

SYLLABUS

Econ M524: *Financial Econometrics* (Fall, 2022)

Time / Location: Tuesday, Thursday, 9:45-11am, Wiley Hall 329

Instructor: Ke-Li Xu, Professor of Economics

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Office Hours: By email appointment

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Overview

This is a second-year course in econometrics (focusing on financial econometrics) for MS students in economics. This course will be useful to students who want to get a solid understanding of the state-of-the-art statistical tools required to analyze and model economic time series data and financial asset prices. The link between new statistical models and implementation is emphasized throughout.

Topics are selected to cover the models which are commonly used in recent empirical finance literature. Some of these models require econometric analysis which may be highly non-trivial. These models include predictive regression, long-horizon predictions, out-of-sample analysis, models with cross-section returns, and more recent topics such as machine learning methods (LASSO, regression trees, dimension reduction methods, factor models, etc.) with applications in empirical asset pricing.

For each topic, we will first develop a good understanding of why certain econometric method works (or does not work) in certain situations, and provide heuristics why sometime new (and more complicated) methods are necessary. Statistical software (MATLAB) will then be used to apply these techniques to real data, mostly taken from recent publications from major journals in finance and econometrics.

The course will be mainly based on my lecture notes (slides). Relevant textbooks and journal articles are given below. Announcements, assignments, program codes, data and lecture notes will be all posted on Canvas. Please check the site regularly.

Prerequisites

One semester graduate course in econometrics (linear regression, hypothesis testing, basic time series analysis). As a refresher of time series analysis, the first three chapters in R.S. Tsay, 2010, *Analysis of Financial Time Series* (John Wiley, 2010), 3rd edition, would be helpful.

Texts and Reading Materials

I will write lecture notes for each topic, and also provide program codes for each numerical analysis done in the class. Since most topics covered are quite recent, there is no single textbook serving this purpose.

Below I provide a list of monographs and journal articles which are relevant for this class.

The following list just provides sources where I draw materials. The list also offers further readings if you are interested in a particular topic or intend to pursue a career in doing research in econometrics or empirical finance. However, reading any of them is not required for this class (e.g. assignments or exams) as long as you are comfortable with lecture notes and data examples I covered in the class.

1. Predictive Regression

- Amihud, Hurvich, and Wang (2009). "Multiple-Predictor Regressions: Hypothesis Testing." *Review of Financial Studies*.
- Chiquoine, and Hjalmarsen (2009). "Jackknifing Stock Return Predictions", *Journal of Empirical Finance*.
- Efron (1993). *An Introduction to Bootstrap*. Chapman & Hall/CRC.
- Golez and Koudijs (2018). "Four Centuries of Return Predictability." *Journal of Financial Economics*.
- Jiang, Lee, Martin and Zhou (2019). "Manager Sentiment and Stock Returns." *Journal of Financial Economics*.
- Phillips (2015). "Pitfalls and Possibilities in Predictive Regression." *Journal of Financial Econometrics*.
- Rapach, Ringgenberg and Zhou (2016). "Short Interest and Aggregate Stock Returns." *Journal of Financial Economics*.
- Rapach, Strauss and Zhou (2013). "International Stock Return Predictability: What is the Role of the United States." *Journal of Finance*.
- Stambaugh (1999). "Predictive Regressions." *Journal of Financial Economics*.

2. Predictability at Long Horizons

- Boudoukh, Richardson, and Whitelaw (2008). "The Myth of Long-horizon Predictability." *Review of Financial Studies*.
- Cochrane (2008). "The Dog that Did Not Bark: A Defense of Return Predictability." *Review of Financial Studies*.
- Hodrick (1992). "Dividend Yields and Expected Stock Returns: Alternative Procedures for Inference and Measurement." *Review of Financial Studies*.
- Lazarus, Lewis, Stock and Watson (2018). "HAR Inference: Recommendations for Practice." *Journal of Business & Economic Statistics*.
- Müller (2014). "HAC Corrections for Strongly Autocorrelated Time Series." *Journal of Business & Economic Statistics*, together with Comments and Rejoinder.

