resources needed for growth. Many people in the United States feel that most foreign aid is a waste of money because it is misused by the recipient countries. This belief has caused Congress to grow increasingly reluctant to send taxpayers’ money abroad except in the clearest cases of need or for reasons of national security.

Foreign Loans

World Bank

The lending agency that makes long-term, low-interest loans and provides technical assistance to less-developed countries.

International Monetary Fund (IMF)

The lending agency that makes short-term conditional low-interest loans to developing countries.

A third source of external funds that can be used to finance LDCs’ domestic investment is loans from abroad. Governments, international organizations, and private banks all make loans to LDCs. Like foreign private investment and foreign aid, loans give LDCs the opportunity to shift their production possibilities curves outward. There are various types of loan sources for LDCs. Bilateral loans are made directly from one country to another. The principal agent for official U.S. bilateral loans is the U.S. Agency for International Development, introduced earlier.

One prominent multilateral lending agency is the **World Bank**. The 186-member World Bank is the lending agency affiliated with the United Nations that makes long-term low-interest loans and provides technical assistance to LDCs. Loans are made only after a planning period lasting a year or more. The World Bank was established in 1944 by major nations meeting in Bretton Woods, New Hampshire. Its first charge was to assist with reconstruction after World War II. Today, the World Bank is located in Washington, D.C., and its main purpose is to channel funds from rich countries to poor countries. Voting shares are in proportion to the money provided by the members. The World Bank makes “last resort” loans to LDCs that are limited to financing basic infrastructure projects, such as schools, health centers, dams, irrigation systems, and transportation facilities, for which private financing is not available. In addition, the World Bank helps LDCs get loans from private lenders by insuring the loans. Thus, the poor countries are able to complete projects and use the economic returns to pay off the lender with interest.

The World Bank is not the only multilateral lending agency making loans to LDCs. The World Bank’s partner institution is the **International Monetary Fund (IMF)**. The International Monetary Fund is the lending agency that makes short-term conditional

Global Economics Hong Kong: A Crouching Pacific Rim Tiger

Applicable Concept: newly industrialized economies

As the map shows, the Pacific Rim economies are located along an arc extending from Japan and South Korea in the north to New Zealand in the south. The Four Tigers of East Asia are Hong Kong, Singapore, South Korea, and Taiwan. These “miracle economies” have often experienced higher economic growth rates, lower inflation rates, and lower unemployment rates than many long-established advanced countries.

Hong Kong is a great success story. When Adam Smith published his famous book, *The Wealth of Nations*, in 1776, Hong Kong was little more than a small barren rock island void of natural resources except fish. Today, Hong Kong is a bustling model of free enterprise in spite of the fact that seven million inhabitants are crowded into only about 400 square miles—one of the highest population densities in the world.

What is the reason for Hong Kong’s success? Following the doctrine of Adam Smith, this economy is a paragon of *laissez faire*. Hong Kong has among the lowest individual and corporate income tax rates in the world and almost no legal restrictions on business. It has no capital gains tax, no interest tax, no sales tax, and no withholding tax. Hong Kong has become the largest banking center in the Pacific region after Tokyo. International trade is also largely unrestricted, and Hong Kong depends to a large extent on trade through its magnificent harbor for its economic success. Tariffs on imported goods are low, and Hong Kong is known as a safe-haven warehouse and trading center, with little or no interference from the government.

Hong Kong has proved that industrious people and entrepreneurs working hard on a crowded island with minimum regulations and open trade can improve their living standard without natural resources. Nevertheless, Hong Kong faces economic and political uncertainty. Under a 99-year lease signed in 1898, the United Kingdom transferred Hong Kong to the People’s Republic of China in 1997. Will China allow Hong Kong to continue to follow Adam Smith’s *laissez-faire* philosophy, resulting in high growth rates, or will Hong Kong change direction? It is anyone’s guess. So far China has not tampered with Hong



© Image copyright zhu difeng, 2009. Used under license from Shutterstock.com

Kong’s *laissez-faire* economy, and its economic freedom ranking is higher than any country in the world.¹

Recessions in the United States affect the global economy, and Hong Kong is no exception. Hong Kong’s GDP growth depends heavily on exports. If, for example, U.S. consumers cut back on purchasing electronic devices, then Hong Kong’s growth rate declines. After a 8 percent growth rate in 2000, the fall-off in global demand triggered by the 2001 recession in the United States slowed Hong Kong’s real GDP growth rate to only 0.5 percent. Between 2004 and 2007, Hong Kong’s growth rate recovered to an average of 7.3 percent, and this East Asian tiger was leaping forward and roaring again. However, as a result of the current financial crisis, Hong Kong slipped into recession in 2009 with a growth rate of –3.6 percent. So Hong Kong is a “crouching Tiger” waiting to leap forward and roar again in the future. The map compares 2009 data for the Four Tigers of East Asia.

ANALYZE THE ISSUE

One of the keys to Hong Kong’s success is its free trade policy. Why is this so important for a developing country? What would be the effect of Hong Kong attempting to protect its domestic industries by raising tariffs and following other protectionist trade policies?

1. Frazer Institute, <http://www.freetheworld.com/>.

low-interest loans to developing countries. The IMF was also established at Bretton Woods in 1944. Its purpose is to help countries overcome short-run financial difficulties. Typically, the IMF makes conditional loans that require the debtor countries to implement fiscal and monetary policies that will alleviate balance-of-payments deficit problems and promote noninflationary economic growth. The 186-member IMF is not a charitable institution. It operates like a credit union with funding quotas that earn interest on the loans. The United States is the IMF's largest shareholder and thus has effective veto power over IMF decisions.

In recent years, the IMF has performed a major role in providing short-term loans to developing countries and to economies making the transition to capitalism. In the late 1990s, the IMF provided multibillion-dollar bailouts to Russia, several Asian countries, Brazil, and other countries experiencing economic turmoil. In 2010, the IMF and some of the EU countries made a rescue loan to debt-plagued Greece with the condition of deep cutbacks in government spending and tax hikes. Critics argue that as long as governments believe the IMF will bail them out, they will fail to correct their own problems. IMF supporters counter that if the IMF does not intervene, troubled economies will default on outstanding loans and cause a worldwide ripple effect. Critics respond that a flood of low-cost short-term loans from the IMF encourages bad government policies and excessive risk taking by banks. Consequently, a bailout in a crisis generates new financial crises and reduces world economic growth.

Finally, private banks also engage in lending to LDCs. Until the 1970s, LDCs borrowed primarily from the World Bank and foreign governments. In the 1970s, private banks began to lend to both governments and private firms in LDCs. During the 1980s, the news was full of stories that some U.S. banks had made so many risky loans to LDCs that default on these loans would lead to the failure of one major U.S. bank after another. As the story goes, "If you can't repay the bank for your car loan, you're in trouble. If a government can't repay the bank a billion dollars, the bank's in trouble."

In the late 1980s, the debt crisis was avoided by (1) writing off some of the loans, (2) lowering the interest rate of remaining loans, and (3) lending LDCs more money to pay interest on their debt. The U.S. government, other Western governments, and the IMF were active in these solutions. Was this a case of "throwing good money after bad" because many loans would never be repaid? The answer is No. Easing the debt burden salvaged some payments and was in the best interest of both rich and poor countries because a fresh start encouraged trade. Nevertheless, the huge outstanding debts of some LDCs make another debt crisis a lingering possibility. In 2005, the wealthiest countries (G8) reached a groundbreaking agreement to eliminate the debt of some of the world's most impoverished countries. In the wake of the recent global financial crisis, IMF lending to LDCs rose sharply in 2008, in addition to financial analysis to policymakers.



CHECKPOINT

Is the Minimum Wage an Antipoverty Solution for Poor Countries?

Imagine you are an economic adviser to the president of a poor LDC. The president is seeking policies to promote economic growth and a higher standard of living for citizens of this country. You are asked whether adopting a minimum wage equal to the average of the IACs' average hourly wages would achieve these goals. Recall the discussion of the minimum wage from Chapter 4 and evaluate this policy.

Key Concepts

GDP per capita
Industrially advanced
countries (IACs)
Less-developed countries
(LDCs)

Vicious circle of poverty
Infrastructure
Foreign aid
Agency for International
Development (AID)

World Bank
International Monetary
Fund (IMF)

Summary

- **GDP per capita** provides a general index of a country's standard of living. Countries with low GDP per capita and slow growth in GDP per capita are less able to satisfy basic needs for food, shelter, clothing, education, and health.
- **Industrially advanced countries (IACs)** are countries with high GDP per capita and output is produced by technologically advanced capital. Countries that have high incomes without widespread industrial development, such as the oil-rich Arab countries, are not included in the IAC list.
- **Less-developed countries (LDCs)** are countries with low production per person. In these countries, output is produced without large amounts of technologically advanced capital and well-educated labor. The LDCs account for about three-fourths of the world's population.
- The **Four Tigers of the Pacific Rim** are Hong Kong, Singapore, South Korea, and Taiwan. These newly industrialized countries have achieved high growth rates and standards of living.
- **GDP per capita comparisons** are subject to four problems: (1) the accuracy of LDC data is questionable, (2) GDP per capita ignores income distribution, (3) fluctuations in exchange rates affect GDP per capita gaps between countries, and (4) there is no adjustment for cost-of-living differences between countries.
- **Economic growth** and **economic development** are related, but somewhat different concepts. Economic growth is measured quantitatively by GDP per capita, while economic development is a broader concept. In addition to GDP per capita, economic development includes quality-of-life measures, such as life expectancy at birth, adult literacy rate, and per capita energy consumption. Economic growth and development are the result of a complex process that is determined by five major factors: (1) natural resources, (2) human resources, (3) capital, (4) technological progress, and (5) the political environment. There is no single correct strategy for economic development, and a lack of strength in one or more of the five areas does not prevent growth.
- The **vicious circle of poverty** is a trap in which an LDC is too poor to save and therefore it cannot invest and shift its production possibilities curve outward. As a result, the LDC remains poor. One way for a poor country to gain savings, invest, and grow is to use funds from external sources such as foreign private investment, foreign aid, and foreign loans. Borrowing by many LDCs led to the debt crisis of the 1980s, which was resolved by writing off and restructuring the loans.

Summary of Conclusion Statements

- LDCs’ GDP per capita is subject to greater measurement errors than data for IACs.
- GDP per capita comparisons among nations can be misleading because GDP per capita does not measure income distribution.
- A conversion problem may widen or narrow the GDP per capita gap between nations because the fluctuations in exchange rates do not reflect actual differences in the value of goods and services produced.
- In general, GDP per capita is highly correlated with alternative measures of quality of life.
- Natural resource endowment can promote economic growth, but a country can develop without a large natural resource base.
- Investment in human capital generally results in increases in GDP per capita.
- Rapid population growth combined with low human capital investment explains why many countries are LDCs.
- There is a significant positive relationship between investment and economic growth and development.
- Many LDCs continue to experience low growth rates even though IACs have developed advanced technologies that the world can utilize.
- Exchange rate controls artificially set by government above the market exchange rates reduce the volume of both exports and imports (international trade).
- There is no single strategy for economic growth and development.

Study Questions and Problems

1. What is the difference between industrially advanced countries (IACs) and less-developed countries (LDCs)? List five IACs and five LDCs.
2. Explain why GDP per capita comparisons among nations are not a perfect measure of differences in economic well-being.
3. Assume you are given the following data for country Alpha and country Beta:

Country	GDP per capita
Alpha	\$25,000
Beta	\$15,000

- a. Based on the GDP per capita data given above, in which country would you prefer to live?
- b. Now assume you are given the following additional quality-of-life data. In which country would you prefer to reside?

Country	Life expectancy at birth (years)	Daily per capita calorie supply	Per capita energy consumption*
Alpha	65	2,500	3,000
Beta	70	3,000	4,000

*Kilograms of oil equivalent.

4. What is the difference between economic development and economic growth? Give examples of how each of these concepts can be measured.
5. Do you agree with the argument that the rich nations are getting richer and the poor nations are getting poorer? Is this an oversimplification? Explain.
6. Explain why it is so difficult for poor LDCs to generate investment in capital in order to increase productivity and growth and therefore improve their standard of living.

7. Why is the quest for economic growth and development complicated?
8. Indicate whether each of the following is associated with a high or low level of economic growth and development:

	High	Low
a. Overpopulation	_____	_____
b. Highly skilled labor	_____	_____
c. High savings rate	_____	_____
d. Political stability	_____	_____
e. Low capital accumulation	_____	_____
f. Advanced technology	_____	_____
g. Highly developed infrastructure	_____	_____
h. High proportion of agriculture	_____	_____
i. High degree of income inequality	_____	_____
9. Without external financing from foreign private investment, foreign aid, and foreign loans, poor countries are caught in the vicious circle of poverty. Explain. How does external financing help poor countries achieve economic growth and development?
10. What are some of the problems for LDCs of accepting foreign aid?
11. Why would an LDC argue for “trade, not aid”?
12. Explain the differences among the Agency for International Development (AID), the World Bank, and the International Monetary Fund (IMF).

For Online Exercises, go to the Tucker Web site at www.cengage.com/economics/tucker.

CHECKPOINT ANSWERS

Does Rapid Growth Mean a Country Is Catching Up?

GDP growth alone does not measure the standard of living. You must also consider population. Even though Beta experienced a greater GDP growth rate, its GDP per capita might be less than Alpha's because its population growth rate is greater. Of course, the reverse is also possible, but without

population data, we cannot say. If you said which country's people are better off cannot be determined because the GDP must be divided by the population to measure the average standard of living, **YOU ARE CORRECT**.

Is the Minimum Wage an Antipoverty Solution for Poor Countries?

An important source of foreign investment for LDCs is multinational corporations that locate plants and other facilities in these countries. LDCs compete with each other for the economic growth and development benefits that these multinational corporations can provide. For an LDC to win the competition, it must offer political stability,

adequate infrastructure, a favorable business climate, and a cheap labor force. If you said you would not support the president's proposal to raise the minimum wage because it would place the LDC at a competitive disadvantage in the labor market, thereby reducing foreign private investment and growth, **YOU ARE CORRECT**.



Practice Quiz

For an explanation of the correct answers, visit the Tucker Web site at www.cengage.com/economics/tucker.

1. An LDC is defined as a country
 - a. without large stocks of advanced capital.
 - b. without well-educated labor.
 - c. with low GDP per capita.
 - d. that is described by all of the above.
2. According to the definition given in the chapter, which of the following is *not* an LDC?
 - a. India
 - b. Egypt
 - c. China
 - d. Ireland
3. Which of the following is *true* when making GDP per capita comparisons among nations?
 - a. The GDP per capita is subject to greater measurement errors for LDCs compared to IACs.
 - b. The GDP per capita does not measure income distribution.
 - c. The GDP per capita is subject to fluctuations from changes in exchange rates.
 - d. All of the above are true.
4. LDCs are characterized by
 - a. high life expectancy.
 - b. high adult literacy.
 - c. high infant mortality.
 - d. all of the above.
 - e. none of the above.
5. According to the classification in the text, which of the following is *not* an IAC?
 - a. United Arab Emirates
 - b. Israel
 - c. Hong Kong
 - d. Greece
6. When the government fixes the exchange rate above market exchange rates,
 - a. international trade falls.
 - b. the infrastructure improves.
 - c. real GDP per capita rises.
 - d. the vicious circle of poverty is broken.
7. Which of the following statements is *true*?
 - a. An LDC is a country with a low GDP per capita, low levels of capital, and uneducated workers.
 - b. The vicious circle of poverty exists because GDP must rise before people can save and invest.
 - c. LDCs are characterized by rapid population growth and low levels of investment in human capital.
 - d. All of the above are true.
8. An outward shift of the production possibilities curve represents
 - a. economic growth.
 - b. a decline in economic development.
 - c. a decrease in human capital.
 - d. a decrease in resources.
9. Which of the following problems do LDCs face?
 - a. Low per capita income and high GDP growth rate
 - b. Low population growth and low per capita income
 - c. Rapid population growth and low human capital
 - d. Low per capita income and high saving rate
10. Which of the following *best* defines the vicious circle of poverty?
 - a. The GDP per capita must rise before people can save and invest.
 - b. People cannot save while capital accumulates.
 - c. Increased GDP per capita relates to lower population growth.
 - d. Poverty, saving, and investment are related like a circle.
11. Which of the following is infrastructure?
 - a. International Harvester tractor plant
 - b. Waste and water system provided by government
 - c. US Airways airplane
 - d. Service of postal workers

Practice Quiz Continued

12. Economic growth and development in LDCs are low because many of them lack
 - a. capital investment.
 - b. technological progress.
 - c. a favorable political environment.
 - d. all of the above.
 - e. none of the above.
13. Which of the following makes short-term conditional low-interest loans to developing countries?
 - a. Agency for International Development (AID)
 - b. World Bank
 - c. International Monetary Fund (IMF)
 - d. New International Economic Order (NIEO)
14. Which of the following groups makes long-term low-interest loans to less-developed countries (LDCs)?
 - a. Agency for International Development (AID)
 - b. New International Economic Order (NIEO)
 - c. International Monetary Fund (IMF)
 - d. World Bank
15. In order for Ethiopia to increase its future economic growth, it must choose a point that is
 - a. below its production possibilities curve.
 - b. further along on its production possibilities curve toward the capital goods axis.
 - c. further along on its production possibilities curve toward the consumption goods axis.
 - d. further along on its production possibilities curve away from the population axis.
 - e. above its production possibilities curve.

Road Map The International Economy

part 5

This road map feature helps you tie material in the part together as you travel the Economic Way of Thinking Highway. The following are review questions listed by chapter from the previous part. The key concept in each question is given for emphasis, and each question or set of questions concludes with an interactive game to reinforce the concepts. Click on the Tucker Web site at www.cengage.com/economics/tucker, select the chapter, and play the visual causation chain game designed to make learning fun. Enjoy the cheers when correct and suffer the jeers if you miss. The correct answers for the multiple-choice questions are given in Appendix C of the text.

Chapter 15. International Trade and Finance

1. Key Concept: Exchange rate changes

Which of the following would cause the U.S. demand curve for Japanese yen to shift to the right?

- a. An increase in the U.S. inflation rate compared to the rate in Japan
- b. A higher real rate of interest on investments in Japan than on investments in the United States
- c. The popularity of Japanese products increases in the United States
- d. All of the above

2. Key Concept: Exchange rate changes

Which of the following would cause the supply of dollars curve in the United States to shift to the right?

