Advanced Econometrics in Labor and IO

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Spring Semester 2022

1 Course organization

- The course takes place on Thursdays (in general), 14:00 - 17:00.
- PhD: Credit points: 9 ECTS.
- Master: Credit points: 6 ECTS.
- First session: April 28th, 2022
- Final session: Exam, July 14th, 2022
- Compulsory reading in bold.
- Evaluation: if this course is taken for credits, the final grade will be determined by
  - 2 problem sets (to be completed in groups of max. 2 participants), weighted 1/3 each,
  - a final exam, weighted 1/3.

2 Course objectives

- Discuss advantages and limitations of structural econometric models. Give students an understanding of why and when adding structure is important.
- Provide insights into strategy (especially, identification) in important papers in structural Labour, Public & IO literature. Give a feel of how one may go about establishing a structural model.
- Establish basic estimation techniques & numerical methods such as Simulation, Numerical integration and Discretisation.
- Develop matrix programming skills using Matlab. Loops vs. vectorisation; readability vs. speed; sustainable coding for several projects.

3 Introduction to Structural Discrete Choice Modeling (April 28, PH)

- **Numerical methods** Judd (1998), Train (2009)
- **Methodology fights** Angrist and Pischke (2010), Frijters (2013), Heckman (2010), Keane (2010), Rust (2010), Rust (2014), Wolpin (2013)

References

Angrist, Joshua and Jörn Pischke (2010), "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics," *Journal of Economic Perspectives* 24 (2), 3-30.

Frijters, Paul (2013) "The Limits of Inference Without Theory", *Economic Record* 89, 429-432.

Heckman, Jim J. (2010), "Building Bridges Between Structural and Program Evaluation Approaches to Evaluating Policy," *Journal of Economic Literature* 48(2), 356-398.

Judd, Kenneth L. (1998), *Numerical Methods in Economics*, MIT Press, Cambridge, MA.

Keane, Michael P. (2010), "Structural vs. Atheoretic Approaches to Econometrics," *Journal of Econometrics* 156, 3-20.

Rust, John (2010), "Comments on: 'Structural vs. atheoretic approaches to econometrics' by Michael Keane," *Journal of Econometrics* 156 (1), 21-24.

Rust, John (2014), "The Limits of Inference with Theory: A Review of Wolpin," *Journal of Economic Literature* 52 (3), 820-850.

Train, Kenneth E. (2009), Discrete Choice Methods with Simulation, Cambridge University Press.

Wolpin, Kenneth I. (2013), The limits of inference without theory, MIT Press.

4 Static discrete choice in IO (May 5, HU)

- Estimating demand and supply parameters in markets with differentiated products using aggregate (product-level) data.
- Coding exercise: preliminaries.

References

Ackerberg, D., L. Benkard, S. Berry, and A. Pakes (2007), "Econometric Tools for Analyzing Market Outcomes," in J. J. Heckman and E. Leamer, eds., *Handbook of Econometrics*, North-Holland, Chapter 63, 4171-4276, Section 1.

Berry, Steven T. (1994), "Estimating Discrete Choice Models of Product Differentiation," *Rand Journal of Economics* 25 (2), 242-262.

Berry, Steven T., Jim Levinsohn, and Ariel Pakes (1995), "Automobile Prices in Market Equilibrium," *Econometrica* 63 (4), 841-890.

Berry, Steven T. and Philip A. Haile (2021), "Foundations of Demand Estimation," In *Handbook of Industrial Organization* 4(1), 1-62.

Conlon, Christopher and Jeff Gortmaker (2020), "Best Practices for Differentiated Products Demand Estimation with pyblp," *The RAND Journal of Economics* 51(4), 1108-1161.

Haile, Phil (2021), "Structural vs. Reduced Form:" Language, Confusion, and Models in Empirical Economics, slides at `http://www.econ.yale.edu/~pah29/intro.pdf`

Reiss, P. and F. Wolak (2007), "Structural econometric modeling: Rationales and examples from industrial organization," in J. J. Heckman and E. Leamer, eds., *Handbook of Econometrics*, North-Holland, Chapter 64, 4277-4415.

5 Static discrete choice in IO (May 12, HU)

- Recap Berry et al. (1995).
- Coding exercise: Berry et al. (1995) nested fixed-point (NFP) algorithm.
- Discuss extensions and alternative estimation methods.

References

Berry, Steven T., Jim Levinsohn, and Ariel Pakes (1995), "Automobile Prices in Market Equilibrium," *Econometrica* 63 (4), 841-890.

Conlon, Christopher and Jeff Gortmaker (2020), "Best Practices for Differentiated Products Demand Estimation with pyblp," *The RAND Journal of Economics* 51(4), 1108-1161.

Nevo, Aviv (2000), "A Practitioner's Guide to Estimation of Random-coefficients Logit Models of Demand," *Journal of Economics and Management Strategy* 9 (4), 513-548.

