

STANFORD UNIVERSITY
DEPARTMENT OF STATISTICS
DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, May 20, 2008
Sequoia Hall Room 200
(Cookies at 3:45 in 1st Floor Lounge)

Matthew Harding
Department of Economics
Stanford University

A Bayesian Mixed Logit-Probit Model for Multinomial Choice

In this paper we introduce a new flexible mixed model for multinomial discrete choice where the key individual- and alternative-specific parameters of interest are allowed to follow an assumption-free nonparametric density specification while other alternative-specific coefficients are assumed to be drawn from a multivariate normal distribution which eliminates the independence of irrelevant alternatives assumption at the individual level. A hierarchical specification of our model allows us to break down a complex data structure into a set of submodels with the desired features that are naturally assembled in the original system. We estimate the model using a Bayesian Markov Chain Monte Carlo technique with a multivariate Dirichlet Process (DP) prior on the coefficients with nonparametrically estimated density. We bypass a problem of prior non-conjugacy by employing a latent class sampling algorithm for the DP prior. The model is applied to supermarket choices of a panel of Houston households whose shopping behavior was observed over a 24-month period in years 2004-2005. We estimate the nonparametric density of two key variables of interest: the price of a basket of goods based on scanner data, and driving distance to the supermarket based on their respective locations, calculated using GPS software. Supermarket indicator variables form the parametric part of our model.