3. Out-of-Sample Prediction

- Clark and McCracken (2013). "Advances in Forecast Evaluation". *Handbook of Economic Forecasting*. Volume 2. Elsevier.
- Campbell and Thompson (2008). "Predicting Excess Stock Returns Out of Sample: Can Anything Beat the Historical Average?" *Review of Financial Studies*.
- Welch and Goyal (2008). "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction." *Review of Financial Studies*.
- West (2006). "Forecast Evaluation". *Handbook of Economic Forecasting* (Vol. 1), eds. Elliott,

Granger, and Timmerman, Elsevier.

4. Machine Learning in Finance

- Hastie, Tibshirani and Friedman (2008). *The Elements of Statistical Learning*. 2nd Edition. Springer.
- Gu, Kelly and Xiu (2019). "Empirical Asset Pricing via Machine Learning." *Review of Financial Studies*.

5. Cross-Section Returns

- Bali, Engle and Murray (2016). *Empirical Asset Pricing: The Cross-Section of Stock Returns*. Wiley.
- Feng, Giglio and Xiu (2019). "Taming the Factor Zoo: A Test of New Factors." *Journal of Finance*.
- Jagannathan, Skoulakis and Wang (2010). "The Analysis of the Cross-Section of Security Returns." *Handbook of Financial Econometrics*, Vol 2, Elsevier.
- Raponi, Robotti and Zaffaroni (2019). "Testing Beta-Pricing Models Using Large Cross-Sections." *Review of Financial Studies*.

Software

If you don't have MATLAB installed on your laptop, you can go to following sites to use MATLAB online (IU username and password needed):

IUanyWARE (Windows)

<https://iuanyware.iu.edu>

Research Desktop (Linux)

<https://red.uits.iu.edu>

<https://kb.iu.edu/d/apum>

A useful MATLAB econometrics toolbox is developed by James P. LeSage. The package can be downloaded from <https://www.spatial-econometrics.com/>. After downloading the zipped folder (jplv7.zip), extract it and save it under your MATLAB working directory. Then you need to add it to your MATLAB search path (Set Path->Add with Subfolders) so that you can call any function in the package (e.g. the useful ones are `ols.m`, `hwhite.m` and `garchpq.m`). There are also many MATLAB packages which you can find online or are shared with researchers.

Problem Sets and Exams

Assignments (35%), Exam 1 (20%, in class), Exam 2 (20%, in class), Presentation & project (25%).

Every two weeks or so we will have a computing session (lab session). Students will bring their own laptops to work on an assignment, which is posted 30 minutes before the session. Students should make good use of the class time to get started on the assignment, through discussions with classmates and the instructor. You don't have to finish the assignment by the end of the session, but must submit the assignment electronically by the end of the day (by midnight). Late assignments will not receive credit

(with exceptions approved by the instructor). Students are encouraged to discuss homework with each other, but must write up solutions on their own.

Students are asked to work on an empirical project. The topic and the data are your choice. You can obtain data from online sources or journal publications. Nowadays many major journals in economics and finance publish the data used in the articles. In the empirical project, you should use econometric methods which are relevant to this class. The project should include the following parts: the research question, the model, the estimation and inference methods, and the conclusion. Programming codes should be also attached. There's no page limit for the written project. The project will be evaluated based on clarity and appropriate use of econometric methods. Longer reports do not necessarily get higher points.

Important Dates

Aug 23 (Tuesday): First class.

Exam 1: Oct 11 (Tuesday)

Thanksgivings Break: Nov 20-27, No classes

Exam 2: Nov 29 (Tuesday)

Presentations: Dec 1 (Thursday), Dec 6 (Tuesday) and Dec 8 (Thursday).

Written report of the project due: Dec 14 (Wednesday)