

The background of the book cover features a light gray surface with numerous black silhouettes of people in various poses, suggesting a busy public space. Scattered throughout are several colorful speech bubbles in shades of purple, green, red, blue, and pink. A large, semi-transparent dark gray rectangle is centered on the cover, serving as a backdrop for the title text.

THE ECONOMIC ANALYSIS OF PUBLIC POLICY

SECOND EDITION

WILLIAM K. BELLINGER

ROUTLEDGE



The Economic Analysis of Public Policy

A critical analysis of public policy decisions requires a far greater depth of knowledge than can be received from news reports and political speeches. Issues such as how best to reduce traffic congestion, reduce acid rain, improve airline safety, or develop a parcel of land are better understood by organizing, measuring, and weighing the effects of alternative policies. *The Economic Analysis of Public Policy* is the ideal introduction to benefit-cost analysis, the economics of efficiency, risk analysis, and present value, and is suitable for those with only a modest background in mathematics and economics.

This second edition of the book has been rigorously updated throughout, in terms of examples and data references, issues covered, and layout and pedagogical features. Key concepts are reinforced through multiple problems and discussion questions within each chapter. The new edition contains extra material on loss aversion, global warming, technology, and US health-care reform, as well as a wider range of international examples. Extra tables have been included in order to clarify more complicated issues. In addition to a new, clearer layout, students will benefit from the new companion website, which will include additional resources such as end of chapter questions, critical thinking exercises, and further reading.

This textbook encourages its readers to understand and apply key concepts while also learning to appreciate policy analysis as part of an interdisciplinary, analytical, and political process that can lead to better government policy decisions. It is an ideal teaching tool for undergraduate and postgraduate students engaged in public administration, public economics, and public policy.

William K. Bellinger is Professor of Economics at Dickinson College, Pennsylvania.

Page Intentionally Left Blank

The Economic Analysis of Public Policy

Second Edition

William K. Bellinger

Second edition published 2016
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

by Routledge
711 Third Avenue, New York, NY 10017

*Routledge is an imprint of the Taylor & Francis Group,
an informa business*

© 2016 William K. Bellinger

The right of William K. Bellinger to be identified as author of this work
has been asserted by him in accordance with the Copyright, Designs and
Patent Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced
or utilized in any form or by any electronic, mechanical, or other means,
now known or hereafter invented, including photocopying and recording,
or in any information storage or retrieval system, without permission in
writing from the publishers.

Trademark notice: Product or corporate names may be trademarks or
registered trademarks, and are used only for identification and explanation
without intent to infringe.

First edition published by Routledge 2007

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Cataloging in Publication Data

Bellinger, William Kenneth, 1950–

The economic analysis of public policy/William K. Bellinger.

pages cm

1. Policy sciences—Economic aspects. 2. Political planning—

Economic aspects. 3. Economic policy. I. Title.

H97.B4655 2015

320.6—dc23

2015012122

ISBN: 978-1-138-79633-1 (hbk)

ISBN: 978-1-138-79634-8 (pbk)

ISBN: 978-1-315-75794-0 (ebk)

Typeset in Times New Roman

by Florence Production Ltd, Stoodleigh, Devon, UK

Contents

<i>Acknowledgments</i>	xi
------------------------	----

SECTION I

Economic and ethical concepts for policy analysis	1
--	----------

1 The meaning of policy analysis	3
---	----------

<i>A brief history of U.S. policy analysis</i>	4
<i>The goals of public policy</i>	6
<i>The steps in policy analysis</i>	7
<i>Views of government and the roles of the policy analyst</i>	8
<i>Critical thinking as a policy tool</i>	11
<i>Critical thinking about policy analysis</i>	17
<i>Conclusion</i>	18
<i>Review questions</i>	19

2 A review of markets and rational behavior	23
--	-----------

<i>What is “perfect” competition?</i>	23
<i>Demand</i>	25
<i>Supply</i>	28
<i>Equilibrium</i>	28
<i>Elasticity</i>	30
<i>The net benefits of consumption</i>	32
<i>The net benefits of production</i>	37
<i>The net benefits of markets</i>	43
<i>The rational consumer and the role of incentives</i>	44
<i>Incentives and policy problems</i>	52
<i>The limits of consumer surplus</i>	54
<i>Conclusion</i>	58
<i>Review questions</i>	58

3 Ethics for policy analysts	64
<i>Ethical goals</i>	65
<i>Utilitarianism</i>	69
<i>John Rawls and the difference principle</i>	73
<i>Robert Nozick and the ethics of the minimalist state</i>	76
<i>The ethics of income redistribution: a graphical analysis</i>	78
<i>The income transfer process and the “leaky bucket” analogy</i>	87
<i>Conclusion</i>	89
<i>Review questions</i>	91

SECTION II

Economics for policy analysts	95
--------------------------------------	----

4 Efficiency and imperfect markets	97
<i>What is efficiency?</i>	97
<i>Pareto optimality</i>	98
<i>The competitive market and Pareto optimality</i>	104
<i>Market imperfections and inefficiency</i>	106
<i>Numerical examples of net gains and deadweight loss</i>	118
<i>Public goods</i>	124
<i>Conclusion</i>	125
<i>Review questions</i>	125

5 Efficiency and the role of government	129
<i>Taxes in competitive markets</i>	130
<i>Other forms of government involvement</i>	134
<i>A case study: agricultural policy</i>	139
<i>Government intervention in imperfect markets</i>	144
<i>Public choice and government failure</i>	152
<i>Conclusion</i>	159
<i>Review questions</i>	159

SECTION III

Tools for analyzing public policy	167
6 An introduction to benefit-cost analysis	169
<i>The process of benefit-cost analysis</i>	170
<i>Decision criteria for benefit-cost analysis</i>	172

<i>Types of policy decisions</i>	176
<i>Benefits and costs using efficiency concepts</i>	182
<i>Cost-effectiveness analysis</i>	184
<i>Weighted net benefits</i>	187
<i>Conclusion</i>	190
<i>Review questions</i>	191
7 Net benefits over time and present value	195
<i>Investment versus saving</i>	197
<i>The present value formula</i>	203
<i>Present value with infinitely long net benefits</i>	204
<i>Examples of federal government discount rates</i>	205
<i>Alternatives to present value</i>	205
<i>Inflation and the discount rate</i>	209
<i>Choosing among projects of different lengths</i>	210
<i>Conclusion</i>	213
<i>Review questions</i>	213
<i>Appendix: The Forrest Center for the Arts</i>	216
8 Choosing a discount rate	222
<i>The ideal market for loans</i>	222
<i>Distortions in the loans market</i>	226
<i>The shadow price of capital method</i>	228
<i>The weighted discount rate</i>	231
<i>Other issues in choosing a discount rate</i>	232
<i>Long-term policies and intergenerational equity</i>	234
<i>Conclusion</i>	239
<i>Review questions</i>	239
9 Risk, uncertainty, and the market for insurance	243
<i>Measuring risk and uncertainty</i>	244
<i>Expected value</i>	245
<i>Decision trees</i>	247
<i>The expected utility model</i>	252
<i>Risk aversion and the willingness to pay for insurance</i>	255
<i>Health, health care, and health insurance</i>	260
<i>Concepts and issues in insurance markets</i>	261
<i>Health insurance policy</i>	264
<i>Other risk concepts</i>	267
<i>Examples of willingness to pay for policies involving risk</i>	269

Other examples of willingness to pay 269

Risk and the discount rate 271

Uncertainty and policy analysis 275

Conclusion 278

Review questions 279

10 Life, health, and health care 283

Methods of valuing non-marketed goods 283

Explaining the value of life 285

How to estimate the value of life 288

Case study: child safety seats in autos 291

Another case study: child safety seats in airplanes 291

Alternatives to the dollar value of life 293

Lengthening life and improving health: quality-adjusted life years 295

Health-care concepts 299

U.S. health-care costs and cost control policy options 301

Conclusion 308

Review questions 308

11 Economic impact analysis 313

An overview of economic impact analysis 314

Estimating direct spending 315

The Keynesian multiplier 317

Economic base models 321

Input-output models 325

Measuring an institution's effect on government 328

Economic impact case studies 329

Conclusion 333

Review questions 334

SECTION IV

Public policy cases 339

12 Urban transportation policy 341

Related economic concepts 342

Modal choice and transportation demand 343

Traffic congestion 345

Highway construction 349

Policies to reduce rush hour driving 353

	<i>Urban mass transit</i>	357
	<i>Case study: MARTA and the Atlanta inner core study</i>	357
	<i>Conclusion</i>	362
	<i>Review questions</i>	363
13	Pollution control policy	367
	<i>Economic views of nature and pollution</i>	368
	<i>Valuing natural and recreational resources</i>	371
	<i>The benefits of controlling air pollution</i>	373
	<i>Benefit-cost analysis of reducing pollution</i>	376
	<i>Policy goals: how much and where to reduce pollution</i>	379
	<i>Direct regulation and pollution control</i>	381
	<i>Incentive approaches to pollution control</i>	383
	<i>Comparing direct regulation and incentives</i>	388
	<i>Climate change</i>	389
	<i>Other pollution policy examples</i>	394
	<i>Conclusion</i>	396
	<i>Review questions</i>	397
14	Poverty and income support policies	403
	<i>What is poverty?</i>	404
	<i>The United States' absolute poverty measure</i>	406
	<i>Who are the U.S. poor?</i>	408
	<i>Criticisms of the U.S. poverty line</i>	408
	<i>Alternative measures of poverty</i>	411
	<i>Measures of inequality</i>	414
	<i>Analyzing U.S. public assistance</i>	418
	<i>The 1996 U.S. welfare reform law</i>	425
	<i>In-kind versus cash benefits: the "food stamp" problem</i>	430
	<i>Conclusion</i>	431
	<i>Review questions</i>	432
15	Policies for the working poor: training, worker subsidies, and the minimum wage	436
	<i>The problem: skills and the labor market</i>	436
	<i>A brief history of U.S. public sector job training</i>	439
	<i>Evaluating training programs</i>	443
	<i>Job training studies</i>	445
	<i>The minimum wage</i>	448

x *Contents*

A recent minimum wage proposal 451

The earned income tax credit 454

Conclusion 456

Review questions 457

Appendix: a more complicated training case 462

Your Turn solutions 465

Index 493

Acknowledgments

While hundreds of former and current students and dozens of local and regional private and public sector officials provided indirect and often unintended inspiration for this book, a smaller number of individuals provided more direct and substantial aid in its completion. I particularly wish to thank two Dickinson College students. Jason Gates provided several contributions to the second edition, including research on health-care policy and the environment, answers to the end-of-chapter questions, multiple-choice questions for review, and excellent feedback on other parts of the book. Jonathan Rogers, a former student, contributed many of the review questions found in the first and second editions of this book, as well as an undergraduate's point of view on the clarity and substance of the text. I also owe thanks to Drs. Stacy Dickert-Conlin and Kristin Skrabis for detailed comments on selected chapters in the first edition, and to Robert Langham, Emily Kindlesides, and Laura Johnson for encouraging my association with Routledge. Also, I wish to express my appreciation to former instructors and colleagues for introducing me to the disciplinary, interdisciplinary, and applied contexts of policy economics. W. Kip Viscusi, Gerald Goldstein, Cyril Dwiggins, Mara Donaldson, Chris Gulatta, James Hoefler, and Eugene Hickock were particularly memorable in this regard. Finally, I wish to express my thanks and love to Jane, Brian, and Lynne. Even the smallest fleet needs a home port.

