University of Wisconsin-Madison
AAE 637 (Applied Econometrics II): Syllabus

INSTRUCTOR: Priya Mukherjee

SEMESTER: Spring 2023

Course Website

All course material will be posted on Canvas. Link: https://canvas.wisc.edu/courses/346431

Meet Times

Lectures

T TH 8:00-9:15 AM, RUSSELL LAB 150

Discussions

F 2:25-3:15 PM, RUSSELL LAB 150

Credits: 4

It is expected that students in this course will engage in at least 180 hours of learning activities (45 hours per credit). For this course, that includes 2.5 hours per week in lecture, 50 minutes per week in discussion sessions, 75 hours total on assignments (12.5 hours on each of the six assignment), and a total of 45 hours for readings and studying the lecture notes, textbooks or other outside materials in preparation for class participation.

Instructor Contact Details and Office Hours

Taylor Hall 417, priya.mukherjee@wisc.edu
Office Hours: Wednesdays 3:00 - 4:00 pm, or by appointment, on Zoom. A permanent Zoom link will be provided on Canvas.

Teaching Assistant Information and Office Hours

Varan Kitayaporn
Email: kitayaporn@wisc.edu
Office Hours: Tuesdays, 9:30-11:00 AM, Taylor Hall 221

Course Description

Focus on extending the standard regression model. Topics include nonlinear regression models, maximum likelihood estimation, panel data, simultaneous equations, linear and nonlinear systems, analysis of discrete choice, limited dependent variables, empirical economic applications and policy analysis.

One of the main goals in this class is to get familiarized with the latest techniques being developed using panel data and apply these methods in an independent estimation exercise. A second goal is to learn to apply appropriate experimental or quasi-experimental methods for the analysis at hand.

I will provide notes in the form of lecture slides and sometimes, additional notes. Papers referenced are optional reading, and I will cover the important parts in lectures.

Learning Outcomes

- Extend the standard linear regression models to nonlinear regression models, estimate them, and interpret the results.
- Estimate models beyond ordinary least squares (OLS), to include Maximum Likelihood (MLE), analysis of discrete choice and limited dependent variables.
- Be introduced to the latest techniques being developed using panel data, and then apply these methods in an independent estimation exercise.
- Select the experimental or quasi-experimental method appropriate for the analysis at hand.

Prerequisite

AAE 636 (or equivalent). If you are unsure of whether you meet the necessary prerequisite, you can get in touch with me.

Assignments and Grading

There will be no exams in this class and the grade will be based entirely on assignments. There will be be six assignments, which will consist of problems based on topics covered in class. All assignments

will involve exercises that will require working heavily with data and code. *All assignments will be weighted equally.*

Each assignment will likely take some time to finish, so I would encourage you to start working on it early. It can help to work in small groups on the assignments and discuss materials taught in class. You should, however, submit your own assignment individually. Solutions will be provided after the deadline, and no late submissions will be accepted. If you anticipate needing extra time, you should discuss you circumstances with me, and may have access to the problem set early so that you can submit it before the deadline.

Submission Dates: All assignments must be submitted by 5 pm. Submission dates for each of the 6 assignments are: February 11, February 28, March 11, April 4, April 18, May 6*. Note that these are deadlines, and you are free to submit your work early.

*The assignments eventually build up towards a research project proposal. An important part of the final assignment will be a short in-class presentation of your proposal. I will randomly assign you to one of the presentation slots in the final 1-2 weeks of classes (do not worry if you have a conflict, the presentation time slots can be adjusted).

I will assign letter grades based on total score at the end of the course. I plan to use the following cutoffs:
92% : A
88% : AB
82% : B
78% : BC
70% : C
60% : D
<60%: F
I reserve the right to adjust these cutoffs downward; they will not be adjusted upward.

****Written materials being submitted must be typed, and you must use the free online version of Latex on: www.overleaf.com).**

- You should submit your Overleaf page to the TA along with any pdf versions.
- You should also submit any code (for example, your do file)

At the start of the semester, the TA will help you get familiar with Overleaf and we will share an example template that you can use for the assignments for the course.

Note on Regrading

Please note that if you ask for a regrade, the entire assignment will be regraded (including all of the other questions).

Softwares, and Discussion Sections

We will primarily make use of STATA for work with data (using R will be optional). On Canvas, you will find a document titled "A BRIEF INTRODUCTION TO STATA", which gives an introduction to the software.

Written materials being submitted must be typed, and you must use the free online version of Latex on: www.overleaf.com).

Discussion sections will review lecture material and provide you with hints on how to do coding, which will be helpful for the assignments. Sections will also take you through various hands-on coding exercises, so please bring your device/laptop to sections.

Please email the TA before discussion to help the TA understand what material would be helpful to cover.

