

**ECONOMICS 671**  
(Advanced **Econometrics**)

Fall 2011

**Professor:** Dr. Junsoo Lee

**Course:** EC 671

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### **COURSE OBJECTIVE**

The objective of this course is to help students understand several important advanced econometrics techniques in cross-section and panel data models and how they can be used in empirical research and practical applications. Emphasis will be placed on appreciating its scope, understanding the essentials underlying the various methods, and developing the ability to relate the methods to important issues faced by a researcher.

At the end of this course, students will be able to use computer based statistical packages to analyze data, will understand how to interpret the output and will be confident to ‘drive’ the analysis process. Emphasis is on being able to use the methods effectively, and on understanding the methods, their appropriateness and their limitations.

### **METHOD OF INSTRUCTION**

The course will be given primarily through lecture and class discussion. Each student is strongly encouraged to participate in class discussion and responsible for coming to the class prepared to contribute substantively to the class discussion. Classroom participation is a vital part of this course. Generally, an analysis of the readings will be used to guide our discussion, but the format will be free-flowing and may vary considerably. In each lecture, we collectively share ownership and responsibility for the success of the course. A minimum requirement for each class meeting is to have read the assigned material from the reference books and articles, and to express opinions, comments, and insights relative to the discussion topic. Students are also expected to participate in all class

activities. Excessive tardiness and absenteeism will negatively affect your contribution grade.

## **COURSE COMPONENTS**

There will be two mid-term exams and one final exam. Quizzes will be also given from time to time with or without prior notice. Exams can be substituted for quizzes and/or other assignments. Students will also submit homework assignments each week on the assigned readings. Homework assignments will include hands-on data analysis exercises.

## **GRADING POLICY**

Two Mid-term exams	200 pts
Final exam	150 pts
Quiz & Homework assignments	80 pts
Empirical Project	50 pts
Class participation	20 pts
<b>Total</b>	<b>500 ± 50 pts</b>

## **EMPIRICAL PROJECT**

The empirical project should utilize econometric tools covered in the course. Each student must clear the topic with the instructor and must submit a proposal (less than 2 pages) by October 4. The proposal should cover (i) the main question you will attempt to examine (ii) data (definitions of variables, how you are going to collect, and etc) and (iii) your suggested econometric models. Each student should submit a written term paper by November 24, Tuesday (before Thanksgiving Day).

The term paper should be typed (double-spaced). The format of the report should look like a journal paper. It should contain sections of (i) introduction, (ii) literature survey and discussion of the data, (iii) econometric models, (iv) estimation results and interpretations, and (v) summary or concluding remarks. Reference lists and tables should be appended.

### **Grade for the empirical project:**

- Idea and topic (Reasonableness, creativity & practical applicability) 35%
- Competence of your analysis 35%
- Writing and required format 30%

Note: The empirical project can be substituted for THREE mini-projects for which you try to replicate the empirical results in someone's paper(s) of your choice. You will need to submit a short paper (about 5 pages long) describing your findings, for each of three

mini-projects at the end of September, October and November, respectively. You are encouraged to make comments on the paper and try to provide new estimation results.

### **Software**

The STATA software will be used throughout. Students will be required to work on a term paper (see *Empirical Project*), and STATA may be necessary to conduct the project. You may use any other software packages you prefer for assignments or projects as long as they can perform required tasks.

### **Textbooks**

#### ***Required***

1. Wooldridge, J., *Econometric Analysis of Cross-Section and Panel Data*, 2<sup>nd</sup> edition, The MIT Press, 2010. (excellent; looks easy but much more intensive than Greene)

#### ***References***

2. Colin Cameron and Pravin Trivedi (CT), *Microeconometrics*, Cambridge publishing Co., 2005. (very good, useful and similar)
3. Verbeek, M., *A Guide to Modern Econometrics*, 3rd edition, John Wiley & Sons, Ltd., 2008. (easy but useful)\*
4. Wooldridge, J., *Introductory Econometrics. A Modern Approach*, 4th edition, Cengage Learning, 2009 (looks easy but not easy; very useful, even better than some advanced books)\*
5. Greene, W., *Econometric Analysis*, 6<sup>th</sup> edition, Prentice Hall, 2011. (dry and dull; used to be popular in old days)
6. *STATA User's manual* (<http://www.stata.com>).

