

## Discrete Choice Modelling And Air Travel Demand Theory And Applications

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-elasticities.

The rail-based transit system is a popular public transportation option, not just with members of the public but also with policy makers looking to install a form of convenient and rapid travel. Even for moving bulk freight long distances, a rail-based system is the most sustainable transportation system currently available. The Handbook of Research on Emerging Innovations in Rail Transportation Engineering presents the latest research on next-generation public transportation infrastructures. Emphasizing a diverse set of topics related to rail-based transportation such as funding issues, policy design, traffic planning and forecasting, and engineering solutions, this comprehensive publication is an essential resource for transportation planners, engineers, policymakers, and graduate-level engineering students interested in uncovering research-based solutions, recommendations, and examples of modern rail transportation systems.

Air Transport and Regional Development Methodologies is one of three interconnected books related to a four-year European Cooperation in Science and Technology (COST) Action established in 2015. The action, called Air Transport and Regional Development (ATARD), aimed to promote a better understanding of how the air transport-related problems of core regions and remote regions should be addressed to enhance both economic competitiveness and social cohesion in Europe. This book discusses key methodological approaches to assessing air transport and regional development, outlining their respective strengths and weaknesses. These include input-output analysis, cost benefit analysis, computable general equilibrium models, data envelopment analysis, stochastic frontier analysis, discrete choice models and game theory. Air Transport and Regional Development Methodologies aims at becoming a major reference source on the topic, drawing from experienced researchers in the field, covering the diverse experience and knowledge of the members of the COST Action. The book will be of interest to several large groups. First, it will serve as an authoritative and comprehensive reference for academics, researchers and consultants. Second, it will advise policy-makers and government organizations at European, national and regional levels. Third, it presents invaluable insights to transport companies such as airports and airline operators. Along with the other two books (Air Transport and Regional Development Policies and Air Transport and Regional Development Case Studies), it fills a much-needed gap in the literature.

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 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

Capacities, Capacity Constraints and Capacity Reserves of Airports, Today and in the Future analyzes airport capacity constraints with empirical methods that forecast future capacities and their capacity shortfalls. When predicting the future of air traffic development, it is imperative for researchers and planners to possess the most accurate data for airport capacity constraints. The book discusses in detail the importance of airport capacity constraints on air traffic development, especially for international hubs, along with mitigation strategies for already packed airports. The book analyzes cross-sectional time-series data to provide greater insight into the problems of airport crowding and over-capacity. The authors go beyond mere strategies to derive capacity, adding estimates for comparable capacities and capacity constraints of airports worldwide. As expanding current airports becomes increasingly difficult, and time consuming-especially for hub-the study of current and future airport capacity constraints becomes ever more needed. Large international airports are especially essential to the global air transport network. The book provides insight into correctly assessing and quantifying the problem of limited airport capacity, while offering strategies for overcoming these issues for a healthy global air traffic network. Focuses on airport capacity constraints in the global air traffic network and their implications for the future of air traffic development Features empirical and model-based approaches that forecast airport capacities and capacity shortcomings Provides over capacity mitigation strategies based on sound and reliable data and methodology Addresses capacity constraints at hub airports, providing insight into correctly assessing and quantifying limited capacity for these important players in the global air transportation network Applies econometric models for the implication of restraining factors on the future volume and structure of air traffic

The break-up of BAA and the blocked takeover of Bratislava airport by the competing Vienna airport have brought the issue of airport competition to the top of the agenda for air transport policy in Europe. Airport Competition reviews the current state of the debate and asks whether airport competition is strong enough to effectively limit market power. It provides evidence on how travellers chose an airport, thereby altering its competitive position, and on how airports compete in different regions and markets. The book also discusses the main policy implications of mergers and subsidies.

In this third edition the chapters have been enhanced to reflect changes in technology and the way the air transport industry runs. Key topics that are newly addressed include low cost airline operations, security issues and EASA regulations on airports. A new chapter covering extended details about wildlife control has been added to the volume.