Page Intentionally Left Blank

Section I

Economic and ethical concepts for policy analysis

The first chapter of the book introduces the reader to the basic meaning of policy analysis and its various uses in the political process. The chapter also discusses the process of critical thinking about the arguments and evidence presented in policy research and political discussion. Chapter 2 begins with a basic overview of the competitive market. It then introduces the net benefits of market exchange to consumers and producers. The model of the utility-maximizing consumer is then introduced and related to a set of policy examples. The third chapter introduces the reader to a set of basic ethical goals for public policy, as well as three theories of distributional justice that can be productively applied to some applications of policy analysis. Those who wish to get right to the applied economic analysis might be tempted to skip this section. In my view, the costs of that choice will ultimately outweigh its benefits.

Page Intentionally Left Blank

1 The meaning of policy analysis

Do not believe in anything simply because you have heard it. Do not believe in anything simply because it is spoken and rumored by many. Do not believe in anything simply because it is found written in your religious books. Do not believe in anything merely on the authority of your teachers and elders. Do not believe in traditions because they have been handed down for many generations. But after observation and analysis, when you find that anything agrees with reason and is conducive to the good and benefit of one and all, then accept it and live up to it.¹

Gautama Siddharta, the Buddha

[M]y way is to divide half a sheet of paper by a line into two columns; writing over the one Pro and over the other Con . . . If . . . thus proceeding I find . . . where the balance lies . . . I come to a determination accordingly . . . I have found great advantage from this kind of equation, in what may be called moral or prudential algebra.²

Benjamin Franklin

At the most general level, efforts to weigh the benefits and costs of a public or private decision involve some version of the type of rational analysis presented in this book. At a basic level, this decision process can take the form of a list of pluses and minuses, as in the quote from Benjamin Franklin, or a list of factors favoring one choice over another. At a more advanced level, this rational decision process can include efforts to measure all relevant benefits and costs using a common scale such as dollars in order to determine a course of action that maximizes the difference between the total benefits and costs of the choice. At any level, the goal of an organized decision-making process is to analyze the various effects of a decision in order to make the choice that most effectively improves individual or societal well-being.

Your Turn 1.1

Create a list of the benefits and costs of attending college versus getting a job. Include benefits that will occur in the future as well as the present, effects on others and on society as a whole as well as yourselves, and non-monetary as well as financial benefits and costs. After making some judgment about which benefits and costs are most important, do your expected benefits outweigh your costs? Do the benefits to others, including your parents and your government, of your college education outweigh their costs? Perhaps the questions raised by this exercise are more important than any specific answer.³

If policy analysis involved only lists of positive and negative effects of decisions such as attending college, it would not warrant an entire semester of your time or your purchase of this book. Moreover, a simple list of positives and negatives would not answer the following crucial questions: (1) Are the total benefits of this policy choice greater than the total costs? (2) Does this policy offer greater *net benefits* (*total benefits minus total costs*) than another alternative? (3) How large a budget is required for this policy? A detailed analysis of policy alternatives can help one to answer such questions.

The degree of accuracy and detail of professional policy analysis depends on the amount of information available to the analyst and the setting in which the analysis takes place. The most thorough form of policy analysis is *benefit-cost analysis*, which attempts to estimate dollar values for all benefits and costs, even when the good in question is never actually bought or sold and has no explicit market value. For example, the benefits of a new section of highway include time savings for travelers as well as possible reductions in energy use and air pollution due to the lessening of congestion. Costs include construction spending, the loss of the benefits of alternative projects, added noise, increased danger from higher speeds, and an increase in “road kill.” Most of these benefits and costs are not determined in the marketplace. However, some common denominator is needed in order to compare the project’s benefits and costs. Policy analysis usually relies on estimated dollar values for judging benefits and costs even when market prices are not available. This dollar valuation of non-traded goods is among the most difficult and controversial aspects of the economic approach to policy analysis.

A brief history of U.S. policy analysis

Princeton University Professor, and later U.S. President, Woodrow Wilson led a movement for the scientific administration of government in the late 1800s, and the explicit goal of achieving positive net benefits from U.S. governmental programs dates back at least to the 1930s. However, the main proliferation of policy

analysis in the U.S. federal government began in the 1960s. The foundation for the U.S. federal government's regular use of policy analysis was provided by the Planning, Programming, and Budgeting System (PPBS) established in the Department of Defense by then Secretary of Defense Robert McNamara. Policy analysis became an established part of other agencies' operations during the mid-1960s' War on Poverty. Policy analysis offices were established in the Office of Economic Opportunity and the Department of Health, Education, and Welfare during that time (see Radin 2000, pp. 13–27). At the same time, a large number of studies of the Johnson administration's War on Poverty's job training programs were undertaken by university professors, a source of information that remains very important today. Also, independent research institutes, or think tanks, sprung up or grew in size during this period, and over 100 such organizations currently exist around the Washington, DC, area (Radin 2000, p. 39).

Research institutes vary in their degree of specialization and their ideological framework. Some specialize in a limited range of policy areas, such as the environment, transportation, or defense policy, while others offer analysis and opinion on a wide range of topics. Some of the most prominent of these organizations have evolved into ideological combatants on a wide range of policy issues. A few examples of organizations with identifiable ideologies and a wide range of policy concerns are the Cato Institute (www.cato.org) and the American Enterprise Institute (www.aei.org), which tend to produce conservative analyses of a wide range of issues, the Brookings Institution (www.brookings.edu), which is considered more centrist in ideology, and the Economic Policy Institute (www.epi.org), which has a liberal or progressive viewpoint. For example, views on the minimum wage of the American Enterprise Institute (www.aei-ideas.org/topic/minimum-wage) and the Economic Policy Institute (www.epi.org/issues/minimum-wage) provide a useful initiation to the challenges of interpreting political views on many subjects.

Your Turn 1.2

Do you favor an increase in the minimum wage in the United States or your own nation at this time? Regardless of your own view, discuss the arguments for and against this idea raised by the American Enterprise Institute and the Economic Policy Institute, and list any questions you have that might help you understand the issue better.

Because the ideology of such organizations is often aligned with that of a subset of one of the major U.S. political parties, the political independence of these organizations is sometimes unclear. However, comparing the work of various think tanks can be an illuminating experience for any student, since their work tends to

be far more substantive than that of general interest publications, television and radio news, or political debates.

The goals of public policy

While this book will occasionally consider the role of institutions and interest groups in policy debate and implementation, its primary role is to present and apply a set of basic economic concepts that can be used to judge and compare alternative public policies. Policy analysis reviews alternative policies according to at least three general criteria: efficiency, equity, and political practicality. Each of these concepts involves some degree of controversy regarding meaning, measurement, and relative importance in the policy process.

Efficiency

According to economic theory, a society achieves allocative efficiency if it provides the greatest possible level of well-being for society given a limited set of resources. At the level of individual policy, efficiency is generally translated into maximizing the difference between the total benefits and total costs of that policy. These benefits and costs include non-monetary as well as monetary factors, and both direct and indirect effects. While the economic theory of efficiency is well established, applying efficiency concepts to policy issues often involves significant challenges when defining and measuring benefits and costs. Also, the goal of efficiency may conflict with other policy goals such as equity or fairness, producing legitimate debate among those on different sides of the issue. Efficiency will be discussed in much greater detail in Chapter 4.

Equity

As a goal of public policy, equity generally involves the pursuit of one or more broad goals such as income equality, minimum standards of treatment, or freedom. As with efficiency, determining a policy's ability to meet equity goals can be difficult, and conflict between ethical and other policy goals presents a frequent challenge for policymakers. For example, equality can be divided into multiple sub-topics, including equal income, equal rights, equal opportunity, and equal access to public services. Many of these dimensions of equality are difficult to define or measure, and in some cases these alternative dimensions of equality may be contradictory.

Furthermore, there are many ethical theories with conflicting conclusions and policy prescriptions. The lack of an accepted ethical paradigm for policy analysis tends to lessen the practical importance of ethical theory, yet the view of this book is that ethical goals provide an important basis for weighing the legitimacy of competing political positions. Since many policy debates involve claims of injustice or immorality, the failure to include ethical considerations in this text

would leave the student without the means of judging these frequent, and frequently misused, claims of right and wrong. The challenge for those who wish to seriously consider the moral dimension of public policy is to learn enough about ethical theories to be able to logically and dispassionately judge the claims of right and wrong in political debates. That process will not be completed in this book. However, a selection of ethical theories related to distributional justice will be considered in Chapter 3.

Political practicality

A third goal of public policy is political practicality. A policy will be politically practical if it has sufficient support to be passed into law and practice by the legislative and administrative branches of government. Political practicality also involves meeting the broader rules and norms of government, such as the U.S. Constitution or British common law, in order to survive a possible judicial review. In addition to passing constitutional review by the courts, a successful policy must achieve popular and legislative support in order to pass into the legal code, and must then be effectively administered in order to have a significant effect on the public. There are many possible barriers to the establishment of a fully effective law or public program. A brief review of the economic analysis of the political process and its challenges is included in Chapter 5.

The steps in policy analysis

A useful guide to the policy analysis process is provided by the U.S. government's Office of Management and Budget (OMB).⁴ The five steps for policy analysis suggested by the OMB are: (1) *state the policy rationale*, or the goal of the policy; (2) *explicitly state the assumptions* used in the analysis; (3) *evaluate alternatives*, including different program sizes, program methods, and public sector involvement; (4) *identify and measure benefits and costs*; and (5) *verify results* through follow-up studies. Eugene Bardach (2000, pp. 1–47) suggests a somewhat clearer eight-step policy analysis process. These steps are: (1) *define the problem*; (2) *assemble evidence*; (3) *select criteria for making the decision*; (4) *construct alternatives*; (5) *predict the outcome of each alternative*; (6) *confront the trade-offs*; (7) *make recommendations*; and (8) *tell your story*. I reversed Bardach's steps 3 and 4 in order to separate the general analysis of the problem more completely from the analysis of a specific policy.

These two lists of steps overlap in several ways. For example, stating a policy rationale generally requires one to identify the problem being addressed and how the policy will reduce or eliminate that problem. Explicitly stating one's assumptions is part of defining the problem and the criteria for judging alternative solutions. Given imperfect information about a problem and the effects of alternative policies, assumptions are usually an important part of one's measurement of benefits and costs, particularly when predicting the future effects of a proposed policy.

The primary difference in the two lists is that the OMB procedures do not include policy recommendations. This difference is a matter of debate within the field of policy analysis, and reflects different views of the role of the analyst. Within government agencies, decisions regarding policy are usually made by high-ranking officials with political as well as administrative responsibilities. In this context, it is often not the place of a staff economist or policy analyst to make specific policy recommendations. On the other hand, there are situations within government where analysts' conclusions and recommendations can be part of the informal process of advising decision-makers. Also, analysts working outside of government have fewer constraints on their role, and often include policy recommendations in their analysis.

