

Discrete Choice Analysis Theory And Application To Travel Demand Transportation Studies

This handbook brings together contributions from the top researchers in the economics of food consumption and policy. Designed as a comprehensive guide to academics and graduate students, it discusses theory and methods, policy, and current topics and applications.

Quantitative marketing has been gaining importance during the last decade. This is indicated by the growing number of model- and method-oriented studies published in leading journals as well as by the many successful applications of quantitative approaches in pricing, advertising, new product planning, and market segmentation decisions. In addition, market research has clearly benefitted from applying advanced quantitative models and methods in practice. Some 60 researchers – among them worldwide leading scholars – offer a broad overview of quantitative approaches in marketing. They not only highlight diverse mathematical and methodological perspectives, but also demonstrate the relevance and practical consequences of applying quantitative approaches to marketing problems.

In this primer the authors provide an unintimidating introduction to the main techniques of choice analysis.

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'This collection of papers, by leading researchers in the field, provides an excellent view of the current state of research and applications. Exciting new techniques are presented, and realistic solutions are offered to issues that arise in applied work. It is an admirably rich volume, offering valuable insights for all readers of choice modeling.' Kenneth Train, University of California, Berkeley and NERA Economic Consulting, Inc., San Francisco, California, US 'I'm an enthusiastic fan of the ICMC, where researchers are friendly, genuinely interested in learning from and helping one another. There is much to learn because each discipline brings a different perspective to the field and to theoretical and applied problems in decision-making and choice behavior. The ICMC embodies the philosophy that most real choice problems are complex and require a cross-disciplinary approach. The papers in this volume represent an eclectic cross-section of the topics covered by key researchers in the field. I look forward to getting our PhD students and postdocs stuck into them.' Jordan Louviere, University of Technology Sydney, Australia Choice modelling has been one of the most active fields in economics over recent years. This valuable new book contains leading contributions from academics and practitioners from across the different areas of study where choice modelling is a key analytical technique, drawn from a recent international conference. Choice models explain the behaviour of individuals by quantifying their values, responses and perceptions of attributes describing the various options (alternatives) available to them. Policy makers and planners have long since recognised the potential of using choice models for guidance purposes, with applications in fields as diverse as transport analysis, healthcare, telecommunications, public service evaluation and energy. The unique mix of theoretical and applied chapters will appeal to academics, students, researchers and practitioners in various fields, as well as anyone with a general interest in the subject.

Multidisciplinary graduate and practitioner guide offering the theory and application of stated choice methods.

Provides stated preference data collection methods, discrete choice models, and statistical analysis tools that can be used to forecast demand and assess welfare impacts for new or modified products or services in real markets, and summarize the conditions under which the reliability of these methods has been demonstrated or can be tested.

Balancing simplicity with technical rigour, this practical guide to the statistical techniques essential to research in marketing and related fields, describes each method as well as

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showing how they are applied. The book is accompanied by two real data sets to replicate examples and with exercises to solve, as well as detailed guidance on the use of appropriate software including: - 750 powerpoint slides with lecture notes and step-by-step guides to run analyses in SPSS (also includes screenshots) - 136 multiple choice questions for tests This is augmented by in-depth discussion of topics including: - Sampling - Data management and statistical packages - Hypothesis testing - Cluster analysis - Structural equation modelling

The Handbook of Choice Modelling, composed of contributions from senior figures in the field, summarizes the essential analytical techniques and discusses the key current research issues. The book opens with Nobel Laureate Daniel McFadden calling for d

Discrete choice models are important tools for analysis of individual choice behavior and have been applied in diverse fields, including transport, marketing, economics, environment and so on. This book begins with discussions about basic concepts and theory underlying the econometrics of discrete choice, commonly used models, model building and tests, and applications of choice models. The third chapter categorizes different sources of errors due to the use of network-based level of service (LOS) attributes in disaggregate travel demand modeling. The fourth chapter investigates the errors in variables problem in multinomial choice modeling with an example of logit model of mode choice. The fifth chapter explores the sensitivity of model results to specification of network-based LOS attributes. The sixth chapter addresses the problems of intrazonal trips in mode choice modeling. The seventh chapter extends the analyses using the mixed logit model. I believe that the book will be useful to students, researchers and practitioners in the field of choice modeling generally and travel demand modeling particularly.