This book reviews Operations Research theory, applications and practice in seven major areas of airline planning and operations. In each area, a team of academic and industry experts provides an overview of the business and technical landscape, a view of current best practices, a summary of open research questions and suggestions for relevant future research. There are several common themes in current airline Operations Research efforts. First is a growing focus on the customer in terms of: 1) what they want; 2) what they are willing to pay for services; and 3) how they are impacted by planning, marketing and operational decisions. Second, as algorithms improve and computing

power increases, the scope of modeling applications expands, often re-integrating processes that had been broken into smaller parts in order to solve them in the past. Finally, there is a growing awareness of the uncertainty in many airline planning and operational processes and decisions. Airlines now recognize the need to develop 'robust' solutions that effectively cover many possible outcomes, not just the best case, "blue sky" scenario. Individual chapters cover: Customer Modeling methodologies, including current and emerging applications. Airline Planning and Schedule Development, with a look at many remaining open research questions. Revenue Management, including a view of current business and technical landscapes, as well as suggested areas for future research. Airline Distribution -- a comprehensive overview of this newly emerging area. Crew Management Information Systems, including a review of recent algorithmic advances, as well as the development of information systems that facilitate the integration of crew management modeling with airline planning and operations. Airline Operations, with consideration of recent advances and successes in solving the airline operations problem. Air Traffic Flow Management, including the modeling environment and opportunities for both Air Traffic Flow Management and the airlines.

[Truncated] Over the last decade, airline markets around the world have been reshaped dramatically by the rapidly growing low-cost carriers and new forms of distribution channel. Significant reduction in searching cost brought by the web-based distribution has made fare product comparison and purchasing an easier task. As a result, traditional demand models based on independent (fare class) demand assumption has been violated. A better understanding of passenger choice behaviour is now needed since the development of new generation revenue management (RM) system requires inputs of demand based on dependent fare classes. Early studies on dependent demand mainly focused on the buy-up and buy-down behaviour for single-leg flights. With the introduction of discrete choice modelling, more recent studies are beginning to incorporate competitions between flights and carriers into the model. In a discrete choice model, a customer is assumed to weigh up service levels of a fare product against its price. The fare option with the highest satisfaction is the one being chosen. As all the components taken into consideration by a traveller may not be readily at hand for the analyst, the satisfaction or utility of a fare product is measured by way of a systematic component - the observed utility - and a random component - the unobserved utility. As such, the choice decision is modelled up to a probability. Discrete choice models are theoretically sound for fare product demand forecasting, as they directly work on the decision making process of air travellers. Currently, the most widely applied discrete choice model in revenue management is the multinomial logit model (MNL), within which the unobserved utility of each alternative is independently and identically distributed (IID). Such a structure leads to the independence from irrelevant alternatives or IIA property. That is, the ratio of probabilities for two alternatives is independent from the existence of any other alternative in the choice set. However, the biggest limitation of IIA is the resulting proportional substitution pattern, which suggests that an improvement in the attributes of one alternative reduces the probabilities for all other alternatives by the same percentage. This highly restricted structure is unlikely to hold in the context of real airline markets. This is because the behaviour of compensatory travellers is likely to vary among the population, and to capture these variations advanced DCMs should be applied.

This research topic for *Frontiers in Psychology* highlights some of the more relevant changes that have conditioned consumer behavior in recent years—among these, the paradigm shift in marketing is worth emphasizing. Today, the market and the companies are implementing Marketing 4.0; This new marketing approach modifies both the business rules and the channels by changing the way to dialogue, interact and relation with consumers. The present Research Topic brings together 30 studies by 76 authors who analyzed the relevance of consumer behavior changes under this new paradigm, using different theoretical and methodological frameworks. These different papers, mainly constituting original research, examine a variety of sub-topics, including online and mobile environments, value co-creation, internal marketing strategies, and diverse industries and product markets. Given this broad selection of papers, we encourage readers to draw their own conclusions about the complex phenomena of consumer behavior. Our hope is that these different perspectives will cover various gaps in the field and prompt discussion among the audience of *Frontiers in Psychology*.

This book constitutes the proceedings of the 8th International Conference on Analysis of Images, Social Networks and Texts, AIST 2019, held in Kazan, Russia, in July 2019. The 24 full papers and 10 short papers were carefully reviewed and selected from 134 submissions (of which 21 papers were rejected without being reviewed). The papers are organized in topical sections on general topics of data analysis; natural language processing; social network analysis; analysis of images and video; optimization problems on graphs and network structures; analysis of dynamic behaviour through event data.

"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 synthesis extends previous efforts to document the state of practice for airport ground access mode choice models. It examines the characteristics of existing models and discusses the issues involved in the development and use of such models to improve the understanding and acceptance of their role in airport planning and management. Information presented in this report may be of interest to a range of airport managers, airport and regional transportation planners, consultants and transportation modeling specialists, and researchers interested in issues involving airport ground access mode choice. For this synthesis, a comprehensive review of the relevant literature was undertaken. To document the extent of the recent use of airport ground access mode choice models and to identify sources of technical documentation on existing models, this literature review was supplemented by a survey of airport authorities, metropolitan planning organizations, consulting firms and research organizations, and other government agencies and industry organizations. Follow-up communications by telephone and e-mail were made where necessary.