Views of government and the roles of the policy analyst

Like policy professionals from any field, economists have several potential roles to play in the policy process. Three such roles are discussed in an article by Robert Nelson (1987). These roles are based on differing theories of government that have been popular at some point during the past century. Nelson's first role for the policy analyst is the "*progressive neutral expert*" (Nelson 1987, p. 52). This role is based on the progressive era's⁵ view that the administration of government should be above corrupting interests and based on sound management principles (see Wilson 1941 reprint). In this vision of government, the rational analysis of policy has a powerful role in determining government's course of action. While the growing importance of benefit-cost analysis over the past few decades suggests a continuing role for this view, reality suggests that political power remains a more important force in the success of a policy initiative.

Robert Nelson's second role for the policy economist is labeled the "*entrepreneur for efficiency*" (Nelson 1987, p. 54). The entrepreneur for efficiency conducts policy analysis and also actively promotes economics or efficiency-based policy designs. This more active role for the analyst is based on a newer theory of government behavior that was developed in the 1950s and remains influential today. This view sees government, and particularly the legislative process, as a struggle among competing groups promoting their own self-interest (Truman 1951).

Policy analysis serves at least two purposes within this interest group view of politics and government. First, the evidence provided by policy analysts serves as support for arguments in favor of particular policy positions. Studies and research findings are regularly used as evidence by advocates of a particular political party or private interest group, and such groups often fund research that is likely to support their point of view. On the other hand, independent policy research may serve to mediate or resolve debates among interest groups. At some point, decision-makers may be persuaded by evidence that there is a correct position regarding the main causes of a problem and the policy solution that best deals with that problem. This positive result seems quite unusual in twenty-first-century democracies.

Nelson's third role for the government economist is the "*ideological combatant*" (Nelson 1987, pp. 56–60). This role is based on the idea that ideology as well as self-interest guide policymakers, and that the battle of ideas may be as important as the battle of interests in determining public policy. In the intellectual arena, the primary ideological debates between economists and others often involve debates over the role of markets, incentives, and efficiency in policy design, the role of the private sector in a just society, and the economists' efforts to place dollar values on non-marketed goods such as environmental resources and human life.

Nelson's primary example of an ongoing ideological battle occurs between economists and non-economists in the area of environmental policy, a battle that is still common today. Many environmental policy arguments combine scientific evidence of environmental harm with relatively absolute views of right and wrong. Environmental activists often frame their political arguments in terms of greedy corporations and the infinite value of nature and of human life. This approach leads to support for stringent environmental standards and the rejection of any consideration of the costs of such standards. On the other hand, environmental economists usually advocate for the impartial weighing of all benefits and costs of environmental policies. These different values and methods tend to produce differing conclusions regarding the appropriate amount of pollution reduction. Non-economists are more likely to support the greatest technically feasible level of cleanup, while economists tend to propose the level of cleanup for which the total benefits of cleanup outweigh the cleanup costs by the greatest amount. Another dimension of environmental policy is the method by which pollution is to be controlled. Economists tend to favor incentive-based approaches such as taxes or pollution permits in many situations, while non-economists with less faith in self-interest or market forces tend to advocate explicit regulatory standards. Elements of these policy debates are presented in Chapter 13, which discusses policy alternatives for pollution control.

Advocacy and analysis

Nelson's entrepreneur for efficiency and ideological combatant both operate within a world of partisan politics and political influence. In the context of competing interests and ideals, conflict often exists between relatively objective analysis and political advocacy. An *advocate* is one who "pleads the cause of another" or "supports any cause by argument" (*Webster's New International Dictionary of the English Language* 1939). Most modern legal systems are based on opposing advocates for the prosecution and the defense, a system that has its roots in Roman law. The duty of a legal advocate is to build a case supporting one side in a trial. The duty of the judge or jury is to weigh the evidence and argument from the two sides in order to render a balanced decision. In the case of public policy, advocacy involves the support of a specific policy goal or point of view, and the political advocate also tends to act by building a case for one side of even the most debatable policy proposals. Advocates for a particular viewpoint are likely to be biased in a number of ways, and being able to identify these sources

of bias is crucial if a student is going to be able to think critically and objectively about policy.⁶

Most policy debates among advocates are likely to involve disagreements over values, definitions of the problem, evidence, and policy conclusions. Advocates for a particular interest group or ideology will provide a set of value arguments, definitions, evidence, and policy recommendations designed to support their point of view. Of course, the use of policy analysis as part of a persuasive argument requires that the findings in the policy study are consistent with the goals of the advocate. Hence, selective use of policy analysis and other evidence is a near certainty in political debates.

In addition to the selective use of evidence, it is possible that policy analysts might be pressured to modify their results or the way they are expressed. In order to reduce the probability of such political influence on the research of government staff economists at the federal level, the United States offers its researchers protection from political interference other than in the choice of their research assignments. The federal government's Office of Personnel Management acts under the following policy statement:

Federal employees are hired, promoted, paid, and discharged solely on the basis of merit and conduct . . . They provide special protections for veterans, victims of discrimination, and those who expose Government waste or fraud. They also guarantee our public employees due process in any action that threatens their employment . . . With these enabling principles, our civil service system ensures that politics and political party, as well as other non-merit factors, have no bearing on the tenure of our civil servants.⁷

This system of protection from political pressure is supported by a system of due process for handling complaints. However, efforts to influence results may still take place. The Union of Concerned Scientists' survey of fisheries scientists reported in 2005 that nearly one-quarter of respondents had been pressured to alter or cut technical information from a report (Smith 2005). Academic researchers are more likely to be independent of direct political influence, but all research supported by private or public funding sources could be subject to some degree of financial influence.

Another interesting dimension of policy analysis is that results can be stored and reconsidered when a crisis emerges or the issue becomes newsworthy for some other reason. For example, in the aftermath of Hurricane Katrina in 2005, some looked at images of the largely submerged city of New Orleans, saw a predominantly African-American population, and responded with arguments about race, class, and the lack of access to transportation for the poor. Others saw visions of looting and violence among some of the same population and drew conclusions regarding the moral decay of at least some parts of American society. Environmentalists pulled out old papers on the costs of losing wetlands and barrier islands. Macroeconomists pulled out their models and forecast macroeconomic slowdowns and higher energy prices. Engineering studies of South Louisiana's system of levees

were reconsidered and widely quoted. Very little of this analysis was actually completed after the hurricane, but the new evidence provided by the aftermath of the storm created important applications for older analysis, as well as a catalyst for the re-emergence of old political debates.

Interdisciplinary analysis

Another important part of the policy analyst's job is the need to consider ideas from multiple academic disciplines. An effective policy analyst must be able to trade ideas with engineers, other social scientists, lawyers, government officials, and the general public. For example, the analysis of infrastructure investments such as highways or mass transit systems requires input from transportation engineers, while the analysis of crime policy may require input from criminologists with backgrounds in sociology or other social sciences, as well as experts in law enforcement. Informed discussions of environmental policy require information from biological, chemical, geological, or environmental scientists.

In addition, communication with public administrators, elected officials, and other interested parties is essential to effective policy analysis, in part because one or more of these groups is probably sponsoring the analysis, and also because they have an active role in implementing legislation or regulations related to the policy in question. When communicating with administrators or the general public, an economic analyst may have to defend, or at least explain, the method and results of benefit-cost analysis. In that sense, analysts also take the role of teachers. The same communication ability applies to one's interaction with clients in the private sector.

Critical thinking as a policy tool

The rest of the chapter will critically review some of the elements of argumentation and critical thinking, and then briefly critique benefit-cost analysis in light of these elements. Sound policy analysis depends on one's ability to organize analysis using established principles of logic and evidence. A brief review of a few important critical thinking concepts may improve the quality of your own analysis, as well as improve your ability to critically analyze the analysis of others. These concepts are useful when analyzing several levels of policy analysis from the "sound bite" in a political advertisement to professional journal articles.

Models and assumptions

Analytical models provide the crucial definitions and logic that are part of most well-constructed arguments. These models may be based on social science, physical or biological science, legal scholarship, moral philosophy, or other academic fields. Any analytical model will contain the following components: (1) initial assumptions and value judgments; (2) definitions of terms; (3) causal relationships; and (4) logical conclusions.⁸ Models usually are judged on their

ability to explain, predict, or productively guide human actions. In the social sciences, the conclusions of theoretical models take the form of predictions about human behavior or the effects of policy alternatives.

Assumptions, definitions, and causal relationships are worthy of additional discussion. Assumptions are probably the most controversial components of economic models. *Assumptions* are stated or unstated value judgments, definitions, and interpretations of fact that are often made without supporting evidence. Their primary role in an analytical model is to simplify and focus the analysis. For example, economists often assume that markets are competitive and efficient unless otherwise noted. Similarly, Marxists assume a set of social relations between classes that include elements of oppression and exploitation of the working class. Finally, analysis based on race, class, gender, or other categories of the population implicitly assumes that members of a given group are similar enough to be analyzed without explicit reference to individual differences. As with the economic assumptions of pure competition, these are simplifying assumptions that are essential to creating a relatively clear analysis. Assumptions, whether or not they are explicitly stated, are absolutely essential as the foundation of any subsequent argument. However, because assumptions are not always supported with logic or evidence, they should always be used with care and humility.

Interpreting evidence

A strong argument must be supported by evidence. This section will present a brief review of types of evidence and their limitations. There are at least three general categories of evidence used to support policy analysis and policy recommendations. They are case studies, expert opinion and research, and general statistics. Each will be discussed briefly.

Case studies

A case study involves a detailed evaluation of an individual person, firm, industry, or geographic area. Case studies are deliberately limited in scope in order to emphasize detailed information. Case studies can be useful for identifying the process through which a problem develops. For example, case studies of sexual harassment in the workplace can identify ways in which harassment occurs, as well as the psychological and physical effects of the harassment on its victims. Because of the individual detail possible in case studies, they are uniquely capable of displaying the human effects of a particular problem, and thereby can bring forth an emotional response from the public and the decision-maker.

The primary weakness of the case study is its inability to answer a few fundamental questions about a policy problem. Most obviously, case studies are inherently incapable of identifying how frequently a problem occurs. It is usually necessary to know the frequency of a problem in order to determine the resources needed to deal with it. Similarly, the broader causes and effects of a policy problem, such as total costs or global impacts, cannot be addressed effectively through case

studies. Also, the subjects of case studies might be chosen in a biased manner and therefore may be misleading or unrepresentative. Whether or not the case chosen for analysis is actually biased, the limits of the case study make such a charge difficult to refute without further evidence. Overall, case studies can play a positive role through their ability to add detail and a human touch to one's argument, but because they cannot determine the frequency or seriousness of a social problem, they are most effective when used in combination with more broadly based forms of evidence such as scientific studies or broadly based statistical analysis.