\* *Under / MA level*

### **OUTLINE**

#### **Part 0. Review**

**(Basic, Under-MA level; will be skipped; no lectures for these topics)**

##### **Review 0. Guide to STATA**

##### **Review 1. Warm-up**

##### **Review 2. Heteroskedasticity robust variance**

**Review 3. Basics of Inference****Review 4. Further issues in regression analysis****Review 5. IV Estimation (I)****Review 6. IV Estimation (II)****Part 1. Panel Data Models****Lecture 1.****Linear Unobserved Effects Panel Data Models**

Wooldridge 10; CT 21; Verbeek 10.1-10.3; Green 13

- Pooling Data Models
- Panel Data Models
- Three approaches
- Hausman Tests
- SUR versus Panel Models
- Nonlinear Panel Data models

**Lecture 2.****Further Topics in Panel Data Models**

Wooldridge 11; CT 22; Verbeek 10.4-10.8; Green 13

- Dynamic Linear Models (also CT 22.5)
- GMM Estimator for Panel Models (CT 22.2)
- IV for FE and RE models (CT 22.4)
- Difference in Difference Estimator (CT 22.6)
- Cluster Samples
- Recent Issues in Panel data models

**Part 2. Limited Dependent Variables Models****Lecture 3****General Estimation Methods \***

(\* can be skipped)

Wooldridge 12, 13, 14; CT 5, 6, 9\*, 10; Verbeek 6; Green 17, 18

- Maximum Likelihood Estimation (MLE) and QMLE
- Generalized Method of Moments and Minimum Distance Estimation

- Semi-parametric and Non-parametric Estimation

#### **Lecture 4**

##### **Binary Discrete Choice Models**

Wooldridge 15; CT 14; Verbeek 7.1; Green 21.2-21.5

- Advantages of LPM
- Review on Probit and Logit Models
- Index model?
- Interpretations for these models
- Panel Choice Models (Chamberlain approach, and other methods)

#### **Lecture 5**

##### **Extended Choice Models**

Wooldridge 15; CT 15; Verbeek 7.2; Green 21.7-21.8

- Multinomial Logit and Conditional Logit Models
- IIA assumption
- Nested Logit Models
- Ordered Probit Models
- Mixture Models and Unobserved Heterogeneity (CT 18)

#### **Lecture 6**

##### **Corner Solution Outcomes and Censored Regression Models**

Wooldridge 16; CT 16; Verbeek 7.4-7.5; Green 22.1-22.3

- Inconsistency of OLS
- Estimation and Inference with Censored Tobit

#### **Lecture 7**

##### **Selection Bias Models**

Wooldridge 17; CT 16; Verbeek 7.6; Green 22.3-22.4

- Censoring, Truncation and Incidental Truncation
- Censoring and Truncated Regression Models
- Two Stage estimation of the Tobit Model
- Models with Self-selectivity
- Corrected Standard Errors of Generated Regressors
- Other extended models
- Examples and Review

#### **Lecture 8**

## Count Data Models

Wooldridge 19; CT 20; Verbeek 7.3; Green 21.9

- Count Data
- Poisson regression models
- Negative binomial models
- Hurdle, ZIP and ZAP Models
- Endogeneity Issue
- Examples
- Panel Count data models\*

## Lecture 9

### Duration Models

Wooldridge 20; CT 17; Verbeek 7.8; Geenen 22.5

- Duration and Transition Data
- Hazard and survival functions
- Non-parametric Approach
- Plot of Hazard Rates
- Homogeneity test
- Semiparametric and Parametric Duration models
- Proportional Hazard Models
- Parametric Duration Models
- Examples and Review

## Lecture 10

### Estimating Average Treatment Effects

Wooldridge 18; CT 3, 25; Green 22.4

- Counterfactual Setting and the Self-Selection Problem
- Propensity Score Matching Methods
- Differences-in-Differences Method
- IV Estimation

CT: SKIP 1, 2, 9, 11, 12, 13, 19, 24, 26, 27