Economics 407: Financial Econometrics

Lutz Kilian
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Lecture: Monday/Wednesday 4:00PM-5:30PM in Lorch 173.
Office hours: Monday after class.
First Day of Class: Wednesday, January 8.
Last Day of Class: Monday, April 21.
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 or how to make money. Rather the emphasis is on understanding and learning how to apply the econometric tools used by academics and practitioners working in these areas. 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.

Students taking 407 are expected to have completed 405. They must have completed or take concurrently 406 (or equivalently 503/504). I will take for granted a thorough understanding of the material taught in 405. Unlike in 406, my focus will be on time series analysis, making 406 and 407 somewhat complementary. In addition, I will take for granted a good understanding of matrix algebra and calculus. If you are not familiar with matrix algebra, I recommend that you delay taking 407 until you have completed a course in matrix algebra. 435 is not required for 407, but may be helpful. The same goes for 402, 442, and related macroeconomic courses.

MAE students must consult me prior to enrolling in 407. Past experience has shown that unless you have A grades in 503/504 and the required background in linear algebra, differential calculus and algebra, this course is not for you.

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 in the computer lab. 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 will 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. 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 $\sqrt{+}, \sqrt{\cdot}, \sqrt{-}$, and fail. Make sure to include all MATLAB code for the assignment. All problem sets must be submitted in class (or under my office door) by the end of class on the due date. 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 by April 28 at 9:00AM 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).

I will probably be out of town for a conference on January 27-29. In the interest of frontloading the material, so you can get started early with the term paper, I plan to have make-up classes on
January 13 and January 15 from 5:30PM-7:00PM after our regular class. The details still have to be confirmed.
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:

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:**
Table of Contents

Part 1: Basic Regression Analysis
1. Introduction to MATLAB ................................................................. 3
  1.1. MATLAB as a language ............................................................... 3
  1.2. Basics ...................................................................................... 3
  1.3. Script Files and Function Files .................................................. 4
  1.4. File Management Inside MATLAB .............................................. 5
  1.5. Variables .................................................................................. 5
  1.6. Loading and Saving Data ............................................................ 7
  1.7. Mathematical Operators ............................................................ 8
  1.8. Pausing and Terminating Programs ............................................ 10
  1.9. Using Logical Statements and Writing Loops .............................. 10
  1.10. Random Number Generators and Distributions ....................... 12
  1.11. Some Useful Functions for Generating Descriptive Statistics ...... 13
  1.12. The Basics of Plotting Data in MATLAB ................................. 14
  1.13. Data Sources for Economic Time Series .................................. 16
  1.14. Check Your Data ................................................................... 18
  1.15. Simple Data Transformations ................................................... 18
2. The Notion of Repeated Sampling .................................................. 20
  2.1. The i.i.d. Model ...................................................................... 20
  2.2. Random Number Generators and Seeds ................................... 20
  2.3. Drawing from a Pre-Specified Distribution ............................... 21
  2.4. From Histograms to Kernel Density Estimates ......................... 22
3. The Basic Linear Regression Model with i.i.d. Errors in Matrix Notation ........................................ 26
  3.1. From the i.i.d. Model to the Linear Regression Model ................ 26
  3.2. The Same Model in Matrix Notation ......................................... 28
  3.3. Assumptions .......................................................................... 28
  3.4. Estimating the Regression Parameters by Ordinary Least Squares .................................................................................................................. 30
    3.4.1. Loss Functions and Curve Fitting ....................................... 30
    3.4.2. The OLS Estimator of $\beta$ in the Basic Linear Regression Model .................................................. 33
    3.4.3. Regression Fit and Prediction ............................................ 34
    3.4.4. Statistical Properties of $\hat{\beta}$ .......................................... 36
    3.4.5. Statistical Properties of $\hat{\sigma}^2$ ......................................... 38
    3.4.6. Asymptotic Normality of the OLS Estimator ...................... 39
    3.4.7. Regression t-tests, Confidence Intervals and $p$-Values .......... 40
    3.4.8. Economic Versus Statistical Significance ......................... 42
  3.5. The MLE of the Basic Linear Regression Model ......................... 43
    3.5.1. The Idea Behind Maximum Likelihood Estimation ............ 43
    3.5.2. Closed-Form MLE for the Basic Linear Regression Model .... 46
    3.5.3. Asymptotic Properties of the MLE .................................... 49
  3.6. Inference on Transformations of Regression Parameters ............. 49
    3.6.1. The Taylor Series Expansion .......................................... 49
    3.6.2. The Delta Method ............................................................ 51
    3.6.3. The Wald Test ............................................................... 51
    3.6.4. Testing Restrictions on the Regression Model with Wald and $t$-Tests .................................................. 52
    3.6.5. One-Sided versus Two-Sided Tests ................................. 55
4. MLE by Numerical Methods in the i.i.d. Case ................................. 56
  4.1. Numerical Optimization in MATLAB ......................................... 56
  4.2. Alternative Approaches to Numerical Optimization .................. 57
Part 2: Univariate Time Series Models

5. Basic Concepts in Time Series Analysis
   5.1. The Origins of Time Series Econometrics in Business Cycle Theory 
   5.1.1. Periodic Cycles? 
   5.1.2. Irregular Cycles 
   5.2. Stochastic Processes 
   5.2.1. Stationarity 
   5.2.2. Ergodicity 
   5.3. White Noise 
   5.4. The Wold Representation Theorem