Stated Preference Methods Using R explains how to use stated preference (SP) methods, which are a family of survey methods, to measure people's preferences based on decision making in hypothetical choice situations. Along with giving introductory explanations of the methods, the book collates information on existing R functions and packages as well as those prepared by the authors. It focuses on core SP methods, including contingent valuation (CV), discrete choice experiments (DCEs), and best-worst scaling (BWS). Several example data sets illustrate empirical applications of each method with R. Examples of CV draw on data from well-known environmental valuation studies, such as the Exxon Valdez oil spill in Alaska. To explain DCEs, the authors use synthetic data sets related to food marketing and environmental valuation. The examples illustrating BWS address valuing agro-environmental and food issues. All the example data sets and code are available on the authors' website, CRAN, and R-Forge, allowing readers to easily reproduce working examples. Although the examples focus on agricultural and environmental economics, they provide beginners with a good foundation to apply SP methods in other fields. Statisticians, empirical researchers, and advanced students can use the book to conduct applied research of SP methods in economics and market research. The book is also suitable as a primary text or supplemental reading in an introductory-level, hands-on course.

Panel data econometrics has evolved rapidly over the past three decades. The field is of both theoretical and practical importance, and methods to deal with micro- and macroeconomic panel data are in high demand from practitioners. Applications in finance, development, trade, marketing, health, labor, and consumer economics attest to the usefulness of these methods in applied economics. This book is a

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comprehensive source on panel data. It contains 20 chapters edited by Professor Badi Baltagi--one of the leading econometricians in the area of panel data econometrics--and authored by renowned experts in the field. The chapters are divided into two sections. Part I examines new developments in theory. It includes panel cointegration, dynamic panel data models, incidental parameters and dynamic panel modeling, and panel data models for discrete choice. The chapters in Part II target applications of panel data, including health, labor, marketing, trade, productivity and macro applications in panels.

Over the past thirty-five years, a substantial amount of theoretical and empirical scholarly research has been developed across the discipline domains of Transportation. This research has been synthesized into a systematic handbook that examines the scientific concepts, methods, and principles of this growing and evolving field. The Handbook of Transportation Science outlines the field of transportation as a scientific discipline that transcends transportation technology and methods. Whether by car, truck, airplane - or by a mode of transportation that has not yet been conceived - transportation obeys fundamental properties. The science of transportation defines these properties, and demonstrates how our knowledge of one mode of transportation can be used to explain the behavior of another. Transportation scientists are motivated by the desire to explain spatial interactions that result in movement of people or objects from place to place. Its methodologies draw from physics, operations research, probability and control theory.

Originally published in 1981. Discrete-choice modelling is an area of econometrics where significant advances have been made at the research level. This book presents an overview of these advances, explaining the theory underlying the model, and explores its various applications. It shows how operational choice models can be used, and how they are particularly useful for a better understanding of consumer demand theory. It discusses particular problems connected with the model and its use, and reports on the authors' own empirical research. This is a comprehensive survey of research developments in discrete choice modelling and its applications.

This book describes the new generation of discrete choice methods, focusing on the many advances that are made possible by simulation. Researchers use these statistical methods to examine the choices that consumers, households, firms, and other agents make. Each of the major models is covered: logit, generalized extreme value, or GEV (including nested and cross-nested logits), probit, and mixed logit, plus a variety of specifications that build on these basics. Simulation-assisted estimation procedures are investigated and compared, including maximum stimulated likelihood, method of simulated moments, and method of simulated scores. Procedures for drawing from densities are described, including variance reduction techniques such as anithetics and Halton draws. Recent advances in Bayesian procedures are explored, including the use of the Metropolis-Hastings algorithm and its variant Gibbs sampling. The second edition adds chapters on endogeneity and expectation-maximization (EM) algorithms. No other book incorporates all these fields, which have arisen in the past 25 years. The procedures are applicable in many fields, including energy, transportation, environmental studies, health, labor, and marketing.

