Economics 457: Financial Econometrics

Lecture: Monday/Wednesday 4:00PM-5:30PM in Lorch 173.
Office hours: Monday after class.
First Day of Class: Wednesday, January 4.
Last Day of Class: Monday, April 17.
Email: lkilian@umich.edu.

Requirements:
The course covers topics in time series analysis with an emphasis on applications rather than statistical theory. The aim of the course is to equip students with a working knowledge of important econometric techniques used in macroeconomics, international finance, and financial economics. Substantial emphasis will be placed on the development of programming skills in MATLAB (a matrix algebra program). Regression analysis will be conducted primarily in matrix notation.

This is not a finance course; I will not teach you how to succeed as a trader. Rather the emphasis is on understanding and learning how to apply the econometric tools used by academics and practitioners working in financial economics and related fields. The course will be helpful for anyone interested in pursuing a graduate degree in a quantitative field, but equally helpful for students interested in working at research institutions or financial institutions. Rather than focus narrowly on the application of econometric tools in finance, I will try to convey a deeper understanding of the most important tools used in applied time series analysis, their proper use and their limitations, illustrated by applications to questions considered in finance.

Students taking Econ 457 are expected to have completed Econ 453. They must have completed or take concurrently Econ 454 (or equivalently Econ 503/504 for MAE students). If (and only if) Econ 453 and/or 454 is not offered, Econ 451 and/or 452 will be treated as a substitute. Students having passed Stats 426 may obtain permission of the instructor to take Econ 457 on a case by case basis. I will take for granted a thorough understanding of the material taught in Econ 453. Unlike in Econ 454, my focus will be on time series analysis, making Econ 454 and Econ 457 complementary. In addition, I will take for granted a good understanding of matrix algebra and calculus. The mathematical prerequisites are Calc I-III.

MAE students must consult me and obtain my permission prior to enrolling in 457. Past experience has shown that unless MAE students have A grades in 503/504 and the required background in linear algebra, differential calculus and algebra, this course will be a challenge.

Grading:
There will be no midterm or final exams in this course. Course grades for Economics 407 will be based on a course paper (33%) and regular homework assignments (66%). This may not sound like much, but this course is quite work-intensive and will involve long hours at the computer.
You should anticipate that this course is likely to be the most time-demanding course you will experience as an undergraduate. If you do not have the time to give this course your full attention, you should take the course at some other time.

The problem set questions typically consist of programming exercises in the matrix algebra software MATLAB and questions that test your understanding of the material. They may be prepared in groups of up to three students, but must be written up and handed in individually. Everyone is responsible for writing their own code. A hardcopy of your Matlab code must be included along with the answers.

Please indicate the other group members, as applicable, and include all of the code along with your written interpretation of the results. Problem sets will be graded on a scale of $\sqrt{+}$, $\sqrt{\checkmark}$, $\sqrt{-}$, and fail. These grades will be converted to numerical grades. Make sure to include all MATLAB code for the assignment. The problem set answers should be presented in the same manner as one would in a professional setting. All problem sets must be submitted in class (or under my office door by the end of class) on the due date. All problem sets must be stapled. Electronic submissions are not acceptable. There will be no extensions.

All problem sets for this course must be coded in MATLAB. There are no exceptions. One of the aims of this course is to make you proficient in MATLAB programming, so you can tackle new challenges on your own. MATLAB is used extensively among practitioners and among researchers and is indispensable for your career whether you plan to go to Wall Street, the Federal Reserve Board, or a research institution. It might not be the only software you will have to master, but it will be the most useful and versatile software. All students have virtual access to MATLAB from any Macintosh or Windows computer with an Internet connection. Alternatively, you may access MATLAB from one of the university computing centers.

The term project involves identifying an econometric technique and applying it to financial or macroeconomic time series. You will write MATLAB code implementing this technique. The code should be well documented and accompanied by a readme-file with instructions, by a description of how this technique works and what it accomplishes, and an empirical application to actual data. The empirical application may replicate some findings in the literature, but it has to be of substantive interest. The empirical analysis should be concisely written and clearly spell out the question of interest and the findings. You may also substitute a methodological question for the empirical application. All topics are subject to my approval.

The course paper should not normally exceed about 10 pages in length. The format of the papers should adhere to the standards required for submission to an academic journal (including a separate title page with an abstract summarizing the paper; a complete list of references; a list of data sources). The presentation should be explicit enough for a classmate to be able to replicate all results. Data sources must be documented and modeling choices should be defended. You should clearly explain what the research question is, why the question is interesting, and what you have learned. You may find it useful to consult my homepage for examples of the format of unpublished papers. A short, but polished paper is vastly preferred to a longer, but shoddy one. Papers must not be co-authored. You may not use the same paper to satisfy requirements for multiple courses. The papers are due on April 23 at 12:00 noon without fail. Please drop them off
at my office. Electronic submissions are not acceptable. All Matlab code used for the paper should be included in a separate appendix (not included in the page count).
Readings:
Upon reviewing possible choices for textbooks, I discovered that no book adequately covers the material I have in mind. Hence, I will draw selectively on various sources, depending on the topic. The discussion of the vector autoregressive model will follow chapters 1-7 of Lütkepohl (2005, also available as a paperback). This book is helpful when it comes to coding the vector autoregressive model because it provides detailed instructions and numerical examples. It also contains a useful review of matrix algebra in the appendix.


Since this book is available online in pdf-format from mirlyn, you are not required to purchase a copy, but if anyone plans on using time series econometrics as a graduate student or as a practitioner, this book is a good investment.

An earlier version of this book (also available as a paperback) will do just as well for this course and may be less expensive:

In addition, I will make use of the book:

Chapters may be downloaded from: http://www-personal.umich.edu/~lkilian/book.html

Finally, I will make extensive use of my lecture notes in class. A pdf copy of my lecture notes will be posted on ctools. The coursepack is required. You may download or print the notes from ctools. I will also ask Dollarbill (on Church Street near the intersection with South University) to prepare bound copies for your convenience. You will be expected to bring those lecture notes to class.

*   *   *   *

The list below contains additional textbooks and monographs that you may find useful for this class. I will not follow any one book closely.

Financial Econometrics:


**Time Series Econometrics:**


**Unit Roots and Cointegration:**


**Forecasting:**


**Applications in International Finance:**


**Econometrics Background:**


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