Econometric Methods and Models
ECON 2310 920

Summer 2022

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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 applications as well as their statistical and practical interpretation; and (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 simple linear regression models, multiple regression models, time series, and panel data. Estimation and inference are conducted using least squares, instrumental variables, and likelihood-based techniques.

Logistics

- Lectures will be asynchronous. I will upload the recordings on Canvas throughout the semester.
- We will have two (optional) live recitation classes every week to go over problem sets and key concepts in the lectures.
- I will hold a live meeting via Zoom on the first day of class to discuss our plan for the course and answer the questions.
- I will send out weekly anonymous surveys to receive feedback about the class.

Prerequisite

ECON 101 and ECON 103, MATH 104 and (MATH 114 or MATH 115); or permission from instructor.

Textbook

The textbook for this course is Stock, James and Mark Watson (2019, 4th Edition): *"Introduction to Econometrics"*.

Course Requirements and Grading

The grade for this course will be allocated as follows:

$$\text{Final Grade} = 60\% \text{ problem sets} + 40\% \text{ final exam}$$

- *Problem sets:* There will be 4 problem sets, each of which is worth 15% of the final grade. You are encouraged to work on problem sets within groups but you must submit your own work.
- *Final exam:* The exam will be held on the last day of class.

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.

Departmental Course Policies

All course policies of the Economics Department apply to this course even if not explicitly listed on this syllabus. See here for full details.

Course Topics

- Introduction and Review
- Linear Regression with One Regressor
- The Ordinary Least Squares (OLS) Estimator
- Assumptions and Properties of OLS
- Hypothesis Tests and Confidence Intervals for Simple Regression
- Regression with a Binary Regressor
- Heteroskedasticity and Homoskedasticity
- Omitted Variable Bias
- Linear Regression with Multiple Regressors
- Hypothesis Tests and Confidence Intervals in Multiple Regression
- Nonlinear Regressions
- Internal and External Validity
- Panel Data and Fixed Effects
- Regression with a Binary Dependent Variable
- Probit and Logit Regression
- Endogeneity and Instrumental Variables Regression
- Experiments and Quasi-Experiments
- Time Series Regression and Forecasting
- Nonstationarity

R Resources

Installing R and RStudio: First, download and install R from here. Second, download and install RStudio by visiting this page 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): 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.