- a. Japanese imports become less popular.
- b. The value of the dollar falls.
- c. The supply of dollars decreases.
- d. Japanese imports become more popular.



Causation Chain Game

Changes in Supply and Demand Curves for Dollars—Exhibit 10

3. Key Concept: Impact of relative price level changes

An increase in inflation in the United States relative to the rate in France would make

- a. U.S. goods relatively less expensive in the United States and in France.
- b. French goods relatively less expensive in the United States and U.S. goods relatively more expensive in France.
- c. French goods relatively more expensive in the United States and in France.
- d. French goods relatively more expensive in the United States and U.S. goods relatively less expensive in France.

4. Key Concept: Impact of relative price level changes

If the Japanese price level falls relative to the price level in the United States, then

- a. Japanese buy less U.S. exports.
- b. the demand for dollars decreases.
- c. the supply of dollars increases.
- d. the value of the dollar falls.
- e. all of the above are true.

**Causation Chain Game**

The Impact of Relative Price Level Changes on Exchange Rates—Exhibit 11

Chapter 16. Economies in Transition

5. Key Concept: Command economy

Which of the following statements is *true* about a command economy?

- a. Shortages occur because of complexities in the planning process.
- b. Planners determine what, how many, and for whom goods and services are to be produced.
- c. Planners often allocate goods and services through a rationing system.
- d. The quality of produced goods and services tends to be inferior.
- e. All of the above are true.

6. Key Concept: Command economy

Which of the following statements *best* describes the role played by prices in a command economy such as the former Soviet Union?

- a. Prices were used to allocate resources.
- b. Prices played the same role as in a market economy.
- c. Prices were used to ration final goods and services but not to allocate resources.
- d. None of the above statements is descriptive.

**Causation Chain Game**

Central Planners Fixing Prices—Exhibit 2

Chapter 17. Growth and the Less-Developed Countries

7. Key Concept: Economic growth

An outward shift of an economy's production possibilities curve is caused by an

- a. increase in capital.
- b. increase in labor.
- c. advance in technology.
- d. all of the above are true.

8. Key Concept: Economic growth

Which of the following is *correct*?

- a. Economic development is more quantitative than economic growth.
- b. A country cannot achieve economic growth with a limited base of natural resources.
- c. Infrastructure is capital provided by the private sector.
- d. All of the above are true.
- e. All of the above are false.

**Causation Chain Game**

Economic Growth—Exhibit 4

9. Key Concept: Achieving economic growth

Which of the following can be a barrier to an LDC's economic growth and development?

- a. Low population growth
- b. A low level of human capital
- c. Faster capital accumulation
- d. More infrastructure

10. Key Concept: Economic growth and development

To grow and prosper, less-developed countries must *not*

- a. invest in human capital.
- b. build a strong infrastructure.
- c. shift resources out of the production of consumer goods and into the production of capital goods.
- d. shift resources out of the production of capital goods and into the production of consumer goods.
- e. improve the quality of the water supply.

**Causation Chain Game**

The Effect of External Financing on an LDC's Production Possibilities Curve—Exhibit 7

Answers to Odd-Numbered Study Questions and Problems*



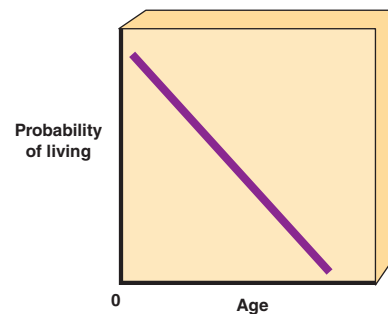
CHAPTER 1 INTRODUCING THE ECONOMIC WAY OF THINKING

1. A poor nation with many people who lack food, clothing, and shelter certainly experiences wants beyond the availability of goods and services to satisfy these unfulfilled wants. On the other hand, no wealthy nation has all the resources necessary to produce everything everyone in the nation wishes to have. Even if you had \$1 million and were completely satisfied with your share of goods and services, other desires would be unfulfilled. There is never enough time to accomplish all the things that you can imagine would be worthwhile.
3. a. capital
5. a. microeconomic issue
b. macroeconomic issue
c. microeconomic issue
d. macroeconomic issue
7. The real world is full of complexities that make it difficult to understand and predict the relationships between variables. For example, the relationship between changes in the price of gasoline and changes in consumption of gasoline requires abstraction from the reality that such variables as the fuel economy of cars and weather conditions often change at the same time as the price of gasoline.
9. The two events are associated, and the first event (cut in military spending) is the cause of the second event (higher unemployment in the defense industry). The point is that association does not necessarily mean causation, but it might.
11. d. statement of normative economics

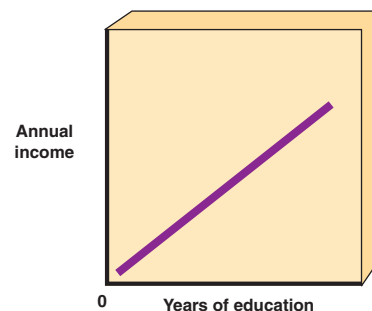
*Note: Answers to even-numbered questions are in the Instructor's Manual

APPENDIX TO CHAPTER 1 APPLYING GRAPHS TO ECONOMICS

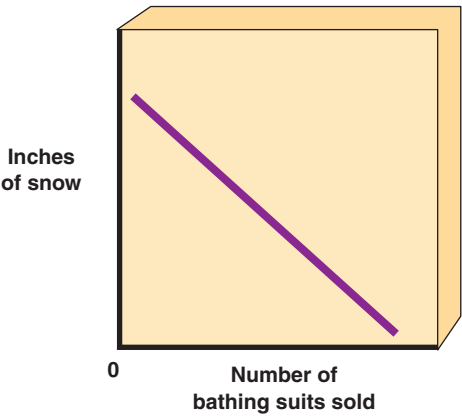
1. a. The probability of living is *inversely* related to age. This model could be affected by improvements in diet, better health care, reductions in hazards to health in the workplace, or changes in the speed limit.



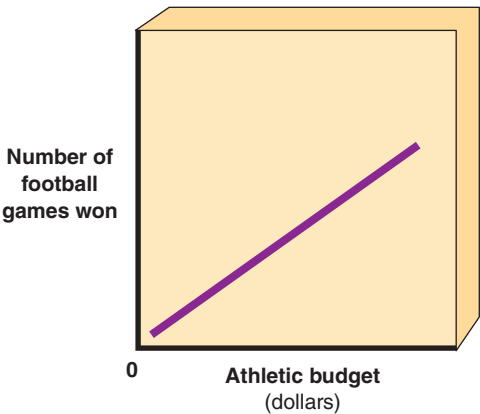
- b. Annual income and years of formal education are *directly* related. This relationship might be influenced by changes in such human characteristics as intelligence, motivation, ability, and family background. An example of an institutional change that could affect this relationship over a number of years is the draft.



- c. Inches of snow and sales of bathing suits are *inversely* related. The weather forecast and the price of travel to sunny vacation spots can affect this relationship.



- d. Most alumni and students will argue that the number of football games won is *directly* related to the athletic budget. They reason that winning football games is great advertising and results in increased attendance, contributions, and enrollment that, in turn, increase the athletic budget. Success in football can also be related to other factors, such as school size, age and type of institution, number and income of alumni, and quality of the faculty and administrators.



CHAPTER 2 PRODUCTION POSSIBILITIES, OPPORTUNITY COST, AND ECONOMIC GROWTH

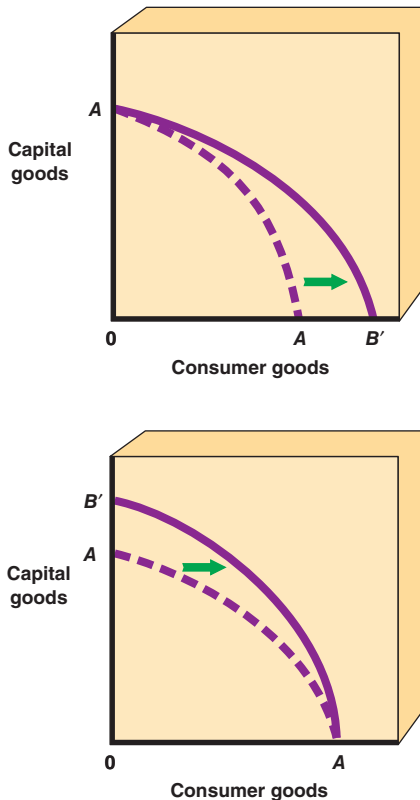
1. Because the wants of individuals and society exceed the goods and services available to satisfy these desires, choices must be made. The consumption possibilities of an individual with a fixed income are limited, and as a result, additional consumption of one item necessarily precludes an expenditure on another next-best choice. The forgone alternative is called the opportunity cost, and this concept also applies to societal decisions. If society allocates resources to the production of guns, then those same resources cannot be used at the same time to make butter.
3. Regardless of the price of a lunch, economic resources—and, labor, and capital—are used to produce the lunch. These scarce resources are no longer available to produce other goods and services.
5. Using marginal analysis, students weigh the benefits of attending college against the costs. There is an incentive to attend college when the benefits (improved job opportunities, income, intellectual improvement, social life, and so on) outweigh the opportunity costs.

7.

Flower boxes	Opportunity cost (pies forgone)
0	
1	4 (30 – 26)
2	5 (26 – 21)
3	6 (21 – 15)
4	7 (15 – 8)
5	8 (8 – 0)

9. Movements along the curve are efficient points and conform to the well-known “free lunch” statement. However, inefficient points are exceptions because it is possible to produce more of one output without producing less of another output.

11.



5. One reason that the demand curve for word processing software shifted to the right might be that people desire new, higher-quality output features. The supply curve can shift to the right when new technology makes it possible to offer more software for sale at different prices.
7. a. Demand shifts to the right.
b. Supply shifts to the left.
c. Supply shifts to the right.
d. Demand shifts to the right.
e. Demand shifts to the right.
f. Supply of corn shifts to the left.
9. a. The supply of CD players shifts rightward.
b. The demand for CD players is unaffected.
c. The equilibrium price falls, and the equilibrium quantity increases.
d. The demand for CDs increases because of the fall in the price of CD players (a complementary good).
11. The number of seats (quantity supplied) remains constant, but the demand curve shifts because tastes and preferences change according to the importance of each game. Although demand changes, the price is a fixed amount, and to manage a shortage, colleges and universities use amount of contributions, number of years as a contributor, or some other rationing device.

CHAPTER 3 MARKET DEMAND AND SUPPLY

1. If people buy a good or service because they associate higher quality with higher price, this is a violation of the *ceteris paribus* assumption. An increase in the quantity demanded results only from a decrease in price. Quality and other nonprice determinants of demand, such as tastes and preferences and the price of related goods, are held constant in the model.
3. a. Demand for cars decreases; oil and cars are *complements*.
b. Demand for insulation increases; oil and home insulation are *substitutes*.
c. Demand for coal increases; oil and coal are *substitutes*.
d. Demand for tires decreases; oil and tires are *complements*.

APPENDIX TO CHAPTER 3 CONSUMER SURPLUS, PRODUCER SURPLUS, AND MARKET EFFICIENCY

1. \$80

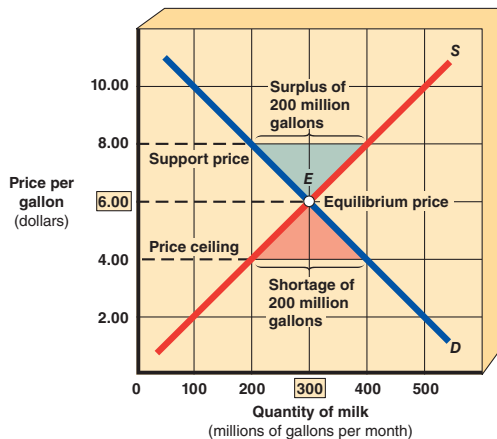
3.

Price	\$30	\$15
Consumer surplus	\$80	\$105
Producer surplus	\$25	\$5
Total surplus	\$105	\$110

The lower price results in higher total surplus because in this case the rise in consumer surplus exceeds fall in producer surplus.

CHAPTER 4 MARKETS IN ACTION

1.



- a. The equilibrium price is \$6.00 per gallon, and the equilibrium quantity is 300 million gallons per month. The price system will restore the market's \$6.00 per gallon price because either a surplus will drive prices down or a shortage will drive prices up.
 - b. The support price results in a persistent surplus of 200 million gallons of milk per month, which the government purchases with taxpayers' money. Consequently, taxpayers who do not drink milk are still paying for milk. The purpose of the support price is to bolster the incomes of dairy farmers.
 - c. The ceiling price will result in a persistent shortage of 200 million gallons of milk per month, but 200 million gallons are purchased by consumers at the low price of \$4.00 per gallon. The shortage places a burden on the government to ration milk in order to be fair and to prevent black markets. The government's goal is to keep the price of milk below the equilibrium price of \$6.00 per gallon, which would be set by a free market.
3. The labor market can be divided into two separate markets, one for skilled union workers and one for unskilled workers. If the minimum wage is above the equilibrium wage rate and is raised, the effect will be to increase the demand for, and the wage of, skilled union workers because the two groups are substitutes.

5. The equilibrium price rises.
7. The government can reduce emissions by (a) regulations that require smoke-abatement equipment or (b) imposing pollution taxes that shift supply leftward.
9. Pure public goods are not produced in sufficient quantities by private markets because there is no feasible method to exclude free riders.

CHAPTER 5 PRICE ELASTICITY OF DEMAND AND SUPPLY

1. Demand is elastic because the percentage change in quantity is greater than the percentage change in price.
3. If the price of used cars is raised 1 percent, the quantity demanded will fall 3 percent. If the price is raised 10 percent, the quantity demanded will fall 30 percent.

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{4,500 - 5,000}{5,000 + 4,500}}{\frac{3,500 - 3,000}{3,000 + 3,500}} = \frac{\frac{-500}{9,500}}{\frac{500}{6,500}} = \frac{-19}{13} = -0.68$$

The price elasticity of demand for the university is inelastic.

7. Demand for popcorn is perfectly inelastic, and total revenue will increase.
9. a. Sunkist oranges
b. Cars
c. Foreign travel in the long run
11. Furniture sales fall by 30 percent and physician services by only 3 percent. Thus, the demand for physician services is much less responsive to a reduction in income than the demand for furniture.
13. The negative number tells you car tires are complements. If the price of cars rises by 10 percent, the quantity demanded of car tires falls by 20 percent.
15. As the demand for a product becomes more inelastic, the greater the amount of a tax on this product that sellers can pass on to consumers by raising the product's price.

CHAPTER 6 CONSUMER CHOICE THEORY

- Utility is a subjective concept, and, therefore, this statement may or may not be true.
- Marginal utility is 10 utils. When you attend the fourth party, total utility will increase, but marginal utility will be less than 10 utils.
- In consumer equilibrium, the marginal utility ratio is $3/4$, which is equal to the price ratio.
- As people consume more of any product, eventually the satisfaction per unit decreases. Since the marginal utility from additional units falls, people will not buy a greater quantity unless the price falls.
- The initial consumer equilibrium is as follows:

$$\frac{\text{MU of steak meal}}{\text{Price of steak meal}} = \frac{\text{MU of hamburger meal}}{\text{Price of hamburger meal}}$$

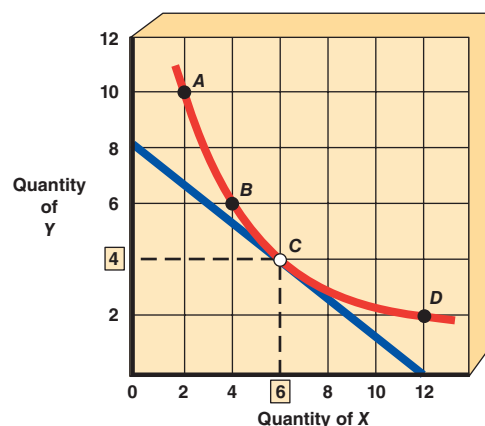
$$\frac{12 \text{ utils}}{\$10} = \frac{6 \text{ utils}}{\$5}$$

The marginal utility per dollar for each good equals 1.2. If the price of a hamburger meal falls to \$2, this equality no longer holds. Now the marginal utility per dollar for a hamburger meal becomes higher at 3 (6 utils/\$2). James can now increase his total utility by purchasing more hamburger meals per month. Given the law of diminishing returns, the marginal utility of hamburger meals falls until consumer equilibrium is restored.

APPENDIX TO CHAPTER 6 INDIFFERENCE CURVE ANALYSIS

- $MRS = 3$ (3 slices of pizza per Coke), but the ratio of prices is $1/2$ (\$1.00 per Coke/\$2.00 per slice of pizza). Since $MRS > \text{slope}$ (the ratio of prices), the consumer is not maximizing total utility. Therefore, the consumer should consume less pizza and more Coke in order to maximize total utility by moving downward along the consumer's indifference curve until consumer equilibrium is achieved where $MRS = \text{price ratio} = 1/2$.

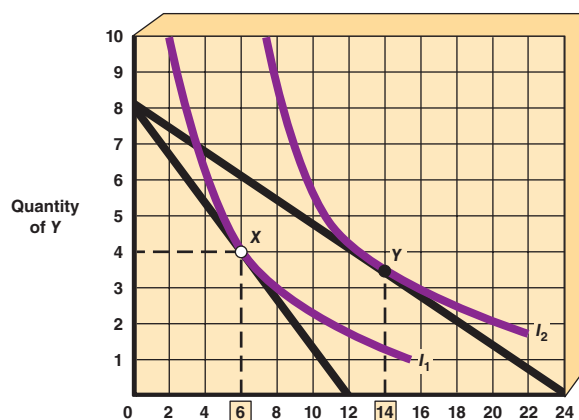
- a. and b.