Expert opinion and research findings

Expertise is usually measured by one's academic degrees, publication record, and experience. However, an expert's opinions can be subject to the same ideological bias as those of a common citizen or politician, and can be analyzed using the same types of questions. For example, is an expert's conclusion typical of research in that area? Is his or her argument fully supported by logic and evidence, or is it weak in one or both respects? Such questions help guide one's critical thinking about any issue. Advocates often have a range of experts or studies to choose from, and their choice is likely to be influenced by their policy goals and points of view.

Another dimension of interpreting policy studies involves the range of estimated effects of a given policy or problem. When one evaluates the literature related to a policy topic, he or she should pay attention to the range of results in addition to the typical median estimate. For example, at this time, there is a relatively wide range of estimates of the expected rise in global temperatures over the next century. A wide range of estimates implies a significant degree of uncertainty about the facts and models related to an issue. Environmental advocates are likely to tell stories based on relatively high estimates of temperature change and more negative sets of predicted effects, while a common position of environmental conservatives, better known these days as climate change skeptics, is to argue that the wide range of evidence suggests that further study is needed before any action should be taken. This issue is discussed at length in Chapter 13. Sometimes a closer look can lead to a narrowing of the range of estimates. For example, an early review of the employment effects of the minimum wage (Brown *et al.* 1982) found that while a relatively wide range of predictions exists, more sophisticated studies tended to cluster near the bottom of that range, indicating that the employment effects of the minimum wage tend to be relatively minor, at least in the short run.

Occasionally one may hear that a particular study has disproven an entire set of previous studies about a particular topic. In some cases, this type of statement may be true, but often this is a biased conclusion based on political ideology. For example, political supporters of a higher minimum wage sometimes argue that a small set of studies, most famously an early study by Card and Krueger, disproved the idea that a higher minimum wage causes a decrease in employment (Card and Krueger 1994). While Card and Krueger are accomplished economists, it is a rather large leap of faith to discount decades of contradictory evidence based on relatively few studies. The minimum wage is discussed in greater detail in Chapter 15.

Official statistics

Statistics from government agencies and other public and private organizations provide another prime source of evidence for public policy analysis and debate. In some ways, official statistics are at the opposite extreme from case studies. Their primary strength is their ability to identify the frequency or breadth of a problem based on large samples of the population.⁹ Anyone who has taken a basic statistics course should understand that even official statistics are estimates rather than facts. However, given the large samples used for most national statistics, measurement error is likely to be small in most cases. The controversies surrounding government statistics are more likely to be based on their definitions or their use by advocates rather than their measurement accuracy.

The definitions of common official statistics are sometimes arbitrary and controversial. In other cases, the specific statistic has been found to offer a biased or incomplete interpretation of the problem it is meant to assess. Sources of bias in commonly used measures such as the inflation rate, the unemployment rate, and the poverty rate have been studied in detail, and are discussed briefly in this book. The inflation rate is discussed in Chapter 8, while the measurement of poverty is discussed in Chapter 14. Another example of a potentially confusing or misleading statistic is the unemployment rate, which will be discussed below.

The unemployment rate is based on a very specific and somewhat arbitrary set of definitions and assumptions. In the United States, the unemployment rate is defined as the number of persons “unemployed,” divided by the number of persons “in the labor force,” multiplied by 100 percent. A person is considered *unemployed* if he or she is not currently working for pay but is actively seeking employment. Similarly, a person is counted as *in the labor force* if he or she is either working at least one hour per week for pay or in a family business, or is actively looking for work. In other words, the labor force is made up of two groups, the employed and the unemployed. However, not everybody who doesn’t work is part of the labor force. Retirees, full-time students, and others who are neither working nor actively looking for work are considered to be outside of the labor force and therefore are not counted as unemployed.

Your Turn 1.3

Based on the previous paragraph, answer the following questions: (1) If a lawyer is currently working as a cashier at K-Mart, is he or she counted as unemployed? (2) Is someone who wants to work full-time but only works one hour per week unemployed? (3) Is a full-time student who is not currently working for pay unemployed? (4) Are you currently unemployed?

Despite its widespread use as an indicator of economic health, the unemployment rate is actually a relatively narrow statistic that measures only one aspect of labor

market conditions. One problem that the unemployment rate does not measure is underutilized skills, as with the lawyer in Your Turn 1.3. The underutilization of skills is sometimes labeled *underemployment*. Similarly, people who are involuntarily working part-time are still employed, as are those working for very low wages. Finally, those who are not currently looking for work are not included in the labor force and are therefore not considered to be unemployed. Individuals who are not actively looking for work but would take a job if offered are called either *marginally attached workers* or *discouraged workers*, depending on their reason for not actively searching for work, and are now measured separately by the U.S. Bureau of Labor Statistics. However, neither group is included among the officially unemployed.

Critics of the unemployment rate are often displeased with its inability to measure broader labor market problems. The significance of this example is that a single benchmark number such as the unemployment rate may provide an indication of trends in the labor market or in the national economy, but it cannot define the entirety of the issue it is meant to represent.

The presentation of statistics

Another aspect of critical thinking about statistics lies in observing how they are presented. One might discuss unemployment, poverty, profits, or virtually any statistic as a total number or as a percentage of some larger sum.

Your Turn 1.4

Consider these statements based on the 2014 Congressional Budget Office report on a proposed minimum wage increase to \$10.10 per hour: (A) Raising the minimum wage from \$7.25 to \$10.10 instead of by one dollar will decrease employment by 500,000 jobs. (B) Raising the minimum wage by one dollar will decrease U.S. employment by only one-third of one percent. Which piece of evidence sounds more reasonable to you? Why?

Statistics presented as large totals often sound more impressive than percentages. One important suggestion regarding the interpretation of statistics is to *beware the big number*. In a large economy, billions of euros or thousands of people do not always represent socially significant sums. For example, corporate profits are often presented as large annual totals, but a large annual total profit does not necessarily mean the company is exploiting the consuming public or its workers. A large company might have an annual profit in the billions but still have a low percentage of profits to total sales or to stockholders' equity. For example, Walmart profits totaled \$17 billion in 2013. These profits amounted to 3.6 percent of total sales revenue, which is actually below the national average for that measure of profits.

Advocacy and statistics

A much more difficult issue in interpreting statistics involves determining whether the statistics are accurate. First, both the advocate and the actual source of the statistics may be biased. Financial interest, ideology, and self-interest may affect who is chosen to do a particular research study, and possibly how the actual research is undertaken. So two other questions to ask when considering policy research is which group sponsored the research, and how do the conclusions of the research relate to the sponsor's ideology or self-interest? Ideology or self-interest also may affect which results are actually quoted by an advocate, and how they are presented.

Another difficulty in interpreting statistics is that different statistics with contradictory trends are sometimes used to identify the same problem. For example, there is a common perception that the U.S. manufacturing sector is being replaced by foreign production. Supporters of this position refer to the rise of imports and the decrease over time in U.S. manufacturing employment, particularly as a percentage of total employment. However, other evidence, particularly the level of manufacturing output, either corrected for inflation or as a percentage of gross domestic product, suggests a very different pattern. See Your Turn 1.5 for evidence of this discrepancy.

Another common fallacy in the use of evidence is to assume that when two events are correlated, one event caused the other. This is referred to as *post hoc, propter hoc analysis*, or *false cause reasoning*. Proving a cause-and-effect relationship requires a combination of theory and evidence, and cannot be accomplished through a statistical correlation alone. For example, opponents of free trade in the United States sometimes claim that free trade is counterproductive because the United States experienced its primary industrial revolutions in the 1800s while under a system of high tariffs. This historical correlation is true. However, proving a causal relationship between tariffs and growth requires that: (1) growing U.S. industries would have been subject to debilitating competition from foreign producers in the absence of tariffs; (2) our industries couldn't successfully compete with those of other countries without the tariffs; and (3) most importantly, the resources invested in those industries couldn't have been used more productively elsewhere. Less plausible examples of false cause reasoning can be found in any number of subjects. For example, the hemline theory of stock prices hypothesized that average stock prices could be predicted based on the length of that season's skirt length (rising hemlines meant rising stock prices). Another less than scientific model of stock prices is the Super Bowl theory, which predicted that a victory by U.S. football's National Football Conference leads to rising stock prices.

Political interpretations of even the most valid statistics should give anyone reason for caution. The supporting evidence used in the arguments of public officials or interest groups is particularly prone to being chosen selectively, represented and interpreted in a biased way, and presented with too much certainty. The evidence found in the policy papers of advocacy organizations should be interpreted with extreme caution whether or not you are inclined to agree with the advocate's position. Again, debates regarding the employment effects of the minimum wage provide excellent examples of this type of bias.

Your Turn 1.5

The following table presents data on the relation between durable goods manufacturing and the total economy. Durable goods are things that last a long time, such as cars or major appliances.

- A Try to explain the difference between the trends in the percentage of production and the percentage of jobs. Also discuss the differences between the figures for the total number of jobs and the percentage of jobs. Which trends in the data suggest that the United States is “deindustrializing,” and which do not?
- B Search the Web for keywords such as “deindustrialization” or “off-shoring.” See the specific evidence used to support such arguments. Also see Baily and Bosworth (2014) for a readable and informed summary of U.S. manufacturing trends.

Table 1.1 U.S. output and employment trends

Year	U.S. durable goods output (\$ billion)	U.S. gross domestic product	Durable goods production (% of GDP)	Total U.S. jobs (non- agricultural, thousands)	Durable goods jobs	Durable good jobs (% of total payroll jobs)
1959	95.3	507.4	18.8	53,270	9,342	17.5
1960	96.9	527.4	18.4	54,189	9,429	17.4
1998	1,567.8	8,759.9	17.9	125,826	11,170	8.9
1999	1,643.6	9,248.4	17.8	129,240	10,986	8.5
2012	2,735.2	16,041.6	17.1	134,104	7,470	5.6

Output is from Table B-8 of the 2000 *Economic Report of the President* and from the Bureau of Economic Analysis Table 1.2.5: Gross Domestic Product by Major Type of Product. Employment is from Table B-44 in the 2000 *Economic Report of the President*, and Table B-14 of the 2014 *Economic Report of the President*.

Critical thinking about policy analysis

While policy analysis has become a relatively common part of the implementation and administration of public programs, it also remains controversial and subject to fundamental criticisms. The previous section on critical thinking in policy analysis can and should be turned back on the subject itself. Among the many critiques of benefit-cost analysis, three seem to be particularly common, and all should be taken seriously. These critiques relate to the utilitarian philosophy that underlies the benefit-cost model, the appropriateness and accuracy of assigning dollar values to non-marketed goods, and objections to the microeconomic foundations of benefit-cost analysis. The critique of utilitarianism is presented in

Chapter 3, while a critique of assigning dollar values to non-marketed goods is presented in Chapter 10. Other critiques will be discussed in this chapter.

Two related sources of complaint about benefit-cost analysis can be briefly mentioned here. One is the common view among institutional and radical economists that markets are dominated more by power and oppression than by supply and demand (Dorman 1996). If this is true, then measuring benefits and costs on the basis of market concepts is likely to be both misdirected and inaccurate. Another objection to benefit-cost analysis arises from populists, who consider the desires of the people to be the primary basis for policy. According to this view, expert analysis may be considered somewhat antidemocratic. In a populist vision, there may be some justification for policy analysis if the primary client for the research is the public itself rather than bureaucrats or interest groups, but for the most part the will and thinking of the people is seen as trumping any type of professional analysis. The arguments of religious conservatives can sometimes be accurately categorized as populist in this sense.

