ECON 2310: Econometric Methods and Models

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Class: M and W, 10:15-11:44 AM, ARCH 208

Office: PCPE 632

Office Hours: T and W, 2-3 PM, or by appointment

TAs: Jacob Broussard   *jbrous@sas.upenn.edu*   T and Th 9-10 AM, PCPE 500

Zhenxiao Chen   *zxchen@sas.upenn.edu*   W 3:30-5:30 PM, PCPE 141

Yi Niu   *n1y1@sas.upenn.edu*   M 9:30-10:30 AM (PCPE 208),

W 9:30-10:30 AM (PCPE 141)

Course Description: This course is designed to introduce you to econometric techniques and their applications in economic analysis and decision making. The main objective of the course is to train you in (i) handling economic data; (ii) quantitative analysis of economic models with probabilistic tools; (iii) econometric techniques, their application as well as their statistical and practical interpretation; (iv) implementing these techniques on a computer.

The course focuses on practical and conceptual issues involved in substantive applications of econometric techniques. Estimation and inference procedures are formally analyzed for simple econometric models and illustrated by empirical case studies using real-life data. The course covers linear regression models, simultaneous-equations models, discrete choice models, time series models, and panel data models. Estimation and inference is conducted using least squares, instrumental variable, and likelihood based techniques.

Prerequisites: ECON 2100 and [ECON 2300 OR (STAT 4300 and STAT 4310) OR (STAT 4300 and STAT 1020)]; Multivariate Calculus: [MATH 1400 or 1070] and [MATH 1410 or 1510 or 1080].

Course Text: The required textbook for this course is Stock, James and Mark Watson (2019, 4th Edition): *"Introduction to Econometrics"*. Besides, lecture slides will be posted. You will be responsible for all the material covered in the lectures and the recitation sessions. However, you will not be responsible for additional material contained in the textbook that is not covered in lectures and recitations.

Course Requirements and Grading:

- **Problem Set [20%]**: **PS1: 5%, PS2: 10%, PS3: 5%.** We assign 3 problem sets. See the course schedule for due dates. Turn pdf version on Canvas. No excuses for missed assignments/deadlines will be accepted. No makeup for missed problem sets.

- **Exam 1 [20%]**: **W 9/24** (tentative date). This exam covers the material taught before *M 9/17* and does not include the material taught on *M 9/22*.

- **Exam 2 [30%]**: **M 10/27** (tentative date). This exam covers the material taught after *M 9/17* and before the exam date, including the material taught on *W 10/22*.

- **Exam 3 [30%]**: **W 12/3** (tentative date). This exam covers the material taught after Exam 2 and before the exam date.

Important Administrative Policies:

Academic Conduct: We expect complete adherence to Penn's code of academic conduct. We will treat any violation, such as cheating in any form, with severity.

Classroom Conduct: We expect classroom conduct to be respectful of others. For example, late arrivals, early departures, and conversations are disruptive to all and are not appreciated. Regular class attendance, participation, and engagement in coursework are important contributors to student success and required in this course. Some or all parts of the course will not be recorded.

Excusal From Exams Due to Severe Illnesses or Conflicts: The exams are in-person. They will NOT be take-home exams. You must EMAIL us at least one hour BEFORE the start time of the exam, providing details of the situation and requesting to be excused. You

must also submit a "course absence report" for the days on which you were unable to take the exam. At our discretion, we will then: (1) Accept the request and require you to take a makeup exam at a time, date, and location determined by us in accordance with University rules. You will be expected to make all necessary arrangements to ensure that you appear at the set time, date, and location. Failure to do so will result in a grade of 0, as there is no "makeup makeup exam". During the period between the originally scheduled exam and the makeup exam, neither we nor the TAs will be available to discuss any material that could be relevant to the exam; **or** (2) Decline the request and assign a grade of 0 if you do not take the exam.

Note: Requests for excusal due to conflicts are granted only in very limited circumstances, as you are expected to make all necessary arrangements to ensure your attendance at the scheduled exam. In particular, conflicting activities such as early/late travel departures/returns, interviews, and non-emergency family events are NOT valid grounds for excusal.

Problem Set and Exam Grading Reviews: You must first review the PS or exam with the TA "in charge" of the PS or exam. If you are not satisfied with the TA's explanation, you may submit a formal regrade request by email to the TA in charge of the PS or exam. The regrade request (1) must clearly state the specific item in dispute and provide a clear and persuasive explanation of the reason for your regrade request, and (2) must be submitted within seven days from the initial release of the PS grade online or the return of the exam (e.g., if the PS or exam is returned at the end of class at 2:45 PM on a Thursday, then the emailed regrade request must be time-stamped earlier than 2:45 PM on the following Thursday). If, and only if, the TA accepts your regrade request, they will then regrade the ENTIRE PS or exam, not just the item in question. Note that, under the reasonable assumption of symmetric grading errors, the expected point change from a regrade is zero, even if you receive additional points for the item in question. Moreover, to the extent that a regrade does produce a point change, it is as likely to be down as up. Finally, we randomly photocopy some PS's and exams before returning them, so we will likely catch any regrade-related cheating.

Course Outline and Schedule: See canvas site.

Statistical Software: We will use the statistical package R via a front-end called RStudio throughout the course. Both programs are free and open source. See the last page of this document for instructions on how to configure your computer to run R and RStudio.

R Resources

Installing R and RStudio: First, download and install R from http://cran.r-project.org/. Second, download and install RStudio by visiting http://rstudio.org/download/desktop and clicking the link listed under "Recommended for Your System."

References: While not required, these references may be useful if you need some extra help learning R, or want to go beyond the material covered in the course.

- Contributed Documentation by Comprehensive R Archive Network (CRAN) http://cran.r-project.org/other-docs.html Comprehensive list of freely available reference material for R.

- *R Twotorials* by Anthony Damico http://www.twotorials.com/
  Ninety energetic, two-minute video tutorials on statistical programming with R.

- Google Developers R Programming Video Lectures
  http://www.r-bloggers.com/google-developers-r-programming-video-lectures/
  R Programming video tutorials from beginning to advanced.

- *Econometrics in R* by Grant Farnsworth
  http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf

- *Resources to help you learn R* by UCLA Academic Technology Services
  http://www.ats.ucla.edu/stat/R/ A wealth of information about R, conveniently arranged in one place. The R Starter Kit is particularly helpful.

- *R in a Nutshell* by Joseph Adler
  http://proquestcombo.safaribooksonline.com/book/programming/r/9781449377502
  Electronic version of the book of the same name published by O'Reilly (Accessible on the UPenn Network). Provides a comprehensive reference guide to R.

- R-bloggers http://www.r-bloggers.com A blog aggregator for R news and tutorials, with lots of applications.