

# DIW Graduate Course: Structural Econometrics in Labor and IO

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## 1 Course organization

- The course takes place on Thursdays, 14:30 - 17:30, in Room 2.2008 (Ferdinand Friedensburg).
- 10 three hour sessions in 12 weeks.
- First session: April 17, 2014
- Final session: July 3, 2014
- Room change: On June 12, the course will be held in Room 1.2026 (Gustav Schmoller).

## 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.
- Provide introduction to the matrix programming language Matlab. Loops vs. vectorisation; readability vs. speed; sustainable coding for several projects.

## 3 Introduction (April 17, LH)

- **Surveys** Akerberg et al. (2007), Reiss and Wolak (2007); Keane et al. (2011), Aguirregabiria and Mira (2010)
- **Methodological background** GMM: Hayashi (2000); Numerical methods: Judd (1998); Discrete Choice: Train (2009); Dynamics: Adda and Cooper (2003)
- **Credibility debate** Angrist and Pischke (2010), Einav and Levin (2010), Heckman (2010), Keane (2010), Nevo and Whinston (2010), Rust (2010)

### References

Akerberg, 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.

Aguirregabiria, Victor, and Pedro Mira (2010), "Dynamic Discrete Choice Structural Models: A Survey," *Journal of Econometrics*, 156(1), 38-67.

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.

Einav, Liran and Jonathan Levin (2010), “Empirical industrial Organization: A Progress Report,” *Journal of Economic Perspectives*, 24 (2), 157-160.

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.

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.

Nevo, Aviv and Michael Whinston (2010), “Taking the Dogma out of Econometrics: Structural Modeling and Credible Inference,” *Journal of Economic Perspectives*, 24 (2), 69-82.

Reiss, P. and F. Wolak (2007), “Structural econometric modeling: Rationales and examples from industrial organization,” *Handbook of Econometrics*, 6, 4277-4415.

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

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

## 4 Static discrete choice in Labor (April 17, April 24, LH)

- Discuss labour supply analyses using discrete choice framework
- Identification & Estimation with individual unobserved heterogeneity
- Discuss with practical session (code available)

### Reference

van Soest, Arthur (1995), “Structural models of family labor supply: A discrete choice approach”, *Journal of Human Resources*, 30 (1), 63-88.

## 5 Static discrete choice in IO: Demand (May 8 & 15, TD/HU)

- Recap Berry (1994) inversion for IV estimation with aggregate data. Discuss Berry et al. (1995) nested fixed-point (NFP) algorithm.
- Coding Exercise.
- Time-permitting: Discuss extensions and alternative estimation methods: macro- and micro-moments; MPEC estimation; nonparametric estimation of random coefficient distribution. Petrin (2002); Dubé et al. (2012); Fox et al. (2011), Train (2008).

## References

- Bajari, Patrick L., Fox, Jeremy T., and Stephen P. Ryan (2007), "Linear Regression Estimation of Discrete Choice Models with Nonparametric Random Coefficient Distributions," *American Economic Review: Papers and Proceedings*, 97(2), 459-463.
- 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.**
- Dubé, Jean-Pierre, Fox, Jeremy T., and Che-Lin Su (2012), "Improving the Numerical Performance of Static and Dynamic Aggregate Discrete Choice Random Coefficients Demand Estimation," *Econometrica*, 80 (5), 2231-2267.
- Fox, Jeremy T., il Kim, Kyoo, Stephen P. Ryan, and Patrick L. Bajari (2011), "A Simple Estimator for the Distribution of Random Coefficients," *Quantitative Economics*, 2, 381-418.
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- 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.**
- Nevo, Aviv (2001), "Measuring Market Power in the Ready-To-Eat Cereal Industry," *Econometrica*, 69 (2), 307-342.
- Petrin, Amil (2002), "Quantifying the Benefits of New Products: The Case of the Minivan," *Journal of Political Economy*, 110 (4), 705-729.**
- Su, Che-Lin and Kenneth L. Judd (2012), "Constrained Optimization Approaches to Estimation of Structural Models," *Econometrica*, 80 (5), 2213-2230.
- Train, Kenneth E. (2008), "EM Algorithms for Nonparametric Estimation of Mixing Distributions," *Journal of Choice Modeling*, 1(1), 40-69.

## 6 Dynamic discrete choice in IO (May 22, June 5, HU)

- Introduction to dynamics.
- Single-agent discrete choice models: Rust (1987); Hendel and Nevo (2006), Gowrisankaran and Rysman (2012).
- Coding exercise.

## References

- Arcidiacono, Peter and Paul B. Ellickson (2011), "Practical methods for estimation of dynamic discrete choice models," *Annual Review of Economics*, 3, 363-394.
- Crawford, Gregory and M. Shum (2005), "Uncertainty and Learning in Pharmaceutical Demand," *Econometrica*, 73(4), 1137-1174.
- Erdem, T. and Michael Keane (1996), "Decision-making under uncertainty: Capturing dynamic brand choice processes in turbulent consumer goods markets," *Marketing Science*, 1-20.

Gowrisankaran, Gautam and Marc Rysman (2012), “Dynamics of Consumer Demand for New Durable Goods,” *Journal of Political Economy*, forthcoming.

Hendel, Igal and Aviv Nevo (2006), “Measuring the Implications of Sales and Consumer Stockpiling Behavior,” *Econometrica*, 74(6), 1637-1673.

Hendel, Igal and Aviv Nevo (2014), “Intertemporal Price Discrimination in Storable Goods Markets,” *American Economic Review*, forthcoming.

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

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Nair, Harikesh (2007), “Intertemporal Price Discrimination with Forward-looking Consumers: Application to the US Market for Console Video-Games,” *Quantitative Marketing and Economics*, 5(3), 239-292.

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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 Labor (June 12 & 19, LH)

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

### References

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

French, Eric and John Jones (2011), “The effects of health insurance and self-insurance on retirement behavior”, *Econometrica*, 79 (3), 693-732.

## 8 Equilibrium search models (June 26, July 3, LH)

- Discuss how on-the-job search generates wage dispersion of observationally equivalent workers
- Estimation using duration data
- Inferring productivity dispersion from wage dispersion
- Introduce firm competition (second-price auction for workers)

## References

Postel-Vinay, Fabien and Jean-Marc Robin (2002), "Equilibrium Wage Dispersion with Worker and Employer Heterogeneity", *Econometrica* 70 (6), 2295-2350.

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