Conclusion

This book is arranged in four sections. Chapters 2 and 3 complete our introduction to basic economic and ethical concepts needed for policy analysis. The economic analysis of efficiency, market failure, and the role of government are discussed in Chapters 4 and 5. The tools of policy analysis are covered in Chapters 6 through 11. These chapters discuss the basics of benefit-cost analysis, methods for comparing present and future net benefits, benefit-cost analysis in the presence of risk and uncertainty, dollar estimates of the value of human life and other non-marketed goods, and economic impact analysis. Several extended policy examples are included in these chapters, but the tools of analysis are emphasized in each chapter. The final four chapters present more detailed overviews of a selection of policy issues. These issues are traffic congestion, the environment, poverty, and policies for the working poor. The first goal of these applied chapters is to expose the student to the range of possible policies related to a specific policy problem. The second goal is to expose the reader to the breadth and differing sources of knowledge required for specific policy areas. For example, in Chapter 13, we consider the role of the physical and biological sciences in analyzing environmental policy, while input from other social scientific fields is considered in the analysis of poverty and anti-poverty policy in Chapters 14 and 15.

While the main topic of this book is the analysis of public policy, the opening quote of this chapter promotes critical thinking, while the second is about careful and rational decision-making. These are totally appropriate quotes for a policy analysis text, for regardless of how many of this book's analytical tools or policy topics are remembered in the future, any significant improvement in one's ability to see beneath the sound bites and shallow reasoning of many of our public policy debates will provide an important benefit to the reader. I hope that this benefit is worth its cost.

Review questions

Conceptual questions

- 1 Review each part of Bardach's eight-step process of policy analysis as well as the five-step procedure of the Office of Management and Budget.
 - A Why might an analyst operating within a bureaucracy such as the federal government feel less free to include policy recommendations as part of his or her report? Discuss the pluses and minuses of excluding this step or leaving it to others.
 - B The OMB requires that the goals and assumptions of one's policy analysis be stated explicitly. Where might this requirement fit into Bardach's list? How is a study that fails to explicitly and thoroughly state its assumptions less reliable or more difficult to interpret?
- 2 Discuss how the three goals of efficiency, equity, and political practicality might apply to the following public policy issues. For each goal, construct a list of relevant questions that might be applied to the case in question.
 - A Rebuilding beachfront property or leaving the beach area uninhabited after Hurricane Sandy struck the U.S. in 2012.
 - B Establishing a universal health insurance program in the United States with no fees for any resident.
 - C Invading Iraq or Syria and establishing a democratic government as a means of fighting Islamic terrorism.
- 3 Nelson's three roles for the policy analyst (the progressive neutral expert, the entrepreneur for efficiency, and the ideological combatant) are based on three different views of the operation of government and formation of public policy.
 - A Review these three roles and the views of government related to each. Which role strikes you as most favorable? Most realistic?
 - B Discuss how a policy analyst might react to a proposal to raise the minimum wage. In your discussion, does the analyst favor or oppose such a policy?
- 4 Find a discussion of a common economic policy issue such as the merchandise trade deficit or the minimum wage on the website of a conservative organization such as the Cato Institute (www.cato.org) or the American Enterprise Institute (www.aei.org), and also on the site of the Economic Policy Institute (www.epinet.org). Note in detail the arguments raised and the evidence used to support their conclusions.

Computational questions

This book relies on your knowledge of introductory economics and the basic mathematics often seen in the analysis of markets and individual decisions. The following questions can be thought of as a test of the basic concepts and skills that will be utilized later in the text.

20 *Economic and ethical concepts*

- 5 A market equilibrium can be summarized in the following three equations:
 - (1) *Demand curve*: $P_d = 100 - 2Q_d$, where P_d and Q_d equal the demand curve's price and quantity
 - (2) *Supply curve*: $P_s = 10 + Q_s$, where P_s and Q_s equal the supply curve's price and quantity
 - (3) *Equilibrium condition*: At equilibrium, demand = supply, which means that $P_d = P_s$ and $Q_d = Q_s$
 - A Graph the demand and supply curves in Figure 1.1. Label the endpoints and slopes of each curve.
 - B Find the equilibrium values for quantity and price using algebra.
 - C Draw lines from the equilibrium point to the quantity and price axes. Total spending equals price \times quantity. Identify this rectangle on the graph. What is the value of total spending in this market?
 - D Consumer surplus is defined as the area beneath the demand curve and above the price. This area usually forms a right triangle. Identify this triangle in the graph. What is the formula for the area of a right triangle? What is the area of the consumer surplus triangle in Figure 1.1.?
- 6 Identify the tangency point in Figure 1.2.
 - A At that point, what is the slope of the straight line? The curved line?
 - B About how many cans of each beverage is this person consuming?
- 7 Solve the following compound fractions.

A $\frac{3/8}{3/32}$

B $\frac{2/3}{16/21}$

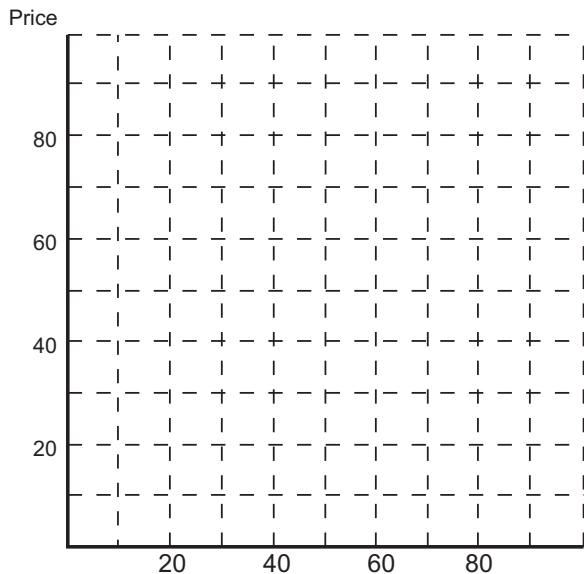


Figure 1.1 Demand and supply curves

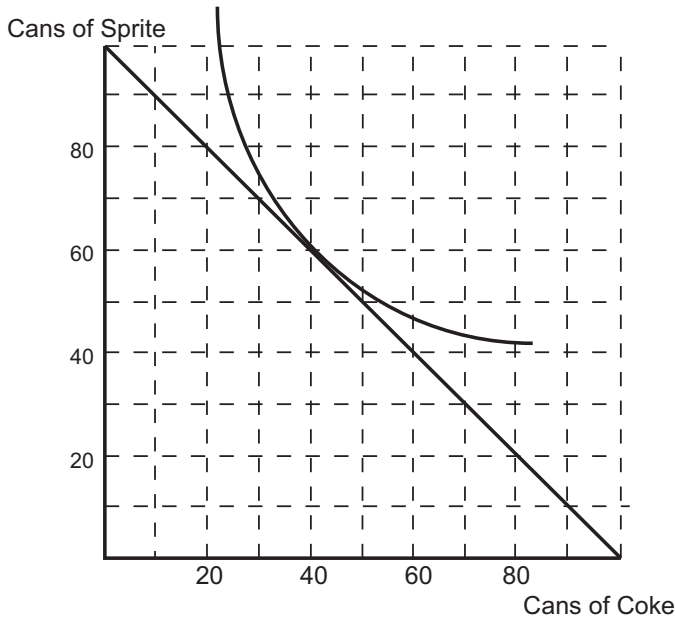


Figure 1.2 A tangency point

Notes

- 1 From the *Kalama Sutra*. Many translations of this passage are less poetic (http://thinkexist.com/quotation/do_not_believe_in_anything_simply_because_you/12103.html).
- 2 From a letter written in London in 1772, reprinted in National Park Service, *Natural Resource Year in Review—2000*, May 2000 (publication D-1459).
- 3 Discussions of the non-income benefits of college education can be found in Oreopoulos and Salvanes (2011) and Haveman and Wolfe (1984).
- 4 Office of Management and Budget, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs,” Circular No. A-94 Revised, October 29, 1992 (www.whitehouse.gov/omb/circulars/a094/a094.html).
- 5 The progressive era extends from the late nineteenth century to roughly World War I.
- 6 For example, <http://mediamatters.org/> is a liberal website that exposes “conservative bias,” while www.mediaresearch.org/ is a conservative website exposing “liberal bias.” Needless to say, each is likely to be biased in its own right.
- 7 The Office of Personnel Management’s website is a good source of information on civil service protections for federal employees (www.opm.gov/Strategic_Management_of_Human_Capital/documents/merit/ideal.asp).
- 8 A good introductory text dealing with the principles of logic and evidence is Phelan and Reynolds (1996).
- 9 For a user-friendly source for a broad range of U.S. government statistics, see FedStats (www.fedstats.gov).

Bibliography

- Baily, Martin N., and Barry Bosworth, "US Manufacturing: Understanding Its Past and Its Potential Future," *Journal of Economic Perspectives*, Vol. 28, No. 1 (Winter 2014), pp. 3–26.
- Bardach, Eugene, *A Practical Guide for Policy Analysis* (New York: Chatham House, 2000).
- Brown, Charles, Curtis Gilroy, and Andrew Kohen, "The Effect of the Minimum Wage on Employment and Unemployment," *Journal of Economic Literature*, Vol. 20 (June 1982), pp. 487–528.
- Card, David, and Alan Krueger, "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," *American Economic Review*, Vol. 84 (September 1994), pp. 772–793.
- Dorman, Peter, *Markets and Mortality: Economics, Dangerous Work, and the Value of Human Life* (New York: Cambridge University Press, 1996).
- Haveman, Robert H., and Barbara Wolfe, "Schooling and Economic Well-Being: The Role of Nonmarket Effects," *Journal of Human Resources*, Vol. 19, No. 3 (Summer 1984), pp. 377–407.
- Nelson, Robert, "The Economics Profession and the Making of Public Policy," *Journal of Economic Literature*, Volume 25 (March 1987), pp. 49–91.
- Office of Management and Budget, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," Circular No. A-94, Revised, October 29, 1992 (www.whitehouse.gov/omb/circulars/a094/a094.html).
- Oreopoulos, Philip, and Kjell Salvanes, "Priceless: The Nonpecuniary Benefits of Schooling," *Journal of Economic Perspectives*, Vol. 25, No. 1 (Winter 2011), pp. 159–184.
- Phelan, Peter, and Peter Reynolds, *Argument and Evidence* (London: Routledge, 1996).
- Radin, Beryl, *Beyond Machiavelli: Policy Analysis Comes of Age* (Washington, DC: Georgetown University Press, 2000).
- Smith, Daniel, "Political Science," *New York Times*, September 4, 2005.
- Truman, David, *The Governmental Process: Political Interests and Public Opinion* (New York: Knopf, 1951).
- Wilson, Woodrow, "The Study of Administration," *Political Science Quarterly*, Vol. 56 (December 1941), pp. 481–506 (reprinted from 1887 article).
- Webster's New International Dictionary of the English Language* (Springfield, MA: G&C Merriam Company, 1939).

