

Economics 629
Econometrics

This course is the second part of the graduate econometrics sequence at UHM. In the first third of the course, we will focus on understanding two estimators: MLE and GMM. Students will learn to prove the consistency, asymptotic normality and efficiency of these estimators as well as construct hypothesis tests. In the latter two thirds of the course, we will focus on empirical methods in applied economics. (See Course Outline below for a comprehensive list of topics.) We will focus on identification problems and solutions in empirical economic research, drawing examples from labor, public finance, health, and development research. Students will be required to write an empirical paper using econometric techniques learned in class. The research paper should be technically accurate, well-written, well-motivated, and suitable for eventual publication.

My Office Hours

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

Prerequisites

Economics 628 or equivalent.

Course Materials

Required: Wooldridge, J.M. (2002). *Econometric Analysis of Cross-Section and Panel Data*.

Recommended: Greene, W.H. (2008). *Econometric Analysis*.

Please see reading list for required readings. Access to www.jstor.org and www.nber.org will be useful. Access to Stata is required.

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)

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

Empirical Methods in Applied Economics

- I. Causal Inference and Identification Problems
 - A. Measurement Error in X
 - B. Omitted Variables Bias
 - C. Incorrect Functional Form of Conditional Expectation
 - D. Rank
- II. Unconfounded Treatment Assignment
 - A. Random Assignment
 - B. Multivariate Matching
 - C. Propensity Score Methods
- III. 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
- IV. Panel Data Models
 - A. Fixed Effects (Within) Estimators
 - B. Between Estimators
 - C. Random Effects Estimators
 - D. Correlated Random Effects
 - E. Seemingly Unrelated Regression
 - F. Optimal Minimum Distance
- V. Discrete Response Models
 - A. Linear Probability Models
 - B. Probit and Logit Models
 - C. Multinomial Logit Models
 - D. Ordered Logit and Ordered Probit Models
- VI. Statistical Problems
 - A. Heteroskedasticity
 - B. Serial Correlation
- VII. Bayesian Inference
- VIII. Issues with Time Series Data

LECTURE AND READING SCHEDULE

Review of Linear Estimation Models

Week 1

- 8/26 (T) Review of OLS and IV
-- Notes from last semester.
-- Wooldridge, Ch 4, 5. Also, Ch 18.
- 8/28 (Th) NO CLASS

Maximum Likelihood Methods

Week 2

- 9/2 (T) Intro to Maximum Likelihood
-- Wooldridge, Ch 13.
- 9/4 (Th) Duration Models
-- Wooldridge, Ch 20.
-- Lancaster, T., (1979), "Econometric Methods for the Analysis of Duration Data",
Econometrica, Vol. 47.

Week 3

- 9/9 (T) Consistency, Asymptotic Normality, and Efficiency
-- Wooldridge, Ch 13.
- 9/11 (Th) Classical Testing
-- Wooldridge, Ch 13.
-- Hausman, J., (1978), "Specification Tests in Econometrics", *Econometrica*, Vol 46.

Week 4

- 9/16 (T) Hausman-Wu Tests
-- Hausman, J., (1978), "Specification Tests in Econometrics", *Econometrica*, Vol 46.
- 9/18 (Th) Partial Likelihood
-- Wooldridge, Ch 13.
-- Cox, D. R.

Generalized Method of Moments

Week 5

- 9/23 (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.
- 9/25 (Th) Consistency and Asymptotic Normality
-- Wooldridge, Ch 14.
-- Hansen, L., (1982), "Large Sample Properties of GMM Estimators", *Econometrica*, Vol. 50, No 4, 1029-54.

Hypothesis Testing in the GMM Framework
-- Class notes.

Empirical Methods in Applied Economics

Week 6

9/30 (T) 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).

10/2 (Th) Unconfounded Treatment Assignment
Multivariate Matching
-- Class notes.

Week 7

10/7 (T) Unconfounded Treatment Assignment, cont'd
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."

10/9 (Th) Alternatives to Unconfoundedness
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*.

Week 8

10/14 (T) Alternatives to Unconfoundedness, cont'd
IV
-- Angrist, J., G. Imbens, and D. Rubin, (1996), "Identification of Causal Effects Using Instrumental Variables", *Journal of the American Statistical Association*, 91.

10/16 (Th) Alternatives to Unconfoundedness, cont'd
Diff-in-Diff
-- Athey, C., and G. Imbens, (2002), "Identification and Inference in Nonlinear Difference-In-Differences Models".

Week 9

10/21 (T) Alternatives to Unconfoundedness, cont'd

Control Function Approach

-- Garen, J., (1984), "The Returns to Schooling: A Selectivity Bias Approach with a Continuous Choice Variable", *Econometrica*, 52.

- 10/23 (Th) 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.

Week 10

- 10/28 (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.

- 10/30 (Th) Panel Data Models
FE, Between, and RE Estimators.
-- Wooldridge, Ch 10, 11. Also, Ch 17.

Week 11

- 11/4 (T) Panel Data Models, cont'd
-- Wooldridge, Ch. 10, 17.
-- Chamberlain, Gary, (1980), "Analysis of Covariance with Qualitative Data", *Review of Economic Studies*, 47.

- 11/6 (Th) Discrete Response Models
-- Wooldridge, Ch 15.

Week 12

- 11/11 (T) Discrete Response Models
-- Wooldridge, Ch 15.

- 11/13 (Th) Bayesian Inference
-- Class notes.

Week 13

- 11/18 (T) Statistical Problems
Heteroskedasticity
-- Class notes.
-- Ashenfelter, O. and A. Krueger, (1994), "Estimates of the Economic Return to Schooling From a New Sample of Twins", *American Economic Review*, 84(5).

- 11/20 (Th) NO CLASS

Week 14

- 11/25 (T) Statistical Problems, cont'd
Serial Correlation

-- Class notes.

11/27 (Th) NO CLASS

Week 15

12/2 (T) Time Series Models, cont'd
-- Class notes.

12/4 (Th) Time Series Models, cont'd
-- Class notes.

Week 16

12/9 (T) Review and Wrap-up

12/11 (Th) FINAL EXAM