6 Dynamic discrete choice in IO (May 19, HU)

- Introduction to dynamics.
- Estimating single-agent discrete choice models: Rust (1987) engine replacement problem.

References

Magnac, Thierry and David Thesmar (2002), "Identifying dynamic discrete decision processes," *Econometrica* 70 (2), 801-816.

Rust, John (1987), "Optimal replacement of GMC bus engines: An empirical model of Harold Zurcher," *Econometrica* 55, 999-1033.

Rust, John (1994), Structural estimation of Markov decision processes, In R. Engle and D. McFadden (Eds.), *Handbook of Econometrics* 4, 3081-3143, North-Holland. Amsterdam.

7 Dynamic discrete choice in IO (June 2, HU)

- Coding exercise: Rust (1987)
- Examples of applications to demand estimation.
- Conditional choice probability (CCP) estimation.

References

Arcidiacono, Peter and Paul B. Ellickson (2011), "Practical methods for estimation of dynamic discrete choice models," *Annual Review of Economics*, 3, 363-394.

Gowrisankaran, Gautam and Marc Rysman (2012), "Dynamics of consumer demand for new durable goods," *Journal of Political Economy* 120(6), 1173-1219.

Hendel, Igal and Aviv Nevo (2014), "Intertemporal price discrimination in storable goods markets," *American Economic Review*, 103(7), 2722-2751.

Hotz, Joseph V. and David A. Miller (1993), "Conditional choice probabilities and the estimation of dynamic models," *Review of Economic Studies* 60, 497-529.

Hotz, Joseph V., David A. Miller, S. Sanders, and J. Smith (1994), "A simulation estimator for dynamic models of discrete choice," *Review of Economic Studies* 61(2), 265-289.

8 Dynamic discrete choice in Labour I (June 9, PH, BI)

- Dynamic incentives to labour supply: investing in human capital
- More on Discretisation
- Interpolation

Reference

Keane, M., P. Todd, and K. Wolpin (2011), "The Structural Estimation of Behavioral Models: Discrete Choice Dynamic Programming Methods and Applications," in *Handbook of Labor Economics*, ed. by O. Ashenfelter and D. Card, Elsevier, vol. 4, 1 ed.

Keane, Michael and Kenneth Wolpin (1997), "The Career Decisions of Young Men", *Journal of Political Economy* 105 (3), 473-522.

9 Dynamic discrete choice in Labour II (June 16, PH, BI)

- Dynamic incentives to labour supply: the role of education, full time and part time experience
- Identification and validation of structural parameters
- Policy Simulation

Reference

Blundell, Richard, Monica Costa-Dias, Costas Meghir, and Jonathan Shaw (2016), "Female Labour Supply, Human Capital and Welfare Reform", *Econometrica* 84(5), 1705-1753.

10 Dynamic discrete choice in Labour III (June 23, PH, BI)

- Dynamic incentives to labour supply: the role of education, full time and part time experience
- Identification and validation of structural parameters
- Policy Simulation

Reference

Blundell, Richard, Monica Costa-Dias, Costas Meghir, and Jonathan Shaw (2016), "Female Labour Supply, Human Capital and Welfare Reform", *Econometrica* 84(5), 1705-1753.

11 Partial job search (June 30, LH), voluntary for Master students

- Discuss motivation and rationale of job search models
- Understand optimal job search decisions
- Non-parametric identification & estimation using duration data
- Simulation using inverse probability sampling

References

John McCall (1970) "The Economics of Information and Job Search, *Quarterly Journal of Economics*, 84, p.113-126

Christopher Flinn & James Heckmann (1982)"New Methods for Analyzing Structural Models of Labor Force Dynamics", *Journal of Econometrics* 18, 115-168.

Richard Rogerson, Robert Shimer & Randall Wright (2005), "Search-Theoretic Models of the Labor Market: A Survey", *Journal of Economic Literature* 43, 115-168.

Kenneth Train (2009), "Chapter 9 - Drawing from Densities" *in* "Discrete Choice Methods with Simulation", Cambridge University Press & https://eml.berkeley.edu/books/choice2.html

12 Equilibrium job search (July 7, LH), voluntary for Master students

- Contrast optimal stopping to equilibrium job search models
- Discuss how on-the-job search generates wage dispersion of observationally equivalent workers
- Simulation & estimation of the model

References

Peter Diamond (1971) "A model of Price Adjustment", *Journal of Economic Theory* 3, 156-168.

James Albrecht & Bo Axell (1984) " An Equilibrium Model of Search Unemployment" (1998), *Journal of Political Economy* 92, 824-840.

Burdett, Kenneth and Dale Mortensen "Wage Differentials Employer Size and Unemployment" (1998), *International Economic Review* 39 (2), 257-273.

Gerard Van Den Berg (1999) "Empirical inference with equilibrium search models of the labour market." *The Economic Journal* 109, p.283-306.

13 Exam July 14th