

In this course, we will continue to build understanding of econometric theory and applications.

My Office Hours

Mondays and Fridays 1-2pm, 531 Saunders Hall; kwaks@hawaii.edu

Prerequisites

Economics 628 or equivalent.

Course Materials

Jeffrey Wooldridge, *"Econometric Analysis of Cross-Section and Panel Data"*.

Please see reading list for required readings. Access to www.jstor.org and www.nber.org will be useful. Access to Stata will be required for the Empirical Methods part of the course.

Requirements and Grades

Final class grades will be based on the following:

Problem Sets	30%
Empirical Paper	30%
Final Exam	40%

Under no circumstances will late problem sets be accepted. There are NO MAKEUP EXAMS so it is essential that you be able to attend the scheduled final exam. If you require any disability-related special accommodations for exams, please speak to me the first week of class so that we can make appropriate arrangements.

COURSE OUTLINE

Linear Estimation and Models

- I. OLS (review)
- II. IV (review)
- III. Unobserved Effects Panel Data Models
 - A. Fixed Effects (Within) Estimators
 - B. Between Estimators
 - C. Random Effects Estimators

Non-Linear Estimation and Models

- I. Maximum Likelihood Methods
 - A. Duration models
 - B. Consistency, Asymptotic Normality, and Efficiency
 - C. Classical Testing, Hausman-Wu Tests
 - D. Partial Likelihood
- II. Generalized Method of Moments
 - A. Abowd and Card, 1989
 - B. Consistency and Asymptotic Normality

- C. Hypothesis Testing
- D. Empirical Likelihood
- E. Classical Minimum Distance Estimation

III. Discrete Response Models

- A. Linear Probability Model
- B. Probit and Logit Models
- C. Multinomial Logit Model
- D. Ordered Logit and Ordered Probit Models

Empirical Methods in Applied Economics

I. Statistical Problems

- A. Heteroskedasticity
- B. Serial Correlation

II. Causal Inference and Identification Problems

- A. Measurement Error in X
- B. Omitted Variables Bias
- C. Incorrect Functional Form of Conditional Expectation
- D. Rank

III. Unconfounded Treatment Assignment

- A. Random Assignment
- B. Multivariate Matching
- C. Propensity Score Methods

IV. Alternatives to Unconfoundedness

- A. IV
- B. Regression Discontinuity Design
- C. Difference-in-Differences
- D. Control Function Approach
- E. One- and Two-sided Censoring, Parametric and Semi-parametric

VII. Panel Data Models

- A. Correlated Random Effects
- B. Seemingly Unrelated Regression
- C. Optimal Minimum Distance

VIII. Issues with Time Series Data

LECTURE AND READING SCHEDULE

Review of Linear Estimation Models

Week 1

8/21 (T) Review of OLS
-- Notes from last semester.
-- Wooldridge, Ch 4.

8/23 (Th) Review of OLS cont'd

Week 2

8/28 (T) Review of IV
-- Notes from last semester
-- Wooldridge, Ch 5. Also, Ch 18.

8/30 (Th) Panel Data Models: FE, Between, and RE Estimators.
To be cont'd in Week 15
-- Wooldridge, Ch 10, 11. Also, Ch 17.

Maximum Likelihood Methods

Week 3

9/4 (T) Intro to Maximum Likelihood
-- Wooldridge, Ch 13.

9/6 (Th) Duration Models
-- Wooldridge, Ch 20.
-- Lancaster, T., (1979), "Econometric Methods for the Analysis of Duration Data",
Econometrica, Vol. 47.

Week 4

9/11 (T) Consistency, Asymptotic Normality, and Efficiency
-- Wooldridge, Ch 13.

9/13 (Th) Classical Testing
-- Wooldridge, Ch 13.
-- Hausman, J., (1978), "Specification Tests in Econometrics", *Econometrica*, Vol 46.

Week 5

9/18 (T) Hausman-Wu Tests
-- Hausman, J., (1978), "Specification Tests in Econometrics", *Econometrica*, Vol 46.

9/20 (Th) Partial Likelihood
-- Wooldridge, Ch 13.
-- Cox, D. R.

Generalized Method of Moments

Week 6

- 9/25 (T) Intro to GMM
-- Wooldridge, Ch 14.
-- Abowd, J. and D. Card, (1989), "On the Covariance Structure of Earnings and Hours Changes," *Econometrica*, Vol. 57, No 2, 441-445.
- 9/27 (Th) Consistency and Asymptotic Normality
-- Wooldridge, Ch 14.
-- Hansen, L., (1982), "Large Sample Properties of GMM Estimators", *Econometrica*, Vol. 50, No 4, 1029-54.

