Discrete Choice Modeling

William Greene
Stern School of Business, New York University

This course will survey techniques used in modeling discrete choices. These models have become essentials tool in modeling individual behavior. The techniques are used in all social sciences, health economics, medical research, marketing research, environmental and energy economics, transport research, and in a constellation of other disciplines. The course will examine several models and techniques used in these studies. We will begin with a brief review of regression-style modeling concepts, then turn to the fundamental building block in discrete choice modeling, the binary choice model. Several variants and extensions will be discussed before we turn attention to multiple equation binary choice models, ordered choice models and models for counts. The second half of the course will be devoted to multinomial choice models of the sort used, e.g., in modeling brand choice in marketing, travel mode choice in transport, and a huge variety of applications in the social and behavioral sciences. Discussion will develop relevant theory and examine several applications from health, environmental economics and transport.

Emphasis in the laboratory sessions will be on estimation of discrete choice models and using them to describe behavior and to predict discrete outcomes. Course participants will apply the techniques on their own computers using the NLOGIT computer program and several 'real' data sets that have been used in applications already in the literature.

Prior knowledge is assumed to include calculus at the level assumed in the first year of a Ph.D. program in economics and a course in econometrics at the beginning Ph.D. based on a textbook such as Greene, W., *Econometric Analysis, 7th* edition. Familiarity with NLOGIT will be helpful, but is not necessary. Two other useful reference books for the course are *Applied Choice Analysis* by David Hensher, John Rose and William Greene (Cambridge University Press, 2005) and *Modeling Ordered Choices* by William Greene and David Hensher (Cambridge University Press, 2010).

Students in this course will obtain background in both the theory and methods of estimation for discrete choice modeling. This course will provide a gateway to the professional literature as well as practical application of the methods at the level of the contemporary research in the field.

Discrete Choice Modeling with Cross Section and Panel Data
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Stern School of Business, New York University
Topic Outline and Course Agenda

Session Topics

Day 1

1. Introduction to the course,methodology, software, modeling concepts, regression basics
2. Standard models for binary choice : estimation and inference using nonlinear models
3. Analysis of binary choice. marginal effects, fit measures, prediction, hypothesis tests
4. Bivariate and Multivariate Probit, Ordered choice, models for count data.
5. Panel data models, random effects, fixed effects, Mundlak formulation, incidental parameters problem, dynamic models,

Lab: Binary Choice Models, Estimation, Testing Hypotheses, Prediction, Analysis, Ordered Choice and Count Data Models, Panel Data Models

Day 2

6. Panel data, heterogeneity and latent class models,
7. Multinomial choice models, the multinomial logit model – applications in environmental economics
8. Random utility models, IIA, multinomial logit, fit and prediction, willingness to pay, partial effects, model simulation, use of the MNL model
9. Extensions of the MNL model, heteroscedasticity, multinomial probit, nested logit, heterogeneity, latent class and mixed logit models, generalized mixed logit
10. Stated preference experiments and panel data

Lab: Multinomial logit models, multinomial probit, random parameters, latent class models Multinomial choice models with stated and revealed preference data. Estimation of a model of revealed preferences for energy supply.