The volume presents innovations in data analysis and classification and gives an overview of the state of the art in these scientific fields and applications. Areas that

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receive considerable attention in the book are discrimination and clustering, data analysis and statistics, as well as applications in marketing, finance, and medicine. The reader will find material on recent technical and methodological developments and a large number of applications demonstrating the usefulness of the newly developed techniques.

Choice Models in Marketing examines recent developments in the modeling of choice for marketing and reviews a large stream of research currently being developed by both quantitative and qualitative researches in marketing. Choice in marketing differs from other domains in that the choice context is typically very complex, and researchers' desire knowledge of the variables that ultimately lead to demand in marketplace. The marketing choice context is characterized by many choice alternatives. The aim of Choice Models in Marketing is to lay out the foundations of choice models and discuss recent advances. The authors focus on aspects of choice that can be quantitatively modeled and consider models related to a process of constrained utility maximization. By reviewing the basics of choice modeling and pointing to new developments, Choice Models in Marketing provides a platform for future research

This book provides practical, research-based advice on how to conduct high-quality stated choice studies. It covers every aspect of the topic, from planning and writing the survey, to analyzing results, to evaluating quality. There is no other book on the market today that so thoroughly addresses the methodology of stated choice. Chapters are written by top-notch academics and practitioners in an accessible style, offering practical, tough advice.

This tutorial presents a hands-on introduction to a new discrete choice modeling approach based on the behavioral notion of regret-minimization. This so-called Random Regret Minimization-approach (RRM) forms a counterpart of the Random Utility Maximization-approach (RUM) to discrete choice modeling, which has for decades dominated the field of choice modeling and adjacent fields such as transportation, marketing and environmental economics. Being as parsimonious as conventional RUM-models and compatible with popular software packages, the RRM-approach provides an alternative and appealing account of choice behavior. Rather than providing highly technical discussions as usually encountered in scholarly journals, this tutorial aims to allow readers to explore the RRM-approach and its potential and limitations hands-on and based on a detailed discussion of examples. This tutorial is written for students, scholars and practitioners who have a basic background in choice modeling in general and RUM-modeling in particular. It has been taken care of that all concepts and results should be clear to readers that do not have an advanced knowledge of econometrics. This book addresses two significant research areas in an interdependent fashion. It is first of all a comprehensive but concise text that covers the recently developed and widely applicable methods of qualitative choice analysis, illustrating the general theory through simulation models of automobile demand and use. It is also a detailed study of automobile demand and use, presenting forecasts based on these powerful new techniques. The book develops the general principles that underlie qualitative choice models that are now being applied in numerous fields in addition to transportation, such as housing, labor, energy, communications, and criminology. The general form, derivation, and estimation of qualitative choice models are explained, and the major models - logit, probit, and GEV - are discussed in detail. And continuous/discrete

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models are introduced. In these, qualitative choice methods and standard regression techniques are combined to analyze situations that neither alone can accurately forecast. Summarizing previous research on auto demand, the book shows how qualitative choice methods can be used by applying them to specific auto-related decisions as the aggregate of individuals' choices. The simulation model that is constructed is a significant improvement over older models, and should prove more useful to agencies and organizations requiring accurate forecasting of auto demand and use for planning and policy development. The book concludes with an actual case study based on a model designed for the investigations of the California Energy Commission. Kenneth Train is Visiting Associate Professor in Economics at the University of California, Berkeley, and Director of Economic Research at Cambridge Systematics, Inc., also in Berkeley. Qualitative Choice Analysis is included in The MIT Press Transportation Studies Series, edited by Marvin L. Manheim.