*Modeling Applications in the Airline Industry* explains the different functions and tactics performed by airlines during their planning and operation phases. Each function receives a full explanation of the challenges it brings and a solution methodology is presented, supported by numerical illustrative examples wherever possible. The book also highlights the main limitations of current practice and provides a brief description of future work related to each function. The authors have filtered the rich literature of airline management to include only the research that has actually been adopted by the airlines, giving a genuinely accurate representation of real airline management and its continuing development of solution methodologies. The book consists of 20 chapters divided into 4 sections: - Demand Modeling and Forecasting - Scheduling of Resources - Revenue Management - Irregular Operations Management. The book will be a valuable source or a handbook for individuals seeking a career in airline management. Written by experts with significant working experience within the industry, it offers readers insights to the real practice of operations modelling. In particular the book makes accessible the complexities of the key airline functions and explains the interrelation between them.

*Discrete Choice Modelling and Air Travel Demand Theory and Applications* Routledge

This book 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 was held at Harrogate in Yorkshire in the North of England from 30 March to 1 April 2009. The conference brought together leading researchers and practitioners from across the many different areas in which choice modelling is a key technique for understanding behaviour and evaluating policy. The highlight of the conference was a presentation by Professor Daniel McFadden from the University of California at Berkeley, Nobel Prize laureate in Economics and chief architect of random utility modelling. The conference also included keynote presentations by five other leading choice modellers, namely Professor Moshe Ben-Akiva, Professor Chandra Bhat, Professor Michel Bierlaire, Professor David Hensher, and Professor Riccardo Scarpa. The diversity of the field was reflected in presentations by both academics and practitioners, coming from six continents

and various different fields, with a similar mix in non-speaking delegates

This book presents a greatly enlarged statistical framework compared to generalized linear models (GLMs) with which to approach regression modelling. Comprising of about half-a-dozen major classes of statistical models, and fortified with necessary infrastructure to make the models more fully operable, the framework allows analyses based on many semi-traditional applied statistics models to be performed as a coherent whole. Since their advent in 1972, GLMs have unified important distributions under a single umbrella with enormous implications. However, GLMs are not flexible enough to cope with the demands of practical data analysis. And data-driven GLMs, in the form of generalized additive models (GAMs), are also largely confined to the exponential family. The methodology here and accompanying software (the extensive VGAM R package) are directed at these limitations and are described comprehensively for the first time in one volume. This book treats distributions and classical models as generalized regression models, and the result is a much broader application base for GLMs and GAMs. The book can be used in senior undergraduate or first-year postgraduate courses on GLMs or categorical data analysis and as a methodology resource for VGAM users. In the second part of the book, the R package VGAM allows readers to grasp immediately applications of the methodology. R code is integrated in the text, and datasets are used throughout. Potential applications include ecology, finance, biostatistics, and social sciences. The methodological contribution of this book stands alone and does not require use of the VGAM package.

This book gives an overview of the main aspects of the potential development of regional airports particularly the economic aspects, the role of low-cost companies, demand modelling, the airport, airline and access mode choices, and the relationships between capacity constraints on hubs and the growth of regional airports.

This book constitutes the proceedings of the 9th International Conference on Discrete Optimization and Operations Research, DOOR 2016, held in Vladivostok, Russia, in September 2016. The 39 full papers presented in this volume were carefully reviewed and selected from 181 submissions. They were organized in topical sections named: discrete optimization; scheduling problems; facility location; mathematical programming; mathematical economics and games; applications of operational research; and short communications.

