

Applied Econometrics of Resource and Energy Demand

AAE 772 (4 credits)

Spring 2020

UW-Madison

Instructor:

Prof. Bill Provencher

Department of Agricultural and Applied Economics 519 Taylor Hall

Email: rwproven@wisc.edu; Ph: 608.695.5153 Office hours: Tu 3:45-4:45

Teaching Assistants:

Pukitta Chunsuttiwat

Department of Agricultural and Applied Economics 312 Taylor Hall

Email: chunsuttiwat@wisc.edu Office hours: TBA

Qinan Lu

Department of Agricultural and Applied Economics 314 Taylor Hall

Email: chunsuttiwat@wisc.edu Office hours: TBA

Class Meetings: Lectures T Th 1-2:15, Discussion F 10:30-11:20, M 1:30-2:20.

COURSE DESCRIPTION

The primary goal of this course is to provide students with the skills necessary to apply econometric analysis to issues in resource and energy demand, including:

- Econometric analysis of the impacts of demand-side resource/energy programs, with an emphasis on advances in experimental and quasi-experimental methods.
- The application of discrete choice econometrics to discrete choice experiments (conjoint analysis, contingent valuation) and program participation data.
- Forecasting resource and energy demand.

Much of the course focuses on panel data methods because panel data is commonly available in demand-side energy/resource analysis. Moreover, lectures and problem sets focus on program/policy evaluation, which is arguably the most common purpose of econometric analysis in both the current academic literature and professional work. A strong understanding of this type of analysis fosters a style of thinking about econometric analysis that is broadly useful.

All material in the course is posted on the course Canvas page. I expect to post lecture notes the evening before lecture, and problem sets the evening before they are assigned.

LEARNING OUTCOMES

After completing this course, students will be able to:

1. Estimate linear regression models and interpret the results,
2. Estimate discrete choice models and interpret the results,
3. Evaluate forecasting models,
4. Select the experimental or quasi-experimental method appropriate for the analysis at hand.

READINGS

The course will draw primarily on material from the following textbooks. There is no required reading, but you might want to consult these texts to supplement the material covered in lecture.

Angrist, J.D. and J.S. Pischke. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press. 373p.

Imbens, G.W. and D.B. Rubin. 2015. *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction*. Cambridge University Press. 625p.

Wooldridge, J.M. 2013 *Introductory Econometrics: A Modern Approach*. South-Western Cengage Learning. 881p.

In addition, I will post on Canvas those papers to which I refer in lecture.

GRADING

Grades will be based on problem sets (50%), and three exams (50%).

This is an intensive course and you must keep up with the work to do well. We meet for 4 hours per week (including lectures and discussions).

Targeted grade distribution:

$\geq 93\%$	A
$< 93\% \ \& \ \geq 88\%$	AB
$< 88\% \ \& \ \geq 83\%$	B
$< 83\% \ \& \ \geq 78\%$	BC
$< 78\% \ \& \ \geq 70\%$	C
$< 70\% \ \& \ \geq 60\%$	D
$< 59\%$	F

TOPICS SCHEDULE (Approximate)

Week 1: Review, selection bias, randomized controlled trials (RCTs) in program evaluation

Week 2: Basic models for estimating treatment effects in RCTs

Week 3: Fixed effects and lagged dependent variable models in the context of RCTs

Week 4: Treatment effect heterogeneity, bad controls, and other issues in program evaluation with RCTs

Week 5: Nonspherical disturbances and robust standard errors

Week 6: Intro to program evaluation with observational data, I

Week 7: Intro to program evaluation with observational data, II

Week 8: Matching with regression analysis

Week 9: Instrumental variable methods I

Week 10: Instrumental variable methods II

Week 11: Discrete choice models I

Week 12: Discrete choice models II

Week 13: Extending maximum likelihood estimation

Week 14: Forecasting

QUIZ SCHEDULE

Feb 21: Quiz 1 covers material in weeks 1-4, first 2 problem sets

Apr 3: Quiz 2 covers material in weeks 5-9, problem sets 3-5

May 4: Quiz 3 covers material in weeks 10-14, problem sets 6-9

ASSIGNMENTS

Assignments will be posted on Wednesdays and due by the end of the day the following **Wednesday**. Discussion sections on Fridays and Mondays will provide an opportunity to get help/advice from Pukitta and Qinan. All econometric work must be done in R. We expect that Friday discussion sections will review lecture material and provide you with a few R coding tips to help you with the week’s problem set. The second discussion section on Monday will provide Pukitta time to respond to questions you have about the homework (email her **before** discussion to help her understand what material to cover!).

All written material must be typed, not handwritten. This includes equations; get to know how to use the equation editor in MS-Word. All problem set material must be uploaded as either (a) R markdown files along with versions of R markdown knitted to pdf, html, or MS-Word; or as (b) MS-Word documents with R files. Pukitta will clarify our expectations for the problem sets in discussion section.

Problem set and quiz schedule:

Exercise		Problem set topic	Problem set posted	Problem set discussed in section	Problem set due
	Week 1				
1	Week 2	RCT Consistency/Diff estimator/DID estimator	Jan 29	Jan 31, Feb 3	Feb 5
2	Week 3	RCT Consistency/2-way fixed effects/LDV	Feb 5	Feb 7, Feb 10	Feb 12
	Week 4				
	Week 5	Quiz covering weeks 1-4 during discussion on Feb 21			
3	Week 6	Nonspherical errors and heterogenous treatment effects	Feb 26	Feb 28, Mar 2	Mar 4
4	Week 7	Estimating treatment effects with observational data	Mar 4	Mar 6, Mar 9	Mar 11
5	Week 8	Matching with regression	Mar 11	Mar 13, Mar 23	Mar 25
6	Week 9	Matching with regression II	Mar 25	Mar 27, Mar 30	Apr 1
	Week 10	Quiz covering weeks 5-9 during discussion on April 3			
7	Week 11	IV using the Week 9 data	Apr 1	Apr 10, Apr 13	Apr 15
8	Week 12	Discrete choice	Apr 15	Apr 17, Apr 20	Apr 22
	Week 15	Quiz covering weeks 10-14 during discussion time May 4			

A NOTE ON COVERAGE OF DISCRETE CHOICE ECONOMETRICS

Students who took AAE 777 have already covered a considerable amount of material on discrete choice (the topic covered in weeks 11-12 and problem set 8). These students will receive different material and a different problem set and a slightly different version of the third quiz than students who have not taken AAE 777. I have not yet worked out the details of this, but will do so before spring break.