# Economics and consumer behavior

**Angus Deaton,** Professor of Econometrics, University of Bristol
**John Muellbauer,** Professor of Economics, Birkbeck College

**Cambridge University Press**
Cambridge
London · New York · New Rochelle
Melbourne · Sydney

Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
32 East 57th Street, New York, NY 10022, USA
296 Beaconsfield Parade, Middle Park, Melbourne 3206, Australia

© Cambridge University Press 1980

First published 1980

Printed in the United States of America
Typeset by Progressive Typographers, Inc., Emigsville, PA
Printed and bound by Vail-Ballou Press, Inc., Binghamton, NY

*Library of Congress Cataloging in Publication Data*

Deaton, Angus.

Economics and consumer behavior.

Bibliography: p.

Includes index.

1. Consumption (Economics) 2. Consumers.

3. Utility theory. I. Muellbauer, John, joint author.
II. Title.
HB801.D36 658.8'34 79-17090
ISBN 0 521 22850 6 hard covers
ISBN 0 521 29676 5 paperback

# PREFACE

This book is about the economic theory of consumer behavior and its uses in economic analysis. It is about the tools and language of utility theory and their application to a field that ranges from empirical work on commodity demand to abstract questions of social choice. The basic theory is the familiar one, although we have made extensive use of cost functions and related "duality" concepts to present it in a way that simplifies what is often seen as difficult or inaccessible material. This, and the range of subject matter, broader than any previous book on consumer behavior, are the most distinctive features of the book. Our main purpose in writing it is to provide in one place a complete toolbox of utility theory together with a demonstration of the power of these tools in action over a wide front of economics. Although the use of utility theory runs as a common thread throughout the book, only a fraction of the space deals with the standard textbook model of choice subject to a linear budget constraint. In recent years, important work has been done in many areas of economics by applying consumer theory to nonstandard situations, for example, to discrete choice, to rationing, to labor supply, to fertility, to quality choice, to choice with complex nonlinear budget constraints resulting from tax and benefit systems, liquidity constraints, uncertainty, and so on. Most of this work emphasizes careful modeling of the *constraints* that consumers face, including the statistical and econometric consequences. We believe this to be a productive approach and much of the book is concerned with it. There is a further area of economics that uses consumer theory as an essential input and that has progressed rapidly in recent years. This is the field of welfare economics, including index number theory and social choice. Many of the important developments in that field are based on straightforward applications of the theory discussed in this book, and we include these examples as part of our catalog of the usefulness of utility theory in economics.

The book is designed to be used in courses teaching theoretical and applied economics at the level of final year undergraduates (particularly Part One) and of graduate courses leading to M.A. and Ph.D. degrees. It should also be of use to professional economists who have a direct or indirect interest in consumer behavior. The structure of the book is designed to permit maximum flexibility in use. Part One, which covers the basic theory and its applications,

including the consumption function, durable goods and labor supply, is a self-contained module. Except where indicated, this material is written to be accessible to final year undergraduates and can be used as an introductory complete course or as a refresher for those who want a straightforward presentation of duality in demand theory. Part One is also a prerequisite for other sections of the book. Part Two is a largely theoretical discussion of aggregation and separability; this will be of greatest interest to specialists in economic theory (e.g., in a graduate theory course), but the main issues are discussed informally in the early sections of both chapters. Part Three is on welfare economics; the chapters on index numbers and household welfare comparisons are straightforward and form a natural extension to Part One for undergraduate use. The chapter on social choice and inequality is inevitably more difficult and is at a similar level to the material on separability. Part Four is more heterogeneous and is designed largely for graduate use. In each of the topics discussed we have attempted to face the subject matter on its own terms, going well beyond traditional confines when the material demands it. If the discussion occasionally becomes difficult, we hope it will be rewarding, because it is in these chapters that many of the most interesting applications of consumer theory are to be found. Given Part One, Chapters from 10 through 14 can be combined in numerous combinations with blocks from Parts Two and Three. We also envisage much of this material, particularly Chapters 11, 12, and 13 on labor supply, the consumption function, and durable goods, as well as Chapter 3 of Part One, being used as parts of applied econometrics courses. Even so, although we frequently discuss the formulation of likelihood functions and present empirical results, we have spent little time on specifically econometric issues, mostly for reasons of space.

