FIN510
Advanced Econometrics I
Module 2, 2017-2018

Course Information

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Classes:
Lectures: Tuesday-Friday 15:30-17:20
Venue: PHBS Building, Room 229

1. Course Description

1.1 Context

Course overview:
This is a graduate level course in econometrics. Econometrics is the application of mathematics, statistical methods and more recently, computer science, to economic and financial data and is described as the branch of economics that aims to give empirical content to economic relations. Econometrics is the intersection of economics, mathematics, and statistics. Econometrics adds empirical content to economic theory allowing theories to be tested and used for forecasting and policy evaluation. It has also been applied to management, marketing, sociology, etc. The course aims to help students use and understand regression analysis, introduces widely used econometric models, and explores underlying economic and intuition. The intent is to teach students technical econometric techniques and ideas that are important in quantitative research in finance and economics. The course begins with brief reviews of probability distributions and limit theorems. Then, it studies the classical linear regression model (CLRM) focusing on the least squares estimator. The course further departs from the standard Gauss-Markov assumptions to include heteroskedasticity, serial correlation, and errors in variables. Advanced topics include instrumental variables, qualitative variable models, and panel data. If time permits, other estimation methods such as the maximum likelihood and the generalized method of moments could be covered. The course emphasis is rather theoretical than empirical, even if some economic applications will be discussed throughout the course.

Prerequisites:

Students are assumed to have already taken Mathematics (GEN500) and should have a working knowledge of basic linear algebra and calculus.

1.2 Textbooks and Reading Materials

Required textbook:

Wooldridge, Jeffrey, *"Introductory Econometrics: A Modern Approach"*, Cengage Learning, 5th edition, 2012. ISBN-13: 978-1111531041 (W).

Hayashi, Fumio, *"Econometrics"*, Princeton University Press, 2000. ISBN-13: 978-0691010182 (H).

Greene, William, *"Econometric Analysis"*, Prentice Hall; 7th edition, 2011. ISBN-13: 978-0131395381 (G).

Cameron, A. Colin and Prawn K. Trivedi "Microeconometrics: Method and Applications", Cambridge University Press; 2005. ISBN-13: 978-0521848053 (CT).

Hamilton, James Douglas, "Time Series Analysis", Princeton University Press, 1994. ISBN-13: 978-0691042893 (HA).

Recommended textbooks:

Angrist, Joshua David, and Jörn-Steffen Pischke, *"Mostly Harmless Econometrics"*, Princeton University Press; 1st edition, 2009. ISBN-13: 978-0691120355 (AP).

Additional readings and material:

The instructor will post additional material on the course management system (CMS). The course name is "Advanced Econometrics I", the code is "ADEC2017".

2. Learning Outcomes

2.1 Intended Learning Objectives / Outcomes

Learning Goals	Objectives/Outcomes	Assessment
1. Our graduates will be effective communicators.	1.1. Our students will produce quality business and research-oriented documents.	YES, since they will learn the theoretical tools to perform independent research
	1.2. Students are able to professionally present their ideas and also logically explain and defend their argument.	NO
2. Our graduates will be skilled in team work and leadership.	2.1. Students will be able to lead and participate in group for projects, discussion, and presentation.	NO
	2.2. Students will be able to apply leadership theories and related skills.	NO
3. Our graduates will be trained in ethics.	3.1. In a case setting, students will use appropriate techniques to analyse business problems and identify the ethical aspects, provide a solution and defend it.	NO
	3.2. Our students will practice ethics in the duration of the program.	NO

4. Our graduates will have a global perspective.	4.1. Students will have an international exposure.	NO
5. Our graduates will be skilled in problem-solving and critical thinking.	5.1. Our students will have a good understanding of fundamental theories in their fields.	Yes, since it is a theoretical course in Econometrics
	5.2. Our students will be prepared to face problems in various business settings and find solutions.	NO
	5.3. Our students will demonstrate competency in critical thinking.	YES, since students will solve some problem sets where they should apply the contents studied in the class.

2.2 Course specific objectives

The objective of this course is to give students tools to:

• Comprehend the theoretical framework underlying estimation results in the classical linear regressions and its main departures.

• Relate economic questions to empirical observation and try to deal with those using econometric models based on sound hypotheses.

• Understand quantitative analyses used in more complex studies, and perform such analyses on their own by providing proofs rather than assuming certain results as given.

2.3 Assessment/Grading Details

Econometrics is cumulative. Each topic builds on the previous one. It is therefore important that students are regular in class attendance and in submitting problem sets. Fully attendance is required and everyone is expected to actively participate in the class discussions. Problem sets will help students to make incremental progress toward the goal of judging the validity of economic theories. Weightings on the various components of the Final grade are as follows:

Assessment task	Weighting
Class attendance and participation	10%
Problem sets	20%
Midterm exam	30%
Final exam	40%
Total	100%

Problem sets:

Students are encouraged to work in groups. However, they must turn in an individual solution. Plagiarism is strictly punished. Late submission is unacceptable and will not be graded. Some problem sets may contain computational exercises. Instructions and deadlines about the problem

sets will be given later on by instructor and available on the course management system.

Midterm and final exam:

Midterm and final exam will be closed book. Calculators are permitted, except those with word processing capabilities. Cell phones are not allowed as calculators. No formulas will be provided and no cheat sheet is allowed in the final exam.