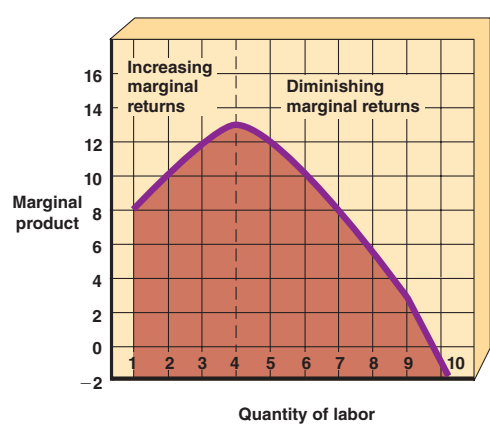
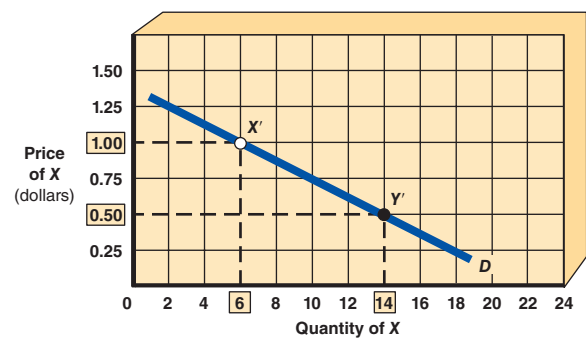


- Consumer equilibrium occurs at point C with 6 units of X and 4 units of Y purchased.

$$d. \text{MRS} = P_x/P_y = \frac{\$1}{\$1.50} = \frac{2}{3}$$

- Hold the price of Y constant at \$1.50 and decrease the price of X from \$1.00 to \$0.50. The new budget line will shift northeastward from the Y axis intercept point of 8 units. Now draw a new indifference curve and determine the new equilibrium point. Finally, draw a graph with various prices of X on the vertical axis and the quantity of X on the horizontal axis. Connecting the two consumer equilibrium points will allow you to draw a downward-sloping demand curve.



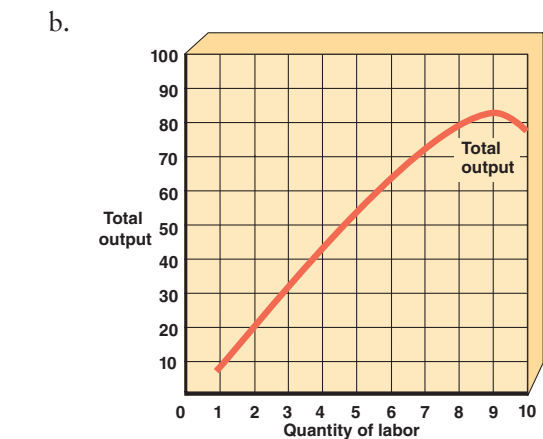


CHAPTER 7 PRODUCTION COSTS

1. a. explicit cost
b. explicit cost
c. implicit cost
d. implicit cost
e. explicit cost
f. implicit cost

3. a.

Labor	Marginal product
1	8
2	10
3	12
4	13
5	12
6	10
7	8
8	6
9	3
10	-2

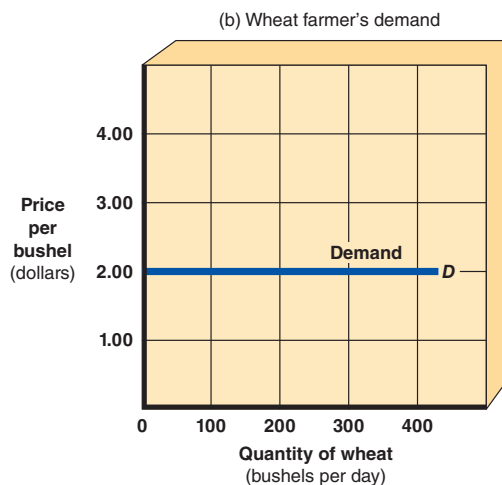
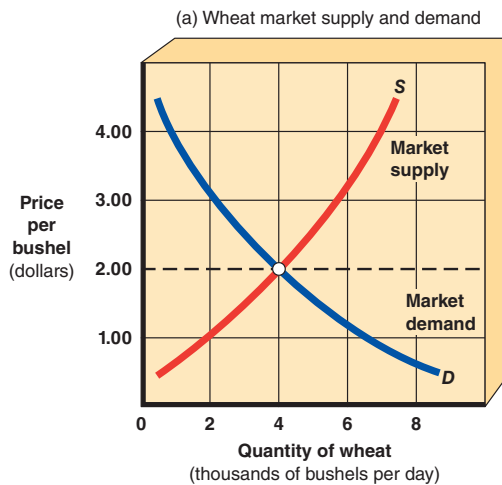


5. None. The position of a firm's short-run average total cost curve is not related to the demand curve.
7. The ATC and AVC curves converge as output expands because $ATC = AVC + AFC$. As output increases, AFC declines, so most of ATC is therefore AVC .
9. The average total cost-marginal cost rule states that when the marginal cost is below the average total cost, the addition to total cost is below the average total cost, and the average total cost falls. When the marginal cost is greater than the average total cost, the average total cost rises. In this case, the average total cost is at a minimum because it is equal to the marginal cost.
11. The marginal product for any number of workers is the slope of the total output curve. The marginal product is the derivative of the total output curve dTO/dQ , where TO is the total output and Q is the number of workers.

CHAPTER 8 PERFECT COMPETITION

1. A perfectly competitive firm will not advertise. Because all firms in the industry sell the same product, there is no reason for customers to be influenced by ads into buying one firm's product rather than another firm's product.

3.



A single wheat farmer is a price taker facing a perfectly elastic demand curve because in perfect competition one seller has no control over its price. The reason is that each wheat farmer is one among many, sells a homogeneous product, and must compete with any new farmer entering the wheat market.

5. At a price of \$150, the firm produces 4 units and earns an economic profit of \$70 ($TR - TC = \$600 - \$530$). The firm breaks even at an output of 2 units.
7. This statement is incorrect. A firm can earn maximum profit (or minimum loss) when marginal revenue equals marginal cost. The confusion is between the “marginal” and the “total” concepts. Marginal cost is the change in total cost from one additional unit of output, and marginal revenue is the change in total revenue from one additional unit of output.
9. The statement is incorrect. The perfectly competitive firm must consider both its marginal revenue and its marginal cost. Instead of trying to sell all the quantity of output possible, the firm will sell the quantity where $MR = MC$ because beyond this level of output the firm earns less profit.
11. Advise the residential contractor to shut down because the market price exceeds the average variable cost and the firm cannot cover its operating costs.

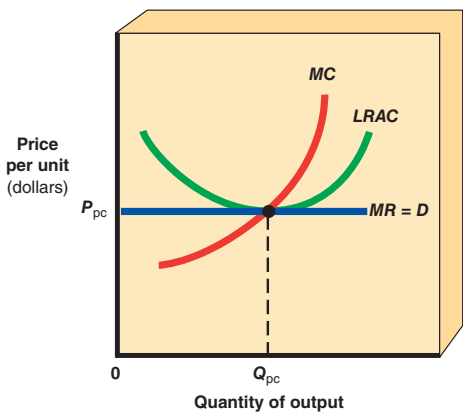
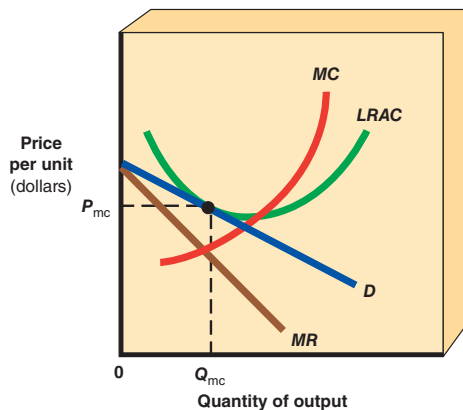
CHAPTER 9 MONOPOLY

1. Each market is served by a single firm providing a unique product. There are no close substitutes for local telephone service, professional football in San Francisco, and first-class mail service. A government franchise imposes a legal barrier to potential competitors in the telephone and first-class mail services. An NFL franchise grants monopoly power to its members in most geographic areas.
3. The reason may be that the hospital has monopoly power because it is the only hospital in the area and patients have no choice. On the other hand, there may be many drugstores competing to sell drugs, and this keeps prices lower than those charged by the hospital.
5. In a natural monopoly, a single seller can produce electricity at a lower cost because the $LRAC$ curve declines. One firm can therefore sell electricity at a cheaper price and drive its competitor out of business over time. Another possibility would be for two competing firms to merge and earn greater profit by lowering cost further.
7. In this special case, sales maximization and profit maximization are the same. The monopolist should charge \$2.50 per unit, produce 5 units of output, and earn \$12.50 in profit. When the marginal cost curve is not equal to zero, the monopolist's $MR = MC$ output is less than 5 units, the price is higher than \$2.50 per unit, and profit is below \$12.50.
9.
 - a. increase output
 - b. decrease output

11. a. not price discrimination
b. price discrimination
c. not price discrimination if justified by a transportation cost difference
d. price discrimination
13. Answers vary with students.

CHAPTER 10 MONOPOLISTIC COMPETITION AND OLIGOPOLY

1. The monopolistically competitive firm's demand curve is less elastic (steeper) than a perfectly competitive firm's demand curve, but more elastic (flatter) than a monopolist's demand curve.
3. a. P_1
b. Q_1
c. Q_3
d. greater than the marginal cost ($B > A$)
- 5.



Because $P_{mc} > MC$, the monopolistically competitive firm fails to achieve allocative efficiency.

The monopolistically competitive firm is also inefficient because it charges a higher price and produces less output than under perfect competition. The perfectly competitive firm sets P_{pc} equal to MC and produces a level of output corresponding to the minimum point on the $LRAC$ curve.

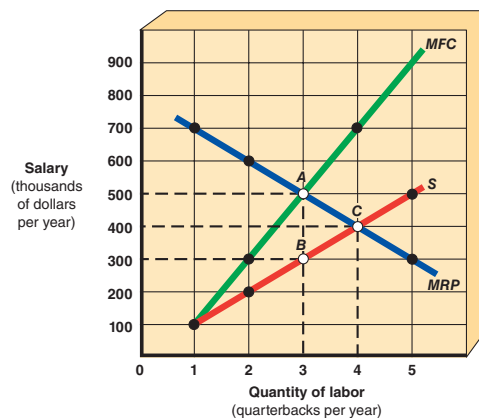
7. Answers might include automobiles, airline travel, personal computers, and cigarettes. An oligopoly differs from monopolistic competition by having few sellers, rather than many sellers; either a homogeneous or a differentiated product, rather than all differentiated products; and difficult entry rather than easy entry.
9. Any maverick jeans firm that raises or lowers its price will earn less profits. Therefore, firms in the jeans industry face a kinked demand curve, and prices remain rigid. Although firms do not engage in price competition, they can engage in nonprice competition. Each firm can use advertising and style to market its brand-name product.
11. The pricing behavior follows the price leadership model. The price leader is Hewlett-Packard, which is the largest and most dominant firm in the computer printer industry. After a price war, IBM followed each of Hewlett-Packard's price hikes.
13. If both firms spend no money advertising, they each earn a profit of \$8 billion in cell A. If either firm does not advertise and the other firm does in cell B or cell C, then the advertising firm attracts more customers and earns \$10 billion compared to a -\$2 billion loss for the rival without ads. This outcome forces both firms to advertise and reduce mutual profits at cell D. As a result of both firms spending large budgets on advertising, their mutual profits are reduced to \$5 billion. If the government bans all cigarette advertising, the result is that both firms will move to the mutually high profit cell A.

CHAPTER 11 LABOR MARKETS

1. This statement is incorrect. Workers supply their labor to employers. Demand refers to the quantity of labor employers hire at various wage rates based on the marginal revenue product of labor.
3. The MRP of the second worker is this person's contribution to total revenue, which is \$50 (\$150 - \$100). Because $MRP = P \times MP$ and

$MP = MRP/P$, the second worker's marginal product (MP) is 10 ($\$50/\$5$).

5. The firm in a perfectly competitive labor market is a price taker. Because a single firm buys the labor of a relatively small portion of workers in an industry, it can hire additional workers and not drive up the wage rate. For the industry, however, all firms must offer higher wages to attract workers from other industries.
7. Students investing in education are increasing their human capital. A student with greater human capital increases his or her marginal product. At a given product price, the MRP is higher, and firms find it profitable to hire the better-educated worker and pay higher wages.
9. At a wage rate of \$90 per day, Zippy Paper Company hires 3 workers because each worker's MRP exceeds or equals the wage rate. Setting the wage rate at \$100 per day causes Zippy Paper Company to cut employment from 3 to 2 workers because the third worker's MRP is \$10 below the union-caused wage rate of \$100 per day.
11. As shown in the exhibit below, for a monopsony, the optimum quantity of labor is 3 quarterbacks, determined at point A, where the MFC curve intersects the MRP curve. However, the team can attract and hire 3 quarterbacks for an annual salary of \$300,000 each at point B on the supply of labor curve, rather than paying a quarterback's contribution to the team's revenues (MRP), which is \$500,000 per year at point A. In a competitive labor market, the Jacksonville Jaguars hire 4 quarterbacks and pay each \$400,000 per year.

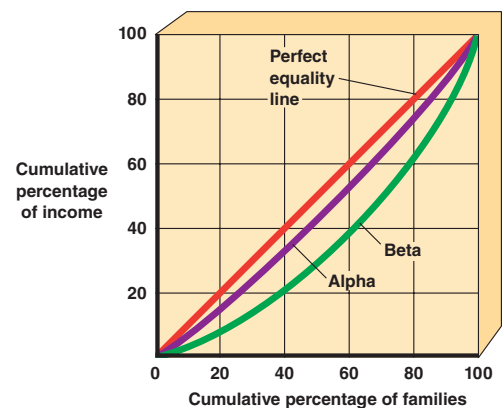


CHAPTER 12 INCOME DISTRIBUTION, POVERTY, AND DISCRIMINATION

1. a.

Percentage of families	Alpha		Beta	
	Percent-age share	Cumu-lative share	Percent-age share	Cumu-lative share
Lowest fifth	17.7%	17.7%	9.0%	9.0%
Second-lowest fifth	19.9	37.6	14.2	23.2
Middle fifth	20.4	58.0	17.5	40.7
Second-highest fifth	20.7	78.7	21.9	62.6
Highest fifth	21.3	100.0	37.4	100.0

b.



- c. Because the Lorenz curve for Alpha is closest to the perfect equality line, Alpha's distribution of income is more equal compared to Beta.
3. Absolute poverty is defined as a dollar figure that represents some level of income per year required to purchase some minimum amount of goods and services essential to meeting a person's or a family's basic needs. Relative poverty is defined as a level of income required to place a person or family in, say, the lowest 20 percent among all persons or families receiving incomes. The poverty line is based on the absolute definition.
5. In-kind transfers are payments in the form of goods and services rather than cash. Examples include such government programs as food stamps, Medicaid, and housing. Noncash income is not counted in a family's income to determine whether the family's income is below the poverty line.

7. The percentage of families in the United States classified as poor was about 12 percent. Poor families are more likely to live in the South. The age, race, and education of the head of the family are also important characteristics of poor families.
9. The three major criticisms are that welfare: (1) reduces the work incentive, (2) is inefficient because the programs cost too much to administer, and (3) treats poor persons with the same needs unequally because the states pay different benefits.
11. This is an opinion question. To agree, you assume that markets are perfectly competitive and discrimination is therefore unprofitable. To disagree, you can argue that in reality labor markets will never be perfectly competitive and the government must therefore address the institutional causes of poverty.

CHAPTER 13 ANTITRUST AND REGULATION

1. The Sherman Act outlaws price-fixing or anticompetitive practices designed to eliminate rivals. The Clayton Act clarifies the Sherman Act by outlawing specific business practices, including price discrimination, exclusive dealing, tying contracts, stock acquisition, and interlocking directorates. The U.S. Department of Justice and Federal Trade Commission (FTC) are responsible for enforcing these laws. Private firms can also bring suit against other firms under these laws.
 3. Both the Robinson-Patman Act and the Celler-Kefauver Act were amendments to close loopholes in the Clayton Act. The Robinson-Patman Act expanded the list of illegal price discrimination practices to include quantity discounting, free advertising, and promotional allowances offered that “substantially lessen competition or tend to create a monopoly.” The Celler-Kefauver Act closed the loophole in the Clayton Act whereby competing firms could merge by asset acquisition (not outlawed in the Clayton Act), rather than by acquiring stock (outlawed in the Clayton Act).
 5. In fact, Alcoa argued that metals such as copper and steel are substitutes for aluminum.
- Therefore, the relevant industry to compute market share was the metals industry and not the aluminum industry. If the court had chosen the U.S. metals industry as the relevant industry, Alcoa would not have a monopoly.
7. a. The federal government will charge the bookstore with predatory pricing in order to monopolize its college market for books, which is a violation of the Sherman Act.
 - b. The federal government will charge the real estate firms with collusion to fix prices, which is a violation of the Sherman Act.
 - c. The federal government will charge a violation of the Clayton Act because the combined market share of this horizontal merger would substantially lessen competition in the personal computer market.
 - d. The federal government will not charge a violation because this is a conglomerate merger between firms in unrelated industries.
 9. The “necessary” condition would be expected to favor existing regulated firms by eliminating or greatly restricting competition and raising prices. The existing regulated firms are better organized politically than either new competitors or consumers. While consumers favor competition and lower prices, regulators would be expected to interpret “necessary” to mean that the service provided by existing firms is sufficient without new firms.
 11. Although a public subsidy achieves efficiency, marginal-cost pricing is usually unpopular with voters, who must provide the monopolist with public funds. Moreover, a public subsidy gives the monopolist a disincentive to minimize costs.

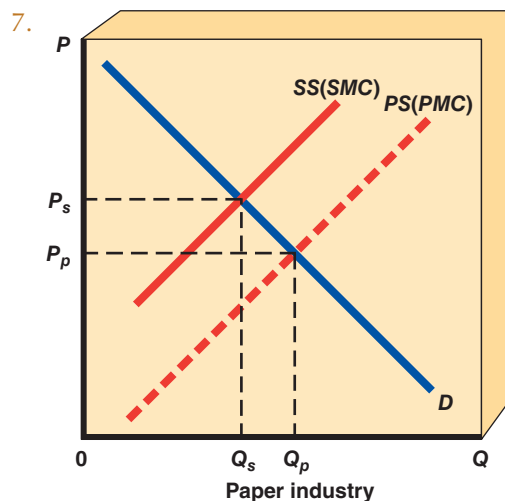
CHAPTER 14 ENVIRONMENTAL ECONOMICS

1. A competitive industry selling a pollution-generating product will charge a lower price and sell a larger quantity than would be the case for a “green” industry. The competitive industry has lower costs because it fails to include external costs. Lower costs allow a lower price. A lower price leads to a larger quantity demanded and sold.

3. If you choose the \$90,000 house, the EMF radiation is *not* an externality. An externality is a third-party effect, whereby buyers and sellers of a product ignore the spillover effects of their transaction. In this case, the market reflects the risk of cancer, with the seller accepting a lower price and the buyer saving \$10,000 to reflect the cancer risk.

