

Peter Arcidiacono
Dynamic Discrete Choice
Tuesday/Thursday 11:45-1:00, 113 Social Science

In this module we will work our way from discrete choice models to dynamic discrete choice models. In dynamic discrete choice models individuals make decisions today recognizing the impact these decisions have on the value of future decisions. We will pay particular attention to advances in how to compute these types of models when unobserved variables are present.

The class is divided into three parts. Part one covers static discrete choice models where we will pay exclusive attention to error structures under the GEV umbrella. Part two focuses on how to estimate dynamic discrete choice models while Part three adds unobserved heterogeneity into dynamic discrete choice models.

All course-related material will be posted on Sakai. The night before each non-programming class, students are expected to post a comment or question about the reading. To post your comment, click on the Forums link.

Students are also expected to write a paper proposal that involves dynamic discrete choice techniques. The paper proposal will be at least 7 pages and contain the following:

- 1) The research question
- 2) Why dynamics are important to the research question
- 3) A fleshed-out dynamic discrete choice model
- 4) A sketch of the estimation procedure
- 5) Ideas regarding data one could use to estimate the model

Grading is based on:

- 1) Blog comments (15%)
- 2) Problem sets (70%)
- 3) Paper proposal (15%)

Schedule

Part I: Static Discrete Choice with GEV Errors

1/9 Introduction, Logit

Train *Discrete Choice Methods with Simulation* (2003) Chapters 1-4

1/14 Nested Logit, Correlations across multiple nests

Bresnahan, Stern, and Trajtenberg (1997 *RAND*)

Part 2: Dynamic Discrete Choice

1/16 Full solution methods: Backwards recursion and Nested fixed point

Rust "Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher"
(1987 *Econometrica*)

Stange “An Empirical Investigation of the Option Value of College Enrollment” (2012
American Economic Journal: Applied Economics)

1/22 **PS 1 due by 3pm**

1/23 Programming

1/28 Introduction to CCP estimation

Hotz and Miller “Conditional Choice Probabilities and Estimation of Dynamic Models” (1993
Review of Economic Studies)

Arcidiacono and Ellickson (2011) “Practical Methods for Estimation of Dynamic Discrete
Choice Models” *Annual Review of Economic Vol. 3* read up through section 3.1

Arcidiacono and Miller (2011 *Econometrica*) section 2

1/30 General error structures and forward simulation

Arcidiacono and Miller (2011) section 3.3

Hotz, Miller, Sanders, Smith “A Simulation Estimator for Dynamic Models of Discrete Choice”
(1994, *Review of Economic Studies*)

2/4 Finite dependence

Arcidiacono and Ellickson (2011) sections 3.2-3.4

Arcidiacono and Miller (2011) section 3.1-3.2

Arcidiacono and Miller “Nonstationary Dynamic Models with Finite Dependence” (2018)

2/6 Dynamic Discrete Choice in Continuous Time

Arcidiacono, Bayer, Blevins, and Ellickson “Estimation of Dynamic Discrete Choice Models in
Continuous Time with an Application to Retail Competition” (2016, *Review of Economic
Studies*)

2/9 **PS 2 due by 3pm**

2/11 Programming

Part 3: Dynamic Discrete Choice with Unobserved Heterogeneity

2/13 Finite mixture distributions and the Expectations Maximization algorithm

Stange (2012)

Arcidiacono and Jones “Finite Mixture Distributions, Sequential Likelihood, and the EM
Algorithm” (2003, *Econometrica*)

2/18 CCP estimation with unobserved heterogeneity

Arcidiacono and Ellickson (2011) sections 4.2

Arcidiacono and Miller (2011) sections 4-7

2/20 Catchup

2/23 PS 3 due by 3pm

2/25 Programming 1

2/27 Programming 2

2/27 Paper proposals due