ECON 205C: Spring Quarter 2024
Econometric Methods III

Version: 3-20-2024

Instructor: **Tae-Hwy Lee**
LEC: MW 10:00 am - 11:20 am, SPR 2206
office hours: M 2:00-2:50 pm, T 11:00-11:50 am, or by appointment, SPR 3103

TA: **Rajveer Jat**
DIS: Th 09:30 am - 10:50 am, SPR 2206
LAB: Th 10:50-11:30 am, SPR 2206
(Please ask Gary to reserve the room for this extra time and cc me)
office hours: T/Th 11:00-11:50 am or by appointment, SPR 31xx
(Check the first year classes and DIS to make sure ok)

Goal: This course covers the econometric methods for the analysis of economic time series data. It provides a foundation for applied research using time series data. The goal is to acquire knowledge necessary to understand the applied and theoretical econometric literature as exposed in the leading journals.

Course Outline (Parts I, II, III): The course deals with univariate and multivariate, stationary and non-stationary, time series methods. The course contains three parts. Part I concerns the standard theory of stationary stochastic processes. Part II concerns the analysis of nonstationary data. We take a close look at the asymptotic distribution theory in the leading case of an AR(1) model and especially the case with an autoregressive unit root. We discuss the characterization, estimation and tests in cointegrated systems. In Part III, we discuss the ARCH models. Lecture notes will be available in Canvas as we progress. The corresponding material in Hamilton (1994) as indicated below will be covered. Hamilton Chapters 3, 4, 5, 6, 10, 11, 15, 16, 17, 21, will be closely followed. Lectures on topics corresponding to Hamilton's Chapters 18, 19, 20, will be discussed using the original publications (references below).

I. STATIONARY TIME SERIES (for the *conditional mean* regression)

Lecture 1: Properties of Stationary ARMA Processes (Hamilton Chapters 3, 4, 6)
Lecture 2: Forecasting Using Stationary ARMA Models (Hamilton Chapter 4)
Lecture 3: Estimation of Stationary ARMA Models (Hamilton Chapter 5)
Lecture 4: Multivariate Time Series Processes and VAR (Hamilton Chapters 10, 11)

II. NONSTATIONARY TIME SERIES (for the *conditional mean* regression)

Lecture 5: Models of Nonstationary Time Series (Hamilton Chapter 15)
Lecture 6: Trends (Hamilton Chapter 16)
Lecture 7: Unit Roots (Hamilton Chapter 17)
Lecture 8: Spurious Regression (Hamilton Chapter 18, Phillips 1986)
Lecture 9: Cointegration (Hamilton Chapters 19, 20, Johansen 1991)

III. STATIONARY TIME SERIES (for the *conditional variance* regression)

Lecture 10: ARCH (Hamilton Chapter 21)

Week 1: We will first finish the remaining topic of Econ 205B before starting the above topics of Parts I, II, III.

Lecture 12 (of Econ 205B): Endogeneity and instrumental variables

References:

Required Textbook

- James Hamilton (1994), *Time Series Analysis*, Princeton University Press. ISBN 0-691-04289-6

References (Books)

- Bruce Hansen (2022), *Econometrics* Chapters 14, 15, 16
- Clive Granger and Paul Newbold (1986), *Forecasting Economic Time Series*, 2ed., Academic Press. ISBN: 9780122951848
- Graham Elliott and Allan Timmermann (2016), *Economic Forecasting*, Princeton University Press, ISBN: 9780691140131

Reference (Papers)

- Peter Phillips (1987), "Time Series Regression with Unit Roots", *Econometrica* 55, 277-302. (for Lecture 7)
- Peter Phillips (1986), "Understanding spurious regression in econometrics," *Journal of Econometrics* 33, 311-340. (for Lecture 8)
- Robert Engle and Clive Granger (1987), "Co-Integration and Error Correction: Representation, Estimation and Testing", *Econometrica* 55, 251-276. (for the first part of Lecture 9)
- Soren Johansen (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica* 59(6), 1551-1580. (for the last part of Lecture 9)

Grading:

Attendance in all LEC/DIS is required. All exams are mandatory and no make-up exams will be given. The final exam is comprehensive but will have more emphasis on Part II and Part III than on Part I. Students are responsible for any announcement and information provided during LEC/DIS. The following schedule may be subject to change with a short notice.

Homework Assignments	30%	Homeworks 12, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
Midterm Exam (in class)	25%	5/01/2024 Wednesday, 10:00 am – 11:20 am (week 5)
Final Exam (take home)	45%	6/10/2024 Monday, 9 am – 11:50 am (week 11)

Homework problem sets will consist of analytical exercises as well as computer exercises. Late homework will not be considered. Questions regarding programming should be directed to the TA.

The homework assignments will be graded by the TA and reviewed by the instructor. The exams will be graded by the instructor and reviewed by the TA. Grading will be strict for correctness and completeness and also for quality in writing that is expected for graduate students.

Each homework assignment will be posted on Canvas with due date specified. You will submit each homework through Canvas as a single PDF. You must write your own solutions but collaboration with other classmates is permitted. Just make sure you submit your own work with your handwriting at the end. This applies to programming (codes and computer outputs, both of which you should create and produce individually). In case of collaboration, include the names of your collaborators at the first page

and indicate roles and contributions of each person. Late submission of the assignment will not be accepted.

Homework assignments aim to help you understand the materials better. It might also reflect what you should expect in the exams. You are allowed to discuss with other students or TA, but every student must submit her/his own assignments individually. Any academic misconduct will be reported. It is your responsibility to make sure that you learn by doing the assignments.

The final exam is cumulative. Both exams are mandatory. There will be no make-up exams.

Academic Integrity: Academic integrity violations involving graduate students are reviewed and processed by the Graduate Division. Examples of academic integrity violations include plagiarism, cheating, unauthorized collaboration, etc. Information, policies and procedures regarding academic integrity for graduate students and the form required to report a violation can be found at the Graduate Division website.

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