

Qualitative Choice Analysis

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Qualitative Choice Analysis
Theory, Econometrics, and an Application to Automobile
Demand

Kenneth Train

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Series Foreword

Today, transportation is a well-established professional field, with numerous subspecialties and international journals, and with educational and research programs at many universities and other organizations around the world. It is a field in which the dominant philosophy is intermodal, multisectoral, and multidisciplinary. It is also a field in which researchers and practitioners can and do focus on specific facets, modes, sectors, disciplines, or methodologies, working in the context of this broad philosophy.

The approach of The MIT Press Series in Transportation Studies mirrors this philosophy. The series presents works across the broad spectrum of transportation concerns. Some volumes report significant new research, while others give analyses of specific policy, planning, management, or methodological issues. Still others show the close interaction between research and practical application in policy or management. Each individual work is intended to be an in-depth treatment from a particular viewpoint. Together, the works in the series present a broad perspective on the field of transportation as a whole.

This book, the tenth in the series, presents the methods of qualitative choice analysis and their application to the analysis of consumer demand for automobiles. Issues concerning the automobile industry and the forces influencing it are, and likely will continue to be, major questions of national policy. In this book, Dr. Train shows the depth of insight that can be gained into an important aspect of this problem—the characteristics of consumer demand for automobiles of various types—through the application of the powerful techniques of qualitative choice analysis. This book should be of interest to those concerned with understanding the forces influencing the automobile industry as well as those interested in qualitative choice methods and their application to modeling consumer behavior.

Marvin L. Manheim

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Preface

This book serves two major functions. The original concern in writing the book was to introduce a new model of automobile demand. Unfortunately, this model, like most of the recent auto demand models, is based on methods that are not widely known, namely, qualitative choice models. A steadily growing group of researchers is applying these techniques in a variety of fields, including energy, housing, labor, telecommunications, and criminology, as well as transportation; but access to the methods is difficult. Important concepts in the field are scattered through numerous papers, many of which are not readily obtainable. The few reviews and texts that are available are advanced, written primarily for people who are already in the field. Consequently, in order to introduce the model of auto demand, it was felt necessary to provide a textbook on the theory and econometrics of qualitative choice models that, while being fully rigorous, assumes no previous knowledge of the topic. Since these methods have application in many fields other than auto demand, their dissemination is an important function of the book independent of the analysis of auto ownership and use.

The book can be viewed in either of two ways. To the reader who is interested in learning qualitative choice methods, the book is a thorough text, with many of the more advanced aspects of the methodology illustrated through an extensive application to automobile demand. For the student of auto demand, the book introduces a new auto demand model; as an aid to understanding the model, the qualitative choice methods on which the model is based are fully explained without assuming the reader is acquainted with numerous background articles.

The book is organized in the following way. Part I provides the text on qualitative choice models. This exposition is written at the level of upper-division undergraduates and graduates with training in econometrics or statistics. The first chapter introduces the general class of models. Successive chapters are devoted to each one of the major types of qualitative choice models, namely, logit, probit, and GEV ("nested logit"). The fifth chapter describes continuous/discrete models, by which qualitative choice methods are combined with standard regression techniques to analyze situations that cannot accurately be modeled by either method alone. The final chapter of part I describes how qualitative choice models are used in policy analysis for forecasting aggregate demand.

Part II introduces the new model of automobile demand. The first chapter in part II reviews the literature on auto demand, providing guide-

lines and setting the stage for the new model. The next chapter describes the model: its structure, detailed specification, and estimation. For the final chapter, a case study is presented in which the model is used for actual policy analysis for the California Energy Commission.