There are no mathematical prerequisites for this book other than a good knowledge of calculus, including partial differentiation, and a familiarity with notions of concavity and the basic concepts of mathematical statistics. Unlike many texts on consumer theory, this book makes little use of matrix algebra apart from the largely notational use of vectors and dot products. In Chapters 1 through 8, which contain the material that is generally suitable for undergraduate work, harder sections are starred (*) or double starred (**); the latter can be omitted at first reading even by a reader continuing to Part Four. We have included over three hundred exercises that seek to complete, reinforce, or extend the material in the text. Those which are more difficult than their immediate neighbors are starred; some of these are very difficult indeed. Each chapter ends with a guide to further reading and all works cited are listed together at the end of the book.

Writing this book, we have accumulated debts to many people. Intellectual debts are the most important and the hardest to quantify, but the influence, work, and example of both Richard Stone and Terence Gorman have had

试读结束：需要全本请在线购买： www.ertongbook.com

great effects over the years on the way we have come to approach the subject. More specifically, we have been heavily dependent on the advice and comments of colleagues who read preliminary drafts of chapters on specialist subjects. In this context we should like to thank David Demery, Peter Hammond, Oliver Hart, Tony Jackson, Richard Layard, Richard Lecomber, and Amartya Sen. General comments, particularly on drafts of the early chapters, were made by Erwin Diewert, Avinash Dixit, Ben Fine, the late Miles Fleming, Arnold Merkies, Jan van Overhagen, and Henri Theil. We are especially grateful to Gerald Kennally who read and commented on it all. Not least, several groups of students at the universities of Amsterdam, Bristol, and Birkbeck, London, suffered through early versions; the protests of John Wrigglesworth, in particular, were most effective in securing remedial action. The typing was done with great speed, precision, and unfailing pleasantness by Mary Harthan and Gillian Baker in Bristol. Finally, our greatest thanks go to Helge and to Catherine who put up with us while we wrote it.

*University of Bristol*
*Birkbeck College*

Angus Deaton
John Muellbauer

CONTENTS


*List of tables and figures* — *page* viii
*Preface* — xii

PART ONE CONSUMER DEMAND ANALYSIS — 1

**1 The limits to choice** — 3
1.1 The nature of opportunity sets — 4
1.2 The implications of a linear budget constraint — 14

**2 Preferences and demand** — 25
2.1 Axioms and utility — 26
2.2 Utility and demand — 31
2.3 Cost minimization and the cost function — 37
2.4 Properties of demands — 43
2.5* Duality in the theory of demand — 47
2.6* Revealed preference theory — 51
2.7** The distance function — 53

**3 The theory at work** — 60
3.1 Stone's analysis — 61
3.2 The linear expenditure system — 64
3.3 Testing the theory — 67
3.4 A new model of demand — 75
3.5 An assessment — 78

**4 Extensions to the basic model** — 86
4.1 The simple neoclassical model of labor supply — 86
4.2 Intertemporal extensions, the consumption function, and durable goods — 97
4.3 Constraints on purchases and rationing — 109

PART TWO SEPARABILITY AND AGGREGATION — 117

**5 Restrictions on preferences** — 119
5.1 Commodity groups and separability: an elementary overview — 120
5.2* Separability and two-stage budgeting: further results — 127

5.3 Strong separability and additive preferences 137
5.4 Homotheticity and quasi homotheticity 142

**6 The theory of market demand** 148
6.1 Exact linear aggregation 149
6.2* Exact nonlinear aggregation 154
6.3 Aggregation with endogenous labor supply 159
6.4 Aggregation under restrictions 161

PART THREE WELFARE AND CONSUMER BEHAVIOR 167

**7 Consumer index numbers** 169
7.1 The true index of the cost of living 170
7.2 Quantity indices and real consumption indices 179
7.3 Cost-of-living subindices 182
7.4 Consumer surplus 184

**8 Household characteristics, demand, and household welfare comparisons** 191
8.1 Engel's approach 193
8.2 Commodity specific generalizations of Engel's model 196
8.3 Empirical applications 202
8.4 Equivalence scales in perspective 205