Week 7

- 10/2 (T) Hypothesis Testing in the GMM Framework
-- Class notes.
- 10/4 (Th) Empirical Likelihood
-- Imbens, G., R. Spady, and P. Johnson, (1998), "Information Theoretic Approaches to Inference in Moment Condition Models", *Econometrica*, Vol. 66, No. 2, 333-357.

Week 8

- 10/9 (T) Classical Minimum Distance Estimation
-- Wooldridge, Ch 14.
- 10/11 (Th) Odds and Ends
Quick Overview of Quantile Regression, Bootstrap (if time permits)
-- Class notes.

Discrete Response Models

Week 9

- 10/16 (T) Linear Probability Models
-- Wooldridge, Ch 15.
- 10/18 (Th) Probit and Logit Models
-- Wooldridge, Ch 15.

Week 10

- 10/23 (T) Multinomial Logit Models
-- Wooldridge, Ch 15.
- 10/25 (Th) Ordered Logit and Ordered Probit Models
-- Wooldridge, Ch 15.

Empirical Methods in Applied Economics

Week 11

- 10/30 (T) Statistical Problems
- Ashenfelter, O. and A. Krueger, (1994), "Estimates of the Economic Return to Schooling From a New Sample of Twins", *American Economic Review*, 84(5).
- 11/1 (Th) Causal Inference and Identification Problems
- Holland, P., (1986), "Statistics and Causal Inference", *Journal of the American Statistical Association*, Vol 81: 945-970.
 - Rubin, D., (1974), "Estimating the Effects of Treatments in Randomized and Nonrandomized Studies", *Journal of Educational Psychology*, Vol. 66.
 - Rubin, D., (1978), "Bayesian Inference for Causal Effects: The Role of Randomization", *Annals of Statistics* Vol. 6.
 - Dinardo, J. and J. Pischke, (1997), "The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?" *Quarterly Journal of Economics*, 112(1).

Week 12

- 11/6 (T) Unconfounded Treatment Assignment
- Multivariate Matching
- Class notes.
- Propensity Score
- Rosenbaum, P., and D. Rubin, (1983), "The Central Role of the Propensity Score in Observational Studies for Causal Effects", *Biometrika*, Vol 70, 1, 41-55.
 - Hirano, K., G. Imbens, and G. Ridder, (2002), "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score."
- 11/8 (Th) NO CLASS

Week 13

- 11/13 (T) Alternatives to Unconfoundedness
- IV
- Angrist, J., G. Imbens, and D. Rubin, (1996), "Identification of Causal Effects Using Instrumental Variables", *Journal of the American Statistical Association*, 91.
- RDD
- Van der Klaauw, "A Regression-discontinuity Evaluation of the Effect of Financial Aid Offers on College Enrollment", *International Economic Review*.
 - Angrist, J., and V. Lavy, "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement", *Quarterly Journal of Economics*.

- 11/15 (Th) Alternatives to Unconfoundedness, cont'd
- Diff-in-Diff
- Athey, C., and G. Imbens, (2002), "Identification and Inference in Nonlinear Difference-In-Differences Models".
- Control Function Approach
- Garen, J., (1984), "The Returns to Schooling: A Selectivity Bias Approach with a Continuous Choice Variable", *Econometrica*, 52.

Week 14

- 11/20 (T) Alternatives to Unconfoundedness, cont'd
- One-Sided and Two-Sided Censoring, Parametric
- Heckman, J., (1990), "Varieties of Selection Bias", *American Economic Review*, 80.
 - Heckman, J., ((1979), "Sample Selection Bias as a Specification Error", *Econometrica*, 47.

- 11/22 (Th) Thanksgiving Holiday

Week 15

- 11/27 (T) Alternatives to Unconfoundedness, cont'd
- One-Sided Censoring, Semi-Parametric
- Ahn, H. and J. Powell, "Semi-parametric Estimation of Censored Selection Models with a Nonparametric Selection Mechanism," *Journal of Econometrics*, 58.

- 11/29 (Th) Panel Data Models
- Wooldridge, Ch. 10, 17.
 - Chamberlain, Gary, (1980), "Analysis of Covariance with Qualitative Data", *Review of Economic Studies*, 47.

Week 16

- 12/4 (T) Issues with Time Series Data
- 12/6 (Th) Issues with Time Series Data, cont'd