Course Outline

There is no required textbook for this class. I will be covering materials from academic papers and will also be referring to the following texts:

- Cameron, A. And P. Trivedi, Microeconometrics, Cambridge University Press
- Joshua Angrist and Jorn-Steffen Pischke, Mostly Harmless Econometrics
- Scott Cunningham, Causal Inference: The Mixtape, https://mixtape.scunning.com/

Please note that all of the materials will be covered in lectures, and the lecture slides, along with other materials provided in the course, are mostly sufficient for learning the contents for this class. Readings are not required unless specified in the lecture slides.

1. A Brief Review of Linear Regressions, and Inference
    - "Robust Standard Errors in Small Samples: Some Practical Advice." Imbens and Kolesar (2016)
    - "GMM estimation with cross sectional dependence" Conley (1999)
    - "Clustering, spatial correlations, and randomization inference." Barrios et al. (2012)
    - "On model selection consistency of Lasso" Zhao and Yu (2006)
2. Causality in Economics

- "Instruments, Randomization, and Learning about Development" A. Deaton (2010)
- "Better LATE Than Nothing: Some Comments on Deaton (2009) and Heckman and Urzua (2009)" Imbens (2010)
- "Propensity Score-Matching Methods for Non-experimental Causal Studies", Dehijia and Wahba (2002)
- "Identification of Endogenous Social Effects: The Reflection Problem" Manski (1993)
- (We may look at applications from the networks and peer effects literatures - see lecture notes)

3. Maximum Likelihood

   - "Binary Response Models for Panel Data: Identification and Information" Chamberlain (2010)
   - "Discrete Choice Methods with Simulation" Train(2009)

4. Research Designs with Panel Data

   - "Difference-in-differences with variation in treatment timing", Goodman-Bacon (2018)
   - "Two-way fixed effects estimators with heterogeneous treatment effects" de Chaisemartin and d'Haultfoeuille (2020)
   - "Difference-in-differences with multiple time periods", Callaway and Santa'Anna (2020)
   - "On the Use of Two-Way Fixed Effects Regression Models for Causal Inference with Panel Data", Imai and Kim (2020)
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   - See lecture notes (we will look at applications)

5. Instrumental Variables

   - "Identification and estimation of local average treatment effects" Imbens and Angrist (1994)
   - "Identification of causal effects using instrumental variables" Angrist, Imbens and Rubin (1996)
   - "Weak instruments in instrumental variables regression: Theory and practice" Andrews, Stock and Sun (2019)
   - "Tolerating defiance? Local average Treatment Effects without Monotonicity" de Chaisemartin
   - "Bartik Instruments: What, When, Why and How" Goldsmith-Pinkham, Sorkin and Swift (2020)

- "Shift-share designs: Theory and inference" Adao, Kolesar and Morales (2019)
- See lecture notes (we will look at applications)

6. Regression Discontinuity Designs

   - A Practical Introduction to Regression Discontinuity Designs: Foundations", Cattaneo, Idrobo and Titiunik, (2020)
   - "A Practical Introduction to Regression Discontinuity Designs: Extensions," Cattaneo, Idrobo and Titiunik, (2021)
   - "Why High-Order Polynomials Should Not Be Used in Regression Discontinuity Designs", Gelman and Imbens (2018)
   - "Robust nonparametric confidence intervals for regression-discontinuity designs" Calanico et al. (2014)
   - "Regression discontinuity designs using covariates" Calanico et al (2019)
   - Manipulation of the running variable in the regression discontinuity design: A density test", McCrary (2008)
   - Difference-in-Discontinuity Designs - lecture notes (we will look at an application)

7. Other Misc.Topics

University-wide policies

How Course Hours are Met by the Course: In accordance with the UW-Madison Credit Hour Policy (b), it is expected that students in this course will engage in at least 180 hours of learning activities (45 hours per credit). For this course, that includes 2.5 hours per week in lecture, 50 minutes per week in discussion sessions, 60 hours total on assignments (10 hours on each assignment), a few hours per week reading and studying the lecture notes, textbooks or other outside materials in preparation for class participation.

Regular and Substantive Student-Instructor Interaction: This course provides two 75-minute live instructor-led face-to-face lectures per week throughout the semester. The instructor will provide students with qualitative feedback on assignments. Additionally, the instructor will facilitate group discussions periodically and lead in-class practice problems as part of the lecture period. All of this is in addition to face-to-face interaction with the teaching assistant.

Academic Integrity: By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behav- ior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Diversity Inclusion: Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals. The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background - people who as students, faculty, and staff serve Wisconsin and the world

Accommodations for Students with Disabilities: The University of Wisconsin- Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information,

including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

Course Schedule

Please refer to the "Timeline" document for the tentative schedule.