**9 Social welfare and inequality** 214
9.1 Social welfare functions and their arguments 214
9.2 Social welfare and inequality 227

PART FOUR EXTENSIONS AND APPLICATIONS 241

**10 The quality of goods and household production theory** 243
10.1 Household production theory 245
10.2 The relevance of household production theory to quality measurement 254
10.3 An alternative view of quality 260
10.4 Other aspects of quality 270

**11 Labor supply** 273
11.1 The participation decision 273
11.2 Nonlinear constraints and restrictions on hours 281
11.3 Labor supply in the long run 294

**12 The consumption function and intertemporal choice** 309
12.1 Intertemporal planning and the life cycle 309
12.2 The dynamics of income and consumption 325
12.3 Information 336
12.4 Consistency in intertemporal choice 340

**13 The demand for durable goods** 345
13.1 Neoclassical models 347
13.2 Stock-adjustment models and costs of adjustment 352
13.3 The discretionary replacement model 355
13.4 Constraints on sales and on borrowing 359
13.5 Discrete choice, diffusion, and cross-section analysis 366
13.6 Habits and lags 373

**14 Choice under uncertainty** 380
14.1 The characterization of uncertainty 381
14.2 The axioms of choice under uncertainty and expected utility maximization 387
14.3 Some standard applications: risk aversion and the allocation of wealth 395
14.4 Intertemporal consumption decisions under uncertainty 405
14.5 Other applications: the theory of search 410

*References* 414
*List of notation* 437
*Name index* 443
*Subject index* 447

# TABLES AND FIGURES

*Tables*


1.1 The assurance game: payoffs (years in jail) for prisoners A and B 14
1.2 Parameter estimates for four Engel curves 20
3.1 Sample results from Stone's analysis of foods 63
3.2 Stone's linear expenditure system results 67
3.3 Symmetric Rotterdam model: U.K. 1900–70 71
3.4 Tests of homogeneity on British data 1954–74 78
7.1 The distributional impact of inflation in the U.K. 1965–76 177
8.1 The Amsterdam scale 193
8.2 Commodity specific and general equivalence scales from the Barten and Prais-Houthakker models for households with a young child and households with an older child 203
10.1 A hedonic regression for British used cars 264
11.1 Estimated probabilities of working 280
11.2 Employment states and probabilities 293
13.1 Age of cars traded in by new car buyers 356
14.1 Payoff matrix 382
14.2 The lottery 391


*Figures*


1.1 A linear budget constraint with a survival constraint 4
1.2 Budget constraint in a barter economy 6
1.3 The budget constraint with a two-part tariff 7
1.4 Budget constraint between leisure and other goods with transfer income 8
1.5 The budget constraint for leisure and other goods in the presence of overtime premia and an income tax 9
1.6 The budget constraint with three alternative jobs 9
1.7 Intertemporal choice with "imperfect" capital markets 10
1.8 The budget constraint for the outputs of household production 11
1.9 The budget constraint for the diet problem with four market goods 11
1.10 The allocation problem between two individuals when output depends on distribution 12

1.11 The violation of adding-up by constant elasticity demand functions 18
1.12 Engel curves for model (2.17) 20
1.13 The basis for downward-sloping demand curves 22

2.1 Strictly convex preferences 29
2.2 Convex but not strictly convex preferences 30
2.3 Case (1) 32
2.4 Case (2) 33
2.5 Case (3) 34
2.6 Case (4) 34
2.7 Income and substitution effects in Case (4) 35
2.8 Utility maximization and cost minimization 38
2.9 The concavity of the cost function 39
2.10 Demand, cost, and indirect utility functions 41
2.11 Primal and dual indifference curves 47
2.12 Indifference curve and cost function with nonconcavity 49
2.13 Revealed preference and the law of demand 52
2.14 The distance function 54
2.15 Compensated inverse demands 56

4.1 The consumption-leisure choice 88
4.2 Income and substitution effects comparing the standard case with the case of a wage change 90
4.3 A backward bending labor supply curve 92
4.4 Intertemporal consumption allocation 100
4.5 Long- and short-run cost functions 111
4.6 The shadow price of the ration $z$ 113

