

# Structural Econometrics: Discrete Choice Methods with Simulation

Daniel Kemptner

Spring Semester 2019

## 1 General information

### Course objectives

- This is the first course of a sequence of two courses on structural econometrics offered by the DIW Graduate Center
- Focuses on discrete choice models for cross section and panel data
- Covers simulation-based estimation techniques such as Maximum Simulated Likelihood (MSL), Method of Simulated Moments (MSM), and Indirect Inference
- Applied papers from the fields of labour economics, health economics, industrial organization, and behavioral economics will be discussed
- Exercises will include the use of a software package (Matlab)
- The aim is to equip students with skills allowing them to carry out independent empirical research

### Course organization

- The course is taught by Daniel Kemptner
- Credit points: 6 ECTS. 6 sessions (4 hours)
- Prerequisites: skills in advanced econometric methods (Master or Ph.D. level)
- All sessions in this course take place at DIW from 2 to 5:30 pm
- First session: 10.4.2019; final session: 22.5.2019

### Grading

- The overall grade will be determined by
  - 2 problem sets (to be completed in groups of max. 2 participants), weighted 1/4 each, and
  - a final exam, weighted 1/2.

### Main textbook

- Train, K.E. (2009), Discrete Choice Methods with Simulation, 2nd ed., Cambridge University Press.

## **2 Introduction to choice models (10.4.; Karl Popper room)**

- Train, K.E. (2009), chapters 1, 2
- Properties of choice models
- Binary choice models
- Non-linear models and panel data; Wooldridge, J.M. (2005); Akay, A. (2011)

## **3 Logit model (17.4.; Karl Popper room)**

- Train, K.E. (2009), chapter 3
- Properties, power, limitations, and estimation
- Kapteyn, A. and F. Teppa (2003)

## **4 Unobserved heterogeneity (24.4.; Karl Popper room)**

- Train, K.E. (2009), chapters 4–6
- Probit model, taste variation and panel data
- Simulation of choice probabilities
- Mixed logit model; van Soest, A. (1995)

## **5 Extensions (8.5.; Karl Popper room)**

- Train, K.E. (2009), chapter 7
- Stated- and revealed-preference data
- Revelt, D. and K.E. Train (1998); von Gaudecker, H.-M., A. van Soest, and E. Wengström (2011)
- Ranked data and ordered responses

## **6 Estimation techniques (15.5. and 22.5.; Karl Popper room)**

- Train, K.E. (2009), chapters 8–11, 14
- Numerical integration and drawing from densities
- MSL estimation, MSM estimation, and indirect inference
- Individual-level parameters
- Expectation-Maximization Algorithm
- Arcidiacono, P., and J. B. Jones (2003); Arcidiacono, P., H. Sieg, and F. Sloan (2007)
- Bootstrapping

## 7 Papers

- Akay, A. (2011), “Finite-sample Comparison of Alternative Methods for Estimating Dynamic Panel Data Models”, *Journal of Applied Econometrics*, 27, pp. 1189-1204.
- Arcidiacono, P., and J. B. Jones (2003): “Finite Mixture Distributions, Sequential Likelihood and the EM Algorithm”, *Econometrica*, 71(3), 933-946.
- Arcidiacono, P., H. Sieg, and F. Sloan (2007): “Living Rationally Under The Volcano? An Empirical Analysis Of Heavy Drinking And Smoking”, *International Economic Review*, 48(1), 37-65.
- McFadden, D. (2001), “Economic Choices”, *The American Economic Review*, 91 (3), pp. 351-378.
- von Gaudecker, H.-M., A. van Soest, and E. Wengström (2011), “Heterogeneity in Risky Choice Behavior”, *The American Economic Review*, 101 (2), pp. 664-694.
- Kapteyn, A. and F. Teppa (2003), “Hypothetical Intertemporal Consumption Choices”, *Economic Journal*, 113, C140-C152.
- Revelt, D. and K.E. Train (1998), “Mixed Logit with Repeated Choices: Household Choices and Appliance Efficiency Level”, *Review of Economics and Statistics*, 80, pp. 647-657.
- van Soest, A. (1995), “Models of Family Labor Supply: A Discrete Choice Approach”, *The Journal of Human Resources*, 30 (1), pp. 63-88.
- Wooldridge, J.M. (2005), “Simple Solutions to the Initial Conditions Problem in Dynamic, Nonlinear Panel Data Models with Unobserved Heterogeneity”, *Journal of Applied Econometrics*, 20, pp. 39-54.