

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

Semester: Fall 2016	Day of Week/Time Th.:6.15-8.45PM, Morton Complex 105
Instructor: Germán Creamer, Babbio 637 gcreamer@stevens.edu	<u>Office Hours</u> : M, 1.30 PM – 3 PM <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(s)

- A. McNeil, R. Frey, and P. Embrechts, *Quantitative Risk Management: Concepts, Techniques, and Tools*, revised ed., Princeton University Press, 2015. (this book should be available in the school bookstore)
- R. S. Tsay, *Analysis of Financial Time Series*, 3rd Ed, John Wiley, 2010. (the electronic version of the second edition is accessible through the school library)

Optional Readings

- 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>

Assignments

Homeworks:

The assignments must be submitted electronically through the course website.

For all the programming homeworks, students should send two uncompressed files: a report and an R program organized by questions. 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 homework or any other issue related to this class during class, after class or during the office hours.

Software: R is the preferred software package for this class.

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
Assignments	10%
Completion of CFA Institute Online Ethics course	5%
Participation	5%
Midterm	40%
Final exam	40%

Class policy

No late homework will be accepted.

Re-grades: If you dispute the grade received for an assignment, you must submit, in writing, your detailed and clearly stated argument for what you believe is incorrect and why. This must be submitted by the beginning of the next class after the assignment was returned. Requests for re-grade after the beginning of class will not be accepted. A written response will be provided by the next class indicating your final score. Be aware that requests of re-grade of a specific problem can result in a regrading of the entire assignment. This re-grade and written response is final; no additional re-grades or debate for that assignment.

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

	Topic	Readings	Assignment
8/29	Introduction to R, forecasting and goodness of fit. Returns	Tsay 1 QRM 3	
9/5	Autoregressive and moving average models	Tsay 2.1-2.5 QRM 4.1	
9/12	ARMA models, autocorrelation & forecasting.	Tsay 2.6 QRM, 4.1	
9/19	Unit root test. Seasonality and models with time series errors	Tsay 2.6-2.8 QRM, 4.1	
9/26	Volatility modeling: ARCH & GARCH	Tsay 2.9, 3.1-3.5 QRM 4.2	
10/3	Alternative GARCH models	Tsay 3.6-3.13	
10/10	High frequency data analysis	Tsay 5	
10/17 Midterm	Value at Risk and economic capital	Tsay, 7 QRM, 2.1, 2.3.1-2.3.4	
10/24	Value at Risk & extreme value theory	Tsay 7 QRM 5.1-5.2 (optional)	
10/31	Market risk	QRM 9.2	
11/7	Credit risk	QRM 10.1	
11/14	Credit risk	QRM 10.2	
11/28	Operational risk	QRM 13.1	
12/5	Enterprise wide risk	QRM 8.4-8.5 Nocco and Stulz, "Enterprise Risk Management: Theory and Practice."	