Microeconometrics of Limited Dependent Variables with applications to Transportation Demand and the Environment

Location:
Dates: May 26 to 30, 2014

Course description

The intensive training seminar focuses on understanding individual choice behaviour using discrete choice models. Understanding individual choice behaviour is critical for several disciplines that need to account for demand dynamics. Discrete choice models represent the cognitive process of economic decisions and are widely used in transportation analysis, applied economics, marketing, and urban planning. Discrete choice analysis is used to forecast demand under differing pricing and marketing strategies and to determine how much consumers are willing to pay for qualitative improvements.

Course objectives

The objective of the course is to provide students the tools for analyzing consumer choices from a set of mutually exclusive and collectively exhaustive alternatives. Through a comprehensive review, from the fundamentals to advanced topics in microeconometrics of discrete choice, students will acquire appropriate knowledge and develop skills to apply the models and interpret their results in a multidisciplinary context.

Content and learning outcomes

Upon completion of this seminar, students will be able to:

1. Describe the fundamentals of economic models of rational choice
2. Explain the foundations of random utility maximization
3. Summarize the empirical implications of the statistical assumptions of regression models with limited dependent variables
4. Analyze choice microdata using statistical packages
5. Interpret the results of model estimation and prediction
6. Formulate and test behavioural hypotheses
7. Predict and simulate choice behaviour

Eligibility

The course is open to graduate students and postdoctoral fellows as well as to professors and practicing researchers. Participants are expected to have working knowledge of standard regression models prior to the course and a practical knowledge of a statistical package such as STATA.

Trainer
This training session will be under the responsibility of Dr. Ricardo Daziano, David Croll Fellow Assistant Professor, School of Civil and Environmental Engineering, Cornell University[1]

General course information
The sessions are in English.

The seminar is scheduled from 9:00am to 5:00pm. Morning sessions will be used for theoretical presentations and afternoon sessions will be reserved for empirical computer applications. STATA will be used for the computer labs.

Seminar website
TBA

Main sources
Vanek F, Angenent L, Banks J, Daziano R, Turnquist M, *Sustainable Transportation Systems Engineering*, McGraw-Hill Professional 2014 (A copy of chapter 4 will be provided in the website of the seminar)

Train K, *Discrete Choice Methods with Simulation*, Cambridge University Press, 2009 (available online)

Topics and schedule

Day 1: **Econometrics of limited dependent variables**
- Censored, truncated, and discrete outcomes
- From regression to conditional probability models
- Binary logit and probit models
- Maximum likelihood estimator
- Introduction to binary choice

Day 2: **Essentials of random utility maximization models**
- Introduction to random utility maximization
- General properties of random utility models
- Choice microdata
- Conditional and multinomial logit models
- Estimation and statistical tests

Day 3: **Forecasting and welfare analysis for energy policy**
- Statistical inference on willingness to pay

- Predicting demand and market shares
- Discrete choice and applied welfare economics
- Vehicle choice: the BLP model
- Upfront costs versus future savings: the energy paradox
- The MPG illusion

Day 4: **Unobserved consumer heterogeneity**
- Continuous heterogeneity distributions (mixed logit)
- Maximum simulated likelihood estimator
- Discrete heterogeneity distributions (latent class)
- Generalized multinomial logit (scale heterogeneity)

Day 5: **Gradient free estimators**
- Probit models
- Bayes estimator of the mutinomial probit model
- Bayes estimator of the mixed logit model

Other readings
Berry S, Levinsohn J and Pakes A. Automobile Prices in Market Equilibrium. *Econometrica* 63(4): 841-890, 1995

Brownstone D and Train K. Forecasting New Product Penetration with Flexible Substitution Patterns. *Journal of Econometrics* 89: 09-129, 1999

Daziano RA. Conditional-Logit Bayes Estimators for Consumer Valuation of Electric Vehicle Driving Range. *Resource and Energy Economics* 35 (3): 429-450, 2013

Cameron C and Trivedi P. *Microeconometrics: Methods and Applications,* Cambridge University Press, 2005 (esp. chapters 14-15)

Jaffe A and Stavins R. The Energy Paradox and the Diffusion of Conservation Technology. *Resource and Energy Economics* 16: 91-122, 1994

McFadden D. *Economic Choices. American Economic Review*, 91(3): 351-378, 2001

Small K and Rosen H. Applied welfare economics with discrete choice models, Econometrica 49, 105-130, 1981