Syllabus for Financial Data Analysis

Zongye Huang and Zheng Tian

Spring semester, 2017

1 Basic information

Time and location

Odd weeks	Monday	13:30 – 15:20	Mingbian Building (明辨楼) 511
	Tuesday	15:40 – 17:30	Buoxue Building (博学楼) 316
Even weeks	Tuesday	15:40 – 17:30	Buoxue Building (博学楼) 316

Instructor information

Name:	Zongye Huang (黄宗晔)	Zheng Tian (田峥)
Email:	zongyeh@163.com	ztian_cueb@163.com
Office:	Chengming Building (诚明楼) 215	Angong Building (安工楼) 215
Tel:	8395-1643	8395-1054

Office hours

Office hours are tentatively scheduled as follows,

- **TODO** Add Zongye's office hour here

Zongye Huang				
Zheng Tian	Tuesday	9:30 am – 11:30 am	Friday	9:30 am – 11:30 am

You are welcomed to stop by our offices at any other time. But making an appointment by email or phone in advance is highly recommended.

2 Course description

Financial data analysis is a required upper-division course for undergraduate students majored in financial economics. In this course, we introduce basic econometric methods applied to financial data, with the following goals: (1) familiarizing students with the features of financial data, (2) equipping students with econometric models to analyze the trend of financial time series and make prediction, and (3) enabling students to implement these techniques using computer software, primarily R programming language.

This course weighs equally on both theoretical and practical learning. As for theories regarding financial time series, we will learn such topics as linear time series models for stationary series, such as AR, MA, ARMA, and for unit-root non-stationary series; volatility analysis, for example,

ARCH, GARCH models; and risk analysis, primarily VaR. Practical learning involves using R to read, manipulate, and analyze financial data with real applications.

3 Textbooks

- Analysis of Financial Time Series, 3rd Edition, by Ruey S. Tsay. (金融时间序列分析) https://www.amazon.cn/dp/0470414359/ref=sr_1_fkmr0_2?ie=UTF8&qid=1486067026&sr=8-2-fkmr0&keywords=Analysis+of+Financial+Time+Series%2C+3rd+Edition%2C+by+Ruey+S.+Tsay
- An Introduction to Analysis of Financial Data with R, 1st Edition, by Ruey S. Tsay (金融数据分析导论:基于R语言) https://www.amazon.cn/An-Introduction-to-Analysis-of-Financial-Data dp/0470890819/ref=pd_sim_14_1?ie=UTF8&psc=1&refRID=PD43V5MGW9BPSD9TSWWH

4 Course materials

Lecture notes

Lecture notes will contain all contents to be taught in class, which are the basis for homework and exams. Previewing and reviewing them will be greatly helpful for learning this course besides reading textbooks. All lecture notes will be uploaded online and sent by email before each session. Please give us your accessible email address as soon as possible.

Data

We will use large amounts of financial data. All data sets will be maintained in Baidu Cloud (or GitHub) from which you can download.

Software

R is the primary software we will use to analyze financial data. You can download (or update to the latest version of) R at https://mirrors.tuna.tsinghua.edu.cn/CRAN/. RStudio is the GUI (graphic user interface) of R. We will use it to edit R code and write empirical reports. Download it at https://www.rstudio.com/products/rstudio/download/.

GitHub is a platform for maintaining projects and collaborating with team members. Basic knowledge about GitHub and Git (a version control system) is necessary. In this semester, we are planning to use GitHub to manage and submit course projects. Please first register a free account at https://github.com/. A short tutorial is available upon finishing registration. A complete tutorial for Git and GitHub will be offered in class. If you are interested, try to install Git according to this instruction https://git-scm.com/book/en/v2/Getting-Started-Installing-Git.

5 Course assignments

Homework

- Homework helps students understand fundamentals theoretical models and practice programming skills.
- You can finish your homework by either handwriting or typesetting using word process software, e.g., Microsoft Word, LaTeX, and the like. Typesetting rather than handwriting is highly recommended.
- Homework must be submitted on the due day that will be announced in class. A grace period for late submission can be granted by request in advance. If granted, you must turn in your homework within one week after the due day. Late submission of homework is subject to reducing score to a lower level. No submission at all will result in no score on homework.

Course project

Course projects help student train research and writing skills as well as team working spirit. You can choose any topic and use any data set that are related to this course to complete a mini research project.

Course projects can be carried out individually or by study group, the latter of which is preferred. An explanation of study group is in the next subsection.

The final product of the project include: (1) a research report, (2) data and code used in the project, and (3) a documentation written in R Markdown that can be used to reproduce your results. Complete explanations regarding research reports and documentation will be given in class.

The requirements for group working

Admittedly, some questions in homework may be difficult and completing a whole set of homework may be time consuming. Therefore, we allow you to form study groups to do homework. Sharing knowledge and helping fellow students are meritorious, and the spirit of team working is desirable in many careers.

The formation of study groups is totally voluntary. The size of each group should not exceed four students, and each student should only join one group. Please send us the information of your study group no later than March 6th.

High resemblance of completed homework within each group is permitted. However, homework that is highly alike between groups will be treated as shirking, resulting in lower scores for all persons involved.

Study groups are also course project groups. We want you to learn how to collaborate with teammates not only mentally but also practically. GitHub Classroom is a good platform to practice teamwork, at which you can work on the same file simultaneously and see the contribution of each team member. (shirking is easily spotted there!)

Exams

- The mid-term exam
  - The mid-term exam is tentatively scheduled in Week 8, which will cover all contents that Prof. Huang teaches.
  - It will be a closed-book test. But you are allowed to bring a one-sided "cheat sheet", on which you can write down some notes that help you remember some important definitions and formulae. You are allowed to write on only one side on the cheat sheet.
  - If you miss the mid-term exam, a make-up test can be arranged. You must notify me of your absence in advance with a valid excuse.
- The final exam
  - The final exam is in Week 17, covering all content that Prof. Tian teaches.
  - It will also be a closed-book, and a one-side cheat sheet will be allowed.
  - The time and location are to be arranged and announced by the university.
  - The make-up test will follow the rule of the university.

Grade distribution

Assignments	Scores
Homework	20
Course project	20
Midterm exam	30
Final exam	30
total	100

6 Course outline

The following table is a tentative schedule for this course. Change will be made contingent on actual progress.

Instructors	Topics	Time
Zongye Huang	Introduction to financial data	Weeks 1 to 2
	Stationary time series	Weeks 3 to 5
	Nonstationary time series	Weeks 6 to 7
	Midterm exam	Week 8
Zheng Tian	Conditional heteroskedastic models	Weeks 9 to 12
	Value at Risk	Weeks 13 to 15
	Review and Q&A	Week 16
	Final exam	Week 17

7 Policy on academic dishonesty

Academic dishonesty is defined to include but is not limited to the following: plagiarism; cheating and dishonest practices in connection with examinations, papers and projects; forgery, misrep-

resentation and fraud. Such behavior will not be tolerated and will be handled according to university guidelines.