

## **Econ 895: Structural Models**

Fall 2018

Carow Hall, Main Lecture Room

Tuesdays, 1:30pm to 4:10pm

### **Instructor:**

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**Description of the course:** The class analyzes structural econometric models of economics and politics. By “structural” model I mean cases where a researcher (i) builds a formal theoretic model, then (ii) derives a likelihood function from that model, then (iii) estimates parameters of the formal model by maximizing the likelihood function. Some particular structural models that the class will examine are: McFadden’s model of urban travel demand (the first example, as far as I am aware, of a logistic regression in social science), Poole and Rosenthal’s NOMINATE scores for legislators, and McKelvey and Palfrey’s Quantal Response Equilibrium model to analyze game-theoretic interactions.

**Prerequisites:** The only pre-requisites for the course are that (i) the student know calculus and at least mildly enjoy it, (ii) the student understands probability very well, at least at the level knowing things like probability density functions and cumulative distribution functions. It is also strongly advised that the student have some experience with statistics and econometrics – at least to the level of executing a probit or logistic regression. The student should also know some rudimentary aspects of game theory – e.g. what a Nash equilibrium is and how to solve for a mixed-strategy equilibrium in a simple game.

**Purpose of the course:** Typically training in quantitative and formal methods is partitioned. Students are taught in some classes (i) how to formulate and solve formal models. And in separate classes they are taught (ii) how to use statistical and econometric techniques to estimate parameters. In this class, we will focus on the intersection of these two central components of applied research. By working through exemplar articles, students will gain experience in drawing testable empirical implications from formal models and how to design statistical estimators that capture the structural parameters of the formal models.

**Requirements:** The requirements of this course are an in-class midterm exam, a series of problem sets, a presentation of an article from the course syllabus, and a presentation of project (which uses tools from the course) that the student might conduct. The problem sets will involve replicating, elaborating, or extending the analysis presented in the assigned papers and will often involve work

on the computer. Though you are welcome to complete the assignments using whatever computer tool you are most familiar with, I encourage you to use R. Also, for some assignments you will use Excel.

The weekly problem sets **are due on Sunday morning at 2:00am.** (I'm usually at my son's speedskating practice by 4:00am on Sundays; I plan to grade at the rink!) Please leave your answers in my mailbox (in Carow) or email them to me.

25% of your grade will be based on your score on the midterm; 50% will be based on your score on the problem sets; and 25% will be based on your presentations in class.

**Dropbox:** Occasionally, I'll post readings or assignments on [www.dropbox.com](http://www.dropbox.com) in the folder, "Structural Models." Make sure I have your email address. If so, you should be able to download these readings or assignments. Please email me if you have any difficulty.

### **Textbooks:**

William Greene. 1997. *Econometric Analysis*. Third Edition.

Gould, William and William Sribney. *ML Estimation with Stata*.

### **Tentative Schedule of Class Meetings**

A "\*" means that we will discuss the paper for certain. If a paper does not have a "\*", it means that we will probably not discuss the paper in class, but I still encourage you to read it.

There is a possibility that I will have to cancel a class. For that reason I've only planned 14 class sessions below. If I do not have to cancel a class, we will end the course after the 14<sup>th</sup> week.

**Week 1.** Introduction, definition of likelihood.

\* Flew, Antony. 1979. "Likelihood." From *A Dictionary of Philosophy*. New York: St. Martin's press.

**Week 2.** Maximum likelihood estimation

\* Diermeier and Merlo (2001). "An Empirical Investigation of Coalitional Bargaining Procedures," manuscript.

\* Greene. *Econometric Analysis*. Pp. 129-140, 159-162, 871-888, 892. [Efficient Estimation – Maximum Likelihood; Three Asymptotically Equivalent Test Procedures; Models with Discrete

Independent Variables: Introduction; Discrete Choice Models; Models for Binary Choice; Estimation and Inference in Binary Choice Models]

Gould and Sribney. Pp. 1-22.

**Week 3.** Levitt and Porter's drunk-driver estimation.

\* Levitt, Steven, and Jack Porter (2001), "How Dangerous are Drinking Drivers?" *Journal of Political Economy*, 109 (No. 6): 1198-1237.

