

Stevens Institute of Technology
School of Business
Syllabus
Fin620: Financial Econometrics

Semester: Spring 2019	Day of Week/Time Tue: 6.30-9:00PM
Instructor: Prof Hamed Ghoddusi hghoddus@stevens.edu	<u>Office Hours</u> : Tue 4:00-5:00PM <u>Class Website</u> : Canvas

Overview

This course will cover the main topics of the analysis of time series to evaluate risk and return of the main products of capital markets. Students will work with historical databases, conduct their analysis, and conduct tests based on the techniques reviewed during the class.

Prerequisites: BIA 652 Multivariate data analytics or MGT 700 Econometrics

Introduction to Course

The significant amount of historical information available for most financial instruments requires a systematic and analytical approach to select an optimal portfolio. Time series analysis facilitates this process understanding, modeling, and forecasting the behavior of financial assets.

This course reviews the most important techniques used by investors, risk managers, and also by finance managers of non-financial service companies to analyze time series of their most relevant financial variables. Even though the methodologies reviewed during this course could also be applied to other domains such as marketing, the main emphasis of this class is on financial applications with special consideration to risk management.

Relationship of Course to Rest of Curriculum

Students will have the opportunity to formalize the concepts of quantitative finance in econometric models that can be applied to risk management or trading.

Learning Goals

By the end of this course, the students will be able to:

1. Understand the foundations of financial time series data, including high-frequency data
2. Apply models and methods for analysis of financial time series (return and volatility) and risk management.
3. Recognize the value and also the limits of econometric methods in financial time series.

Pedagogy

The class will combine class presentations, discussions, exercises, and case analysis to motivate students and train them in the appropriate use of econometric techniques.

Required Text

- R. S. Tsay, *Analysis of Financial Time Series*, 3rd Ed, John Wiley, 2010.

Optional Readings

- A. McNeil, R. Frey, and P. Embrechts, *Quantitative Risk Management: Concepts, Techniques, and Tools*, revised ed., Princeton University Press, 2015.
- E. Zivot and J. Wang, *Modeling Financial Time Series with S-plus*, 2nd Ed., Springer, 2005.
- J. Campbell, A. Lo, and A. MacKinlay, *The Econometrics of Financial Markets*, Princeton University Press, 1997.
- R. Hyndman and G. Athanasopoulos, *Forecasting: Principles and Practices*, 2013. OTexts. <https://www.otexts.org/fpp>

Projects

The assignments (i.e three interim project reports) must be submitted electronically through the course website.

For all the programming tasks, students should send two uncompressed files: a report and an R program. Please do not copy and paste large parts of the R program as part of the solutions. Create your tables with the R output whenever it is possible or copy small sections of the R program and EXPLAIN the results.

Do not send sections of your code or ask a complex homework question by email. I cannot debug your program or write a long explanation by email. However, you are welcome to ask any questions about the projects, homework, or any other issue related to this class during class or during the office hours.

Software: R is the preferred software package for this class. Occasionally, we will use Eviews too.

CFA Institute Online Ethics Course:

You should complete the seven modules, one for each Standard, of the CFA Code and Standards. This course is about ethical behavior in the global investment management industry. It is accessible for free in the following link:

<http://www.cfainstitute.org/learning/products/onlinelearning/Pages/62901.aspx>

You should submit a full course certificate of completion to receive 5 points.

Grades and Evaluation

Assignment	Grade Percent
Homework and Project	25%
Completion of CFA Institute Online Ethics course	5%
Paper Presentations	10%
Midterm	30%
Final exam	30%

Ethics and Cooperation: You are allowed to discuss lecture and textbook materials, and how to approach assignments.

You cannot share ideas in any written form: code, pseudocode or solutions. You cannot submit someone else's work found through the internet or any other source, or a modification of that work, with or without that person's knowledge, regardless of the circumstances under which it was obtained, copied, or modified. Of course, no cooperation is allowed during exams.

The following statement is printed in the Stevens Graduate Catalog and applies to all students taking Stevens courses, on and off campus.

“Academic Improprieties

The term academic impropriety is meant to include, but is not limited to, cheating on homework, during in-class or take home examinations and plagiarism. The Institute has adopted a procedure to deal with such actions. An instructor of a graduate course may elect to formally charge a student with committing an academic impropriety to the Dean of Graduate Academics or to adjudicate the issue personally.”

Consequences of academic impropriety are severe, ranging from receiving an “F” in a course, to a warning from the Dean of the Graduate School, which becomes a part of the permanent student record, to expulsion.

Reference: <https://www.stevens.edu/provost/graduate-academics/handbook/academic-standing.html#PDG>

Consistent with the above statements, all homework exercises, tests and exams that are designated as individual assignments MUST contain the following signed statement before they can be accepted for grading.

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination. I further pledge that I have not copied any material from a book, article, the Internet or any other source except where I have expressly cited the source.

Signature _____

Date: _____

Please note that assignments in this class may be submitted to www.turnitin.com, a web-based anti-plagiarism system, for an evaluation of their originality.

Course/Teacher Evaluation

Continuous improvement can only occur with feedback based on comprehensive and appropriate surveys. Your feedback is an important contributor to decisions to modify course content/pedagogy which is why we strive for 100% class participation in the survey.

All course teacher evaluations are conducted on-line. You will receive an e-mail one week before the end of the course informing you that the survey site is open along with instructions for accessing the site. Simply click on the course that you wish to evaluate and enter the information. All responses are strictly anonymous. We especially encourage you to clarify your position on any of the questions and give explicit feedbacks on your overall evaluations in the section at the end of the formal survey which allows for written comments. We ask that you submit your survey before the last class.

Course Schedule FIN620

Px: the paper from the reading list

Tsay x: the section x of the textbook

Date	Topic	Readings	Assignment
1/22	Overview of the course: introduction to R and financial econometrics	Tsay 1	
1/29	Autoregressive and moving average models	Tsay 2	
2/05	Autoregressive and moving average models	Tsay 2, P1	Project Report #1
2/12	Seasonality, Stationary and Unit-Root Processes, Cointegration	Tsay 2, 8, P2	
2/19	Monday Schedule; NO CLASS!		
2/26	Multivariate models: VAR and VECM models	Tsay 8, P3	
3/05	GARCH Models	Tsay 3, P4	Project Report #2
3/12	Mid-Term Exam		
3/19	Spring Break		
3/26	Alternative GARCH models	Tsay 4, P5	
4/02	Value at Risk & extreme value theory	Tsay 7, P6	
4/09	Principle component analysis (PCA) and Factor Models	Tsay 9, P7	
4/16	Multivariate volatility models, Event Study methodology (time permitted)	Tsay 10, P8	Project Report #3
4/23	MCMC models	Tsay 12, P9	
4/30	Projects Presentations		
5/07	Final Exam		