Houses have many characteristics that influence their price, including number of rooms, location, nearby schools, and environmental amenities. If you are willing to buy a house near a nuclear plant, or near EMFs, you, the buyer, bear the consequences, not a third party.

5. An instructor who automatically flunks students who do not turn in all homework assignments is exhibiting command-and-control regulation. She is dictating the production process for achieving knowledge. The inefficiencies are that students may turn in poorly done assignments or may copy assignments and that some students may understand the material without doing the homework or may have an alternative production method, such as the use of computer software, to achieve knowledge. The instructor's method is particularly inefficient if her assignments are busywork and do not really help the students to achieve knowledge.



At Q_p , pollution from paper production leads to coffee-colored rivers. At socially efficient Q_s , there is less pollution, and rivers are less polluted. The rivers are unlikely to be pristine, which requires no production at all.

9. Consumers will share in the benefits of cleaner air if any individual buys a less-polluting car. Since they enjoy the same benefit whether they pay extra or their neighbor pays extra for a cleaner car, they will let the neighbor buy the cleaner car. Of course, since their neighbor uses the same reasoning, no one ends up paying extra to buy a cleaner car.
11. Convincing examples should be sent to the author of the text. It is very difficult to find markets where the transaction costs of reaching an agreement are near zero. It is also difficult to find two-party situations, since most pollution spills over to many individuals. With many individuals involved, the free-rider problem arises, as a given individual wants to benefit from pollution agreements, but let others bear the cost. There can often be income effects, as fighting pollution may take a large amount of one's income. Candidates for markets where the Coase Theorem might apply include convincing your neighbor to leash her dog (you might help finance invisible fencing), enforcing laws concerning the fencing of cattle (see question 12 for further discussion), and settling disputes when one builder interferes with the views of existing homes.
13. a. Command-and-control regulation would dictate the use of an alternative technology with lower carbon emissions.
b. An effluent tax would place a tax on carbon emissions so that firms could no longer ignore these costs. In turn, prices of carbon-emitting products would increase, and quantities would decrease.
c. Permits would be issued giving the right to emit carbon. The number of permits would equal the socially efficient emissions level. Firms would be allowed to buy or sell these permits. Firms with higher marginal costs of emissions abatement would buy permits, while firms that could reduce emissions at a lower cost would profit from selling permits.
15. According to Garrett Hardin, individuals will use a common property resource as long as their marginal benefits exceed their marginal costs. They will disregard the external costs to others if additional fishing or grazing subtracts from the fish or grass available to others using the common. As all users of the common will

behave in this way, the commons will be used beyond the efficient point, and potentially to the point of exhaustion, where the availability of the commons will collapse.

Elinor Ostrom has studied fisheries and other commons and finds that those who are using the resource will attempt to establish institutions that will lead to optimal use. Rather than leave the commons as open access, they will convert it to common property. They will limit who can access the property and limit its use, so that the commons will not be fished or grazed into exhaustion.

CHAPTER 15 INTERNATIONAL
TRADE AND FINANCE

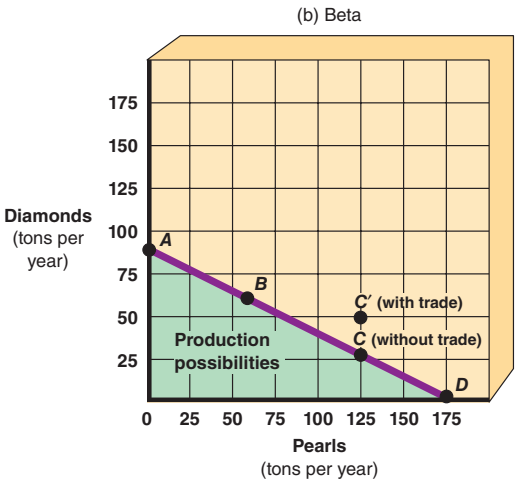
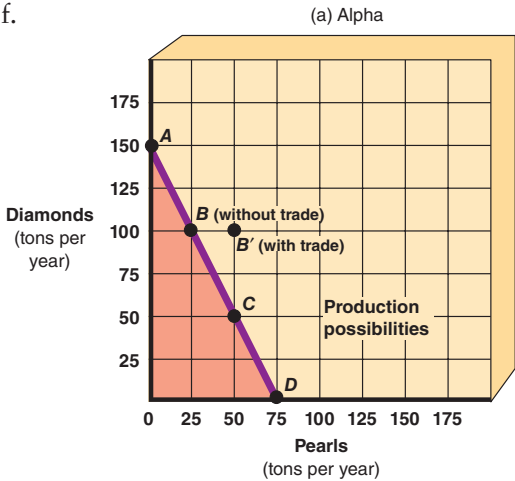
1. a. In Alpha, the opportunity cost of producing 1 ton of diamonds is 1/2 ton of pearls. In Beta, the opportunity cost of producing 1 ton of diamonds is 2 tons of pearls.
- b. In Alpha, the opportunity cost of producing 1 ton of pearls is 2 tons of diamonds. In Beta, the opportunity cost of producing 1 ton of pearls is 1/2 ton of diamonds.
- c. Because Alpha can produce diamonds at a lower opportunity cost than Beta can, Alpha has a comparative advantage in the production of diamonds.
- d. Because Beta can produce pearls at a lower opportunity cost than Alpha can, Beta has a comparative advantage in the production of pearls.
- e.

	Diamonds (tons per year)	Pearls (tons per year)
<i>Before specialization</i>		
Alpha (at point B)	100	25
Beta (at point C)	30	120
Total output	130	145
<i>After specialization</i>		
Alpha (at point A)	150	0
Beta (at point D)	0	180
Total output	150	180

As shown in the above table, specialization in each country increases total world output per

year by 20 tons of diamonds and 35 tons of pearls.

f.

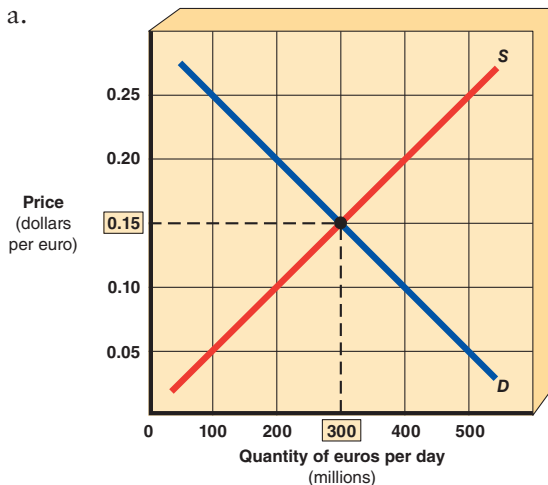


Without trade, Alpha produces and consumes 100 tons of diamonds and 25 tons of pearls at point B on its production possibilities curve. Without trade, Beta produces and consumes 30 tons of diamonds and 120 tons of pearls (point C). Now assume Alpha specializes in producing diamonds at point A and imports 50 tons of pearls in exchange for 50 tons of diamonds. Through specialization and trade, Alpha moves its consumption possibility to point B', outside its production possibilities curve.

3. The principle of specialization and trade according to comparative advantage applies to both nations and states in the United States. For example, Florida grows oranges, and Idaho grows potatoes. Trade between these states, just

like trade between nations, increases the consumption possibilities.

5. U.S. industries (and their workers) that compete with restricted imports would benefit. Consumers would lose from the reduced supply of imported goods from which to choose and from higher prices for domestic products, resulting from lack of competition from imports.
7. Although some domestic jobs may be lost, new ones are created by international trade. Stated differently, the economy as a whole gains when nations specialize and trade according to the law of comparative advantage, but imports will cost jobs in some specific industries.
9. Although each nation's balance of payments equals zero, its current and capital account balances usually do not equal zero. For example, a current account deficit means a nation purchased more in imports than it sold in exports. On the other hand, this nation's capital account must have a surplus to offset the current account deficit. This means that foreigners are buying more domestic capital (capital inflow) than domestic citizens are buying foreign capital (capital outflow). Thus, net ownership of domestic capital stock is in favor of foreigners.
11. a.



- b. \$0.15 per euro
- c. An excess quantity of 200 million euros would be demanded.

CHAPTER 16 ECONOMIES IN TRANSITION

1. Americans prefer large cars and canned soup. Europeans predominantly buy small cars and dry soup. The role of women and minorities in the workplace is an excellent example of how culture relates to the labor factor of production.
3. Such a program would provide additional economic security for the elderly, but higher taxes could reduce the incentive to work, and economic efficiency might be reduced.
5. In a traditional agricultural system, a benefit would be that members of society would cooperate by helping to build barns, harvest, and so on. Under the command system, worrying about errors and crop failures would be minimized because the state makes the decisions and everyone in society has a basic income. In a market economy, a bumper crop would mean large profits and the capacity to improve one's standard of living.
7. Because most economies are mixed systems, this term is too broad to be very descriptive. The terms *capitalism* and *communism* are more definitive concerning the role of private ownership, market allocations, and decentralized decision making. Embracing a market-oriented system means a transfer of power from the command bureaucracy to consumers. Markets are incompatible with the principle that socialist citizens are supposed to be concerned with the collective interest.

CHAPTER 17 GROWTH AND THE LESS-DEVELOPED COUNTRIES

1. The difference between IACs and LDCs is based on GDP per capita. This classification is somewhat arbitrary. A country with a high GDP per capita and narrow industrial development based on oil, such as the United Arab Emirates, is excluded from the IAC list. There are 27 economies listed in the text as IACs, including Switzerland, Japan, the United States, Singapore, and Hong Kong. The following countries

- are considered to be LDCs: Argentina, Mexico, South Africa, Jordan, and Bangladesh.
3. a. Based only on GDP per capita, you would conclude that Alpha is a better place to live because this country produces a greater output of goods and services per person.
b. Based on the additional evidence, you would change your mind and prefer to live in Beta because the quality-of-life data indicate a higher standard of living in this country.
 5. The average growth rate of GDP per capita for IACs exceeds the GDP per capita growth rate for LDCs. This evidence is consistent with the argument. The argument is oversimplified because there is considerable diversity among the LDCs. In a given year, a LDC may have a GDP per capita growth rate greater than many IACs.
 7. Economic growth and development are complicated because there is no single prescription that a country can follow. The chapter presents a multidimensional model with five basic categories: natural resources, human resources, capital, technological progress, and political environment. Because an LDC is weak in one or more of the key factors, such as natural resources, does not necessarily mean that the LDC cannot achieve economic success.
 9. Because they are poor countries with low GDP per capita, they lack domestic savings to invest in capital; and lacking investment, they remain poor. The rich in these poor countries often put their savings abroad because of the fear of political instability. An inflow of external funds from abroad permits the LDC to increase its capital without reducing its consumption and to shift its production possibilities curve outward.
 11. Poor countries are too poor to save enough to finance domestic capital formation. International trade is a way LDCs can generate savings from abroad. Exports provide the LDCs with foreign exchange to pay for imports of capital stock that is necessary for economic growth and development.

Answers to Practice Quizzes

B

CHAPTER 1 INTRODUCING THE ECONOMIC WAY OF THINKING

1. c 2. d 3. c 4. c 5. a 6. a 7. a 8. a 9. a
10. c 11. a 12. b 13. c 14. d 15. d

APPENDIX TO CHAPTER 1 APPLYING GRAPHS TO ECONOMICS

1. d 2. d 3. a 4. d 5. d 6. c 7. c 8. c 9. d
10. d 11. d 12. b

CHAPTER 2 PRODUCTION POSSIBILITIES, OPPORTUNITY COST, AND ECONOMIC GROWTH

1. c 2. a 3. c 4. c 5. b 6. c 7. c 8. e 9. a
10. c 11. b 12. d 13. e 14. c 15. a

CHAPTER 3 MARKET DEMAND AND SUPPLY

1. e 2. a 3. b 4. b 5. a 6. b 7. c 8. b
9. c 10. b 11. c 12. c 13. d 14. d 15. c
16. d 17. d 18. c 19. d 20. d

APPENDIX TO CHAPTER 3 CONSUMER SURPLUS, PRODUCER SURPLUS, AND MARKET EFFICIENCY

1. c 2. b 3. d 4. e 5. d 6. d 7. b 8. d
9. a 10. b

CHAPTER 4 MARKETS IN ACTION

1. a 2. a 3. c 4. d 5. d 6. d 7. c 8. b
9. a 10. b 11. c 12. a 13. c 14. d 15. d

CHAPTER 5 PRICE ELASTICITY OF DEMAND AND SUPPLY

1. a 2. b 3. a 4. a 5. a 6. d 7. a 8. a
9. d 10. c 11. c 12. c 13. c 14. b 15. b

CHAPTER 6 CONSUMER CHOICE THEORY

1. c 2. d 3. a 4. a 5. d 6. d 7. c 8. b
9. a 10. a 11. b 12. a 13. d 14. a 15. d

APPENDIX TO CHAPTER 6 INDIFFERENCE CURVE ANALYSIS

1. d 2. d 3. c 4. d 5. c 6. b 7. d 8. b
9. d 10. a 11. c 12. b

CHAPTER 7 PRODUCTION COSTS

1. d 2. b 3. c 4. c 5. d 6. d 7. c 8. d
9. d 10. c 11. c 12. b 13. c 14. b 15. d
16. c 17. d 18. e 19. c 20. d

CHAPTER 8 PERFECT COMPETITION

1. b 2. b 3. b 4. b 5. c 6. d 7. b 8. d
9. b 10. b 11. a 12. d 13. b 14. d 15. d
16. a 17. d 18. d 19. b 20. a

CHAPTER 9 MONOPOLY

1. d 2. d 3. d 4. d 5. b 6. d 7. b 8. d
9. b 10. d 11. e 12. b 13. b 14. d 15. e

CHAPTER 10 MONOPOLISTIC COMPETITION AND OLIGOPOLY

1. b 2. b 3. d 4. d 5. d 6. d 7. a 8. a
9. b 10. d 11. d 12. a 13. c 14. b 15. a
16. a 17. d 18. a 19. a 20. d

CHAPTER 11 LABOR MARKETS

1. d 2. a 3. c 4. a 5. c 6. b 7. d 8. b
9. c 10. c 11. b 12. c 13. c 14. a 15. b

CHAPTER 12 INCOME DISTRIBUTION, POVERTY, AND DISCRIMINATION

1. a 2. c 3. c 4. a 5. b 6. d 7. d 8. a
9. d 10. c 11. a 12. d 13. d 14. d 15. c

CHAPTER 13 ANTITRUST AND REGULATION

1. d 2. a 3. d 4. b 5. d 6. a 7. c 8. d
9. c 10. a 11. b 12. a 13. e 14. d 15. d

CHAPTER 14 ENVIRONMENTAL ECONOMICS

1. d 2. e 3. a 4. a 5. a 6. c 7. d 8. b
9. d 10. b 11. b 12. b 13. c 14. a

CHAPTER 15 INTERNATIONAL TRADE AND FINANCE

1. b 2. c 3. a 4. d 5. d 6. a 7. d 8. a
9. c 10. c 11. b 12. c 13. c 14. a 15. a
16. b 17. a 18. a 19. e 20. d

CHAPTER 16 ECONOMIES IN TRANSITION

1. c 2. d 3. d 4. a 5. b 6. a 7. c 8. b
9. b 10. c 11. c 12. a 13. a 14. d 15. a

CHAPTER 17 GROWTH AND THE LESS-DEVELOPED COUNTRIES

1. d 2. d 3. d 4. c 5. a 6. a 7. d 8. a
9. c 10. a 11. b 12. d 13. c 14. d 15. b

C

Answers to Road Map Questions

PART 1

1. e 2. c 3. c 4. d 5. a 6. e 7. d 8. d
9. d 10. b

PART 2

1. b 2. c 3. a 4. a 5. d 6. d 7. d 8. c
9. c 10. c 11. b 12. a 13. c

PART 3

1. c 2. e 3. c 4. b 5. a 6. a 7. b 8. c
9. d 10. b 11. d

PART 4

1. c 2. d 3. d 4. d 5. a 6. d 7. a

PART 5

1. d 2. d 3. b 4. e 5. e 6. c 7. d 8. e
9. b 10. d

Glossary

A

Ability-to-pay principle The concept that those who have higher incomes can afford to pay a greater proportion of their income in taxes, regardless of benefits received.

Absolute advantage The ability of a country to produce a good using fewer resources than another country.

Adaptive expectations theory The concept that people believe the best indicator of the future is recent information. As a result, people persistently underestimate inflation when it is accelerating and overestimate it while it is slowing down.

Adjustable-rate mortgage (ARM) A home loan that adjusts the nominal interest rate to changes in an index rate, such as rates on Treasury securities.

Agency for International Development (AID) The agency of the U.S. State Department that is in charge of U.S. aid to foreign countries.

Aggregate demand curve (AD) The curve that shows the level of real gross domestic product (GDP) purchased by households, businesses, government, and foreigners (net exports) at different possible price levels during a time period, *ceteris paribus*.

Aggregate expenditures function (AE) The function that represents total spending in an economy at a given level of real disposable income.

Aggregate expenditures model The model that determines the equilibrium level of real GDP by the intersection of the aggregate expenditures and aggregate output (and income) curves.

Aggregate supply curve (AS) The curve that shows the level of real GDP produced at different possible price levels during a time period, *ceteris paribus*.

Appreciation of currency A rise in the price of one currency relative to another.

Arbitrage The practice of earning a profit by buying a good at a low price and reselling the good at a higher price.

Automatic stabilizers Federal expenditures and tax revenues that automatically change levels in order to stabilize an economic expansion or contraction; sometimes referred to as *nondiscretionary fiscal policy*.

Autonomous consumption Consumption that is independent of the level of disposable income.

Autonomous expenditure Spending that does not vary with the current level of disposable income.

Average fixed cost (AFC) Total fixed cost divided by the quantity of output produced.

Average tax rate The tax divided by the income.

Average total cost (ATC) Total cost divided by the quantity of output produced.

Average variable cost (AVC) Total variable cost divided by the quantity of output produced.

B

Balance of payments A bookkeeping record of all the international transactions between a country and other countries during a given period of time.

Balance of trade The value of a nation's imports subtracted from its exports. Balance of trade can be given in terms of goods, services, or goods and services.

Balanced budget multiplier An equal change in government spending and taxes, which changes aggregate demand by the amount of the change in government spending.

Barter The direct exchange of one good or service for another good or service, rather than for money.

