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: Tuesday, 3:30–5:00 pm, 218 Stockbridge Hall or Zoom
  - Sign up at: `calendly.com/mwoerman/officehours` or `sites.google.com/site/mattwoerman/teaching`

Best way to communicate with me

- "Public" question: Ask in class
- 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
  - Demand for groundwater and energy in agriculture and sustainable groundwater management
  - Design of carbon markets and other environmental policies
- This is my fourth year as an assistant professor and fourth time teaching this course
  - You get to benefit from all of my mistakes the last three 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 (or most familiar) statistical software?
  - Any experience with R?
- Anything else you want us to know?
  - A boring fact about yourself?

Course Information

Course Website

`github.com/woerman/ResEcon703`

I will use this GitHub repository to post lecture slides, R code, links to lecture videos, problem sets, datasets, etc.

Course Description

You have 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 and to understand their use in the literature

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)

Multimodal Course

This course is "multimodal," meaning it is presented simultaneously

- In person (standard ResEcon 703 course)
- Online (DACSS 797E offered through UWW)

For both modes of instruction, synchronous participation during the class time is necessary for your success

- You should not plan to take this course asynchronously

In-person students should attend in person when safely possible for the best learning environment

- Online attendance is permitted when in-person is not possible

Course Structure

We will use both asynchronous lecture videos and synchronous classes

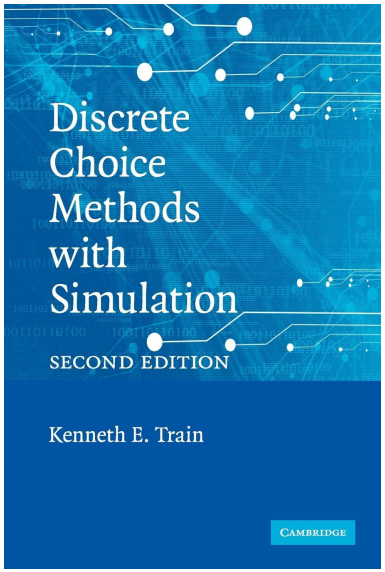
- Asynchronous lecture videos and assigned reading will generally cover the "theory" for the week's topic
- Synchronous classes will cover "applications" of the week's topic

Typical schedule for a week

- Thursday afternoon: I will post links to the next week's course materials and send an email with additional information
- Before 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 class time: I will overview the material and answer questions, and then we will interactively work through applications of the material

Course Materials

Textbook and Notes

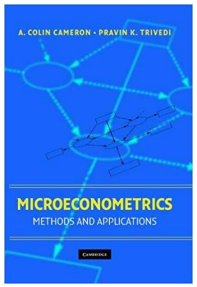


Discrete Choice Methods with Simulation (Second Edition)
Kenneth E. Train

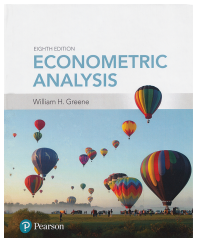
- Available for free at:
  `eml.berkeley.edu/books/choice2.html`
- Paperback copy is usually less than $50

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

Other References

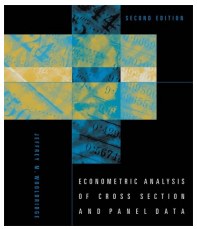


Microeconometrics: Methods and Applications
A. Colin Cameron and Pravin K. Trivedi



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 in Week 2
- 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: 5 at 12.5% each (62.5% total)
- Final project: 25%
- Participation: 12.5%

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 Project

Final project will be similar to problem sets

- Estimation, interpretation, etc.
- At least ten days to complete
- Work in groups of up to three people

How the final project differs from problem sets

- Closely mimics a real-world research project
- Will require roughly twice the effort of a problem set

More details to come toward the end of the semester

Participation

Synchronous class attendance is not required but STRONGLY recommended

- You will be responsible for this material
- Classes will be recorded for later viewing
- If you miss a class, watch the recording (and sign up for office hours if helpful) to catch up on the material

"Participation" is required

- Read the assigned text
- Watch asynchronous lecture videos
- Complete the Google Form about each week's material

See syllabus for tentative schedule of weekly topics and reading