2 A review of markets and rational behavior

[W]hile the law [of competition] may be sometimes hard for the individual, it is best for the race, because it ensures the survival of the fittest in every department.¹

Andrew Carnegie

Markets change, tastes change, so the companies and the individuals who choose to compete in those markets must change.²

Attributed to An Wang (founder of Wang Laboratories,
a defunct computer company)

A commodity appears at first sight an extremely obvious, trivial thing. But its analysis brings out that it is a very strange thing, abounding in metaphysical subtleties and theological niceties.³

Karl Marx

The analysis of markets and rational individual behavior dominates the typical introductory microeconomics course. For those who have a good recollection of introductory economics, early sections of this chapter will probably be unnecessary. For those who welcome a review of the subject, the entire chapter may be valuable. This chapter reviews two building blocks for the upcoming analysis of market inefficiency and public policy, the competitive market and the utility-maximizing individual.

What is “perfect” competition?

In the world of business, many decisions are required in order to effectively compete. These decisions include choosing the price, quality, and quantity of one’s product as well as the method of production, the location of one’s production facility, and many others. Like most abstract models in the social sciences, mainstream economics starts its analysis of competition by assuming away many important aspects of the real world in order to present an explicit and easy-to-understand overview of the essential components of competition. These simplifying assumptions are called the classical assumptions of a perfectly competitive market.

Classical assumptions for perfect competition

- 1 *Many buyers and sellers*: This assumption implies that no single producer or consumer will be a large enough part of the market to influence prices through their individual actions. One case that violates this assumption is a monopoly, or a single seller of a product.
- 2 *Perfect information*: This means that every buyer and seller is aware of the price and quality of the products offered for sale and can make fully informed decisions about what to buy or sell.
- 3 *Homogeneous product*: This means that the output of each firm in the market is identical. Examples include shares of General Motors stock offered for sale by various stockholders, and raw agricultural or mineral products. Any product that has a brand name or unique qualities violates this assumption to some degree. Markets with product differences or brand names are referred to as *monopolistically competitive* markets.
- 4 *Freedom of entry and exit, or perfect mobility*: According to this assumption, individual buyers or sellers can enter or leave a market without restriction or significant transactions costs. For example, firms will tend to enter a market when demand and profits are unusually high, workers apply for jobs when and where wages are high, shoppers come to stores for sales, etc. For this assumption to hold, no legal or technical barriers to entry or exit may exist.
- 5 *No collusion*: Collusion means group decision-making. Collusion among sellers may allow them to fix their prices above the competitive price for that market. This is particularly likely in oligopolistic markets or when government permits collusion. Examples of collusion include cartels such as the Organization of Petroleum Exporting Countries (OPEC), the business trusts of the nineteenth century, and labor unions.

If these competitive assumptions are approximately true for a given market, both buyers and sellers will be *price takers*, meaning that no buyer or seller will have the power to influence the market price of the product. For example, if General Motors stock is currently trading at \$29 a share and I offer to sell some shares for \$30, no informed buyer will purchase my shares at that time since there are many shares available, everybody in the market knows the current price, and all shares are identical.

Your Turn 2.1

Can you think of any other goods besides some stocks and bonds for which markets are likely to be perfectly competitive, or nearly so? Which of the competitive conditions are violated in the labor market, and which are not?

In reality, effective competition does not require that all of these conditions be fully met, but it does require at a minimum that buyers and sellers have multiple alternatives and sufficient information to make wise decisions. Also, in order for competition to work well in the long run, neither economic nor legal barriers can prevent the movement of buyers and sellers into and out of the market.

Demand

The model of the competitive market depends on the interaction of buyers (demand) and sellers (supply). Each side of the market will be discussed in turn. *Demand* is a concept that summarizes the decisions of buyers in a market, with an emphasis on how much of a product will be purchased. The decision to buy a certain quantity of a product depends on several factors, including the price of the product, one's income, the prices of related goods, consumer tastes, the number of consumers in the market, and other factors. This list of factors affecting quantity demanded is summarized in a *demand function*, which in general form is merely a list of variables in the demand relationship. Equation 2.1 provides a general demand function for cola. In Equation 2.1, P is price and Q is quantity demanded.

Equation 2.1 $Q_{\text{Cola}} = f(P_{\text{Cola}}, \text{income, other prices, tastes, the number of consumers})$

A demand function can be represented on a two-dimensional graph by graphing the relationship between quantity and one of the variables on the right, usually the relationship between quantity and price, while holding all other variables constant. This graphical relation between price and quantity demanded, holding other factors fixed, is called the *demand curve*. It is generally true that the lower the price, the more of a good people will buy. Therefore, the price of a good has a negative relationship to the quantity demanded.

Other demand concepts

The relationships between the quantity demanded and other components of the demand function involve some additional concepts. First, the prices of other goods may affect the demand curve for Coca-Cola. For example, Pepsi and Coke are similar products serving the same basic functions (thirst quenching, caffeine boost). Therefore, a lower price for Pepsi will tend to lead some people to buy more Pepsi and less Coke. Goods are called *substitutes* when a lower price of one good leads people to buy less of the other. On the other hand, pizza and Coke (or pizza and beer) are goods that tend to be consumed together. Cheaper pizza will lead consumers to buy more pizza and also more Coke. Goods such as pizza and Coke, where a lower price of one leads to higher consumption of both, are referred to as *complements*.

Another set of concepts describes the relation between the demand curve and the consumer's level of income. Goods that have a positive relationship between income and demand are called *normal goods*. Goods whose demand falls when

income rises are called *inferior goods*. Inferior goods may include generic or off-brand products at the grocery store, older used cars, or less savory examples such as discarded food from restaurants. As people's incomes rise, they are less likely to consume inferior goods.

Shifts in the demand curve

If there are changes in any of the demand factors other than price, the demand curve will shift either leftward or rightward. Similarly, a change in price (or a shift in supply) will *not* lead to a shift in the demand curve. The rule for how the change in a variable affects demand can be summarized in the following rule:

If you see the variable on the axis (i.e. price), its relationship to quantity is seen in the slope of the demand curve. If you don't see the variable on an axis, its effect on quantity is seen as a shift in the curve.

Your Turn 2.2

In Figure 2.1 below, the initial demand curve for cola is D_1 . Label the location of the demand curve after each of the following events. Is each event below consistent with a new demand at D_1 , D_2 , or D_3 ?

- (a) Researchers find that Coke cures warts.
- (b) Papa Joe's pizza goes on sale.
- (c) The population of caffeine addicts declines.
- (d) Pepsi goes on sale.
- (e) Coke goes on sale.

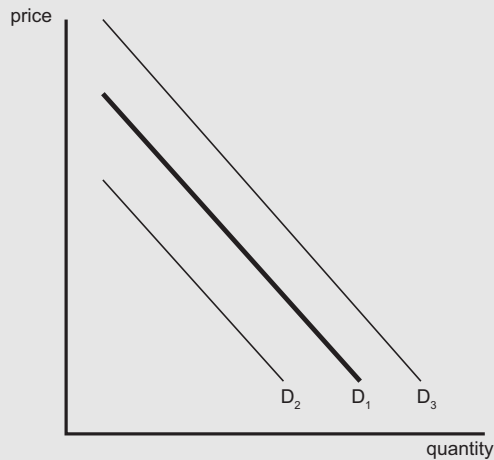


Figure 2.1 Demand for Coke

A mathematical example may help to explain why a change in one of the invisible demand variables such as income shifts the demand curve. Assume that Spuds' daily demand for Coke is determined by the price of Coke, the price of Pepsi, and income, as in Equation 2.2:

Equation 2.2 $Q_{\text{Coke}} = 2 + .05 \text{ Income} + .5 P_{\text{Pepsi}} - 1 P_{\text{Coke}}$

The positive relationship between the demand for Coke and income means that Coke is a normal good, while the positive relationship between the price of Pepsi and the quantity demanded of Coke means that the goods are substitutes (a higher price of Pepsi means more Coke will be demanded). If his daily spendable income is \$40, and the price of Pepsi is \$1, substituting these numbers into the demand function produces:

Equation 2.3 $Q_{\text{Coke}} = 2 + .05 (40) + .5(1) - 1 P_{\text{Coke}}$, or
 $Q_{\text{Coke}} = 2 + 2 + \frac{1}{2} - 1 P_{\text{Coke}}$, or
 $Q_{\text{Coke}} = 4.5 - 1 P_{\text{Coke}}$

Solving this equation for price gives us the usual graphical form of the demand curve:

Equation 2.4 $P_{\text{Coke}} = 4.5 - Q_{\text{Coke}}$

This demand is D_1 in Figure 2.2.

Now, if his daily income falls to \$20, the demand function in Equation 2.2 becomes:

Equation 2.5 $Q_{\text{Coke}} = 2 + .05 (20) + .5(1) - 1 P_{\text{Coke}}$, or $P_{\text{Coke}} = 3.5 - Q_{\text{Coke}}$

This demand is D_2 in Figure 2.2.

Notice by comparing Equations 2.2 and 2.5 that the slopes of the demand curves are the same but the endpoint is lower after income falls.

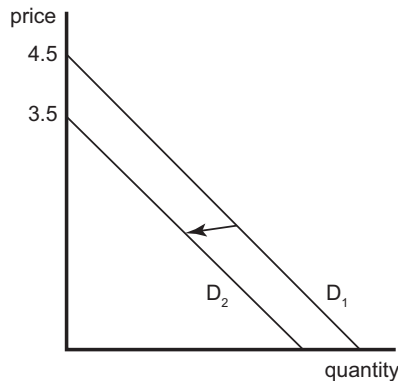


Figure 2.2 Demand shift

Your Turn 2.3

If income rises to \$60 per day, find the new demand curve equation and compare it to the original curve in Figure 2.2.

Supply

Supply is a concept that summarizes the decisions of producers in a market. The economically rational decision to produce a product involves weighing the benefits and costs of producing each additional unit of a good and choosing the quantity for which the marginal benefit or revenue equals the marginal cost. As with demand, the quantity of goods supplied to the market depends on many different factors, which can be summarized in a supply function. In a simple supply function, the quantity produced will depend on the price of the product, the prices of inputs (goods used in the production process), technology or productivity, and the number of firms producing the product. Equation 2.6 presents a simple supply function:

$$\text{Equation 2.6 } Q_{\text{supplied}} = f(\text{price, labor cost, other input prices, technology, the number of firms})$$

The *supply curve* is a graph of the relation between the price of the product and the quantity produced holding all other parts of the supply function fixed. It is generally true that a rise in the price will lead to higher levels of production. Therefore, the price of a good has a positive or direct relationship to the quantity supplied. If any other factor affecting supply changes, this change will appear as a leftward or rightward shift in the supply. Note that a rightward shift is correctly labeled as an increase in supply due to the higher quantity offered at each price, even though the curve is moving downward vertically.

