Week 0: Course Overview

ResEcon 703: Topics in Advanced Econometrics

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Agenda

Today's topics

- Introductions
- Course information
- Course materials
- Grades and assignments

Introductions

My Info

Matt Woerman

- Assistant Professor, Resource Economics

Contact info

- Email: mwoerman@umass.edu
- Office hours: Wednesday, 9–11 am, Zoom
  - ▸ Sign up at: sites.google.com/site/mattwoerman/teaching

Best way to communicate with me

- "Public" question: Ask in Zoom class or Google Form
- Short "private" question: Email with [ResEcon 703] in the subject
- Longer "private" question: Sign up for office hours

About Me

- I study energy and environmental economics, industrial organization, and applied econometrics
  - ▸ Market power and technologies in wholesale electricity markets
  - ▸ Effects of climate change on power plant operations and electricity market outcomes
  - ▸ Demand for groundwater and energy in agriculture and sustainable groundwater management
  - ▸ Design of carbon markets and other environmental policies
  - ▸ Tools for designing experiments with panel data
- This is my second year as an assistant professor and second time teaching this course
  - ▸ You get to benefit from all of my mistakes last year!
  - ▸ You can play a role in shaping the design of this course, for yourself and for future classes
- My wife is an assistant professor in the Biology Department at UMass
  - ▸ "Dr. Woerman"/"Prof. Woerman" is not a unique identifier, so call me "Matt" if you would like
- Pronouns: he/him/his

About You

Introduce yourself

- Name
- Pronouns
- Department
- Research interests
- Favorite statistical software? Any experience with R?
- Anything else you want us to know?

Course Information

Course Websites

github.com/woerman/ResEcon703

moodle.umass.edu/course/view.php?id=70648

I will post lecture slides, R code, links to lecture videos, problem sets, datasets, etc. on both websites

Course Description

You've already taken

- ResEcon 701: Probability Theory and Statistical Inference
- ResEcon 702: Econometric Methods
    - ► Classical linear regression model
    - ► "Treatment effect" estimation

(If you have not taken ResEcon 702, please see me to determine if this course is appropriate for you)

Isn't that enough? What else is there?

- Structural estimation
- Discrete choice models

Course Goals

1. Gain an in-depth understanding of some of the most common structural estimation methods in modern empirical economics
   - Maximum likelihood estimation
   - Generalized method of moments
   - Maximum simulated likelihood
   - Method of simulated moments

2. Develop the technical ability to apply these structural estimation methods to your own research

3. Apply these methods to discrete choice models motivated by the random utility model
   - Logit model
   - Generalized extreme value models (nested logit model)
   - Mixed logit model (random coefficients logit model)

Course Structure

We will use both asynchronous lectures and synchronous Zoom classes

- Asynchronous lecture videos will generally cover the "theory" for the week's topic
- Synchronous Zoom classes (at the scheduled meeting time) will cover "applications" of the week's topic

Typical schedule for a week

- Friday: I will post the next week's lecture videos and send an email with information and links for the following week
- Before Zoom class on Tuesday: You will read the assigned reading, watch the lecture videos, and submit a mandatory (but brief) Google Form about the week's material
- Synchronous Zoom classes: I will overview the material and answer questions, and then we will interactively work through applications of the material
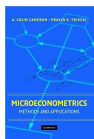
Course Materials

Textbook and Notes
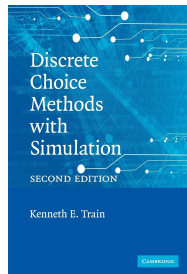
Discrete Choice Methods with Simulation (Second Edition)
Kenneth E. Train

- Available for free at:
  `eml.berkeley.edu/books/choice2.html`
- Paperback copy is usually less than $50

- I will also post supplemental notes on some topics that we cover

Other References

Microeconometrics: Methods and Applications
A. Colin Cameron and Pravin K. Trivedi

Econometric Analysis
William H. Greene

Econometrics
Fumio Hayashi

Econometric Analysis of Cross Section and Panel Data
Jeffrey M. Wooldridge

Software

We will use the R statistical programming language in this course

But I already know Stata/Matlab/Python/SAS/Julia. Why R?

- R is free and open source
- R is powerful and flexible
  - ▶ Basic statistics, data cleaning, linear regression, matrix algebra, simulation methods, structural estimation, data visualization, etc.
- R is favored by employers

How can I learn R?

- R tutorial next week
- Many R resources available for free
- First problem set will be a (relatively) gentle introduction to R

You do not have to use R. But I will not provide any support or partial credit for work done in other programming languages.

Installing R

Installing R is *usually* straightforward

 Download (cran.r-project.org) and install R

 Download (www.rstudio.com/products/rstudio/download) and install RStudio Desktop (Open Source License)

What is the difference between R and RStudio?

R is like a car's engine. It is the program that powers your data analysis.

RStudio is like a car's dashboard. It is the program you interact with to harness the power of your "engine."

Grades and Assignments

Grades

Your final grade will be made up of

- Problem sets: 4 at 15% each (60% total)
- Final exam: 30%
- Attendance and participation: 10%

Problem Sets

Problems sets will simulate the kind of analysis you will do when conducting your own research

- Apply the estimation methods you learn in class
- Interpret your results
- Draw policy-relevant conclusions

Rules for problem sets

- You can work in groups of up to three people (I recommend you do)
- Submit one write up with the names of all group members
- You must submit your code with your write up
- You can only use "canned" routines when told to do so

See syllabus for tentative problem set schedule

Final Exam

Final exam will be similar to problem sets

- Take-home, not in class
- Estimation, interpretation, etc.
- At least two weeks to complete (actual exam timeline TBD)

How the final exam differs from problem sets

- Will require roughly twice the effort of a problem set
- SINGLE-AUTHORED! No collaboration, consultation, etc.

More details to come toward the end of the semester

Attendance and Participation

Attendance in synchronous Zoom classes is not required but STRONGLY recommended

- You will be responsible for this material
- Classes will be recorded for asynchronous viewing
- If you have an occasional conflict and miss a class, sign up for office hours to catch up on the material

"Participation" is required

- Keep up with the assigned reading
- Watch asynchronous lecture videos
- Complete the Google Form about each week's material

See syllabus for tentative schedule of weekly topics and reading