"This book provides a rigorous and comprehensive coverage of transportation models and planning methods and is a must-have to anyone in the transportation community, including students, teachers, and practitioners." Moshe Ben-Akiva, Massachusetts Institute of Technology.

In recent years, airline practitioners and academics have started to explore new ways to model airline passenger demand using discrete choice methods. This book provides an introduction to discrete choice models and uses extensive examples to illustrate how these models have been used in the airline industry. These examples span network planning, revenue management, and pricing applications. Numerous examples of fundamental logit modeling concepts are covered in the text, including probability calculations, value of time calculations, elasticity calculations, nested and non-nested likelihood ratio tests, etc. The core chapters of the book are written at a level appropriate for airline practitioners and graduate students with operations research or travel demand modeling backgrounds. Given the majority of discrete choice modeling advancements in transportation evolved from urban travel demand studies, the introduction first orients readers from different backgrounds by highlighting major distinctions between aviation and urban travel demand studies. This is followed by an in-depth treatment of two of the most common discrete choice models, namely the multinomial and nested logit models. More advanced discrete choice models are covered, including mixed logit models and generalized extreme value models that belong to the generalized nested logit class and/or the network generalized extreme value class. An emphasis is placed on highlighting open research questions associated with these models that will be of particular interest to operations research students. Practical modeling issues related to data and estimation software are also addressed, and an extensive modeling exercise focused on the interpretation and application of statistical tests used to guide the selection of a preferred model specification is included; the modeling exercise uses itinerary choice data from a major airline. The text concludes with a discussion of on-going customer modeling research in aviation. Discrete Choice Modelling and Air Travel Demand is enriched by a comprehensive set of technical appendices that will be of particular interest to advanced students of discrete choice modeling theory. The appendices also include detailed proofs of the multinomial and nested logit models and derivations of measures used to represent competition among alternatives, namely correlation, direct-elasticities, and cross-

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elasticities.

In the 16th Edition of *Advances in Econometrics* we present twelve papers discussing the current interface between Marketing and Econometrics. The authors are leading scholars in the fields and introduce the latest models for analysing marketing data. The papers are representative of the types of problems and methods that are used within the field of marketing. Marketing focuses on the interaction between the firm and the consumer. Economics encompasses this interaction as well as many others.

Economics, along with psychology and sociology, provides a theoretical foundation for marketing. Given the applied nature of marketing research, measurement and quantitative issues arise frequently. Quantitative marketing tends to rely heavily upon statistics and econometrics. However, quantitative marketing can place a different emphasis upon the problem than econometrics, even when using the same techniques. A basic difference between quantitative marketing research and econometrics tends to be the pragmatism that is found in many marketing studies. Another important motivating factor in marketing research is the type of data that is available. Applied econometrics tends to rely heavily on data collected by governmental organizations. In contrast marketing often uses data collected by private firms or marketing research firms. Observational and survey data are quite similar to those used in econometrics. However, the remaining types of data, panel and transactional, can look quite different from what may be familiar to econometricians. The automation and computerization of much of the sales transaction process leaves an audit trail that results in huge quantities of data. A popular area of study is the use of scanner data collected at the checkout stand using bar code readers. Methods that work for small data sets may not work well in these larger data sets. In addition, new sources of data, such as clickstream data from a web site, will offer new challenges. This volume addresses these and related issues.

First systematic treatment of best-worst scaling, explaining how to implement, analyze, and apply the theory across a range of disciplines.

Conjoint analysis (CA) and discrete choice experimentation (DCE) are tools used in marketing, economics, transportation, health, tourism, and other areas to develop and modify products, services, policies, and programs, specifically ones that can be described in terms of attributes. A specific combination of attributes is called a concept profile. Building on the authors' significant work in the field, *Choice-Based Conjoint Analysis: Models and Designs* explores the design of experiment (DOE) issues that occur when constructing concept profiles and shows how to modify commonly used designs for solving DCE and CA problems. The authors provide historical and statistical background and discuss the concepts and inference. The book covers designs appropriate for four classes of DOE problems: (1) attributes in CA and DCE studies are often ordered; (2) studies increasingly are computer-assisted; (3) choice is often influenced by competition; and (4) constraints may exist on attribute levels. Discussion begins with commonly used "generic" designs. The text then presents designs that avoid "dominated" or "dominating" profiles that may occur with ordered attributes and explores the use of orthogonal polynomials to describe relationships between ordered attribute levels and preference. Computer administration entails limited "screen real estate" for presenting concept profiles. The book covers approaches for subsetting attributes and/or levels to "fit" profiles into available "screen real estate." It then

