

Financial Econometrics

FINN 6219-U90, Fall 2017

Location: Center City, Room 904, Wednesday 5:30pm - 8:15pm
Instructor: Professor Chris Kirby
Phone: 687-0845
Email: ckirby10@uncc.edu
Office: Friday 349A
Office hours: By appointment

Course Description

The field of financial econometrics is at the forefront of modern empirical research on the inner workings of stock, bond, futures, and options markets. It is a young and rapidly evolving discipline that emphasizes the use of advanced statistical techniques for analyzing price and return data. This course provides a “hands on” introduction to these techniques. Students will be required to develop programming skills in MATLAB, a matrix-algebra-based statistical analysis package. The emphasis will be on understanding and applying a set of econometric tools that are widely used by academics and practitioners who work in quantitative areas such as risk management, investment management, and financial engineering

Requirements

Please note that the standards and requirements set forth in this syllabus may be modified at any time. Notice of such changes will be by announcement in class.

Attendance: Encouraged but not required

Problem Sets (15%): The problem sets will typically consist of programming exercises. You can work on them in groups of up to three students. If you work in a group, submit a single set of solutions that has each group member's name on the cover page. Include the MATLAB code used to generate solutions and a written interpretation of the results. Your solutions will be graded on a four-point scale, i.e., your score will be a 1 (substandard), 2 (acceptable), 3 (good), or 4 (superior). Late submissions are not permitted and will earn a score of zero. There will be no extensions of due dates so plan accordingly. Use of my solutions from previous semesters, or those of students who have taken the course in previous semesters, is prohibited, and will constitute a violation the Code of Student Academic Integrity.

Problem set solutions must be coded in MATLAB. There are no exceptions. One of the course objectives is to make you proficient in MATLAB programming so that you can tackle new challenges on your own. MATLAB is in common use among both practitioners and researchers, and you will find that MATLAB programming skills are valued, regardless of whether you go to Wall Street, the Federal Reserve Board, a money-center bank, or a research institution. MATLAB will not be the only software you need to know, but it will probably be the most useful and versatile software.

The first lecture will provide an introduction to MATLAB. However, I expect you to learn to write MATLAB code on your own. This will be a time consuming process if you have limited programming experience. I will provide examples to build on, but I will not debug your code. That is your responsibility. You should be prepared to spend 3 to 4 hours per week outside of class to learn the material.

Midterm Exam (30%): Consists of problems that test your understanding of the econometric techniques covered in the lectures. You will have 2.5 hours to complete the exam.

Final Exam (35%): Cumulative and similar in format to the midterm. It will be held on Wednesday, December 13 from 5:30 pm to 8:00 pm in our usual Center City classroom.

Term Project (20%): The term project involves selecting a time-series econometric technique, using MATLAB to apply it to financial data, and producing a paper that describes your methodology and results. Your MATLAB code should be well documented and accompanied by (i) a readme-file with instructions of how to run it, (ii) a description of how the selected technique works and what it accomplishes, and (iii) an empirical application to actual data. The empirical application may replicate an existing study, but it has to be of substantive interest. All topics are subject to my approval. The papers are due by Friday, December 8 at noon. Drop them off at my office. Any submissions received after this date and time will receive a grade of zero.

Important guidelines: Your paper should not exceed 10 pages in length. The format should adhere to the standards required for submission to an academic journal (including a separate title page with an abstract summarizing the paper; a complete list of references; a list of data sources). The discussion of the analysis should be detailed enough to permit one of your classmates to replicate all results. Data sources must be documented and modelling choices must be justified. You should clearly explain what the research question is, why the question is interesting, and what you have learned. A short but polished paper is greatly preferred to a long but unpolished one. Papers may not be co-authored.

Textbooks and Software

There is no text for the course. The lecture notes are designed to be both comprehensive and self-contained. However, I will provide optional readings from the following two texts for those of you who want to see additional discussion of the material covered by the lectures:

- (i) Analysis of Financial Time Series, 3rd ed., by Tsay, Wiley, ISBN: 9780470414354
- (ii) The Econometric Modelling of Financial Time Series, 3rd ed., by Mills and Markellos, Cambridge University Press, ISBN: 9780521710091

As noted earlier, the required software for the course is MATLAB. You can access it in the computer labs in the Friday building, or install it on your computer: see <http://itservices.uncc.edu/student-services/software-downloads>. I have posted the download and installation instructions provided by ITS on the course webpage.

Prerequisites

This course is intended for graduate students in finance and economics. I will therefore assume knowledge of introductory-level finance, macroeconomics and econometrics. The formal prerequisite for the course is ECON 6218 or MATH 6201.

Academic Integrity

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code. The Code is available from the Dean of Students Office or online.

Accommodations for Disabilities

Students who wish to seek accommodations for disabilities must first consult with the Office of Disability Services and follow the instructions of that office to obtain accommodations.

Tentative Course Outline

A list of topics for the course is shown below. Any readings will be posted to the course web page prior to each lecture.

Part 1: Basic Regression Analysis

- 1.1 Introduction to MATLAB
- 1.2. The Notion of Repeated Sampling
- 1.3. The Basic Linear Regression Model with i.i.d. Errors in Matrix Notation
- 1.4. MLE by Numerical Methods in the i.i.d. Case

Part 2: Univariate Time Series Models

- 2.1. Basic Concepts in Time Series Analysis
- 2.2. Approximating the Wold Representation
- 2.3. Data Transformations
- 2.4. Parametric Analysis of Time Series: Estimating AR, MA, and ARMA Processes
- 2.5. Nonparametric Analysis of Time Series
- 2.6. Measuring Volatility
- 2.7. Measuring Risk
- 2.8. What if the Regression Errors are not i.i.d.? Robust Regression Standard Errors

Part 3: Multivariate Time Series Models

- 3.1. Estimating Reduced-Form Vector Autoregressions
- 3.2. AR and VAR Lag Order Selection
- 3.3. Structural VAR Models: Lessons from the Money-Income Causality Debate

Part 4: Forecasting

- 4.1. Univariate Forecasting
- 4.2. Univariate Forecasting with Large Cross-Sections

- 4.3. Predictability Tests
- 4.4 Pseudo Out-of-Sample Tests of Equal Predictive Accuracy
- 4.5 Direction-of-Change Tests
- 4.6 Data Mining

Part 5: Unit Roots, Spurious Regressions and Cointegration

- 5.1 Testing the Unit Root Hypothesis
- 5.2 Spurious Regressions
- 5.3 Cointegration

Part 6: Bootstrapping

- 6.1 Bootstrapping Time Series Models