Time Series Analysis in Economics

FALL 2021

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Mode of Delivery, Time and Location

- The regular lectures will be asynchronous, hence pre-recorded and uploaded via Compass. You are supposed to listen to the lectures BEFORE coming to the discussion section.
  - This is a well-established and quickly growing delivery mode, called "flipping the classroom". We can also consider this as a hybrid course format. Please see https://covid19.illinois.edu/guides/academics/ for more information.
- We will have discussion section in class, 8-9:20am mostly Mondays (except Week 3) at Gregory 319.
  - The first part of the discussion section will be Q&A section. Please bring all your questions, AFTER listening to the pre-recorded lecture videos.
  - After this Q&A section, you can freely discuss any topic related to the course materials with me or your classmates.
  - Depending on the COVID situation, we may hold this discussion section online. The zoom link will be provided in such a case.

Office Hours: You can use the discussion section to ask any question so there will be no formal office hours. You can request an individual office hour by appointment (at least 2-day advanced notice is required).

Main Course Materials: Course Slides and Lecture Notes, prepared by the instructor

Recommended Textbooks

- *An Introduction to Computational Finance and Financial Econometrics* by Eric Zivot, manuscript in preparation. Pdf files will be provided through course webpage.
- *Financial Econometrics* by Oliver Linton, Cambridge University Press
- *Statistics and Data Analysis for Financial Engineering* by David Ruppert, Springer-Verlag.

Exams: Exams are open-book take-home exams. Exam 1 is during **10/1-10/8** and Exam 2 is during **12/8-12/15**. Please see the course schedule in page 3 below.

Grading: There will be 7 assignments and two take-home exams. They will count toward the grade as follows. If you miss any of the exams or most parts of assignments, you cannot pass this course.

Assignments	50%
Exam I and II	50%

Assignments

There will be 7 problem sets, typically with 5-7 days to finish.

Please use our course webpage for your questions. In this way we can openly discuss what are difficult and how to overcome. You can discuss problem sets with classmates, but *must submit your own answers.* Problems sets are mainly to encourage you to "practice", and understanding them by yourself will be the most important task in this class. *The written solutions will not be provided*; you are supposed to review the course materials and find the answers by yourselves. Memorizing solutions right before the exam is not the right way to learn. If you want to clarify your mistakes in your homeworks *after being graded*, please talk to the instructor or grader by setting up an appointment.

Description of the Course

This course is an introduction to time series econometric modelling. The main focus is to study econometric models and methods to understand dynamics of economic time series. We first begin by reviewing the essential concepts in probability/statistics and time series econometrics. Then some popular time series econometric models and estimation methods will be investigated. Finally, we review selected topics in economics, and learn how to apply the econometric methods to analyze and understand the empirical properties of economic data. Both analytical problem sets and data exercises will be assigned as homework, in order to enhance our theoretical understandings and practical skills.

Academic Integrity

Regarding the violation of academic integrity, the student code for ACADEMIC INTEGRITY POLICY AND PROCEDURE from the University of Illinois system will be strictly followed: http://studentcode.illinois.edu/article1/part4/1-402/

Course Schedule - subject to some changes

- Week 1: Course Introduction (8/23; **IN-CLASS**), Understanding Empirical Properties of Time Series Data (8/25; **asynchronous**)
- Week 2: Discussion Section (8/30; **IN-CLASS**), Review of Concepts in Probability Theory (8/30, 9/1; **asynchronous**)
- Week 3: Non-instructional day (9/6; *no class*, Labor Day), Discussion Section (9/8; **IN-CLASS**)
- Week 4: Review of Concepts in Probability and Statistics (9/13, 9/15; **asynchronous**)
- Week 5: Discussion Section (9/20; **IN-CLASS**), Introduction to Time Series Econometrics (9/22; **asynchronous**)
- Week 6: Discussion Section (9/27; **IN-CLASS**), Time Series Econometrics (9/29; **asynchronous**)
- Week 7: **Exam I (open-book & take-home; 10/1-10/8)**
- Week 8: Time Series Econometrics (10/11, 10/13; **asynchronous**)
- Week 9: Time Series Econometrics (10/18, 10/20; **asynchronous**)
- Week 10: Discussion Section (10/25; **IN-CLASS**), Volatility Models (10/27; **asynchronous**)
- Week 11: Volatility Models (11/1, 11/3; **asynchronous**)
- Week 12: Discussion Section (11/8; **IN-CLASS**), Single Index (SI) Model & Estimation (11/10; **asynchronous**)
- Week 13: Single Index (SI) Model & Estimation (11/15, 11/17; **asynchronous**)
- Week 14: Thanksgiving Break (*no class*)
- Week 15: Discussion Section (11/29; **IN-CLASS**), Multi-factor Asset Pricing (12/1; **asynchronous**)
- Week 16: Discussion Section (12/6; **IN-CLASS**), **Exam II starts from 12/8**
- Week 17: **Exam II (open-book & take-home; 12/8-12/15, 10pm)**

Safety Information

Run > Hide > Fight

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with any kind of emergency – like fire, severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight.

Run

Leaving the area quickly is the best option if it is safe to do so.

- Take time now to learn the different ways to leave your building.
- Leave personal items behind.
- Assist those who need help, but consider whether doing so puts yourself at risk.
- Alert authorities of the emergency when it is safe to do so.

Hide

When you can't or don't want to run, take shelter indoors.

- Take time now to learn different ways to seek shelter in your building.
- If severe weather is imminent, go to the nearest indoor storm refuge area.
- If someone is trying to hurt you and you can't evacuate, get to a place where you can't be seen, lock or barricade your area, silence your phone, don't make any noise and don't come out until you receive an Illini-Alert indicating it is safe to do so.

Fight

As a last resort, you may need to fight to increase your chances of survival.

- Think about what kind of common items are in your area which you can use to defend yourself.
- Team up with others to fight if the situation allows.
- Mentally prepare yourself – you may be in a fight for your life.

Please be aware of persons with disabilities who may need additional assistance in emergency situations.

Other resources

- **police.illinois.edu/safe** for more information on how to prepare for emergencies, including how to run, hide or fight and building floor plans that can show you safe areas.
- **emergency.illinois.edu** to sign up for Illini-Alert text messages.
- **Follow the University of Illinois Police Department** on Twitter and Facebook to get regular updates about campus safety.