5.1 A possible utility tree 123
5.2 Price elasticities estimated from the linear expenditure system and an alternative model. (From A. S. Deaton, *European Economic Review*, Vol. 6, 1975.) 140
5.3 Homothetic preferences 143

6.1 Linear Engel curve 152

7.1 Base-weighted true and Laspeyres price indices 171
7.2 Current-weighted true and Paasche price indices 172
7.3 Money metric utility 179
7.4 Quantity metric utility 181
7.5 Marshallian consumer surplus 185
7.6 Equivalent and compensating variations 187

试读结束：需要全本请在线购买： www.ertongbook.com

8.1 The Engel model for measuring equivalence scales 195
8.2 The indifference curves for the Prais-Houthakker model 198
8.3 The change in the equivalence scale comparing the Barten and the Prais-Houthakker models 199
8.4 The choice between children and utility from consumption 210
8.5 The downward bias of the cost of children for poor families 211

9.1 Utilitarian and nonutilitarian social welfare functions 219
9.2 Distribution of a fixed total between an aesthete and a boor on utilitarian principles 220
9.3 Rawlsian social welfare contours and the unimportance of cardinality 221
9.4 An anonymous homogeneous social welfare function 228
9.5 The measurement of inequality 230
9.6 Intersecting and nonintersecting Lorenz curves 233
9.7 Social welfare contours for two inequality indices 235
9.8 Simplex for three households 236
9.9 Social welfare contours in the 3-household simplex 237

10.1 Choice in the household production model 246
10.2 The characteristics model 251
10.3 Bias in the Laspeyres index based on shadow prices 257
10.4 The hedonic price schedule for consumers with different tastes 258
10.5 Perfect substitutes 262
10.6 The envelope property of the hedonic price schedule 266

11.1 The minimum wage necessary to induce participation 274
11.2 Selectivity biases in a cross section of hours worked 278
11.3 Leisure-goods budget constraint with a progressive income tax 281
11.4 The poverty trap 282
11.5 Linearizing a convex budget constraint 283
11.6 Restricted hours 284
11.7 Flexibility in hours with an overtime premium 287
11.8 A sectoral labor market with excess supply 288
11.9 A sectoral labor market with excess demand 289
11.10 Choice of income profile to maximize present value 295
11.11 Choice of consumption profile to maximize utility 296
11.12 Present value maximization subject to a perceived earnings function 302
11.13 Earnings function kinked at high school completion 304
11.14 Simple illustration of path analysis 305

12.1 Life-cycle wage profiles for typical manual and nonmanual workers 312
12.2 The effect of a borrowing constraint 318

13.1 User cost series for British consumer durable stock for 1955–1976, as computed in Muellbauer. (From "Testing neoclassical models of the demand for durables," in A. S. Deaton, ed., *Essays in the Theory and Measurement of Consumer Behaviour,* Cambridge: Cambridge University Press, 1980.) 350
13.2 Sales and borrowing constraints not binding 361
13.3 Borrowing constraint binding, sales constraint not binding 362
13.4 Sales constraint binding, borrowing constraint not binding 362
13.5 Both borrowing and sales constraints binding 363
13.6 Borrowing and sales constraints binding when the buying price exceeds the selling price 363
13.7 Choices of two households faced with binary choice 367
13.8 The derivation of threshold expenditure $x_T(\epsilon)$ 368
13.9 Television ownership per 1,000 population in selected countries 370

14.1 Continuous state and consequence variables 383
14.2 The budget set with two states and two assets 384
14.3 Risk averse indifference curve 386
14.4 The sure-thing principle 390
14.5 Concave, risk-averse utility 397
14.6 A Friedman-Savage utility function 398
14.7 Negative exponential utility function 401
14.8 Portfolio choice in the mean-variance model 403
14.9 Present and future consumption with uncertainty about future income 407

PART ONE

# Consumer demand analysis

The limits to choice • Preferences and demand • The theory at work • Extensions to the basic model