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discusses strategies for sequential experimentation. Choice also is influenced by the availability of competing alternatives. The book uses availability and cross-effects designs to illustrate the design and analysis of portfolios and shows the relationship between availability effects and interaction effects in analysis of variance models. The last chapter highlights approaches to experimental design in which constraints are imposed on the levels of attributes. These designs provide the means to untangle the pricing and formulation problems in CA and DCE.

Discrete Choice Analysis presents these results in such a way that they are fully accessible to the range of students and professionals who are involved in modelling demand and consumer behavior in general or specifically in transportation - whether from the point of view of the design of transit systems, urban and transport economics, public policy, operations research, or systems management and planning. The methods of discrete choice analysis and their applications in the modelling of transportation systems constitute a comparatively new field that has largely evolved over the past 15 years. Since its inception, however, the field has developed rapidly, and this is the first text and reference work to cover the material systematically, bringing together the scattered and often inaccessible results for graduate students and professionals. Discrete Choice Analysis presents these results in such a way that they are fully accessible to the range of students and professionals who are involved in modelling demand and consumer behavior in general or specifically in transportation - whether from the point of view of the design of transit systems, urban and transport economics, public policy, operations research, or systems management and planning. The introductory chapter presents the background of discrete choice analysis and context of transportation demand forecasting. Subsequent chapters cover, among other topics, the theories of individual choice behavior, binary and multinomial choice models, aggregate forecasting techniques, estimation methods, tests used in the process of model development, sampling theory, the nested-logit model, and systems of models. Discrete Choice Analysis is ninth in the MIT Press Series in Transportation Studies, edited by Marvin Manheim.

Every one relies on some kind of transportation system nearly every day. Going to work, shopping, dropping children at school and many other cultural or social activities imply leaving home, and using some form of transportation, which we expect to be efficient and reliable. Of course, efficiency and reliability do not occur by chance, but require careful and often relatively complex planning by transportation system managers, both in the public and private sectors. It has long been recognized that mathematics, and, more specifically, operations research is an important tool of this planning process. However, the range of skills required to cover both fields, even partially, is very large, and the opportunities to gather people with this very diverse expertise are too few. The organization of the NATO Advanced Studies Institute on "Operations Research and Decision Aid Methodologies in Traffic and Transportation Management" in March 1997 in Balatonfüred, Hungary, was therefore more than welcome and the group of people that gathered for a very studious two weeks on the shores of the beautiful lake Balaton did really enjoy the truly multidisciplinary and high scientific level of the meeting. The purpose of the present volume is to report, in a chronological order, the various questions that were considered by the lecturers and the students at the institute. After a general introduction to the topic, the first week

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focused on issues related to traffic modeling, mostly in an urban context.

The second edition of this popular book brings students fully up to date with the latest methods and techniques in choice analysis. Comprehensive yet accessible, it offers a unique introduction to anyone interested in understanding how to model and forecast the range of choices made by individuals and groups. In addition to a complete rewrite of several chapters, new topics covered include ordered choice, scaled MNL, generalised mixed logit, latent class models, group decision making, heuristics and attribute processing strategies, expected utility theory, and prospect theoretic applications. Many additional case studies are used to illustrate the applications of choice analysis with extensive command syntax provided for all NLOGIT applications and datasets available online. With its unique blend of theory, estimation and application, this book has broad appeal to all those interested in choice modelling methods and will be a valuable resource for students as well as researchers, professionals and consultants.