6. Approximating the Wold Representation
   6.1. MA(q) Models
   6.2. AR(p) Models
   6.3. Impulse Response Functions
   6.4. ARMA(p,q) Models

7. Data Transformations
   7.1. Time-Varying Variances
   7.2. Time-Varying Means
   7.2.1. Deterministic Detrending
   7.2.2. Log-Differencing
   7.2.3. The Hodrick-Prescott (HP) Filter
   7.2.4. Other Forms of Detrending
   7.3. Seasonality
   7.3.1. Seasonal Dummies
   7.3.2. Seasonal Differencing
   7.3.3. Other Forms of Seasonal Adjustment
   7.3.4. Seasonality in High-Frequency Financial Data
   7.4. The Danger of Applying the Wrong Transformation to Economic Time Series

   8.1. OLS Estimator and Conditional MLE of AR Models
   8.2. Numerical MLE of MA and ARMA Models

9. Nonparametric Analysis of Time Series

10. Measuring Volatility
   10.1. ARCH Models
   10.1. GARCH Models
   10.3. The ARCH-in-Mean Model
   10.4. Other Models of Conditional Heteroskedasticity

11. Measuring Risk
   11.1. Forecasting in the Standard GARCH Model
   11.2. Value at Risk
   11.3. Other Risk Measures

12. What if the Regression Errors are not i.i.d.? Robust Regression Standard Errors
   12.1. Regression Error Heteroskedastic, but Serially Uncorrelated
   12.2. Regression Error Serially Correlated and Heteroskedastic of Unknown Form

Part 3: Multivariate Time Series Models

13. Estimating Reduced-Form Vector Autoregressions
   13.1. From Structural to Reduced-Form Models
   13.2. Multivariate LS Estimation of VAR Models
   13.3. Cross-Sectional Aggregation of Time Series Models

14. AR and VAR Lag Order Selection
Part 4: Forecasting
16. Univariate Forecasting ................................................................. 143
   16.1. The Bias-Variance Trade-Off ................................................... 144
   16.2. The Role of Trends ................................................................. 145
   16.3. The Role of Forecast Uncertainty ............................................. 145
   16.4. Forecasting Model Selection .................................................... 146
       16.4.1. Recursive Pseudo Forecasts ............................................. 147
       16.4.2. Rolling Pseudo Forecasts ............................................... 148
   16.5. Real-Time Data versus Ex-Post Revised Data .......................... 149
   16.6. Forecast Efficiency Tests ...................................................... 149
17. Univariate Forecasting with Large Cross-Sections .......................... 151
   17.1. Shrinkage Methods .............................................................. 151
   17.2. Model Averaging ................................................................. 153
   17.3. Approximate Factor Models .................................................. 154
18. Predictability Tests ................................................................. 157
20. Direction-of-Change Tests ......................................................... 159
21. Data Mining .............................................................................. 160
   21.2. What is Data Mining? ............................................................ 160
   21.2. Cures for Data Mining .......................................................... 161

Part 5: Unit Roots, Spurious Regressions and Cointegration
22. Testing the Unit Root Hypothesis .................................................. 164
   22.1. The Dickey-Fuller (DF) Test .................................................... 165
   22.2. The Augmented Dickey-Fuller (ADF) Test ............................... 166
   22.3. Other Unit Root Tests ........................................................... 168
23. Spurious Regressions ................................................................. 169
24. Cointegration ............................................................................. 171
   24.1. Cointegration Tests ............................................................... 172
       24.1.1. Known Cointegrating Vector ............................................. 173
       24.1.2. Unknown Cointegrating Vector ......................................... 173
   24.2. Implications of Cointegration for VAR Models ......................... 174
   24.3. Pitfalls in Interpreting VEC Model Estimates ........................... 175
Part 6: Bootstrapping

25. Bootstrapping Time Series Models ................................................................. 178
   25.1 What is Bootstrapping? ................................................................. 178
       25.1.1. Motivation ................................................................. 178
       25.1.2. The Bootstrap Analogy: An Illustrative Example .................... 179
   25.2. A Primer on Bootstrap Techniques for Linear Regression Models .......... 183
       25.2.1. Bootstrapping i.i.d. Observations ........................................ 183
       25.2.2. Bootstrapping in the Fixed Regressor Model with i.i.d. Innovations ...... 185
       25.2.3. Bootstrapping in the Random Regressor Model with i.i.d. Innovations ... 186
       25.2.4. Bootstrapping in the Dynamic Regressor Model with i.i.d. Innovations ... 187
       25.2.5. Bootstrapping if the Assumption of i.i.d. Innovations is Violated .......... 189
           Heteroskedasticity in the Innovations ........................................ 189
           Serial Correlation in the Innovations ........................................ 190
   25.3. Uses of the Bootstrap Approximation .............................................. 194
       25.3.1. A Selective Review of Two-Sided Bootstrap Confidence Intervals ..... 195
       25.3.2. Which Interval Should We Use? ........................................ 197
       25.3.3. Bootstrap Confidence Intervals for VAR Impulse Responses ........... 198
       25.3.4. Bootstrap Approximations and Near Unit Roots ..................... 199
       25.3.5. Bootstrap Confidence Intervals in the Presence of Unit Roots .......... 201
       25.3.6. Bootstrap Critical Values for ADF Tests ................................. 203

Appendix 1: Advice on Writing the Research Paper ........................................... 205

Appendix 2: Examples of Ideas for Paper Topics .............................................. 207