Syllabus for Introduction to Econometrics

Zheng Tian

Spring semester, 2017

1 Basic information

Time and location

Odd weeks	Monday	08:00 am – 09:50 am	Buoxue Building (博学楼) 706
	Wednesday	10:00 am – 11:50 am	Buoxue Building (博学楼) 306
Even weeks	Monday	08:00 am – 09:50 am	Buoxue Building (博学楼) 706

Instructor information

Name: Zheng Tian (田峥)
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Office hours

Office hours are tentatively scheduled as follows,

Tuesday	9:30 am – 11:30 am
Friday	9:30 am – 11:30 am

You are welcomed to stop by my office at any other time. But making an appointment by email or phone in advance is highly recommended.

2 Course description

Objectives

Econometrics is a subject in Economics, consisting of "economic tricks" for quantitative analysis. It is an indispensable component in economists' toolbox. The roles of Econometrics include, but not limited to, quantitatively examining the association between economic variables, giving empirical support to economic theories, making forecasts about economic performance in the future, and evaluating policy impacts. At an introductory level, this course want to achieve the following goals: (1) letting students know basic econometric theories and methods, (2) enabling students to use software, primarily R, to estimate a simple econometric model, and (3) making students be aware of the notion of reproducible research as a standard workflow of empirical research.

Serving for these ends, the contents of this course will cover single and multiple linear regression model, the ordinary least squares estimation, hypothesis testing, model specification assessment, detection and solutions to problems in regression, such as, heteroskedasticity and multicollinearity, and panel data model. If time is permitted, we will also cover such topics as instrumental variable methods, and the Probit and Logit models. This course will not cover Time Series Econometrics except for a touch on the concept of serial correlation. This course will lay out a solid foundation for the future series of Econometric courses, such as Intermediate Econometrics, Time Series Econometrics, and Advanced Econometrics.

Prerequisite

Principles of Microeconomics, Principles of Macroeconomics, Calculus, Introductory Probability and Statistics, and Linear Algebra.

3 Textbooks

Required

Stock, J. and Wastson, M. (2010) *Introduction to Econometrics*, 3rd edition

Recommended

- Jeffery Wooldridge (2012) *Introductory Econometrics*, 5th edition, China edition
- Kleiber and Zeileis (2008) *Applied Econometrics with R*

4 Course materials

Lecture notes

Lecture notes, along with other course materials, including slides, homework, and answers, will be uploaded to `https://isem-cueb-ztian.github.io/Intro-Econometrics-2017/`.

Book companion materials

There is a companion website for this book, `http://wps.aw.com/aw_stock_ie_3/`, where you can download dataset for exercises, pratical quizzes, and STATA tutorial.

5 Course assignments

Homework

- Homework will be assigned every other week, aiming to help students understand fundamental concepts in econometric theories and grasp basic estimation and inference methods.

- Each homework will consist of two parts, theoretical questions and empirical exercises, which are all selected from the end-of-chapter exercises in the textbook of Stock and Watson.
- The due day of each homework will be on Mondays of the week after each homework is assigned. I strongly suggest you do your homework early before the due day.
- You can finish your homework by either handwriting or typesetting using word process software, e.g., Microsoft Word, LaTeX, and the like. Typesetting rather than handwriting is highly recommended.
- Homework will be graded as A, B, C, and D, based on the following rule
  - **A**: Homework is submitted by the due day. Numeric and mathematical answers are correct for all questions with only minor mistakes. Empirical exercises are finished with the desired format (the format is explained below). Explanations to your answers are convincing with correct use of econometric terminology. English writing is clear and grammatically right. (A = 100 percent points)
  - **B**: Homework is submitted by the due day. Numeric and mathematical answers are correct for most questions. Empirical exercises are finished with the desired format. Explanations are sound but may not be totally right. English writing is good with minor grammatical errors. (B = 85 percent points)
  - **C**: Homework is submitted by the due day. Empirical exercises are finished, without complying with the required format. Numeric and mathematical answers are correct for nearly half of questions. Explanations may not be right but with some merits. English writing is merely understandable with obvious grammatical errors. (C = 70 percent points)
  - **D**: Homework is submitted by the due day. Numeric and mathematical answers are correct only for a few questions. Explanations are wrong. English writing is very poor. (D = 60 percent points)
- Homework must be submitted on the due day. A grace period for late submission can be granted by request in advance. If granted, you must turn in your homework within one week after the due day. Late submission of homework is subject to reducing score to a lower level. No submission at all will result in no score on homework.
- Requirement for empirical exercises

  Empirical exercises are the questions that ask you to do data analysis with software. Completing empirical exercises usually involves two types of work. One type is writing code in software to read data, estimate the model, and calculate statistics. Another type of work is writing narrative words to describe your question and explaining your results. Therefore, completed empirical exercises should reflect your endeavor on both types of work. To this end, the desired format of empirical exercises should consist of the following components.