Base year A year chosen as a reference point for comparison with some earlier or later year.

Benefit-cost analysis The comparison of the additional rewards and costs of an economic alternative.

Benefits-received principle The concept that those who benefit from government expenditures should pay the taxes that finance their benefits.

Board of Governors of the Federal Reserve System The seven members appointed by the president and confirmed by the U.S. Senate who serve for one nonrenewable 14-year term. Their responsibility is to supervise and control the money supply and the banking system of the United States.

Budget deficit A budget in which government expenditures exceed government revenues in a given time period.

Budget line A line that represents all combinations of two goods that a consumer can purchase with a fixed amount of money given the price of each good.

Budget surplus A budget in which government revenues exceed government expenditures in a given time period.

Business cycle Alternating periods of economic growth and contraction, which can be measured by changes in real GDP.

C

Capital The physical plants, machinery, and equipment used to produce other goods. Capital goods are man-made goods that do not directly satisfy human wants.

Capitalism An economic system characterized by private ownership of resources and markets.

Cartel A group of firms that formally agrees to control the price and the output of a product.

Celler-Kefauver Act A 1950 amendment to the Clayton Act that prohibits one firm from merging with a competitor by purchasing its physical assets if the effect is to substantially lessen competition.

Ceteris paribus A Latin phrase that means while certain variables change, “all other things remain unchanged.”

Change in demand An increase or a decrease in the quantity demanded at each possible price. An increase in demand is a rightward shift in the entire demand curve. A decrease in demand is a leftward shift in the entire demand curve.

Change in quantity demanded A movement between points along a stationary demand curve, *ceteris paribus*.

Change in quantity supplied A movement between points along a stationary supply curve, *ceteris paribus*.

Change in supply An increase or a decrease in the quantity supplied at each possible price. An increase in supply is a rightward shift in the entire supply curve. A decrease in supply is a leftward shift in the entire supply curve.

Checkable deposits The total of checking account balances in financial institutions convertible to currency “on demand” when a check is written without advance notice.

Circular flow model A diagram showing the flow of products from businesses to households and the flow of resources from households to businesses. In exchange for these resources, money payments flow between businesses and households.

Civilian labor force The number of people 16 years of age and older who are employed, or who are actively seeking a job, excluding members of the armed forces, homemakers, discouraged workers, and other persons not in the labor force.

Classical economists A group of economists whose theory dominated economic thinking from the 1770s to the Great Depression. They believed recessions would naturally cure themselves because the price system would automatically restore full employment.

Classical range The vertical segment of the aggregate supply curve, which represents an economy at full-employment output.

Clayton Act A 1914 amendment that strengthens the Sherman Act by making it illegal for firms to engage in certain anticompetitive business practices.

Coase Theorem The proposition that private market negotiations can achieve social efficiency regardless of the initial definition of property rights.

Coincident indicators Variables that change at the same time that real GDP changes.

Collective bargaining The process of negotiating labor contracts between the union and management concerning wages and working conditions.

Command economy A system that answers the *What*, *How*, and *For Whom* questions by central authority.

Command-and-control regulations Government regulations that set an environmental goal and dictate how the goal will be achieved.

Commodity money Anything that serves as money while having market value in other uses.

Communism A stateless, classless economic system in which all the factors of production are owned by

the workers and people share in production according to their needs. In Marx's view, this is the highest form of socialism toward which the revolution should strive.

Comparable worth The principle that employees who work for the same employer must be paid the same wage when their jobs, even if different, require similar levels of education, training, experience, and responsibility. A nonmarket wage-setting process is used to evaluate and compensate jobs according to point scores assigned to different jobs.

Comparative advantage The ability of a country to produce a good at a lower opportunity cost than another country.

Complementary good A good that is jointly consumed with another good. As a result, there is an inverse relationship between a price change for one good and the demand for its "go together" good.

Conglomerate merger A merger between firms in unrelated markets.

Constant-cost industry An industry in which the expansion of industry output by the entry of new firms has no effect on the individual firm's cost curve.

Constant returns to scale A situation in which the long-run average cost curve does not change as the firm increases output.

Consumer equilibrium A condition in which total utility cannot increase by spending more of a given budget on one good and spending less on another good.

Consumer price index (CPI) An index that measures changes in the average prices of consumer goods and services.

Consumer sovereignty The freedom of consumers to cast their dollar votes to buy, or not to buy, at prices determined in competitive markets.

Consumer surplus The value of the difference between the price consumers are willing to pay for a product on the demand curve and the price actually paid for it.

Consumption function The graph or table that shows the amount households spend for goods and services at different levels of disposable income.

Cost-push inflation A rise in the general price level resulting from an increase in the cost of

production that causes the aggregate supply curve to shift leftward.

Cross-elasticity of demand The ratio of the percentage change in quantity demanded for a good or service to a given percentage change in the price of another good or service.

Crowding-in effect An increase in private-sector spending as a result of federal budget deficits financed by U.S. Treasury borrowing. At less than full employment, consumers hold more Treasury securities, and this additional wealth causes them to spend more. Business investment spending increases because of optimistic profit expectations.

Crowding-out effect A reduction in private-sector spending as a result of federal budget deficits financed by U.S. Treasury borrowing. When federal government borrowing increases interest rates, the result is lower consumption by households and lower investment spending by businesses.

Currency Money, including coins and paper money.

Cyclical unemployment Unemployment caused by the lack of jobs during a recession.

D

Deadweight loss The net loss of consumer and producer surplus for underproduction or overproduction of a product.

Debt ceiling A legislated legal limit on the national debt.

Decreasing-cost industry An industry in which the expansion of industry output by the entry of new firms decreases the individual firm's cost curves (cost curve shifts downward).

Deflation A decrease in the general (average) price level of goods and services in the economy.

Demand A curve or schedule showing the various quantities of a product consumers are willing to purchase at possible prices during a specified period of time, *ceteris paribus*.

Demand curve for labor A curve showing the different quantities of labor employers are willing to hire at different wage rates in a given time period, *ceteris paribus*. It is equal to the marginal revenue product of labor.

Demand for money curve A curve representing the quantity of money that people hold at different possible interest rates, *ceteris paribus*.

Demand-pull inflation A rise in the general price level resulting from an excess of total spending (demand) caused by a rightward shift in the aggregate demand curve.

Depreciation of currency A fall in the price of one currency relative to another.

Deregulation The elimination or phasing out of government restrictions on economic activity.

Derived demand The demand for labor and other factors of production that depends on the consumer demand for the final goods and services the factors produce.

Direct relationship A positive association between two variables. When one variable increases, the other variable increases, and when one variable decreases, the other variable decreases.

Discount rate The interest rate the Fed charges on loans of reserves to banks.

Discouraged worker A person who wants to work, but who has given up searching for work because he or she believes there will be no job offers.

Discretionary fiscal policy The deliberate use of changes in government spending or taxes to alter aggregate demand and stabilize the economy.

Diseconomies of scale A situation in which the long-run average cost curve rises as the firm increases output.

Disinflation A reduction in the rate of inflation.

Disposable personal income (DI) The amount of income that households actually have to spend or save after payment of personal taxes.

Dissaving The amount by which personal consumption expenditures exceed disposable income.

E

Economic growth The ability of an economy to produce greater levels of output, represented by an outward shift of its production possibilities curve. Also, an expansion in national output measured by the annual percentage increase in a nation's GDP.

Economic profit Total revenue minus explicit and implicit costs.

Economic system The organizations and methods used to determine what goods and services are produced, how they are produced, and for whom they are produced.

Economics The study of how society chooses to allocate its scarce resources to the production of goods and services in order to satisfy unlimited wants.

Economies of scale A situation in which the long-run average cost curve declines as the firm increases output.

Effluent tax A tax on a pollutant.

Elastic demand A condition in which the percentage change in quantity demanded is greater than the percentage change in price.

Embargo A law that bars trade with another country.

Emissions trading Trading that allows firms to buy and sell the right to pollute.

Entrepreneurship The creative ability of individuals to seek profits by taking risks and combining resources to produce innovative products.

Equation of exchange An accounting identity that states the money supply times the velocity of money equals total spending.

Equilibrium A market condition that occurs at any price which the quantity demanded and the quantity supplied are equal.

Excess reserves Potential loan balances held in vault cash or on deposit with the Fed in excess of required reserves.

Exchange rate The number of units of one nation's currency that equals one unit of another nation's currency.

Expenditure approach The national income accounting method that measures GDP by adding all the spending for final goods during a period of time.

Explicit costs Payments to nonowners of a firm for their resources.

External national debt The portion of the national debt owed to foreign citizens.

Externality A cost or benefit imposed on people other than the consumers and producers of a good or service.

F

Federal Deposit Insurance Corporation (FDIC)

A government agency established in 1933 to insure commercial bank deposits up to a specified limit.

Federal funds market A private market in which banks lend reserves to each other for less than 24 hours.

Federal funds rate The interest rate banks charge for overnight loans of reserves to other banks.

Federal Open Market Committee (FOMC)

The Federal Reserve's committee that directs the buying and selling of U.S. government securities, which are major instruments for controlling the money supply. The FOMC consists of the seven members of the Federal Reserve's Board of Governors, the president of the New York Federal Reserve Bank, and the presidents of four other Federal Reserve district banks.

Federal Reserve System The 12 Federal Reserve district banks that service banks and other financial institutions within each of the Federal Reserve districts; popularly called the Fed.

Federal Trade Commission Act The federal act that in 1914 established the Federal Trade Commission (FTC) to investigate unfair competitive practices of firms.

Fiat money Money accepted by law and not because of its redeemability or intrinsic value.

Final goods Finished goods and services produced for the ultimate user.

Fiscal policy The use of government spending and taxes to influence the nation's output, employment, and price level.

Fixed input Any resource for which the quantity cannot change during the period of time under consideration.

Flow A measurement in units per time period such as dollars per year. For example, income and consumption are flows that occur per week, per month, or per year.

Foreign aid The transfer of money or resources from one government to another for which no repayment is required.

Fractional reserve banking A system in which banks keep only a percentage of their deposits on reserve as vault cash and deposits at the Fed.

Free trade The flow of goods between countries without restrictions or special taxes.

Free-rider problem The problem that if some individuals benefit, while others pay, few will be willing to pay for improvement of the environment or other public goods. As a result, these goods are under-produced.

Frictional unemployment Unemployment caused by the normal search time required by workers with marketable skills who are changing jobs, initially entering the labor force, reentering the labor force, or seasonally unemployed.

Full employment The situation in which an economy operates at an unemployment rate equal to the sum of the frictional and structural unemployment rates. Also called the natural rate of unemployment.

G

Game theory A model of the strategic moves and countermoves of rivals.

GDP chain price index A measure that compares changes in the prices of all final goods during a given year to the prices of those goods in a base year.

GDP gap The difference between full-employment real GDP and actual real GDP.

GDP per capita The value of final goods produced (GDP) divided by the total population.

Government expenditures Federal, state, and local government outlays for goods and services, including transfer payments.

Government failure Government intervention or lack of intervention that fails to correct market failure.

Gross domestic product (GDP) The market value of all final goods and services produced in a nation during a period of time, usually a year.

H

Horizontal merger A merger of firms that compete in the same market.

Hot spot problem For emissions that do not disperse uniformly, emissions may be higher in locations where firms buy permits that allow them to increase emissions.

Human capital The accumulation of education, training, experience, and health that enables a worker to enter an occupation and be productive.

Hyperinflation An extremely rapid rise in the general price level.

Implicit costs The opportunity costs of using resources owned by the firm.

Incentive-based regulations Government regulations that set an environmental goal, but are flexible as to how buyers and sellers achieve the goal.

Income approach The national income accounting method that measures GDP by adding all incomes, including compensation of employees, rents, net interest, and profits.

Income effect The change in quantity demanded of a good or service caused by a change in real income (purchasing power).

Income elasticity of demand The ratio of the percentage change in quantity demanded for a good or service to a given percentage change in income.

Incomes policies Federal government policies designed to affect the real incomes of workers by controlling nominal wages and prices. Such policies include presidential jawboning, wage-price guidelines, and wage-price controls.

Increasing-cost industry An industry in which the expansion of industry output by the entry of new firms increases the individual firm's cost curves (cost curve shifts upward).

Independent relationship A zero association between two variables. When one variable changes, the other variable remains unchanged.

Indifference curve A curve showing the different quantity combinations of two goods that produce the same satisfaction or total utility to a consumer.

Indifference map A selection of indifference curves with each curve representing a different level of satisfaction or total utility.

Indirect business taxes Taxes levied as a percentage of the prices of goods sold and therefore collected as part of the firm's revenue. Examples include general sales taxes, excise taxes, and customs duties.

Industrially advanced countries (IACs) High-income nations that have market economies based on large stocks of technologically advanced capital and well-educated labor. The United States, Canada, Australia, New Zealand, Japan, and most of the countries of Western Europe are IACs.

Inelastic demand A condition in which the percentage change in quantity demanded is less than the percentage change in price.

Inferior good Any good for which there is an inverse relationship between changes in income and its demand curve.

Inflation An increase in the general (average) price level of goods and services in the economy.

Inflationary gap The amount by which aggregate expenditures exceed the amount required to achieve full-employment equilibrium.

Infrastructure Capital goods usually provided by the government, including highways, bridges, waste and water systems, and airports.

In-kind transfers Government payments in the form of goods and services, rather than cash, including such government programs as food stamps, Medicaid, and housing.

Interest-rate effect The impact on total spending (real GDP) caused by the direct relationship between the price level and the interest rate.

Intermediate goods Goods and services used as inputs for the production of final goods.

Intermediate range The rising segment of the aggregate supply curve, which represents an economy as it approaches full-employment output.

Internal national debt The portion of the national debt owed to a nation's own citizens.

International Monetary Fund (IMF) The lending agency that makes short-term conditional low-interest loans to developing countries.

Inverse relationship A negative association between two variables. When one variable increases, the other variable decreases, and when one variable decreases, the other variable increases.

Investment The accumulation of capital, such as factories, machines, and inventories, that is used to produce goods and services.

Investment demand curve The graph that shows the amount businesses spend for investment goods at different possible rates of interest.

Invisible hand A phrase that expresses the belief that the best interests of a society are served when individual consumers and producers compete to achieve their own private interests.

J

Jawboning Oratory intended to pressure unions and businesses to reduce wage and price increases.

K

Keynesian range The horizontal segment of the aggregate supply curve, which represents an economy in a severe recession.

Kinked demand curve A demand curve facing an oligopolist that assumes rivals will match a price decrease, but ignore a price increase.

L

Labor The mental and physical capacity of workers to produce goods and services.

Laffer curve A graph depicting the relationship between tax rates and total tax revenues.

Lagging indicators Variables that change after real GDP changes.

Land A shorthand expression for any natural resource provided by nature.

Law of demand The principle that there is an inverse relationship between the price of a good and the quantity buyers are willing to purchase in a defined time period, *ceteris paribus*.

Law of diminishing marginal utility The principle that the extra satisfaction of a good or service declines as people consume more in a given period.

Law of diminishing returns The principle that beyond some point the marginal product decreases as additional units of a variable factor are added to a fixed factor.

Law of increasing opportunity costs The principle that the opportunity cost increases as production of one output expands.

Law of supply The principle that there is a direct relationship between the price of a good and the quantity sellers are willing and able to offer for sale in a defined time period, *ceteris paribus*.

Leading indicators Variables that change before real GDP changes.

Less-developed countries (LDCs) Nations without large stocks of technologically advanced capital and well-educated labor. LDCs are economies based on agriculture, such as most countries of Africa, Asia, and Latin America.

Long run A period of time so long that all inputs are variable.

Long-run aggregate supply curve (LRAS) The curve that shows the level of real GDP produced at different possible price levels during a time period in which nominal incomes change by the same percentage as the price level changes.

Long-run average cost curve (LRAC) The curve that traces the lowest cost per unit at which a firm can produce any level of output when the firm can build a plant of any desired plant size.

Lorenz curve A graph of the actual cumulative distribution of income compared to a perfectly equal cumulative distribution of income.

M

M1 The narrowest definition of the money supply. It includes currency, traveler's checks, and checkable deposits.

M2 The definition of the money supply that equals M1 plus near monies, such as savings deposits and small time deposits of less than \$100,000.

Macroeconomics The branch of economics that studies decision making for the economy as a whole.

Marginal analysis An examination of the effects of additions to or subtractions from a current situation.

Marginal-average rule The rule states that when marginal cost is below average cost, average cost falls. When marginal cost is above average cost,

average cost rises. When marginal cost equals average cost, average cost is at its minimum point.

Marginal cost (MC) The change in total cost when one additional unit of output is produced.

Marginal cost pricing A system of pricing in which the price charged equals the marginal cost of the last unit produced.

Marginal factor cost (MFC) The additional total cost resulting from a one-unit increase in the quantity of a factor.

Marginal product The change in total output produced by adding one unit of a variable input, with all other inputs used being held constant.

Marginal propensity to consume (MPC) The change in consumption spending resulting from a given change in real disposable income.

Marginal propensity to save (MPS) The change in saving resulting from a given change in real disposable income.

Marginal rate of substitution (MRS) The rate at which the consumer is willing to substitute one good for another good without a change in total utility. The MRS equals the slope of an indifference curve at any point on the curve.

Marginal revenue (MR) The change in total revenue from the sale of one additional unit of output.

Marginal revenue product (MRP) The increase in a firm's total revenue resulting from hiring an additional unit of labor or other variable resource.

Marginal tax rate The fraction of additional income paid in taxes.

Marginal utility The change in total utility from one additional unit of a good or service.

Market Any arrangement in which buyers and sellers interact to determine the price and quantity of goods and services exchanged.

Market economy An economic system that answers the *What*, *How*, and *For Whom* questions using prices determined by the interaction of the forces of supply and demand.

Market failure A situation in which market equilibrium results in too few or too many resources used in the production of a good or service. This inefficiency may justify government intervention.

Market structure A classification system for the key traits of a market, including the number of firms, the similarity of the products they sell, and the ease of entry into and exit from the market.

Means test A requirement that a family's income not exceed a certain level to be eligible for public assistance.

Medium of exchange The primary function of money to be widely accepted in exchange for goods and services.

Microeconomics The branch of economics that studies decision making by a single individual, household, firm, industry, or level of government.

Mixed economy An economic system that answers the *What*, *How*, and *For Whom* questions through a mixture of traditional, command, and market systems.

Model A simplified description of reality used to understand and predict the relationship between variables.

Monetarism The theory that changes in the money supply directly determine changes in prices, real GDP, and employment.