Equilibrium

Equilibrium exists in a market when the quantity supplied equals the quantity demanded at a single price, or where the supply and demand curves cross. Markets will tend to move toward an equilibrium price and quantity from any other point. For instance, if the price is below equilibrium (as with P_1 in Figure 2.4), more cola is demanded than is being produced, and a shortage of cola exists. Since some consumers who are willing to buy cola at price P_1 cannot do so because of the shortage, they may offer to pay a higher price. Similarly, dealers may notice the lines of people waiting for Coke or the low inventory of Coke on their shelves, and raise the price on their own. Either way, the rising price will stop some

Your Turn 2.4

In order to analyze various shifts in supply, see Figure 2.3 below. Starting from S_1 , will each event below lead to a new curve such as S_2 , S_3 , or S_4 ?

- (a) Bean beetles decimate the cola crop.
- (b) Cola workers demand higher wages.
- (c) Sugar prices tumble.
- (d) New technology allows firms to transport beans directly to the factory (“beam them up, Scotty”).
- (e) The demand for cola rises.

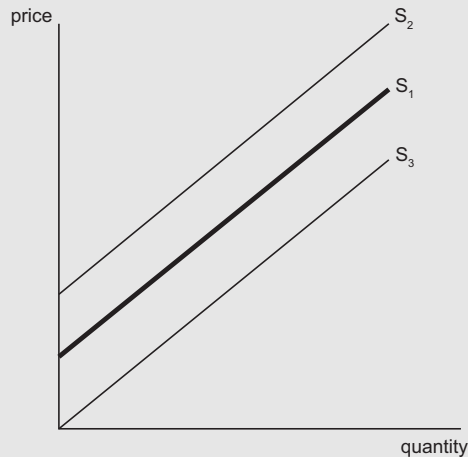


Figure 2.3 The supply of cola

consumers from buying, and also lead to a larger quantity of coke supplied, until the shortage disappears at price P_2 and quantity Q_2 .

Equilibrium using equations

As Figure 2.4 shows, equilibrium involves a single price at which the quantity demanded equals the quantity supplied. In algebraic form, an equilibrium will involve three simple equations, a demand curve equation, a supply curve equation, and an equilibrium equation, which simply states that, at equilibrium, the left-hand sides of the two equations are equal ($P_s = P_d$ or $Q_s = Q_d$), since at equilibrium both price and quantity are the same for demand and supply. Here are two examples.

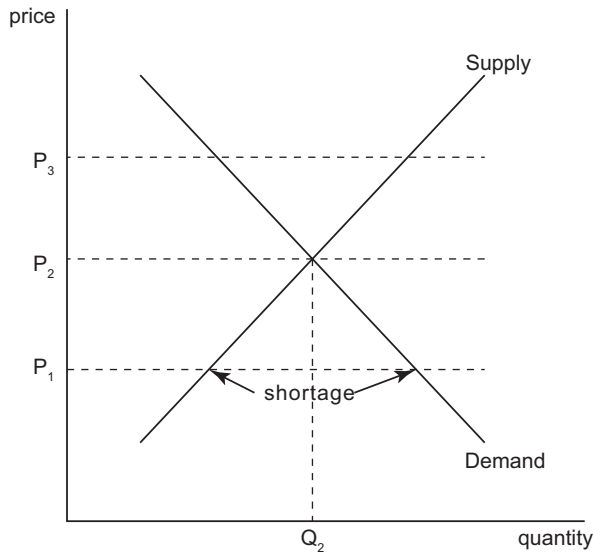


Figure 2.4 The cola market

Your Turn 2.5

Find the equilibrium price and quantity for the following sets of equations. (Hint: substitute the right sides of the demand and supply equations into the equilibrium equation, then solve.)

Example A: Cola

Demand: $P_d = 100 - \frac{1}{2} Q_d$

Supply: $P_s = 20 + \frac{1}{2} Q_s$

Equilibrium: $P_d = P_s$

Example B: Cola

$Q_d = 200 - 2P_d$

$Q_s = -40 + 2P_s$

$Q_d = Q_s$

Elasticity

Another concept from introductory microeconomics that has important implications for some public policies is *elasticity*, which in the most general terms refers to the responsiveness of the quantity of a good to a change in a part of the demand or supply function, such as the good's price, the consumer's income, or the prices of an input for production. The elasticity concept will be introduced using the price elasticity of demand, the first elasticity to be considered in most or all introductory texts. To review briefly, the *price elasticity of demand* provides a numerical value of the responsiveness of the quantity demanded to a change in the price of the product. In general terms, the price elasticity of demand is defined as the percentage change in quantity divided by the percentage change in price

$(\% \Delta Q / \% \Delta P)$ or $(\Delta Q / Q) / (\Delta P / P)$. If one is measuring elasticity by moving from one point to another along a demand curve, a slightly more detailed formula is generally used. Demand elasticity at the introductory level is usually defined by the *midpoint formula*, where the percentage changes in price and quantity are measured using the average of the old and new prices and quantities. Using the midpoint formula (see Equation 2.7 below) gives a consistent answer regardless of which direction one moves along the demand curve, as well as being more consistent regarding implications of price elasticity discussed later in this section. If one moves from point A to point B (or B to A) on the demand curve, the elasticity of demand is calculated using the following formula:

$$\text{Equation 2.7} \quad \text{elasticity} = \frac{\frac{\Delta Q}{(Qa + Qb)/2}}{\frac{\Delta P}{(Pa + Pb)/2}} = \Delta Q / \text{average } Q \div \Delta P / \text{average } P$$

Because price and quantity move in opposite directions along a downward-sloping demand curve, price elasticity will almost always be negative. Because it is more difficult to refer to negative numbers verbally, economists and policy analysts generally discuss price elasticity in terms of its absolute value. In reviewing the meaning of this elasticity measure, let's assume that the price of oil is rising. If the absolute value of elasticity is greater than 1, the demand for oil is referred to as *elastic*. Elastic demand means that the percentage decrease in quantity purchased is larger than the percentage rise in price. On the other hand, if the percentage decrease in the quantity demanded for oil is less than the percentage rise in price, the absolute value of elasticity will be less than 1, and demand will be referred to as *inelastic*. It is also possible that the percentage decrease in quantity will equal the percentage increase in price, giving an elasticity value of 1. This result is labeled *unit elastic*.

Your Turn 2.6

Assume that the government of Amnesia recently increased the minimum wage from \$7 to \$9. The Amnesian government knows that an economist predicted that employment of Amnesian teens would drop from 101 to 99 as a result of the higher wage, but they don't remember why this is important.

- A Using the midpoint formula, find the price elasticity of demand for Amnesian teens. Is demand elastic, inelastic, or unit elastic over this price range?
- B Another economist claims that teen employment would fall from 120 to 80 as a result of the same wage increase. Find this economist's predicted elasticity of demand. Is this elasticity elastic, inelastic, or unit elastic?

The primary implication of price elasticity is its ability to predict the effect of a change in price on total spending in a market. Total spending equals price multiplied by quantity. If demand is elastic, a price increase leads to a proportionally larger decrease in quantity, and total spending falls. If demand is inelastic, a price increase causes customers to reduce their quantity demanded by a smaller proportion and total spending will rise.

Your Turn 2.7

Let's return to Amnesia to continue our previous Your Turn example. The total earnings of minimum wage teenage labor (per hour) in Amnesia will equal the wage multiplied by the number of employees. Find the total earnings for these teens before and after the minimum wage increase for both sets of employment predictions in **Your Turn 2.6**. Are the changes in total earnings consistent with the elasticity of demand estimates for Amnesian teens?

The net benefits of consumption

One of the most profound contributions of early classical economists such as Adam Smith is the principle of *mutually beneficial trade*, which in simple terms states that free and informed trade in a market generally benefits both buyers and sellers. Defining these net benefits for consumers and producers involves two crucial concepts in policy analysis, consumer and producer surplus. Each will be explained carefully below.

In theory, the consumer will weigh the benefits and costs of each unit purchased and buy only those units for which the marginal benefits are greater than or equal to the marginal costs. The benefits of consumption are not directly measured in terms of money, and for good reason. The pleasure we receive from consumption is generally experienced in terms of an emotional or perceptual response, such as increased happiness or decreased discomfort. Economists summarize these non-monetary benefits in the rather dull word, *utility*.

Definitions

Marginal utility is the utility gained by consuming one more unit of a product.

Total utility is the satisfaction gained from all units consumed. It also equals the sum of the marginal utilities of all units consumed.

For most consumers and most products, the marginal utility of the second unit is less than that of the first unit, the marginal utility of the third is less than that of the second, and so on. This behavioral principle is called *the law of diminishing marginal utility*. For example, a hiker emerging from a desert trail may be in extreme discomfort due to thirst. His or her first glass of water will provide a high level of marginal utility because it eliminates the most urgent discomfort caused by his or her thirst. A second glass probably will also offer considerable marginal utility, but less than the first. This pattern of positive but decreasing marginal utility will continue for additional glasses of water that might be used for rinsing our face, our feet, or our pet. It is also common for marginal utility to eventually reach zero and then become negative. This would be consistent with the common phrase “too much of a good thing.”

Under most circumstances, utility cannot be directly measured. However, in order to assess the benefits of public policy, we must have some way of measuring these benefits. Fortunately, the demand curve offers a simple way of approximating the marginal utility of consumption in dollar terms. The height of the demand curve at a given quantity represents the maximum consumers are willing to pay for that particular unit of the good. In Figure 2.5 below, we assume that Carrie has a relatively high marginal utility for coffee. Because of this high marginal benefit from consuming coffee, she is willing to pay a maximum of \$8 for her first mug of the day. As a rational consumer, she will pay as little as possible for coffee, but if she was forced to, she would buy the first mug for any amount up to \$8.

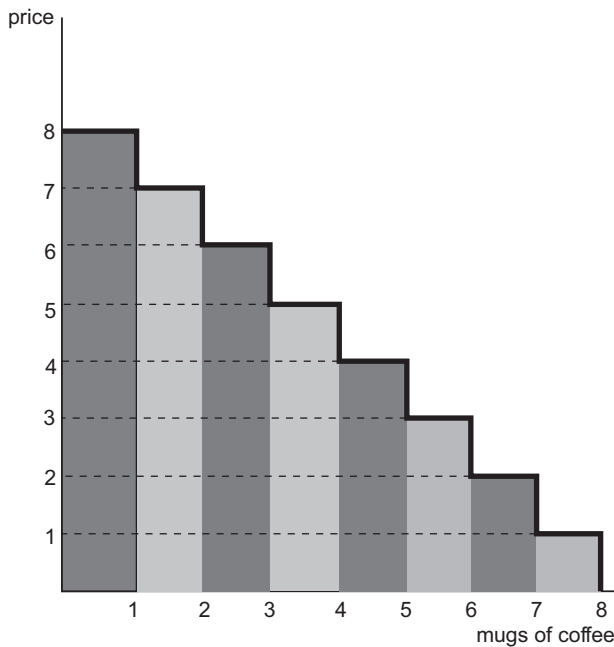


Figure 2.5 Carrie's demand for coffee

Since \$8 is the *maximum* amount she would be willing to pay, the utility of the first mug of coffee is about equal to the utility she could get by spending the \$8 on her next best alternative choice. This thought experiment suggests that the maximum a person is willing to pay for a particular unit of a good provides a useful way of estimating the marginal utility of consuming that unit. At this point, two concepts that will be used to define the dollar-valued benefits of consumption are necessary.