  1. A short introduction to what is the question;
  2. Mathematical equations for the regression model and statistics;
  3. A description of your estimation results with correct interpretation;
  4. Tables and graphs that help reflect estimation results;
  5. The code that you write to carry out estimation.

Although you can use any software to do empirical exercises, I prefer using RStudio and the `rmarkdown` package, which I will teach in class. We will learn how to make dynamic documents in the manner of reproducible research.

- The requirements for group working on homework

  Admittedly, some questions in homework may be difficult and completing a whole set of homework may be time consuming. Therefore, I allow you to form study groups to do homework. Sharing knowledge and helping fellow students are meritorious, and the spirit of team working is desirable in many careers.

  The formation of study groups is totally voluntary. The size of each group should not exceed four students, and each student should only join one group. Please send me the information of your study group no later than **March 6th**.

  High resemblance of completed homework within each group is permitted. However, homework that is highly alike between groups will be treated as shirking, resulting in lower scores for all persons involved. Similarly, empirical exercises can only be identical among members within each group, and should be different between groups.

Mid-term examination

- The mid-term exam will cover most materials taught before and including Chapter 6: multiple regression estimation.
- It is tentatively scheduled on **April 24th, Monday**.
- It will be a closed-book test. But you are allowed to bring a one-sided "cheat sheet", on which you can write down some notes that help you remember some important definitions and formulae. You are allowed to write on only one side on the cheat sheet.
- If you miss the mid-term exam, a make-up test can be arranged. You must notify me of your absence in advance with a valid excuse.

Final examination

- The final exam will be comprehensive, covering all being taught throughout the semester.
- The time and location are to be arranged and announced by the university.
- It will also be a closed-book test. You are still allowed to bring a "cheat sheet" written on **both sides** this time.
- The make-up test will follow the rule of the university.

6 Grade distribution

Assignments	Scores
Homework	30
Midterm exam	30
Final exam	40
total	100

7 Course outline and schedule

Table 1 displays the tentative outline and schedule for this course. The schedule is subject to change according to the actual course progress. Chapters referred in the table are in the required textbook. Other related references would be cited in lecture notes.

Table 1: Tentative Course Schedule

Dates	Contents	Due dates
Week 1		
[2017-02-20 Mon]	Syllabus and Introduction (Chapter 1)	
[2017-02-22 Wed]	Review of probability (Chapter 2)	
Week 2		
[2017-02-27 Mon]	Review of statistics (Chapter 3)	
Week 3		
[2017-03-06 Mon]	Review of linear algebra (Appendix 18.1)	Homework 1 due
[2017-03-08 Wed]	Introduction to R	
Week 4		
[2017-03-13 Mon]	Single regression: estimation (Chapters 4 and 17)	
Week 5		
[2017-03-20 Mon]	Continue on single regression estimation	
[2017-03-22 Wed]	Single regression with R and introduction to rmarkdown	
Week 6		
[2017-03-27 Mon]	Single regression: hypothesis tests (chapters 5 and 17)	Homework 2 due
Week 7		
[2017-04-03 Mon]	Continue on single regression hypothesis tests	
[2017-04-05 Wed]	Multiple regression: estimation (chapters 6 and 18)	
Week 8		
[2017-04-10 Mon]	Continue on multiple regression estimation	
Week 9		
[2017-04-17 Mon]	Multiple regression: hypothesis tests (chapters 7 and 18)	Homework 3 due
[2017-04-19 Wed]	Continue on multiple regression hypothesis tests	
Week 10		
[2017-04-24 Mon]	Mid-term examination	
Week 11		
[2017-05-01 Mon]	Labor Day break	Homework 4 due
[2017-05-03 Wed]	Multiple regression with R	
Week 12		
[2017-05-08 Mon]	Nonlinear regressions (chapter 8)	
Week 13		
[2017-05-15 Mon]	Continue on nonlinear regressions and R	Homework 5 due
[2017-05-17 Wed]	Assessing multiple regression (chapter 9)	
Week 14		
[2017-05-22 Mon]	Continue on assessing multiple regression	
Week 15		
[2017-05-29 Mon]	Regression with panel data (chapter 10)	Homework 6 due
[2017-05-31 Wed]	Continue on panel data model and R	
Week 16		
[2017-06-05 Mon]	Review and Q&A	
Week 17		
TBA	Final examination	

8 Policy on academic dishonesty

Academic dishonesty is defined to include but is not limited to the following: plagiarism; cheating and dishonest practices in connection with examinations, papers and projects; forgery, misrepresentation and fraud. Such behavior will not be tolerated and will be handled according to university guidelines.