The Chinese University of Hong Kong, Spring 2022
ECON5150: Applied Econometrics

Instructor:

Fan, Michael

Office hours: by appointment

Office: 903 ELB

Email: michaelqfan@gmail.com

Lecture Hours and Venue:

Tuesday 12:30pm to 3:15pm, Hui Yeung Shing Building (HYS) G05

Course announcements: Blackboard @CUHK

Course Description: This is a course of graduate level (MPhil/PhD) applied econometrics. Both microeconometric theory and empirical strategies for applied econometric research will be discussed. Modern causal inference including machine learning tools and big data analysis are introduced.

Prerequisite: Students who wish to take this course should be familiar with the knowledge of basic regression analysis, multivariate calculus, linear algebra, econometrics and mathematical statistics at the undergraduate level.

Topics (tentative):
In this course you will learn microeconometric theories and practical skills to conduct empirical economic studies using real data. We will discuss the theoretical properties of instrumental variable methods, treatment effect, matching, panel data models, differences-in-differences, synthetic control methods, regression discontinuity designs, and modern causal inference topics including machine learning in causal inference. We will discuss and replicate some case studies prepared by the instructor.

Tentative course outline by topics:
- Randomized controlled trial
- Linear models and least squares estimator
- Basic asymptotic theory
- Model selection
- Estimating systems of equations
- Endogeneity and instruments
- Generalized method of moments
- Internal and external validity

- Case studies
- Panel data models
- Maximum likelihood methods
- Nonparametric regression*
- Discrete choice and censored regression*
- Treatment effect*
- Difference-in-differences*
- Synthetic Control Methods*
- Regression discontinuity designs*
- Bartik IV*
- Machine learning methods*

* The selective topics will be covered in class if schedule allows.

Expected Learning Outcomes:

After finishing this course, students are expected to

1. have a deep and comprehensive understanding of empirical econometric methods.

2. acquire sufficient econometric knowledge to write academic papers in applied economics and technical policy reports.

3. be familiar with the frontiers of modern applied econometrics research, modern machine learning methods and its applications in economic study

4. equip with programming skills in STATA, R, or Matlab, etc.

Recommended References:

Notice the following textbooks are not required but they are recommended for readings. For the case studies, I will send the papers and codes to the class.

Mostly Harmless Econometrics: An Empiricist's Companion, 1st edition, Angrist and Pischke, Princeton University Press, 2009

Microeconometrics: Methods and Applications, Cameron and Trivedi, Cambridge, 2005

Econometric Analysis of Cross Section and Panel Data, Second Edition, Jeffery M. Wooldridge, The MIT Press, 2010

Econometric Analysis (7th Ed), Greene, Prentice-Hall, 2011

The Elements of Statistical Learning, Second Edition, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer, 2009

Final Project

In the end of the semester, the students will present a final project which they choose (with the guidance and formal approval of the instructor) after the fourth week of the lectures. Students can form study groups voluntarily and work on the project together. For the project, the students need to either collect data by their own, or use the data which the instructor will provide them (more credit will be given for self-collected data and innovative topics). In the presentation, each study group has to make PPT slides and explain the economic model (if there is one), the econometric model, the empirical results (and data description) and the explanation of these results. While one group is presenting, the instructor and the rest of the class will be the 'referees' to ask questions about the project. Each group will need to submit the final term paper, PPT and replication code in the end of the semester for full evaluation of project credits.

Evaluations:
- Homework problem sets (20%)
- Midterm exam (40%)
- Final Project (40%) For group project, all members within the same group would get the same grade, except for the case that I regard as total 'free-riding' behavior.
- No Final Exam

Academic Honesty:

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at http://www.cuhk.edu.hk/policy/academichonesty/.