Econometrics

School of Economics
Summer 2020, Syllabus

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General Information

This course aims to provide students with a basic understanding of econometrics and its applications to both cross-sectional and panel data. After the course, students should be able to carry out simple regression analyses, including estimation and inference.

The course will cover topics including single variable and multiple variables linear regression analysis, simple nonlinear regression analysis, basic tests and inference, simultaneous equation model, fundamental time series analysis, basic panel data model, and discrete (binary) choice models.

Prerequisites

Calculus I, Linear Algebra, Probability Theory, Statistics

Textbook and Reference

1. J. Stock, M. Watson, Introduction to Econometrics, Pearson,2019
2. J. Wooldridge, Introductory Econometrics: A Modern Approach, Cengage Learning, 2019
3. J. Wooldridge, Econometric Analysis of Cross Section and Panel Data, Massachusetts Institute of Technology, 2010

Grade

The course grade will be based on the performance on the problem sets to be given throughout the semester (40%), and a course project (60%).There are four problem sets containing both theoretical exercises and practical problems to be solved using statistical software. These problem sets are designed to help the students understand the materials of the course more thoroughly. I will **NOT** accept late submission. Academic integrity is expected. Failure to comply will result to immediate failure of the course and may be subject to further investigations/penalties by the university regulations.

Course Content

1. Introduction
   - What is Econometrics; History and key figures; Basic methods
   - Stock and Watson Ch 1
2. Probability Theory and Statistics
   - Random variables; Population and sample; Distributions; Moments.
   - Stock and Watson Ch 2,3
3. Simple Regression Model
   - Linear regression models with one regressor; Ordinary Least Square (OLS) estimator; Assumptions of OLS; Measure of fit.
   - Stock and Watson Ch 4
4. Inference
   - One-sided and Two-sided Hypotheses; Confidence interval; Binary explanatory variables; Gauss-Markov assumptions; t-test.
   - Stock and Watson Ch 5
5. Regression Model with Many Regressors
   - Omitted variable bias; Multiple regressors; OLS for multiple regression models; Multicollinearity; Joint hypothesis testing.
   - Stock and Watson Ch 6,7
6. Specifications
   - Nonlinear model; Polynomial and logarithm; Interaction between regressors; Class size and test score (example).
   - Stock and Watson Ch 8
7. Endogeneity
   - Causes of endogeneity; Endogeneity bias; Instrumental variables (IV); Two stage least square (2SLS) method.
   - Stock and Watson Ch 9,12
8. Panel Data
   - Panel structure; Time series dimension; Fixed effect model; Estimation.
   - Stock and Watson Ch 10
9. Binary Choice Models
   - Binary dependent variables; Linear probability model; Logit and Probit models; Maximum Likelihood Estimation (MLE).
   - Stock and Watson Ch 11