Air Transport: A Tourism Perspective provides rigorous insights into the current complexities, synergies and conflicts within air transportation and tourism, presenting a balanced, comprehensive, contemporary, and global analysis that thoroughly examines the links between theory and practice. The book offers readers a multi-sector, global perspective on the practical implications of the link between air transport and tourism. By using a novel approach, it systematically explores the successive stages of a tourist's trip-investigating reasons for flying, the airport experience, airline industry structures, competition and regulation, and air transportation and destination interrelationships. In addition, the book explores current and salient debates on such issues as the influence of traveling to visit friends and family, the role of charters versus low cost carriers, public subsidies to support airport development, and much more. Presents insights from an international team of expert contributors with proven research and publication experience in their specialty area Includes cutting-edge analyses based on original research that identifies emerging research directions and policy and managerial implications Utilizes a multidisciplinary approach to fully explore theoretical and policy concepts and their effect on air transportation and tourism development Provides case studies from around the globe in each chapter This volume presents new developments in the research on ancillary benefits. Twenty years after the influential OECD report on ancillary benefits, the authors discuss theoretical innovations and offer new empirical findings on various ancillary effects in different world regions. Covering topics such as ancillary health effects associated with reduced air pollution, the influence of ancillary benefits on international cooperation on climate protection, co-effects of carbon capture and storage, ancillary effects of adaptation to climate change, multi-criteria decision analysis covering multiple effects of climate protection actions, and the analysis of primary and ancillary effects within an impure public goods framework, it provides starting points for further research on integrated climate policies seeking to address a range of policy objectives simultaneously.

Much applied environmental economics is concerned with the valuation of changes in environmental quality. Obtaining reliable valuation estimates requires attention to theoretical and econometric issues that are often quite subtle. Volume 2 of the Handbook of Environmental Economics presents both the theory and the practice of environmental valuation. It synthesizes the vast literature that has accumulated since the publication of the Handbook of Natural Resource and Energy Economics two decades ago. It includes chapters on individual valuation methods written by researchers responsible for fundamental advances in those methods. It also includes cross-cutting chapters that deal with aspects of welfare theory, uncertainty, experimental methods, and public health that are pertinent to valuation. Throughout the volume, attention is paid to research and policy issues that arise not only in high-income countries, where most of the theory and econometrics that underlie applied valuation methods have been developed, but also in poorer parts of the world. The volume provides a state-of-the-art reference for scholars and practitioners alike.

This book is open access under a CC BY 4.0 license. This book reports on the results of an extended survey conducted across Europe within the framework of the APPRAISAL FP7 project to determine the extent to which an integrated assessment approach to air quality is being adopted, on the one hand, by regional and local authorities to develop air quality plans and, on the other, by researchers. Following a detailed analysis of the role and structure of the components of an integrated assessment study, the results of the survey are considered from a variety of perspectives. Above all, the book discusses the new light the survey sheds on emission abatement policies and measures planned at regional and local scales, and on their synergies/trade-offs with measures implemented at the national scale. Detailed consideration is given to the currently available modeling methodologies for identifying emission sources, assessing the effectiveness of emission reduction measures, and evaluating the impacts of emission abatement measures on human health. Current strengths and weaknesses revealed by the survey are explored, and the application of an integrated assessment tool in two case studies (in Brussels and Porto) is discussed. The book will appeal to all those interested in the use of integrated assessment in connection with the sources, effects and control of air pollution.

This major reference book comprises specially commissioned surveys in environmental and resource economics written

by an international team of experts. Authoritative yet accessible, each entry provides a state-of-the-art summary of key areas that will be invaluable to researchers, practitioners and advanced students.

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  
Non-market valuation has become a broadly accepted and widely practiced means of measuring the economic values of the environment and natural resources. In this book, the authors provide a guide to the statistical and econometric practices that economists employ in estimating non-market values. The authors develop the econometric models that underlie the basic methods: contingent valuation, travel cost models, random utility models and hedonic models. They analyze the measurement of non-market values as a procedure with two steps: the estimation of parameters of demand and preference functions and the calculation of benefits from the estimated models. Each of the models is carefully developed from the preference function to the behavioral or response function that researchers observe. The models are then illustrated with datasets that characterize the kinds of data researchers typically deal with. The real world data and clarity of writing in this book will appeal to environmental economists, students, researchers and practitioners in multilateral banks and government agencies.

Demand for Emerging Transportation Systems: Modeling Adoption, Satisfaction, and Mobility Patterns comprehensively examines the concepts and factors affecting user quality-of-service satisfaction. The book provides an introduction to the latest trends in transportation, followed by a critical review of factors affecting traditional and emerging transportation system adoption rates and user retention. This collection includes a rigorous introduction to the tools necessary for analyzing these factors, as well as Big Data collection methodologies, such as smartphone and social media analysis. Researchers will be guided through the nuances of transport and mobility services adoption, closing with an outlook of, and recommendations for, future research on the topic. This resource will appeal to practitioners and graduate students. Examines the dynamics affecting adoption rates for public transportation, vehicle-sharing, ridesharing systems and autonomous vehicles Covers the rationale behind travelers' continuous use of mobility services and their satisfaction and development Includes case studies, featuring mobility stats and contributions from around the world

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.

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