

Finance 5330: Financial Econometrics

Spring Semester, 2020

Course Information

- Course Dates: January 06 - April 29
- Course Time: TR 4:30 - 5:45 PM
- Course Room: Huntsman Hall 126
- Slack Channel
- Course Canvas

Instructor Information

- Tyler J. Brough
- Office Hours: TBD & By Appointment
- Office: BUS 512
- Email: tyler dot brough at aggemail dot usu dot edu (please use this one and NOT my tyler dot brough at usu dot edu account)

Syllabus

Course Description

This course covers modern financial econometrics and data analysis. We will cover predictive time series models as well as modern algorithmic models. We will cover applications to risk management and trading (among other topics). We will also discuss modern developments such as how financial econometrics is influenced by and interfaces with artificial intelligence and machine learning.

Prerequisites

- ECN 4330 or equivalent
- ***Strong economic and statistical logic***

Textbooks

The *required* textbooks are the following:

- Analysis of Financial Data by Gary Koop.
- Scrum: The Art of Doing Twice the Work in Half the Time by Jeff and J.J. Sutherland

Other books that we may draw from:

- Introduction to Statistical Learning by James, Witten, Hastie, and Tibshirani.
- Analysis of Financial Time Series - 3rd Edition by Ruey Tsay.

- The Econometrics of Financial Markets by Campbell, Lo, and MacKinlay.
- Applied Econometric Time Series - 4th Edition by Walter Enders.

Methods of Teaching and Learning

This course will be taught as a graduate seminar style course. That means that your participation is crucial. You will get out of the course what you individually and collectively put in.

Most lectures will consist of Jupyter notebooks and slides covering the material, though wherever possible I will use the Socratic method.

One essential element of this course is project management using the agile methodology of Scrum. The course consists of four projects. You will be placed into teams and the balance of the semester will be completing the four projects as a team. I will be the stakeholder to whom you will make periodic update reports and ultimately the deliverables for the projects. More details will be given about this in class.

Assessment and Grading

Students will be assessed according to the following:

- Class Preparation, Participation and Citizenship (20%) - Much has been said about this already above. Let me just emphasize that no student can earn an A in the course who does not take this component of their grade seriously!
- Project I (20%) - Pairs trading and statistical arbitrage
- Project II (20%) - Volatility models and predictive densities
- Project III (20%) - Tests of superior predictive ability (RC, SPA, StepM)
- Project IV (20%) - Implement and test an original dynamic trading strategy

Slack All class communication will take place using Slack, a messaging system that replaces email. Students will be invited to the Fin 5330 Slack channel prior to the first week of class.

Clients for most computing and mobile platforms can be downloaded from the Slack website, or students may use the web client via a desktop browser.

Programming I will be presenting code in the Julia programming language throughout the course. Occasionally, I might present some code in Python or R. You are expected to complete your programming assignments and exams in one of these programming languages.

Schedule of Topics

We will attempt to cover the following list of topics:

1. **Module I**: Foundations: financial data, difference equations, programming, mathematics and statistics, Monte Carlo studies
2. **Module II**: Linear time series analysis, volatility models, unit roots and cointegration
3. **Module III**: Multivariate time series models
4. **Module IV**: Backtesting trading strategies, data snooping bias, and the bootstrap

NB: I reserve the right to dynamically alter this list as the course progresses. I will announce any such changes in class and on the course Slack channel.

Import dates:

- **Jan 06** - First day of classes
- **Mar 02 - 06** - Spring break
- **Apr 21** - Last day of classes
- **Apr 23 - Apr 29** Final exams

The weekly schedule will be updated on the course Google Spreadsheet