

ST 790, Introduction to Financial Statistics, Fall 2018

Tuesday & Thursday 1:30 - 2:45PM, 1108 SAS Hall

Instructor: Dr. Rui Song

Email: rsong@ncsu.edu

Moodle log in: <http://wolfware.ncsu.edu/>

Office: 5120 SAS Hall

Phone: (919) 515-1955

Office Hours: 3-4pm T, TH, or by appointment.

Teaching Assistant: Hengrui Cai

Email: hcai5@ncsu.edu

Office Hours: 6-7pm T, TH, or by appointment.

Course Prerequisite: ST 521, 522 or 701, 702.

Financial econometrics is an interdisciplinary subject that uses statistical methods and economic theory to address a variety of quantitative problems in finance. These include building financial modeling, testing financial economics theory, simulating financial systems, volatility estimation, risk management, capital asset pricing, portfolio allocation, portfolio and derivative hedging, among others. Topics covered include portfolio theory, capital asset pricing models (CAPM), multi-factor pricing models, portfolio allocation, and risk management. The course will focus on statistical techniques and applications of statistical models to econometrics and financial market data, as seen from consumption, investment, and saving points of view.

Course Resources:

- Text Book: Jianqing Fan and Qiwei Yao (2017), The Elements of Financial Econometrics, Cambridge University Press.
- References:
 - J.Y. Campbell, A.W. Lo and A.C. MacKinlay (1997): The Econometrics of Financial Markets, Princeton University Press
 - Ruppert, D., Matteson, D.S. (2015). Statistics and Data Analysis for Financial Engineering (2nd ed., pp. 721). New York, NY: Springer.
- Software: Python, R, Matlab, C, or something similar to do computational homework problems and the final project.
- Additional Online Materials: Please refer to moodle website: <http://wolfware.ncsu.edu/>
The contents will be updated regularly.

Course Objectives: By the end of this semester, you need to know the following:

- Asset returns and efficient markets.
- Efficient portfolios and CAPM.
- Multifactor pricing models.
- Portfolio allocation and risk assessment.
- Consumption-based CAPM.
- Present value models.
- Linear time series and dynamics of returns*
- Discrete time volatility models of returns*
- Multivariate time series and volatility*

Grading: Homework 50%, Literature review and course presentation 25%, Final project 25%

1. For homework: Problems will be posted in moodle. No late homework will be accepted. Missed homework will receive a grade of zero. The homework will be graded, and each assignment carries equal weight. You are allowed to work with other students on the homework problems, however, verbatim copying of homework is absolutely forbidden. Therefore each student must ultimately produce his or her own homework to be handed in and graded.
2. For Literature Review: The goal of the literature review is to learn more about cutting edge development of statistical methods in the field of financial econometrics. You will choose an article from top tier journals in the field of Statistics, Finance, or from the link in moodle. The article should discuss topics covered in or related to this course.

In Oct 9 or 11, you will present the literature review to the class. Each presentation will be about 12 minutes, with 1-3 minutes for discussion. This presentation slides should be a concise, professional presentation in PowerPoint or PDF that includes: Title of paper being reviewed, Introduction, goals of paper, methods and results, Future work (What needs to be done next? What improvements can be made?)

3. For final project on Quantopian contest, you will need to write an algorithm and submit it to the contest no less than Oct 30. Submissions are entered into the contest starting at the next market open. You can check back every day to see your results. Top performers are displayed on the leaderboard. As a “fund manager”, you will need to build your trading strategy and monitor your portfolio performance for at least a month (Nov 1-Nov 30). After Nov 30, you need to summarize your results into a report based on your trading strategy and

performance, including returns, positions, leverage, risk control etc. The report is due on Dec 7. A poster session based on your final project will be held on Dec 6 in the Solomon Commons at class meeting time.