Figure 2.5 represents Carrie's demand for coffee. If we assume that Carrie can buy only whole mugs, we can draw her demand as a series of steps ending at each whole number. This type of graph is called a step function, for obvious reasons.

Definitions

The *marginal value* of consumption is the maximum a person is willing to pay for a particular unit of a good.

The *total value* of consumption is the sum of the marginal values for all units actually consumed.

Your Turn 2.8

See Figure 2.5. If Carrie consumes five mugs of coffee, what is the marginal value of the last mug? What is the total value of all five mugs combined?

If the demand curve is represented by a straight line rather than a step function, the marginal value and total value concepts are the same, but the method one uses to find numerical values for these concepts changes. In Figure 2.6, consumers are buying 10 mugs of coffee at a price of \$10 each. The height of the demand curve determines the marginal value, as before. With a linear demand curve, however, total value will equal the area under the demand curve between the vertical axis and the quantity bought in the market. For those with a calculus background, a definite integral will suffice. For others, dividing the total value into two areas, the rectangle below the price and the triangle above the price, allows one to find the total value by calculating the areas of the rectangle and triangle (areas A and B in Figure 2.6) and adding them.

Your Turn 2.9

Find the total value for coffee purchased given the demand curve in Figure 2.6.

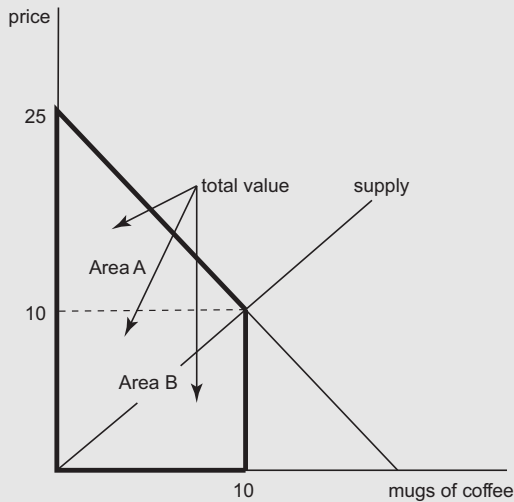


Figure 2.6 Total value

The marginal and total value concepts are sufficient to provide a measurable dollar-based estimate of the satisfaction one receives from consuming a good such as coffee.

The cost and net benefits of consumption

As noted in the elasticity section, a consumer's *total spending* on a good equals the price of the good multiplied by the number of units purchased. Total spending appears in a typical market graph as a rectangle bounded by the equilibrium price and quantity.

Your Turn 2.10

What is the total spending in Figure 2.6?

If we define total value as our measure of the benefits of consumption and total spending as the cost of consumption, then the net benefits of consumption will equal the total benefits minus the total cost, or total value minus total spending.

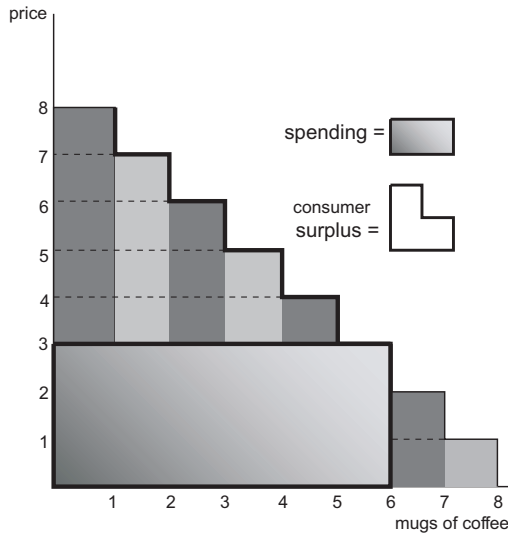


Figure 2.7 Carrie's consumer surplus for coffee

Definition

The net benefit of consumption, or the difference between total value and total spending, is called *consumer surplus*.

In Figure 2.7, Carrie's demand for coffee is reconsidered using this new concept. Let's consider the first mug of coffee. \$8 is Carrie's marginal value for the first mug of coffee. If the price of coffee is \$3 per mug, Carrie receives a net benefit or consumer surplus of \$5 for the first mug. The consumer surplus for each additional unit can be calculated in the same way. The total consumer surplus is then found by adding the consumer surpluses of each unit actually purchased. As long as the price is less than or equal to the maximum willingness to pay, Carrie will buy that mug. In Carrie's case, she will buy six mugs, rather than five.

Your Turn 2.11

See Figure 2.7 for Carrie's consumer surplus. Find the number of mugs Carrie will purchase at a price of \$3, and then find her total spending, consumer surplus, and total value in dollars.

If demand curves are linear, the consumer surplus equals the area of the triangle above the price but below the demand curve (area A in Figure 2.6), while the rectangle below the price (area B) equals total spending for that good.

Your Turn 2.12

Calculate the consumer surplus, total spending, and total value for Figure 2.6.

The primary lesson of this analysis is that if rational consumers are able to make free and informed decisions, they will only buy those units of a good such as coffee that provide a positive or zero marginal consumer surplus. By doing this, they will maximize their total consumer surplus.

Your Turn 2.13

Combining the market equilibrium and consumer surplus concepts is an important starting point for analyzing the efficiency of markets and the effects of public policy, analysis that begins in Chapter 4. Assume that the following demand and supply equations define a market for public transportation. Assume Q measures thousands of bus rides.

$$\text{Demand: Price} = 12 - 2Q \quad \text{Supply: Price} = 3 + Q$$

- A Find the equilibrium price and quantity, and sketch both demand and supply curves, including endpoints and equilibrium values.
- B Find the consumer surplus, total spending, and total value to the consumer of this market.
- C Assume the government passes a \$3 per ride subsidy that shifts the supply curve down to $\text{Price } 0 + Q$. Find the new equilibrium price and quantity, and the new consumer surplus. How much better off are consumers with the subsidy? (Hint: find the difference between the new and old consumer surplus values.)

The net benefits of production

In a competitive market model, producers are also assumed to be rational, informed, and powerless with regard to the price they charge for their product. Like the consumer, they may produce and sell as much or as little as they wish given the market price for the product, the cost of the inputs they buy, and the limits of their technology. Like the consumer, the seller wishes to maximize his or her well-being, and will produce and sell any unit of a good that offers marginal benefits greater than or equal to its marginal costs. Because the basic model of the rational

producer bears many similarities to that of the consumer, we can explain the basic net gains to producers relatively briefly. We will assume that the only measurable gross benefit to producers is the revenue they make through sales of their product. As with consumer spending, sellers' total revenue equals the price per unit (P) multiplied by the number of units sold (Q), and appears as a rectangle on a supply-demand graph.

In order to consider suppliers' costs and net benefits, we must ask the following question: *What is the minimum price at which the firm is willing to produce and sell a given unit?* The height of the supply curve for any unit defines the minimum price at which that unit would be produced and sold. The height of the competitive firm's supply curve at a particular quantity also equals the marginal cost of producing that unit. Therefore, the supply curve tells us that the minimum price at which a particular unit will be produced must be high enough to equal the marginal cost of producing that unit.

The total variable cost of production, generally labeled the *opportunity cost* in the market model, is visualized as the area under the supply curve and to the left of the quantity produced. Mathematically, it equals the sum of the marginal costs for all units produced. See Figures 2.8 and 2.9 below.

If the price is greater than the marginal cost of producing a given unit, then producing that unit will provide a net benefit to the producer. The net benefit to the suppliers of a good in a market is known as *producer surplus*. Producer surplus equals the difference between total revenue and the opportunity cost of production.

Definitions

Revenue: price multiplied by quantity sold.

Opportunity cost: The sum of the marginal costs of producing each unit, and also the area under the supply curve and to the left of the quantity produced.

Producer surplus: The total revenue of producers minus the opportunity cost of production. Producer surplus is the area between the market price and the height of the supply curve for a given unit of a good.

For example, the first mug of coffee in Figure 2.8 costs 50 cents to produce but brings in \$3 in revenue. Therefore, the producer will receive a producer surplus of \$2.50 for that unit. Similarly, the third unit costs \$1.50 to produce, brings in \$3 in revenue, and has a producer surplus of \$1.50 for that unit. The total producer surplus is the sum of the producer surpluses for all units produced and sold.

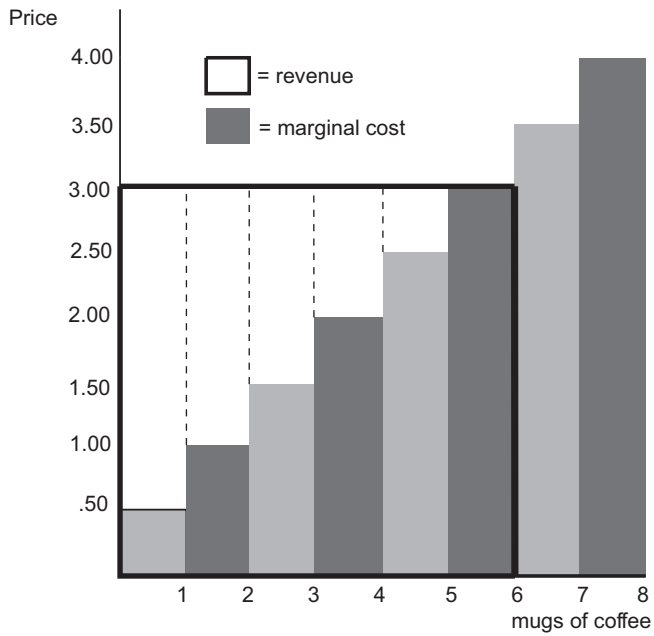


Figure 2.8 Costs and benefits of production

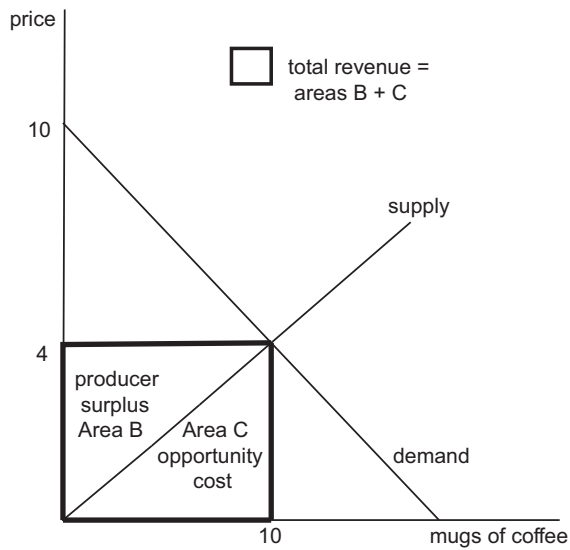


Figure 2.9 Producer surplus, opportunity cost, and revenue