Monetary Control Act A law, formally titled the Depository Institutions Deregulation and Monetary Control Act of 1980, that gave the Federal Reserve System greater control over nonmember banks and made all financial institutions more competitive.

Monetary policy The Federal Reserve's use of open market operations, changes in the discount rate, and changes in the required reserve ratio to change the money supply (M1).

Money Anything that serves as a medium of exchange, unit of account, and store of value.

Money multiplier The maximum change in the money supply (checkable deposits) due to an initial change in the excess reserves banks hold. The money multiplier is equal to 1 divided by the required reserve ratio.

Monopolistic competition A market structure characterized by (1) many small sellers, (2) a differentiated product, and (3) easy market entry and exit.

Monopoly A market structure characterized by (1) a single seller, (2) a unique product, and (3) impossible entry into the market.

Monopsony A labor market in which a single firm hires labor.

Mutual interdependence A condition in which an action by one firm may cause a reaction from other firms.

N

National debt The total amount owed by the federal government to owners of government securities.

National income (NI) The total income earned by resource owners, including wages, rents, interest, and profits. NI is calculated as GDP minus depreciation of the capital worn out in producing output.

Nationalism The act of transforming a private enterprise into a government enterprise.

Natural monopoly An industry in which the long-run average cost of production declines throughout the entire market. As a result, a single firm can supply the entire market demand at a lower cost than two or more smaller firms.

Natural rate hypothesis The concept that the economy will self-correct to the natural rate of unemployment. The long-run Phillips curve is therefore a vertical line at the natural rate of unemployment.

Negative income tax (NIT) A plan under which families below a certain break-even level of income would receive cash payments that decrease as their incomes increase.

Net exports effect The impact on total spending (real GDP) caused by the inverse relationship between the price level and the net exports of an economy.

Net public debt National debt minus all government interagency borrowing.

Network good A good that increases in value to each user as the total number of users increases. As a result, a firm can achieve economies of scale. Examples include Facebook and Match.com.

New-source bias Bias that occurs when regulations provide an incentive to keep assets past the efficient point.

Nominal GDP The value of all final goods based on the prices existing during the time period of production.

Nominal income The actual number of dollars received over a period of time.

Nominal interest rate The actual rate of interest without adjustment for the inflation rate.

Nonprice competition The situation in which a firm competes using advertising, packaging, product development, better quality, and better service, rather than lower prices.

Normal good Any good for which there is a direct relationship between changes in income and its demand curve.

Normal profit The minimum profit necessary to keep a firm in operation. A firm that earns normal profit earns total revenue equal to its total opportunity cost.

Normative economics An analysis based on value judgment.

O

Offset Reduction in an existing pollution source to counteract pollution from a new source.

Oligopoly A market structure characterized by (1) few sellers, (2) either a homogeneous or a differentiated product, and (3) difficult market entry.

Open market operations The buying and selling of government securities by the Federal Reserve System.

Opportunity cost The best alternative sacrificed for a chosen alternative.

P

Peak The phase of the business cycle in which real GDP reaches its maximum after rising during a recovery.

Per se rule The antitrust doctrine that the existence of monopoly alone is illegal, regardless of whether or not the monopoly engages in illegal business practices.

Perfect competition A market structure characterized by (1) a large number of small firms, (2) a homogeneous product, and (3) very easy entry into or exit from the market. Perfect competition is also referred to as *pure competition*.

Perfectly competitive firm's short-run supply curve The firm's marginal cost curve above the minimum point on its average variable cost curve.

Perfectly competitive industry's long-run supply curve The curve that shows the quantities supplied by the industry at different equilibrium prices after firms complete their entry and exit.

Perfectly competitive industry's short-run supply curve The supply curve derived from the horizontal summation of the marginal cost curves of all firms in the industry above the minimum point of each firm's average variable cost curve.

Perfectly elastic demand A condition in which a small percentage change in price brings about an infinite percentage change in quantity demanded.

Perfectly inelastic demand A condition in which the quantity demanded does not change as the price changes.

Personal income (PI) The total income received by households that is available for consumption, saving, and payment of personal taxes.

Phillips curve A curve showing an inverse relationship between the inflation rate and the unemployment rate.

Political business cycle A business cycle caused by policymakers to improve politicians' reelection chances.

Positive economics An analysis limited to statements that are verifiable.

Poverty line The level of income below which a person or a family is to be considered poor.

Precautionary demand for money The stock of money people hold to pay unpredictable expenses.

Predatory pricing The practice of one or more firms temporarily reducing prices in order to eliminate competition and then raising prices.

Price ceiling A legally established maximum price a seller can charge.

Price discrimination The practice of a seller charging different prices for the same product that are not justified by cost differences.

Price elasticity of demand The ratio of the percentage change in the quantity demanded of a product to a percentage change in its price.

Price elasticity of supply The ratio of the percentage change in the quantity supplied of a product to the percentage change in its price.

Price floor A legally established minimum price a seller can be paid.

Price leadership A pricing strategy in which a dominant firm sets the price for an industry and the other firms follow.

Price maker A firm that faces a downward-sloping demand curve and therefore it can choose among price and output combinations along the demand curve.

Price system A mechanism that uses the forces of supply and demand to create an equilibrium through rising and falling prices.

Price taker A seller that has no control over the price of the product it sells.

Private benefits and costs Benefits and costs to the decision maker, ignoring benefits and costs to third parties. Third parties are people outside the market transaction who are affected by the product.

Privatization Privatization is the process of turning a government enterprise into a private enterprise.

Producer surplus The value of the difference between the actual selling price of a product and the price producers are willing to sell it for on the supply curve.

Product differentiation The process of creating real or apparent differences between goods and services.

Production function The relationship between the maximum amounts of output that a firm can produce and various quantities of inputs.

Production possibilities curve A curve that shows the maximum combinations of two outputs an economy can produce in a given period of time with its available resources and technology.

Progressive tax A tax that charges a higher percentage of income as income rises.

Proportional tax A tax that charges the same percentage of income, regardless of the size of income. Also called a *flat-rate tax* or simply a *flat tax*.

Protectionism The government's use of embargoes, tariffs, quotas, and other restrictions to protect domestic producers from foreign competition.

Public choice theory The analysis of the government's decision-making process for allocating resources.

Public good A good or service with two properties: (1) users collectively consume benefits, and (2) there is no way to bar people who do not pay (free riders) from consuming the good or service.

Q

Quantity theory of money The theory that changes in the money supply are directly related to changes in the price level.

Quota A limit on the quantity of a good that may be imported in a given time period.

R

Rational expectations theory The belief that people use all available information to predict the future, including the future impact of predictable monetary and fiscal policies. Predictable expansionary macroeconomic policies can therefore be negated by immediately flexible wages and prices when businesses and workers anticipate the effects of these policies on the economy.

Rational ignorance The voter's choice to remain uninformed because the marginal cost of obtaining information is higher than the marginal benefit from knowing it.

Real balances effect The impact on total spending (real GDP) caused by the inverse relationship between the price level and the real value of financial assets with fixed nominal value.

Real GDP The value of all final goods produced during a given time period based on the prices existing in a selected base year.

Real income The actual number of dollars received (nominal income) adjusted for changes in the CPI.

Real interest rate The nominal rate of interest minus the inflation rate.

Recession A downturn in the business cycle during which real GDP declines. Also called a *contraction*.

Recessionary gap The amount by which aggregate expenditures fall short of the amount required to achieve full-employment equilibrium.

Recovery An upturn in the business cycle during which real GDP rises. Also called an *expansion*.

Regressive tax A tax that charges a lower percentage of income as income rises.

Required reserve ratio The percentage of deposits that the Federal Reserve requires a bank to hold in vault cash or on deposit with the Fed.

Required reserves The minimum balance that the Federal Reserve requires a bank to hold in vault cash or on deposit with the Fed.

Resources The basic categories of inputs used to produce goods and services. Resources are also called *factors of production*. Economists divide resources into three categories: land, labor, and capital.

Robinson-Patman Act A 1936 amendment to the Clayton Act that strengthens the Clayton Act against price discrimination.

Rule of reason The antitrust doctrine that the existence of monopoly alone is not illegal unless the monopoly engages in illegal business practices.

S

Saving The part of disposable income households do not spend for consumer goods and services.

Say's Law The theory that supply creates its own demand.

Scarcity The condition in which human wants are forever greater than the available supply of time, goods, and resources.

Sherman Act The federal antitrust law enacted in 1890 that prohibits monopolization and conspiracies to restrain trade.

Short run A period of time so short that there is at least one fixed input.

Short-run aggregate supply curve (SRAS) The curve that shows the level of real GDP produced at different possible price levels during a time period in which nominal incomes do not change in response to changes in the price level.

Shortage A market condition existing at any price where the quantity supplied is less than the quantity demanded.

Slope The ratio of the change in the variable on the vertical axis (the rise or fall) to the change in the variable on the horizontal axis (the run).

Social benefits and costs The sum of benefits to everyone in society, including both private benefits and external benefits. Social costs are the sum of costs to everyone in society, including both private costs and external costs.

Socialism An economic system characterized by government ownership of resources and centralized decision making.

Speculative demand for money The stock of money people hold to take advantage of expected future changes in the price of bonds, stocks, or other nonmoney financial assets.

Spending multiplier (*SM*) The ratio of the change in aggregate demand (total spending) resulting from an initial change in any component of aggregate expenditures or aggregate demand, including consumption, investment, government spending, and net exports. As a formula, the spending multiplier equals $1/(1 - MPC)$ or $1/MPS$.

Stagflation The condition that occurs when an economy experiences the twin maladies of high unemployment and rapid inflation simultaneously.

Stock A quantity measured at one point in time. For example, an inventory or the amount of money in a checking account.

Store of value The ability of money to hold value over time.

Structural unemployment Unemployment caused by a mismatch of the skills of workers out of work and the skills required for existing job opportunities.

Subprime mortgage loan A home loan made to borrowers with an above-average risk of default.

Substitute good A good that competes with another good for consumer purchases. As a result, there is a direct relationship between a price change for one good and the demand for its “competitor” good.

Substitution effect The change in quantity demanded of a good or service caused by a change in its price relative to substitutes.

Supply A curve or schedule showing the various quantities of a product sellers are willing to produce and offer for sale at possible prices during a specified period of time, *ceteris paribus*.

Supply curve of labor A curve showing the different quantities of labor workers are willing to offer

employers at different wage rates in a given time period, *ceteris paribus*.

Supply-side fiscal policy A fiscal policy that emphasizes government policies that increase aggregate supply in order to achieve long-run growth in real output, full employment, and a lower price level.

Surplus A market condition existing at any price where the quantity supplied is greater than the quantity demanded.

T

Tariff A tax on an import.

Tax incidence The share of a tax ultimately paid by consumers and sellers.

Tax multiplier (*TM*) The change in aggregate demand (total spending or total expenditures) resulting from an initial change in taxes. As a formula, the tax multiplier equals $1 - \text{spending multiplier}$.

Technology The body of knowledge applied to how goods are produced.

Total cost (*TC*) The sum of total fixed cost and total variable cost at each level of output.

Total fixed cost (*TFC*) Costs that do not vary as output varies and that must be paid even if output is zero. These are payments that the firm must make in the short run, regardless of the level of output.

Total revenue The total number of dollars a firm earns from the sale of a good or service, which is equal to its price multiplied by the quantity demanded.

Total utility The amount of satisfaction received from all the units of a good or service consumed.

Total variable cost (*TVC*) Costs that are zero when output is zero and vary as output varies.

Traditional economy A system that answers the *What*, *How*, and *For Whom* questions the way they always have been answered.

Tragedy of the Commons Individuals will use an open access resource to the point of exhaustion, basing their use on private benefits while disregarding external costs to others.

Transactions costs The costs of negotiating and enforcing a contract.

Transactions demand for money The stock of money people hold to pay everyday predictable expenses.

Transfer payment A government payment to individuals not in exchange for goods or services currently produced.

Trough The phase of the business cycle in which real GDP reaches its minimum after falling during a recession.

Trust A combination or cartel consisting of firms that place their assets in the custody of a board of trustees.

U

Unemployment compensation The government insurance program that pays income for a short time period to unemployed workers.

Unemployment rate The percentage of people in the civilian labor force who are without jobs and are actively seeking jobs.

Unit of account The function of money to provide a common measurement of the relative value of goods and services.

Unitary elastic demand A condition in which the percentage change in quantity demanded is equal to the percentage change in price.

Utility The satisfaction, or pleasure, that people receive from consuming a good or service.

V

Variable input Any resource for which the quantity can change during the period of time under consideration.

Velocity of money The average number of times per year a dollar of the money supply is spent on final goods and services.

Vertical merger A merger of a firm with its suppliers.

Vicious circle of poverty The trap in which countries are poor because they cannot afford to save and invest, but they cannot save and invest because they are poor.

W

Wage and price controls Legal restrictions on wage and price increases. Violations can result in fines and imprisonment.

Wage and price guidelines Voluntary standards set by the government for “permissible” wage and price increases.

Wage-price spiral A situation that occurs when increases in nominal wage rates are passed on in higher prices, which, in turn, result in even higher nominal wage rates and prices.

Wealth The value of the stock of assets owned at some point in time.

Wealth effect A shift in the consumption function caused by a change in the value of real and financial assets.

World Bank The lending agency that makes long-term low-interest loans and provides technical assistance to less-developed countries.

World Trade Organization (WTO) An international organization of member countries that oversees international trade agreements and rules on trade disputes.

Index

A

Absolute advantage, 407–408
Accounting profit, 182–184
Acid rain program, 385
Ad valorem, 408
Advertising
 changes in demand, 101–102, 301
 deceptive, 351
 free, 352
 in monopolistic competition, 270–272, 274–275
 nonprice competition, 269, 279
 in oligopoly, 277, 279, 286
 social networking, 272
 tobacco, 140
Afghanistan, 458
Africa, 458
African Americans, 330–331, 340–341
Agency for International Development (AID), 470
Agricultural price supports, 109–111
AIDS vaccination market, 114, 115
Airline Deregulation Act of 1978, 360, 365
Alcoa antitrust case, 354–355, 357, 368
Alligator farming, 232–233
Aluminum Company of America (Alcoa). *See* Alcoa antitrust case
AMD, 75
American Federation of State, County, and Municipal Employees, 342
American Greetings, 11
American Medical Association (AMA), 128
American Tobacco Trust, 354
Amish, 435, 441
“Antimerger Act”. *See* Celler-Kefauver Act of 1950
Antipoverty programs, 332–336, 343

Antitrust

Alcoa case, 354–355, 357, 368
AT&T case, 355–356, 357, 360
IBM case, 355, 357
internationally, 358–359
key cases, 353–357
laws concerning, 349–353
mergers, 358
Microsoft Corporation, 348, 356–357
Standard Oil, 253, 348, 349, 354, 357
Apple Computer Company, 199, 355
Appreciation of currency, 423
Arbitrage, 254
Archer Daniels Midland (ADM), 350
Asia, 458
Asian-Pacific Economic Cooperation (APEC), 412
Associated Press, 75
Association, vs. causation, 10–11
Asus, 75
AT&T antitrust case, 355–356, 357, 360
Auto emissions, 385
Average cost curves, 188–191
Average cost per unit, 219
Average fixed cost (AFC), 188, 192, 200
Average private cost, 377
Average total cost (ATC), 190–191, 192, 200
Average variable cost (AVC), 189, 192, 200

B

Balance of payments, 413–419, 429
Balance of trade, 414, 415, 417, 429
Banana trade, 412–413
Bangladesh, 458, 461
Barriers to entry, 261, 269
Baum, L. Frank, 426

Biases, 13
Black market, 107
Boston Globe, 451
Boston Snow Index (BSI), 11
“Brain drain”, 464
Brazil, 390, 472
Break-even income, 336
Break-even point, 216
Bryan, William Jennings, 426
Budget line, 171–173, 177
Burmester, Sven, 451
Bush, George H. W., 13
Bus Regulatory Reform Act of 1982, 360
Buyers, 63–67, 127

C

Cable television industry, 360, 362–363
CAFE standards, 381, 383
California, 363, 385–386
Canada
 economic system of, 447
 GDP of, 458
 as trading partner, 403, 411, 418
Cap and trade, 388–389
Capital
 accumulation of, 465–466
 costs of, 375
 definition, 3–5
 in developing countries, 468–470
 efficiency of, 197
 entrepreneurship, 45
 formation of, 47
 human, 298, 312, 324, 463–464
 in industrially advanced countries, 458
 international debt, 418–419
 ownership of, 443, 446
 price of, 74
 production possibilities curve, 46–48
 public, 47
Capital account, 416–417, 429

- Capital formation, 47
- Capital goods, 38, 46–48
- Capitalism, 442–444, 453
- Caplan, Arthur, 79
- Carbon emissions, 388–389
- Carbon taxes, 388–389
- Careers in economics, 13–15
- Carlson, Chester, 44
- Carnation, 353
- Cartels, 281–283, 289
- Cash assistance, 333
- Cash for Clunkers program, 375
- Cash transfer programs, 333–334
- Catalytic converters, 380–381
- Causation, vs. association, 10–11
- Celler-Kefauver Act of 1950, 352, 368
- Central American Free Trade Agreement (CAFTA), 412–413
- Centralized decision making, 446
- Central Selling Organization (CSO), 244
- Ceteris paribus assumption, 9, 16
- “Chain Store Act”. *See* Robinson-Patman Act of 1936
- Chan, Anthony, 11
- Chaplin, Bill, 233
- Chavez, Hugo, 452
- Cheap foreign labor argument, 411
- Chernobyl nuclear disaster, 386
- Chicago Board of Trade, 384, 385
- China
 - economic system of, 436, 441, 444–445, 447, 449–452
 - free market reforms, 450–451
 - global warming, 390
 - government efficiency, 386–387
 - quality-of-life measures, 461
 - as trading partner, 403, 418
- Chiquita Brands International, 412
- Chlorofluorocarbons (CFCs)
 - emissions, 374–375
- Choice, 5–6, 36
- Chronicle of Higher Education*, 339
- Cigarettes, and price elasticity of demand, 140
- Civil Aeronautics Board (CAB), 359, 360, 361, 365
- Clayton Act of 1914, 350–351, 352, 368
- Clean Air Act, 382
- Clean Air Interstate Act, 384–385
- Climate change, 390–391
- Climategate, 391
- Coase, Ronald, 387
- Coase Theorem, 387–393, 394
- Coca-Cola, 9, 66, 285
- Collective bargaining, 302–304, 312
- College athletes, 310
- Command-and-control regulation, 380–381, 394
- Command economy, 436–439, 453
- Command socialism, 444
- Common Market, 414
- Communism, 444–445, 453
- Communist Manifesto* (Marx/Engels), 444–445
- “Company town”, 307
- Compaq, 75
- Comparable worth, 341–343
- Comparative advantage, 406–407, 428
- Competition, 111–113, 376–377
- Competitive markets, 374–379
- Complementary goods, 66, 68, 143, 144
- Computers, 75, 112
- Conglomerate merger, 358, 368
- Constant-cost industry, 228–229, 235
- Constant returns to scale, 198, 201
- Consumer choice theory
 - consumer equilibrium, 157–159, 163, 173–174, 177
 - income effect, 160, 163, 394
 - substitution effect, 160–163
 - utility, 154–157, 163
- Consumer equilibrium, 157–159, 163, 173–174, 177
- Consumer goods, 39
- Consumer Product Safety Commission (CPSC), 360, 361, 367
- Consumer sovereignty, 443, 453
- Consumer surplus, 91–92, 97
- Continental Baking, 353
- Contractionary fiscal policy. *See also* Fiscal policy
- Copayment rate, 125
- Copenhagen conference, 390
- Corporate Average Fuel Economy (CAFE) standards, 381, 383
- Costa Rica, 413
- Costs, 182–184, 200. *See also* Production costs
- Cross-elasticity of demand, 142–144, 148
- Cuba, 436, 444–448
- Currency, 422–423, 429. *See also* Exchange rates
- Current account, 414–416, 429