CHAPTER 1

# The limits to choice

Consumer behavior is frequently presented in terms of preferences, on the one hand, and possibilities on the other. The emphasis in the discussion is commonly placed on *preferences,* on the axioms of choice, on utility functions and their properties. The specification of which choices are actually available is given a secondary place and, frequently, only very simple possibilities are considered. In this book, we shall have a great deal to say about preferences, and discussion of them begins in Chapter 2. We begin, however, with the *limits to choice* rather than with the choices themselves. Unlike preferences, the opportunities for choice are often directly observable so that, to the extent that variations in behavior can be traced to variations in opportunities, we have a straightforward and objective explanation of observed phenomena. It is our view that much can be so explained and that the part played by preferences in determining behavior tends to be overestimated. Hence, this first chapter considers what can be said about behavior without detailed consideration of how choices are made. A large part of this book, from Chapters 2 to 9, works with one very special assumption about the opportunity set, namely that choices are constrained by fixed, known prices in such a way that the total value of the objects chosen should not exceed some predetermined total. In this case, we say that the consumer faces a linear budget constraint. A detailed examination of more complex situations is postponed until Chapters 10 to 14 by which stage the basic material will have been covered. Although this later analysis is technically more difficult, nonlinear budget constraints arise frequently in practice and in §1.1 we present a largely diagrammatic survey of both the linear and nonlinear cases. This provides an elementary introduction to the later material as well as providing a preview of the topics to be covered in the rest of the book. For uniformity of usage, the limits to choice will be described through the "constraints" facing consumers even though, for the moment, nothing is being optimized. Indeed, no formal assumptions are made about choice itself; for the most part, the likely implications of the constraints under consideration will be obvious enough.

Section 1.2 focusses on the simple linear budget constraint that underlies much of the subsequent analysis. Again, without specific assumptions about choices, we can make quite far-reaching deductions about behavior and we

explore the consequences of these for empirical analysis. Finally, as a preparation for Chapter 2, we use a model of *irrational* choice proposed by Becker (1962) to suggest that the use of preference orderings is only one way in which models of consumer behavior may be completed.

## 1.1 The nature of opportunity sets

### *The linear budget constraint*

The simplest and single most important type of opportunity set is that which arises when the household has an exogenous budget, outlay or total expenditure $x$, which is to be spent within a given period on some or all of $n$ commodities. These can be bought in nonnegative quantities $q_i$ at given fixed prices $p_i$. The constraint can then be written

$$x \geq \sum_{i=1}^{n} p_i q_i \tag{1.1}$$

When $n = 2$, (1.1) is illustrated in Figure 1.1 by the area in the triangle $A0B$ since $q_1$ and $q_2$ must be nonnegative. The coordinates of the points $A$ and $B$ are marked; at $A$ all of the budget is spent on good 2 so that $q_2 = x/p_2$ and $q_1 = 0$ and conversely at $B$. Note an immediate complication which arises if there is a basic survival constraint. An example is illustrated in the diagram.

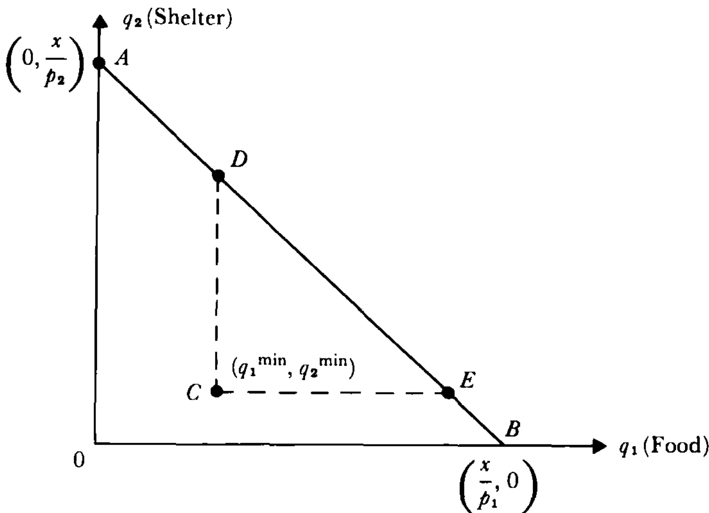


Figure 1.1. A linear budget constraint with a survival constraint.

试读结束：需要全本请在线购买： www.ertongbook.com