It is increasingly common for analysts to seek out the opinions of individuals and organizations using attitudinal scales such as degree of satisfaction or importance attached to an issue. Examples include levels of obesity, seriousness of a health condition, attitudes towards service levels, opinions on products, voting intentions, and the degree of clarity of contracts. Ordered choice models provide a relevant methodology for capturing the sources of influence that explain the choice made amongst a set of ordered alternatives. The methods have evolved to a level of sophistication that can allow for heterogeneity in the threshold parameters, in the explanatory variables (through random parameters), and in the decomposition of the residual variance. This book brings together contributions in ordered choice modeling from a number of disciplines, synthesizing developments over the last fifty years, and suggests useful extensions to account for the wide range of sources of influence on choice.

This work takes a fresh and contemporary look at the growing interest in the development and application of discrete choice experiments (DCEs) within the field of health economics. The book comprises chapters by highly regarded academics with experience of applying DCEs in the area of health. Thus the book is relevant to post-graduate students and applied researchers with an interest in the use of DCEs for valuing health and health care and has international appeal.

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"The discrete choice approach provides an ideal framework for describing the demands for differentiated products and can be used for studying most product differentiation models in the literature. By introducing extra dimensions of product heterogeneity, the framework also provides richer models of firm location and product selection."--BOOK JACKET.

This open access book offers up-to-date advice and practical guidance on how to undertake a discrete choice experiment as a tool for environmental valuation. It discusses crucial issues in designing, implementing and analysing choice experiments. Compiled by leading experts in the field, the book promotes discrete choice analysis in environmental valuation through a more solid scientific basis for research practice. Instead of providing strict guidelines, the book helps readers avoid common mistakes often found in applied work. It is based on the collective reflections of the scientific

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network of researchers using discrete choice modelling in the field of environmental valuation (www.envecho.com).

Contains a selection of the best theoretical and applied papers from the inaugural International Choice Modelling Conference. The conference was organised by the Institute for Transport Studies at the University of Leeds and held in Harrogate, North Yorkshire on 30 March to 1 April 2009.

This book is a treatise on empirical microeconomics: it describes the econometric theory of qualitative choice models and the empirical practice of modeling consumer demand for a heterogeneous commodity, housing. Accordingly, the book has two parts. The first part gives a self-contained survey of discrete choice models with emphasis on nested and related multinomial logit models. The second part concentrates on three substantive questions about housing demand and how they can be answered using discrete choice models. Why combine these two distinct parts in one book? It is the interaction between theory and application in empirical microeconomics on which we focus in this book. Hence, emphasis in the methodological part is on practicability, and emphasis in the applied part is on the usage of the proper econometric specifications. Econometrics means measuring economic phenomena. Because nature (ironically, in the case of economics, this is most often the government) rarely provides us with well-defined economic experiments, measurement of economic phenomena usually requires an elaborate statistical apparatus that is able to separate concurrent and confounding phenomena. Discrete choice models have proved to be a very convenient apparatus to study the complex issues in housing demand. We present models, techniques, and statistical problems of discrete choice in the first and methodological part of the book, written in conventional textbook style.

Although the issue of offender decision-making pervades almost every discussion of crime and law enforcement, only a few comprehensive texts cover and integrate information about the role of decision-making in crime. The Oxford Handbook of Offender Decision Making provide high-quality reviews of the main paradigms in offender decision-making, such as rational choice theory and dual-process theory. It contains up-to-date reviews of empirical research on decision-making in a wide range of decision types including not only criminal initiation and desistance, but also choice of locations, times, targets, victims, methods as well as large variety crimes including homicide, robbery, domestic violence, burglary, street crime, sexual crimes, and cybercrime. Lastly, it provides in-depth treatments of the major methods used to study offender decision-making, including experiments, observation studies, surveys, offender interviews, and simulations. Comprehensive and authoritative, the Handbook will quickly become the primary source of theoretical, methodological, and empirical knowledge about decision-making as it relates to criminal behavior.

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