D

- Dairy price support program, 110
- Dallas Morning News*, 233
- Davis, Gray, 363
- Deadweight loss, 94–95, 97
- DeBeers, 244
- Decentralized decision making, 443
- Deceptive advertising, 351
- Decreasing-cost industry, 229–230, 235
- Dell, 75
- Demand
 - changes in, 61–63, 67–68, 101–102, 104
 - changes in quantity demanded vs. changes in demand, 61–63
 - expectations of buyers, 65–66, 67
 - income, 65, 67
 - law of, 59–61, 83
 - market equilibrium, 101–102, 104
 - nonprice determinants of, 62, 63–68, 75, 83

- number of buyers, 67
- for perfectly competitive firm, 215
- prices of related goods, 66, 68
- shifts in for health care, 127–128
- for sneakers, 79, 81
- tastes and preferences, 65, 67
- Demand curve
 - definition, 59
 - derivation of, 174–176
 - kinked, 279–281, 289
 - for labor, 295–298, 301–302, 304, 312
 - movement along vs. shift in demand, 63
 - natural monopoly and, 361
 - nonprice determinants, changes in, 67–68
 - price elasticity of demand, 135–138
- Demand shifters, 62
- Deng Xiaoping, 449, 450. *See also* China
- Depreciation of currency, 422
- Depression. *See also* Great Depression
- Deregulation, 360, 365, 368
- Derived demand, 298, 301, 312
- Developing nations, 390
- Diamond-water paradox, 156
- Difficult entry, 278
- Digital Equipment, 355
- Diminishing marginal utility, law of, 157, 163
- Diminishing returns, law of, 185–187, 200, 295
- Direct relationships, 21–22
- Discretionary fiscal policy. *See also* Fiscal policy
- Discrimination, 340–342
- Diseconomies of scale, 198–199, 201
- Division of labor, 197
- Dogster.com, 272
- Dole Food Company, 412
- Dollars, supply and demand for, 420. *See also* Currency
- Dominican Republic, 413

- Double dividend, 381, 389
- Double eagle coins, 426–427
- Drake, Edwin L., 253
- Duke Power Company, 363
- E**
- Earned-Income Tax Credit (EITC), 333
- Economic development, 473
- Economic efficiency, 374, 443
- Economic freedom, 443, 461
- Economic growth, 42–47, 49–50, 462–468, 473. *See also* International trade and finance
- Economic indicators, 11
- Economic profit, 182–184, 200
- Economics
 - applying graphs to, 21–29
 - careers in, 13–15
 - definition, 5–6, 16
 - fundamental questions, 35–36, 49
 - methodology of, 6–9
 - normative vs. positive, 12–14, 16
- Economic systems
 - command economy, 436–439, 453
 - comparison of, 447–452
 - definition, 453
 - market economy, 438–441, 453
 - mixed economy, 441–442, 453
 - privatization vs. nationalization, 452, 453
 - traditional economy, 435–436, 453
 - types of, 435–442, 453
- Economic way of thinking
 - disagreements, 12–13
 - hazards of, 9–12
 - introduction to, 2–16
 - methodology, 6–9
 - scarce resources and production, 3–5
 - scarcity, 3, 16, 36, 349
 - scarcity and choice, 5–6

- Economies of scale
 - in decreasing-cost industry, 229
 - definition, 196–197, 201
 - Internet and, 199
 - in monopolies, 242–243
 - natural monopoly and, 361
 - in oligopoly, 278
- Efficiency, economic, 374
- Efficiency, vs. equality, 324–326
- Efficiency of capital, 197
- Efficient points, 40, 49
- Effluent taxes, 381–382, 388–391, 394
- Egypt, 461
- Einstein, Albert, 8
- Elastic demand, 133, 135, 137, 147
- Elasticity, 137
- Elasticity coefficient, 130, 135, 137, 138
- Elastic supply, 143, 144
- Election of 1896, 426
- Electricity, and price ceilings, 363
- Electric vehicles (EV), 385–386
- El Salvador, 413
- Embargo, 408, 428
- Emissions trading, 382–386, 388–391, 394
- Employer power, 306–311
- Employment argument, 411
- Energy consumption, 461
- Energy Policy Act, 360
- Engels, Friedrich, 444
- Enron, 363
- Entitlement programs, 333
- Entrepreneurship, 4–5, 44–45
- Entry, barriers to, 261, 269
- Environmental economics
 - Coase Theorem, 387–393, 394
 - command-and-control regulations, 380–381, 394
 - and competitive markets, 374–379
 - competitive markets and environmental efficiency, 374–379

- effluent taxes, 381–382, 388–391, 394
 - emissions trading, 382–386, 388–391, 394
 - environmental efficiency, achieving, 379–393
 - government and, 386–393
 - incentive-based regulation, 380, 381–386, 394
 - trains and farm crops
 - examples, 387–392
 - Environmental Protection Agency (EPA), 359–361, 384–385
 - Equal Employment Opportunity Commission (EEOC), 342
 - Equality, vs. efficiency, 324–326
 - Equal Pay Act (EPA), 342
 - Equilibrium
 - competition, 112–113
 - competitive, 232–233
 - consumer equilibrium, 157–159, 163, 173–174, 177
 - definition, 80, 84
 - health care market, 125–126
 - market, 101–105, 377
 - market failure, 111
 - in monopolistic competition, 288
 - in monopsony, 309–310
 - perfectly competitive firm, 214–215, 225–227, 235
 - price ceilings and price floors, 106–111
 - price system, 82
 - for sneakers, 79, 81
 - for typical competitive and “green” industries, 378
 - Equilibrium prices, 80, 91–94, 96, 104–105, 113
 - Equilibrium wage rate, 299–300
 - Essential services, 105
 - Ethiopia, 458
 - Euro, 414–415
 - European Central Bank, 415
 - European Economic and Monetary Union (EMU), 414
 - European Economic Community (EEC), 414
 - European Union (EU), 412–415
 - Excess capacity, 277
 - Exchange rates, 419–421, 424–427, 429. *See also* Currency
 - Exclusive dealing, 351
 - Expectations, 76–77
 - Explicit costs, 182, 200
 - External benefit, 113, 115, 119, 364, 374
 - External cost, 113, 119, 364, 374, 376–377
 - External debt, 418
 - Externalities, 113–115, 119, 360, 364, 374, 377–379, 391, 394
- F**
- Facebook, 272
 - Factors of production. *See* Resources
 - Fair Labor Standards Act, 14
 - Fair-return price, 363–364
 - Farm crops, as examples of Coase Theorem, 387–392
 - Favorable balance of trade, 415
 - Featherbedding, 301
 - Federal Aviation Administration (FAA), 365
 - Federal budget. *See also* National debt
 - Federal Communications Commission (FCC), 359, 361
 - Federal debt. *See* National debt
 - Federal Energy Regulatory Commission (FERC), 363
 - Federal Insurance Contribution Act, 333
 - Federal Trade Commission Act of 1914, 351, 352, 368
 - FedEx, 45
 - Few sellers, 278
 - Final Four, 285
 - Financial capital, 5. *See also* Capital
 - Fiscal policy. *See also* Discretionary fiscal policy
 - Fixed input, 184
 - Fixed resources, 38
 - Florida Fish and Wildlife Conservation Commission, 233
 - Food and Drug Administration (FDA), 128, 359, 361
 - Food stamps, 335
 - Forbes* magazine, 451
 - Ford, Gerald, 13
 - Ford, Henry, 44
 - Forecasts, 8
 - Foreign aid, 470
 - Foreign exchange, supply and demand for, 419–423, 429
 - Foreign loans, 470–472
 - Foreign private investment, 469
 - Forest Service, U.S., 387
 - France, 441, 444
 - Free advertising, 352
 - Freeconomics, 199
 - Free enterprise system, 442
 - Free market reforms, 450–451
 - Freemiums, 199
 - Free-rider problem, 392, 394
 - Free riders, 115–116, 378–379
 - Free to Choose* (Friedman and Friedman), 116
 - Free trade, 408–410, 428
 - Free trade agreements, 411–413
 - Free Trade Area of the Americas (FTAA), 412
 - Friedman, Milton
 - Free to Choose*, 116
 - negative income tax, 336
 - opportunity cost, 36
 - on private ownership, 443
 - school vouchers, 116
 - Friedman, Rose, 116
 - Frozen dessert pies, 353
 - Fully employed resources, 38
 - Future production possibilities curve, 46–48
- G**
- Galbraith, John Kenneth, 260
 - Game theory, 283–286, 289
 - Gas-electric hybrid vehicles, 386
 - Gasoline, tax incidence and, 145, 148
 - Gasoline price ceiling, 107
 - Gasoline tax, 381

Gates, Bill, 348, 357
 Gateway, 75
 Gator farming, 232–233
 GDP per capita, 458–462, 473
 General Agreement on Tariffs and Trade (GATT), 408, 412, 467
 General Motors, 452
 Germany, 415
 Glass, Mark, 233
 Global warming, 390–391
 Godwin, Frank, 232
 Gold standard, 426
 Gosplan, 436–437
 Government, 380, 386–393, 394. *See also* Federal budget; Regulation
 Graphs
 direct relationship, 21–22
 inverse relationships, 23–24
 slope of a curve, 26–27
 slope of a straight line, 24–25
 study hint for, 29
 three-variable relationship, 27–28
 Great Depression, 426
 Greece, 472
 “Green” firms, 376
 “Green” industries, 378
 Greenthumb.com, 272
 Greeting card sales, 11
 Gross domestic product (GDP). *See also* Real GDP
 Guatemala, 413

H

Hardin, Garrett, 392
 Harkin, Tom, 342
 Hayek, Friedrich von, 443
 Hazardous waste disposal, 386–387
 Health care, supply and demand
 analysis of, 125–128
Health Economics, 140
 Health insurance, 125–127
 Hewlett-Packard, 75
 Hicks, John, 260
 Hogan, Daniel E., 11
 Homogeneous products, 213–214, 278
 Honduras, 413
 Hong Kong, 447, 459, 471, 473
 Hoogewerf, Rupert, 451
 Horizontal merger, 358, 368
 Hot spot problem, 384, 394
 Housing assistance, 335
 Hoxby, Caroline, 117
 Hu Jintao, 451
 Human capital, 298, 312, 324, 463–464
 Human resources, 463–464
 IBM antitrust case, 355, 357
 If-then statements, 12, 16
 Imperfect information, 360, 364–365, 366
 Implicit costs, 182, 200
 Impossible entry, 241–242
 Incentive-based regulation, 380, 381–386, 394
 Income
 break-even, 336
 in capitalism, 443
 and demand for health care, 127
 distribution of, 323–329
 equality vs. efficiency, 324–326
 global comparisons of, 329
 inequality, 117–118
 Lorenz curve, 326–327, 343
 median money, 324
 as nonprice determinant, 65, 67
 real, 160
 real median, 325
 trends in, 323–324, 327–329
 Income effect, 160, 163, 394
 Income elasticity of demand, 141–142, 144, 147
 Income inequality, 117–118
 Income unitary elastic, 144
 Increasing-cost industry, 230–233, 235
 Increasing opportunity costs, law of, 40–42, 49, 404

Independent relationship, 25
 India, 461
 Indifference curve
 budget line, 171–173, 177
 construction of, 168–176
 consumer equilibrium, 157–158, 163, 173–174, 177
 definition, 177
 derivation of the demand curve, 174–176
 as downward sloping and convex, 168–170
 indifference map, 170–171, 177
 Indifference map, 170–171, 177
 Individual demand curve, 59–60
 Industrially advanced countries (IACs), 458–460, 471, 473
 Inefficient output, 40, 49
 Inelastic demand, 133, 135, 137, 147
 Inelastic supply, 143, 144
 Infant industry argument, 410
 Infant mortality rate, 461
 Inferior goods, 67, 141, 144, 148
 Infrastructure, 466, 467
 In-kind transfers, 332, 333, 334–335, 343
An Inquiry into the Nature and Causes of the Wealth of Nations (Smith). *See* *The Wealth of Nations* (Smith)
 Intel, 75
 Intercept, 24
 Interest rates, 107, 423
 Interlocking directorates, 351
 International Air Transport Association (IATA), 282
 International debt, 418–419
 International Monetary Fund (IMF), 427, 470, 472
 International Panel on Climate Change (IPCC), 391
 International Telecommunications Union (ITU), 282
 International trade and finance, 402–427
 absolute advantage, 407–408
 balance of payments, 413–419, 429

benefits of, 404
 capital account, 416–417, 429
 comparative advantage,
 406–407, 428
 current account, 414–416,
 429
 exchange rates, 419–427, 429
 free trade agreements,
 411–413
 free trade vs. protectionism,
 408–410, 428
 in less-developed countries,
 467
 need for, 403–406
 production possibilities curve
 for, 404–405
 protectionism arguments,
 410–411
 specialization without trade,
 405
 specialization with trade, 406
 U.S. international debt,
 418–419
 Internet Explorer browser, 357
 Interstate Commerce Commission
 (ICC), 359, 361
 Invention, 44
 Inverse relationships, 23–24
 Investment, 47, 50
 Invisible hand, 212, 440, 443
 Italy, 444

J

Jagger, Mick, 13
 Japan
 economic system of, 441, 447
 GDP per capita, 458
 quality-of-life measures, 461
 as trading partner, 403, 418
 Jet Blue, 365
 Jobs, Steven, 199

K

Kaiser Aluminum, 355
Das Kapital (Marx), 444
 Kinked demand curve, 279–281,
 289

*Knight Ridder/Tribune Business
 News*, 233
 Kyoto Conference, 390

L

Labor, 4, 108–109, 464. *See also*
 Labor markets
 Laboratory rats, 161
 Labor markets
 demand for, 295–298, 301–
 302, 304, 312
 employer power, 306–311
 labor unions, 301–306
 monopsony, 306–311
 under perfect competition,
 295–300
 racial discrimination and, 340
 supply of, 298–299, 301–303,
 304, 312
 Labor unions, 301–306
 Laissez-faire theory, 439–440, 471
 Land, 4
 La Puma, John, 78
 Latin America, 412–413, 458
 Law and order, 467
 Law of demand, 24, 159, 161. *See*
 also Demand; Demand curve
 Law of diminishing marginal
 utility, 157, 163
 Law of diminishing returns,
 185–187, 200, 295
 Law of increasing opportunity
 costs, 404
 Legal barriers, 242
 Leonard, John, 310
 Less-developed countries (LDCs)
 aid from advanced countries,
 468–472
 capital, accumulation of,
 465–466
 compared to developed
 countries, 458–462
 definition, 458, 473
 economic growth and
 development, 462–468,
 473
 foreign aid, 470
 foreign loans, 470–472

foreign private investment,
 469
 GDP per capita, 458–462,
 473
 human resources, 463–464
 international trade, 467
 natural resources, 462–463
 political environment,
 466–468
 private bank lending to, 472
 quality-of-life measures,
 461–462
 technological progress, 466
 Levi Strauss Company, 5
 Life expectancy, 461
 Lilly Ledbetter Fair Pay Act of
 2009, 342
 Literacy rate, 464
 London School of Economics, 13
 Long run, 185, 200, 253–254,
 274–275
 Long-run average cost curves
 (LRAC), 195–198, 201, 227,
 242, 361–362
 Long-run competitive equilibrium,
 232–233
 Long-run equilibrium for
 perfectly competitive firm,
 226–227
 Long-run marginal cost curve
 (LRMC), 361
 Long-run perfectly competitive
 equilibrium, 235
 Long-run production costs,
 195–196
 Long-run profit maximization,
 262
 Long-run supply curves
 constant-cost industry,
 228–229, 235
 decreasing-cost industry,
 229–230, 235
 increasing-cost industry,
 230–233, 235
 under perfect competition,
 226–227
 for perfectly competitive
 industry, 228
 Lorenz curve, 326–327, 343