The exam schedule will be:

Midterm exam: December 22, 2017 (Friday).

Final exam: January 19, 2018 (Friday).

2.4 Academic Honesty and Plagiarism

It is important for a student's effort and credit to be recognized through class assessment. Credits earned for a student work due to efforts done by others are clearly unfair. Deliberate dishonesty is considered academic misconducts, which include plagiarism; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; or altering, forging, or misusing a University academic record; or fabricating or falsifying of data, research procedures, or data analysis.

All assessments are subject to academic misconduct check. Misconduct check may include reproducing the assessment, providing a copy to another member of faculty, and/or communicate a copy of this assignment to the PHBS Discipline Committee. A suspected plagiarized document/assignment submitted to a plagiarism checking service may be kept in its database for future reference purpose.

Where violation is suspected, penalties will be implemented. The penalties for academic misconduct may include: deduction of honour points, a mark of zero on the assessment, a fail grade for the whole course, and reference of the matter to the Peking University Registrar.

For more information of plagiarism, please refer to *PHBS Student Handbook*.

3. Topics, Teaching and Assessment Schedule

Week	Topic	Text	Note
Nov 17, 2017	Introduction to the class. The nature of econometrics and economic data: • The experimental ideal.	Chapter 1 (W) Appendix B (W)	*Chapter 1 (AP)* *Chapter 2 (AP)*
Nov 21, 2017	Probability review: • Probability spaces. • Random variables. • Discrete and continuous distributions.	Appendix B (W)	
Nov 24, 2017	Statistical inference: • Point estimation.	Appendix C (W)	***Appendix C (G)***

	• Interval estimation. • Hypothesis testing.		
Nov 28, 2017	Limit theorems. The conditional expectation function.	**Chapter 2.1 (H)**	*Chapter 3 (AP)*
Dec 1, 2017	Simple linear regression model: • Standard assumptions. • Least squares estimator.	Chapter 2 (W) **Chapter 1 (H)**	*Chapter 3 (AP)*
Dec 5, 2017	Simple linear regression model: • Properties of least squares estimator. • Estimator of σ^2.	Chapter 2 (W) **Chapter 1 (H)**	*Chapter 3 (AP)* **Problem Set 1**
Dec 6, 2017	Multiple regression analysis: • Standard assumptions. • Least squares estimator. • Properties of least squares estimator. • Gauss-Markov theorem. • Estimator of σ^2.	Chapter 3 (W) Chapter 6.2 (W) Chapter 6.3 (W) Appendix D (W) Appendix E (W) **Chapter 1 (H)**	*Chapter 3 (AP)*
Dec 12, 2017	Multiple regression analysis: • Distribution of β and σ^2. • Wald test. • Goodness of fit. • Confidence interval of β. • Prediction interval of y.	Chapter 4 (W) Chapter 6.4 (W) Appendix D (W) Appendix E (W) **Chapter 1 (H)**	*Chapter 3 (AP)* **Problem Set 2**
Dec 15, 2017	Heteroscedasticity: • Generalized least squares estimator. • Feasible generalized least squares estimator.	Chapter 8 (W)	
Dec 19, 2017	Serial correlation: • Estimation. Multicollinearity.	Chapter 12 (W) Chapter 3.4 (W) **Chapter 1 (HA)** **Chapter 2 (HA)** **Chapter 3 (HA)**	
Dec 22, 2017	**Midterm Exam**		
Dec 26, 2017	Large sample theory: • Large sample properties of least squares estimators. • Large sample properties of $t-$statistic and $F-$statistics.	Chapter 5 (W) **Chapter 2 (H)**	**Problem Set 3**
Dec 29, 2017	Qualitative variables: • Dummy independent variables. • Dummy dependent variable.	Chapter 7 (W) Chapter 17.1 (W)	*Chapter 6 (AP)*

Jan 2, 2018	Specification error: • Inclusion of irrelevant variables. • Exclusion of relevant variables. Measurement error: • Measurement error in a dependent variable. • Measurement error in independent variables.	Chapter 3.3 (W) Chapter 3.4 (W) Chapter 9.4 (W)	
Jan 5, 2018	Instrumental variables: • Endogeneity bias. • Identification. • Overidentification.	Chapter 15 (W) **Chapter 3 (H)**	
Jan 9, 2018	System of equations: • Seemingly unrelated regressions. Panel data: • Difference-in-difference estimation. • Fixed effect model. • Random effect model.	Chapter 13.3 (W) Chapter 13.4 (W) Chapter 14.1 (W) Chapter 14.2 (W) *Chapter 10.1 (G)* *Chapter 10.2 (G)* *Chapter 10.3 (G)* **Chapter 21 (CT)**	**Problem Set 4**
Jan 12, 2018	Maximum likelihood estimation: • Likelihood function. • Properties of maximum likelihood estimates.	*Chapter 14.1 (G)* *Chapter 14.2 (G)* *Chapter 14.3 (G)* *Chapter 14.4 (G)* *Chapter 14.6 (G)* *Chapter 14.9 (G)*	
Jan 16, 2018	Generalized method of moment estimator: • Method of moments. • Generalized method of moments.	**Chapter 3 (H)**	
Jan 19, 2018	**Final Exam**		