ECONOMETRICS III:
FINANCIAL ECONOMETRICS
(Last updated May 2, 2007)

The course will cover several topics on Financial Econometrics and Empirical Finance, although the focus is mostly on time series-based methods applied to finance. Given the format of the class, I hope you will find some of the topics interesting, and some of them totally irrelevant/uninteresting. This is unavoidable: I pretend to give a general overview of quite a few advanced methodologies used in applied data analysis for macroeconomics and finance. These should be of use to those of you that are planning on moving into research, for it might help you narrow down the range of possible techniques/issues that you would like to work on in the near future. For those that want to move into the non-academic world, it will definitely give you increased technical sophistication in the analysis of real data, and hopefully it will help you see the more applied side of econometrics. We may have some tutorial sessions on using Eviews, the program that best fits the requirements of the analysis of financial time series.

Course grades will be based on a final exam (50%), and a number of problem sets (50%).

CHAPTERS
(The topics marked with an asterisk may not be covered due to time constraints)

I. Review of some basic concepts on Time Series Analysis

II. Estimation Principles and Related Issues
   1 Estimation Principles
      1.1 Method of Moments
      1.2 Maximum Likelihood Estimation
      1.3 The Kalman Filter and MLE
      1.4 QML Estimation
      1.5 Indirect Inference
   2 Resampling Methods
      2.1 The Bootstrap
      2.2 The Jackknife
   3 Numerical Optimization (*)
      3.1 Direct Search
      3.2 Gradient Methods

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1 Although I hope that there will be some discrepancy about which are uninteresting!
2 Even so, I have had to skip a few classic topics because of time constraints. Especially relevant among these are event studies, cross-section tests of asset pricing models and market microstructure. The book by Campbell, Lo and Mackinlay in the reading list contains a whole chapter on each of these topics, but I will do a quick review of the first two in one of the chapters.
III. General Features of Financial Time Series and Tests of the Random Walk Hypothesis

1 The Behavior of Financial Time Series
   1.1 Independence
   1.2 Skewness and Kurtosis
   1.3 Tests for Normality
   1.4 Stable Distributions and Existence of Moments
   1.5 Mixtures of Distributions

2 Tests of the Random Walk Hypothesis
   2.1 Autocorrelation and Portmanteau Tests
   2.2 Variance Ratio Tests
   2.3 Unit Root Tests
   2.4 Other Tests
   2.5 Are there cycles in the stock market?

IV. Volatility and Financial Time Series

1 Stylized Facts of Financial Time Series Volatility
2 ARCH Models
   2.1 ARCH
   2.2 Estimation
   2.3 Testing for ARCH
   2.4 GARCH
   2.5 Forecasting with ARCH Models
   2.6 Extensions
3 Volatility in Levels
4 Stochastic Volatility
5 Long Memory in Mean and Volatility (*)
   5.1 ARFIMA Models
   5.2 FIGARCH Models
   5.3 Tests for Long Memory

V. A quick look at the empirical analysis of the main Valuation Models

1 Testing the CAPM
2 Testing the APT and other valuation models
3. Risk or characteristics?
4. Anomalies
5 Event studies

VI. Nonparametric Methods

1 Estimation of Density Functions
   1.1 Simple Histogram Estimation
   1.2 The Rosenblatt-Parzen Estimator
2 Estimation of Conditional Moments and Derivatives
   2.1 Nonparametric Regression: The Nadaraya-Watson Estimator
   2.2 Nonparametric Regression: Local Linear Regression
   2.3 Nonparametric Regression: Series Methods
   2.4 Estimation of Higher Order Moments (*)
   2.5 Estimation of Derivatives of Functions (*)
3 Choosing the Window Width and the Kernel
3.1 The Choice of Window Width
3.2 The Choice of Kernel
4 Nonparametric Regression for Time Series (*)

VII. Special Topics in Time Series Analysis (*)
1 Nonlinearity
   1.1 Stylized Facts
   1.2 Tests for Nonlinearity
2 Regime-Switching Models
   2.1 Switching Regressions
   2.2 Regime-Switching in Mean: Hamilton's Model
   2.3 SWARCH
   2.4 Estimation of Regime-Switching Models
   2.5 How Many Regimes?
3 Threshold Models
   3.1 TAR and SETAR Models
   3.2 TARCH and QTARCH
   3.3 Estimation of Threshold Models
   3.4 Tests for Threshold Effects
4 Other Nonlinear Models
   4.1 Bilinear Models
   4.2 Other Nonlinear Specifications
5 Estimation of Endogenous Breakpoints
   5.1 Known Breakpoints (Structural Change)
   5.2 Endogenous Breakpoints
6 State-Space Models and the Estimation of Unobservables
   6.1 The State-Space Representation
   6.2 The Kalman Filter
   6.3 Other Methods for Estimation of Unobservables
7 Markov-Chain Monte Carlo Methods
   7.1 MCMC applied to outlier detection

REFERENCES

A) BOOKS. You may find some of the following books useful for the sessions:

  An easy, introductory book, that also contains directions on carrying out analysis with Eviews and RATS.

  This book is a must for anyone pretending to do research with financial data. It has become the reference book for any course similar to the first part of ours.

A clear and very well written manual on both theory and empirical asset pricing. Its use of GMM is especially intense and enlightening.

- Gourieroux, C. and J. Jasiak, [2002]: *Financial Econometrics*. Princeton University Press. Gourieroux tends to be a little too technical, but his knowledge of econometrics is so broad that anything he writes is worth at least taking a look at.


- Mills, T., [1999]: *The Econometric Modelling of Financial Time Series*. Cambridge Univ. Press. Not very expensive and comprehensive enough. Some chapters are better written than others, but in general it is accessible and easy to read. Be sure to check the second edition, updated and with a clearer focus on financial data.


- Taylor, S., [1986]: *Modelling Financial Time Series*. John Wiley and Sons: New York. This book was a classic reference for financial time series, though it has been clearly surpassed by Mills and by Campbell, Lo and Mackinlay.

- Tsay, R.S., [2002]: *Analysis of Financial Time Series*. John Wiley and Sons: New York. A recently published book by one of the authors who have contributed the most to nonlinear time series. Quite expensive, but nicely written and very easy to read.

**B) ARTICLES.** This is a very limited list of some of the articles that I will use for my sessions, with the chapter number.