<http://pricetheory.uchicago.edu/levitt/Papers/LevittPorterHowDangerousAre2001.pdf>

**Week 4.** Models of discrete choice and random utility

\* MacFadden (1974) "The Measurement of Urban Travel Demand". *Journal of Public Economics*. 3: 303-328.

Debreu, Gerard. 1960. Review of *Individual Choice Behavior: A Theoretical Analysis*. In *The American Economic Review*. 50: 186-8.

\* Greene. Pp. 906-938. [ Bivariate and Multivariate Probit Models; Logit Models for Multiple Choices; Nested Logit Models; Ordered Data ]

**Week 5.** Empirical applications of spatial models, I

\* Greene. Pp. 926-931. [Ordered Data]

\* Krehbiel and Rivers. 1988. "The Analysis of Committee Power: An Application to the Minimum Wage," *AJPS*.

Rabinowitz and MacDonald. 1989. "The Directional Theory of Voting," *APSR*

Westholm (1997) "Distance vs. Direction: The Illusory Defeat of the Proximity Theory of Electoral Choice," *APSR*.

Lewis and King (1999) "No Evidence on Directional vs. Proximity Voting." *Political Analysis*

**Week 6.** Empirical applications of spatial models, II

\* Poole and Rosenthal (1985) "A Spatial Model for Legislative Roll Call Analysis," *AJPS*

\* Groseclose, Levitt, and Snyder (1999) "Comparing Interest Group Scores across Time and Chambers: Adjusted ADA Scores for the U.S. Congress," APSR

**Week 7.** \*\*\* Midterm \*\*\*\*

**Week 8.** Spatial models outside the legislature:

\* Groseclose and Milyo. 2005. "A Measure of Media Bias." *Quarterly Journal of Economics*, November (4).

<http://www.sscnet.ucla.edu/polisci/faculty/groseclose/pdfs/MediaBias.pdf>

Poole, Keith. 1998. "Recovering a Basic Space From a Set of Issue Scales." *AJPS*. Pp. 954-93.

**Week 9.** Crime and Running for Congress (and Other Two-Step Decision Models).

\* Groseclose, Tim, and Keith Krehbiel (1994), "Golden Parachutes, Rubber Checks, and Strategic Retirements from the 102<sup>nd</sup> House," *American Journal of Political Science*, 38: 75-99.

<http://www.jstor.org/stable/pdfplus/10.2307/2111336.pdf>

Feinstein, Jonathan (1990), "Detection-Controlled Estimation," *Journal of Law and Economics*, 133 (No. 1): 233-76.

<http://www.jstor.org.mutex.gmu.edu/stable/pdfplus/725516.pdf?acceptTC=true>

**Week 10.** Models of strategic interaction I

Bresnahan and Reiss (1991) "Econometric Models of Discrete Games," *Journal of Econometrics*.

Kooreman (1994) "Estimation of Econometric Models of Some Discrete Games," *Journal of Applied Econometrics*.

\* McKelvey and Palfrey (1992) "Quantal Response Equilibria for Normal Form Games," *Games and Economic Behavior*.

McKelvey and Palfrey (1998) "Quantal Response Equilibria for Extensive Form Games," *Experimental Economics*.

**Week 11.** Models of strategic interaction, II

\* Signorino (1999) "Strategic Interaction and the Statistical Analysis of International Conflict." APSR

Lewis and Schultz (2002) "Revealing Preferences: Empirical Estimation of a Crisis Bargaining Game with Incomplete Information," *Political Analysis*.

**Week 12.** Regression and Probit Tricks: Transforming a likelihood function so that it can be estimated by a regression or probit. And, testing the median voter theory

\* Groseclose and Stewart. 1998. The Value of Committee Seats in the House, 1947-1991. *AJPS*.

\* Levitt, Steven D. 1996. "How Do Senators Vote? Disentangling the Role of Party Affiliation, Voter Preferences, and Senator Ideology." *American Economic Review* 86:425-441.

Romer and Rosenthal. "The Elusive Median Voter"

Romer and Rosenthal "Median Voters or Budget Maximizers: Evidence from School Expenditure Referenda"

Inman ``Testing Political Economy's `As If' Proposition: Is the median voter really decisive?"

### **Week 13. Creating One's Own Structural Model**

Lecture will be canceled this week. Instead, students will be required to meet with me to discuss their progress on their projects.

### **Week 14. Student Presentations**

Each student will give a presentation, approximately 30 minutes long, on his or her project.