Los Angeles Times, 338
Loss minimization, 221, 252

M

Macroeconomics, 6, 16
Mainframe computer market, 355
Mantle, Mickey, 79
Mao Zedong, 449, 450
Marginal analysis, 37–38, 49, 158, 216–220
Marginal-average rule, 191–193, 201, 361
Marginal cost (MC), 191, 192, 194, 200, 201
Marginal cost pricing, 363, 368–369
Marginal cost relationships, 191–194
Marginal factor cost (MFC), 307–309, 313
Marginal private cost, 377
Marginal product (MP), 185, 194, 201
Marginal product of labor, 295
Marginal rate of substitution (MRS), 170, 177
Marginal revenue (MR), 218, 234, 245–247, 261
Marginal revenue equals
 marginal cost method, of loss minimization, 221, 252
Marginal revenue equals marginal cost method, of profit maximization, 216–220, 234, 250–251
Marginal revenue product (MRP), 296, 312
Marginal social benefit, 375, 379
Marginal social cost, 375, 377, 379
Marginal utility, 154–157, 163
Marginal utility per dollar (MU/P), 158
Market, 78
Market demand, 59–60
Market demand curve, 59–61, 92
Market economy, 438–441, 453
Market efficiency, 94–96, 111
Market equilibrium, 101–105, 377
Market failure, 96, 111, 119, 127, 256, 360, 379, 394
Market price, 215
Market structures, 213, 234, 287. *See also* Monopolistic competition; Monopoly; Oligopoly; Perfect competition
Market supply, 70
Market supply and demand analysis, 78–81
Market supply curve, 71, 93
Marriage trends, 11
Marshall, Alfred, 80
Marx, Karl, 444–445, 453
Maximum output, 40
MCI, 356, 360
McKinley, William, 426
Means test, 333
Median money income, 324
Medicaid, 125, 334–335
Medicare, 125, 334
Mercantilism, 440
Mergers, 358, 368
Methodology of economics, 6–9
Mexico, 403, 411, 418, 425
Microeconomics, 6, 16
Microsoft Corporation, 348, 356–357
Midpoints formula, 130–131
Military goods, 39
Milk, market for, 110
Minimum wage, 14, 108–109
Ministry of Economy, Trade and Industry (METI), 441
MIT antitrust case, 356, 357
Mixed economy, 441–442, 453
Models, 7–8, 16
Money amount, 160
Monopolistic competition
 advertising, 270–272, 274–275
 characteristics of, 268–269
 definition, 287, 288
 game theory, 283–286, 289
 long run, 274–275
 output and, 273–274, 276–277
 vs. perfect competition, 274–277, 288
 price and output decisions, 273–274
 as price maker, 269–272
 as resource misallocator, 275–276
 short run, 273–274
Monopoly. *See also* Antitrust characteristics of, 241–245
 critique of, 259–260
 definition, 261, 287
 disadvantages, 262
 economies of scale, 242–243
 impact of on an industry, 258
 internationally, 244
 long run, 253–254
 long-run profit maximization, 262
 output decisions, 245–254
 vs. perfect competition, 256–259
 price and output decisions, 245–254
 price discrimination, 254–256
 regulated, 362
 as resource misallocator, 256–257
 short-run loss minimization, 250–252
 short-run profit maximization, 248–250, 261
Monopsonistic equilibrium, 309–310
Monopsony, 306–311
Monroe, Dick, 232
Montreal Protocol, 374
Motor Carrier Act of 1980, 360
Mozambique, 461
Mutual interdependence, 278, 284, 289
MySpace, 272

N

National Aeronautics and Space Administration (NASA), 444
National Collegiate Athletic Association (NCAA), 310

National debt, 418–419
 National Industrial Recovery Act (NIRA) of 1933, 305
 Nationalization, 452, 453
 National Labor Relations Act (NLRA), 305
 National Metal Industries, 11
 National security argument, for protectionism, 410
 National Transplant Organ Act of 1984, 78
 Natural monopoly, 243, 261, 355, 360–364
 Natural resources, 462–463
 “Natural rights”, 440
 NCAA basketball, 285
 Negative externalities, 113
 Negative income tax (NIT), 336–339, 343
 Negative slope, 24
 Neighborhood effects, 113
 Net unilateral transfers, 416
 Network good, 245, 261
 “New economy”, 44
 Newly industrialized economies, 471
 New-source bias, 384
 New Source Performance Standards, 384
 New York taxicabs, 259
New York Times, 75
 New Zealand, 458
 Nicaragua, 413
 Nixon, Richard, 107, 427
 Noise pollution, 374
 Nominal amount, 160
 Nonprice competition, 269, 279, 288, 289
 Nonprice determinants
 of demand, 62, 63–68, 75, 83
 of supply, 70, 73, 74–78, 84
 Nonrenewable resources, 4
 Normal goods, 67, 141, 144, 147
 Normal profit, 183–184
 Normative economics, 13, 14, 16
 North American Free Trade Agreement (NAFTA), 411–412, 467

North Korea, 436, 447
 Nuclear power, 386

O

Oak Ridge, Tennessee, 387
 Obama, Barack, 342
 Occupational Safety and Health Administration (OSHA), 359, 361

O’Connor, Sandra Day, 13
 Offsets, 382–383
 Oil embargo, 107
 Oligopoly, 287
 advertising, 277, 279, 286
 characteristics of, 277–278
 definition, 289
 economies of scale, 278
 evaluation of, 286
 in Final Four, 285
 vs. perfect competition, 289
 price and output decisions, 279–286
 Opportunity cost, 36–37, 49, 107
 Organization of Petroleum Exporting Countries (OPEC), 282, 310
 Organ shortage, 78–79
 Origin, 21
 Ostrom, Elinor, 392
 Output decisions
 in monopolistic competition, 273–274, 276–277
 in a monopoly, 245–254
 in oligopoly, 279–286
 perfect competition and, 257–258
 Overpopulation, 464
 Ownership of vital resource, 242

P

Pakistan, 458
 Payoff matrix, 283–284
 Peck, Andrew, 75
 Pepsi-Cola, 66, 285
 Perfect competition, 212–233

characteristics of, 213–214
 definition, 234
 labor markets under, 295–300
 long-run equilibrium, 235
 long-run supply curves, 226–227
 vs. monopolistic competition, 274–277, 288
 vs. monopoly, 256–259
 vs. oligopoly, 289
 vs. other market structures, 287
 output and, 257–258
 price takers, 214–215
 short-run loss minimization, 220–222
 short-run profit maximization, 215–220
 short-run supply curves, 223–226, 234
 Perfectly competitive firm
 demand for, 215
 long-run equilibrium, 226–227
 long-run supply curves, 228
 marginal revenue, 296
 market price, 215
 vs. monopolistic competition, 257
 as price taker, 214–215
 short-run loss minimization, 220–222
 short-run profit maximization, 215–220
 short-run supply curves, 223–224
 shutting down, 220–222
 Perfectly competitive industry,
 short-run supply curves, 224–225, 235
 Perfectly competitive market,
 376–377
 Perfectly elastic demand, 134, 135, 147, 214
 Perfectly elastic supply, 143, 144
 Perfectly inelastic demand, 134, 135, 147
 Perfectly inelastic supply, 143, 144

- Per se rule, 355, 368
- Personal computer software industry, 356–357
- Personal Responsibility and Work Opportunity Act of 1996, 338, 339–340
- Per-unit cost, 188
- Pet Milk, 353
- Petrosian Company, 244
- Phase-out rate, 337
- Photovoltaic cells (PVCs), 386
- Political environment, 466–468
- Pollution. *See also* Environmental economics
 - acid rain program, 385
 - efficient quantity of, 379
 - emissions trading, 328–329, 382–386, 390–391, 394
 - as externality, 364
 - graphical analysis of, 113–115
 - taxes, 114–115
- Positive economics, 12, 14, 16
- Positive externality, 113
- Positive slope, 24
- Postal Service, U.S., 444
- Poverty, 330–332, 465. *See also* Antipoverty programs
- Poverty line, 330, 343
- Preconceptions, 13
- Predatory pricing, 349, 357
- Predictions, 8
- Present investment, 46–48
- Price
 - impact of decrease in on total revenue, 132
 - in monopolistic competition, 273–274
 - in a monopoly, 245–254
 - and nonprice determinants of demand, 64
 - and nonprice determinants of supply, 73
 - in oligopoly, 279–286
 - of other goods firm could produce, 76, 77
 - of personal computers, 75
 - of related goods, 66, 68
 - of substitutes, 128
- Price ceilings, 105–107, 119, 363
- Price change, 137, 139, 141
- Price competition, 259
- Price discrimination
 - conditions for, 254–255
 - definition, 262
 - fairness of, 255–256
 - laws against, 351–352, 353
- Price elasticity, 144–146
- Price elasticity of demand
 - adjustment to a price change over time, 139, 141
 - availability of substitutes, 139
 - cigarettes and, 140
 - cross-elasticity of demand, 142–144, 148
 - definition, 147, 261
 - demand curve, 135–138
 - determinants of, 138–141, 147
 - elastic demand, 133, 135, 137, 147
 - income elasticity of demand, 141–142, 147
 - inelastic demand, 133, 135, 137, 147
 - marginal revenue and total revenue, 245–247
 - midpoints formula, 130–131
 - other measures of, 141–146
 - perfectly elastic demand, 134, 135, 147, 214
 - price elasticity of supply, 143–144, 148
 - share of budget spent on the product, 139
 - for specific products, 138
 - terminology, 135
 - total revenue test, 132
 - unitary elastic demand, 133–134, 135, 137, 147
 - variations along a demand curve, 135–138
- Price elasticity of supply, 143–144, 148
- Price floors, 107–111, 119
- Price leadership, 281, 285, 289
- Price maker, 245, 250, 253, 261, 269–272, 279
- Price supports, 109–111
- Price system, 78–79, 82, 84
- Price taker, 214–215, 234, 245, 269, 277
- Private benefits and cons, 374, 375, 377
- Private goods, vs. public goods, 116–117
- Private interest, 446
- Private ownership, 443
- Private property, 445
- Privatization, 452, 453
- Problem identification, 7
- “The Problem of Social Cost” (Coase), 387
- Producers, 76, 77
- Producer surplus, 92–94, 97
- Product differentiation, 268–269, 272, 278, 288
- Production costs, 181–199
 - costs and profit, 182–184
 - law of diminishing returns, 185–187, 200, 295
 - long-run production costs, 195–196
 - marginal cost relationships, 191–194
 - marginal product, 185
 - scales of production, 196–199
 - scarce resources, 3–5
 - short-run cost formulas, 187–192
 - short run vs. long run, 184–185
- Production function, 185, 200, 295
- Production possibilities curve (PPC)
 - effect of external financing, 469
 - international trade, 404–405
 - less-developed countries, 462–463, 468
 - for military goods, 39
 - outward shift in, 43
 - overview of, 38–40, 49
 - present and future, 465

Profit

- accounting, 182–184
- and costs, 182–184
- economic and accounting, 182–184, 200
- maximization of, 216–220, 234, 250–251, 362
- normal, 183–184

Profit motive, 440

Protectionism, 408–413, 428

Public capital, 47

Public goods, 115–117, 120, 391

Public interest, 440, 444, 446

Public ownership, 445

Public sector. *See also* Government

Q

Quality-of-life measures, 461–462

Quantity, and equilibrium price, 80

Quantity demanded, changes in, 61–63, 83

Quantity supplied, changes in, 70–73, 84

Queen Elizabeth I, 244

Quota, 409–410, 428

R

Racial bias, 339, 340–342. *See also* Discrimination

Railroads, regulation and, 359

Reagan, Ronald, 355, 389

Real GDP. *See also* Gross domestic product (GDP)

Real income, 160

Real median income, 325

Regulation. *See also* Antitrust command and control, 380–381, 394

vs. deregulation, 360, 365

externalities, 364

historical origins of, 359–360

imperfect information, 364–366

incentive-based, 380–386, 394

pollution, 114–115

price ceilings, 105–107, 119, 363

situations calling for, 360–367

Regulatory agencies, 359–361

Related goods, 66, 68

Relative incomes, 423

Relative price levels, 423

Relative real interest rates, 423

Renewable resources, 4

Rent controls, 105–107

Research and development (R&D), 279

Resolution Trust Corporation (RTC), 452

Resources, 16

changes in, 44

definition, 3–5

human, 463–464

misallocation of, 256–257, 275–276, 367

nonrenewable, 4

prices of, 74, 76, 77, 128

Reynolds Aluminum, 355

Richland, Washington, 387

Rinehart, James R., 78

The Road to Serfdom (Hayek), 443

Robber barons, 349

Robinson-Patman Act of 1936, 351–353, 368

Rockefeller, John D., 253, 348, 349, 354

Roosevelt, Franklin D., 305, 334, 426

Roosevelt, Theodore, 354

Rule of reason, 354, 368

Russia, 447, 449, 472

Ruth, Babe, 407

S

Safety defects, 366–367

Salaries, 15

Scales of production, 196–199

Scarce resources, 3–5

Scarcity, 3, 5–6, 16, 36

School vouchers, 116–117

Schumpeter, Joseph, 260

Schwarzenegger, Arnold, 13

Securities and Exchange

Commission (SEC), 359, 361

Self-interest, 439

“Self-reliance” policy, 450

Sellers, 74, 76, 128

Shaw, George Bernard, 12

Sherman Antitrust Act of 1890, 253, 350, 352, 368

Shortage, 80

Short run, 185, 200, 273–274

Short-run competitive

equilibrium, 232–233

Short-run cost curves, 190

Short-run cost formulas, 187–192

Short-run equilibrium, 225–226, 288

Short-run loss, 220, 250–252

Short-run loss minimization, 220–222, 252

Short-run production costs, 184–185

Short-run profit maximization marginal revenue equals

marginal cost method, 216–220, 250–251

for a monopoly, 248–250, 261

for perfectly competitive firm, 215–220

total revenue-total cost method, 215–216, 217, 234, 248–250

Short-run supply curves, 223–226, 234–235

Shutting down, 220–222

Singapore, 459, 471, 473

Single seller, 241

Slope of a curve, 26–27

Slope of a straight line, 24–25

Small sellers, many, 268

Smith, Adam

as father of modern economics, 439

invisible hand, 212

market economy, 438–441

The Wealth of Nations, 111, 156, 197, 348, 438, 440, 444

Smith, Frederick W., 45

Smithsonian Institution, 45

Smoot-Hawley Act of 1930, 408–409
 Sneakers, demand for, 79, 81
 Social benefits and costs, 375, 377
 Socialism, 444–447, 453
 Social networking, 272
 Social Security (OASDHI), 333–335
 South Korea, 459, 471, 473
 Southwest Airlines, 365
 Soviet Ministry of Fisheries, 244
 Soviet Union, 386, 436, 445, 446
 Sowell, Thomas, 336
 Specialization, 197, 405, 406, 428
 Spillover effect, 113
 “Spot market”, 363
 Sprint, 356, 360
 Staggers Rail Act of 1980, 360
 Standard Oil, 253, 348, 349, 354, 357
 Standex International Corporation, 11
 Steel industry, 114
 Stock acquisition of competing companies, 351
 Strauss, Levi, 5
 Substitute goods, 66, 68, 139, 143, 144, 147
 Substitution effect, 160–162, 163
 Sulfur dioxide, 385, 388
 Super Bowl, 11
 Supply
 changes in, 102–104
 changes in quantity supplied vs. changes in supply, 70–73
 definition, 68
 expectations of producers, 76, 77
 law of, 68–70, 83
 and market equilibrium, 102–104
 nonprice determinants of, 70, 73, 74–78, 84
 number of sellers, 74, 76, 128
 prices of other goods firm could produce, 76, 77
 resource prices, 74, 76, 77, 128

 shift in vs. movement along supply curve, 72
 shifts in for health care, 128
 for sneakers, 79, 81
 taxes and subsidies, 74, 76, 77
 technology, 74, 77
 Supply curve, 69, 72, 76–77
 Supply curve of labor, 298–299, 312
 Supply shifters, 70
 Supreme Court, U.S., 117
 Surplus, 78–79, 80
 Sweeney, John D., Jr., 334
T
 Taiwan, 459, 471, 473
 Tariff, 408–409, 428
 Tastes and preferences, 65, 67, 127, 422
 Taxation. *See also* Tax cuts
 ad valorem, 408
 effluent taxes, 381–382, 384, 388–391, 394
 impact of and price elasticity, 144–146
 negative income tax, 336–339, 343
 pollution and, 114–115
 price elasticity, 144–146
 and subsidies, 74, 76, 77, 115
 tax incidence, 145, 148
 Tax cuts, 389. *See also* Taxation
 Taxi and Limousine Commission (TLC), 259
 Taxicabs, 259
 Tax incidence, 145, 148
 Technological change, 44, 49, 466
 Technology, 38, 74, 77
 Telephone service, 355–356
 Temporary Assistance to Needy Families (TANF), 334
 Tennessee Valley Authority (TVA), 384, 444
 Theory, 8. *See also* Models
 Third parties, 113, 125, 364, 392
 Three-variable relationship, 27–28
 Time magazine, 451

Tit-for-tat, 285
 Tobacco, 140
 Total cost (TC), 188, 192
 Total cost curves, 187–188
 Total fixed cost (TFC), 187–188, 200
 Total revenue (TR), 132, 133, 136, 137, 245–247
 Total revenue test, 132
 Total revenue-total cost method, of profit maximization, 215–216, 217, 234, 248–250
 Total utility, 154–157, 163
 Total variable cost (TVC), 188, 200
 Trade deficits, 418
 Trading partners, U.S., 403
 Traditional economy, 435–436, 453
 Tragedy of the Commons, 392, 394
 Trains, as example of Coase Theorem, 387–392
 Transaction costs, 392, 394
 Truman, Harry, 12
 Trust, 349, 368
 Tucker, 280
 Tucker Motor Company, 280
 Tying contracts, 351
U
 Unemployment compensation, 333
 Unfavorable balance of trade, 414
 Unique product, 241
 Unitary elastic demand, 133–134, 135, 137, 147
 Unitary elastic supply, 143, 144
 United Arab Emirates, 458
 United Auto Workers (UAW), 452
 United Kingdom, 444
 United Nations, 470
 United Network for Organ Sharing (UNOS), 79
 Upshaw, David L., 11
 Uruguay round, 408
 USA Today, 75, 117, 233
 U.S. Steel, 354

Usury laws, 107
Utah, 353
Utah Pie Company, 353
Utility, 154–157, 163
Utility, marginal, 154–157, 163
Utility companies, 360

V

Value judgments, 13, 16
Variable input, 184–185
Variables
 direct relationship, 21–22
 independent relationship, 25
 inverse relationships, 23–24
 slope of a straight line,
 24–25
 three-variable relationship,
 27–28

Vertical merger, 358, 368
Vicious circle of poverty, 465, 473

W

Wage rates, 308
Wagner Act, 305
Wall Street Journal, 75
Washington Post, 233, 338
Water-diamond paradox, 156
The Wealth of Nations
 (Smith), 111, 156, 197, 348,
 438, 440, 444
Web sites, 199
Welfare. *See* Antipoverty
 programs
Wells, Lawler, 232
Willingness to accept (WTA), 392
Willingness to pay (WTP), 392

Winfrey, Oprah, 294
The Wonderful Wizard of Oz
 allegory of exchange rates,
 426–427
Workfare, 339–340
Working poor, 14
World Bank, 470
World Trade Organization
 (WTO), 409, 412, 467

X

Xerox Corporation, 44

Y

Yen, 420, 421
YouTube, 272
Yucca Mountain, 386

