

**Model selection with applications to finance and macroeconomics**  
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**Course description**

This course examines model selection and other statistical techniques used to model time series data with a special emphasis to applications in finance and macroeconomics. The course has three specific objectives. The first is to equip students with the tools they need for state-of-the-art empirical research in this area. The second objective is to lay out the econometric theory of model selection, with an emphasis on recent developments. The third objective is to analyze selected recent works and their empirical implications.

The course is built so that for each topic the econometric tool is presented first, followed by the relevant empirical applications. Among the topics, the course will cover:

- i) Review of tests for unit roots and applications to efficient tests of stock return predictability both at short and long horizons
- ii) Tests for structural breaks and applications to models of exchange rate dynamics
- iii) Forecasting and structural breaks, and applications to the Term Structure and other financial variables as predictors of future GDP growth and inflation dynamics

## Preliminary reading list and references

- **1. Introduction: An overview of the time series properties of macro and finance data**
  - Description of time series data, model selection, structural breaks and forecasting: a paper that gives an overview of what will be covered in this course
    - *Stock and Watson, "Business Cycle Fluctuations in US Macroeconomic Time Series", in: Taylor, John B.; Woodford, Michael, eds. Handbook of macroeconomics. Volume 1A. Handbooks in Economics, vol. 15. Amsterdam; New York and Oxford: Elsevier Science, North-Holland, 1999; 3-64, available at: <http://www.nber.org/papers/w6528>*
  
- **2. Modeling and inference in persistent time series, with applications to stock return predictability and exchange rates**
  - Econometric theory: Univariate tests for unit roots
    - *chp. 9 H,*
    - *Stock, J.H. (1994), "[Unit Roots, Structural Breaks and Trends](#)", in Engle, R. and D. McFadden, *Handbook of Econometrics, Vol. 4.**
    - *Elliott, G., T. Rothemberg, and J.H. Stock (1996), *Efficient Tests for Unit Roots, Econometrica* (available on JSTOR)*
    - *Stock, J.H. (1991), "[Confidence intervals for the largest autoregressive root in U.S. macroeconomic time series](#)"*
    - *Cavanagh, C. L., G. Elliott and Stock, J. H. (1995): "Inference in Models with nearly Integrated Regressors", *Econometric Theory* 11, 1131-47.*
  - Economic applications: Short and Long Horizon regressions in Finance and Macroeconomics
    - *Campbell, J.Y., and M. Yogo (2006): "Efficient Tests of Stock Return Predictability", *Journal of Financial Economics* 81, 27-60.*
    - *Rossi, B. (2006), "[Expectation Hypotheses Tests at Long Horizons](#)", mimeo*
  - Goal: Learn to test for unit roots and construct confidence intervals for the largest root, implement efficient tests of predictability at both short and long horizons
  
- **3. Structural breaks and model selection in unstable environments**
  - Econometric theory: tests for structural breaks
    - *Andrews, D.W.K. (1993), "Tests for Parameter Instability and Structural Change with Unknown Change Point", *Econometrica* 61, 821-856.*
    - *Bai, J., and P. Perron (1998), *Estimating and Testing Linear Models with Multiple Structural Changes, Econometrica*; 66(1): 47-78*

- Bai, J. (1997), *Estimating Multiple Breaks One at a Time*, *Econometric-Theory*; 13(3): 315-52
- Bai, J. (1996), *Testing for Parameter Constancy in Linear Regressions: An Empirical Distribution Function Approach*, *Econometrica*; 64(3): 597-622
- Rossi, B. (2005), *Optimal tests for nested model selection in the presence of underlying parameter instability*, *Econometric Theory*
- Giacomini and B. Rossi (2006), *Non-nested model selection in unstable environments*, mimeo
- o Economic applications: Empirical evidence on structural breaks and their implications for an forecasting inflation and exchange rates
  - Stock, J.H., and M.W. Watson (1996), [\*Evidence on Structural Instability in Macroeconomic Time Series Relations\*](#), *Journal of Business and Economic Statistics*. January 1996; 14(1): 11-30
  - Estrella, A. and G. A. Hardouvelis (1991), [\*"The Term Structure as a Predictor of Real Economic Activity"\*](#), *The Journal of Finance* 46(2), 555-576.
  - Rossi, B. (2006), *"Are exchange rates really random walks? Some evidence robust to parameter instability"*, *Macroeconomic Dynamics* 10(1), 20-38.
  - Chen, Y., K. Rogoff, and B. Rossi (2007), *"Commodity prices and Exchange Rate Fluctuations"*, mimeo.
- o Goal: Learn how to test for structural breaks, evaluate the power of the term structure as a predictor of real economic activity

#### - 4. Forecasting

- o Econometric theory: tests for equal and absolute predictive ability
  - West, K. (1996), [\*"Asymptotic Inference about Predictive Ability"\*](#), *Econometrica* 64(5), 1067-1084.
  - Chao, J., V. Corradi and N. Swanson (2001), *"An Out-of-sample Test for Granger Causality"*, *Macroeconomic Dynamics*.
  - Clark, T. and M. McCracken (2001), [\*Tests of Equal Forecast Accuracy and Encompassing for Nested Models\*](#), *Journal of Econometrics* 105(1): 85-110
  - Giacomini, R. and H. White (2004), *"Tests of Conditional Predictive Ability"*, mimeo, UCLA and UCSD.
  - Giacomini, R. and B. Rossi (2005), *"Detecting and Predicting Forecast Breakdowns"*, mimeo, UCLA and Duke University
  - A. Timmermann (2005), [\*"Forecast Combinations"\*](#), forthcoming in the *Handbook of Forecasting*
  - G. Elliott (2005), [\*"Forecasting with trending variables"\*](#), forthcoming in the *Handbook of Forecasting*
  - Rossi, B. (2005), *"Testing Out-of-sample Predictive Ability and the Meese-Rogoff Puzzle"*, *International Economic Review* 46(1), 61-92.
- o Economic applications: forecasting inflation and GDP growth by using the term structure and asset prices

- Stock, J. H., and M. W. Watson (2003), "Forecasting Output and Inflation: The Role of Asset Prices", *Journal of Economic Literature* XLI, 788-829.
  - Giacomini, R. and B. Rossi (2006), "[How stable is the forecasting performance of the yield curve for output growth?](#)", *Oxford Bulletin of Economics and Statistics*
  - Clark, T. and M. McCracken (2005), "The Power of Tests of Predictive Ability in the Presence of Structural Breaks", *Journal of Econometrics*. January; 124(1): 1-31
- Goal: Learn how to make and evaluate forecasts and test for equal predictive ability