

## CREI Summer School 2014

### Recent Developments in Forecasting: Estimation and Evaluation

Teacher: Barbara Rossi

This course examines recent advances in forecast estimation and evaluation. The course has three specific objectives. The first is to discuss tools used in state-of-the-art empirical research. The second objective is to lay out their econometric foundations. The third objective is to analyze selected recent works in forecast evaluation, with an emphasis on their empirical implications and analysis. (Asterisks denote papers that will be discussed in class)

## I. METHODS FOR FORECAST EVALUATION

### 1. Tests of Forecast Comparison

- Econometric theory
  - Diebold, F. and R. Mariano (1995), "Comparing Predictive Accuracy," *Journal of Business and Economic Statistics* 13.\*
  - West, K. (1996), "Asymptotic Inference about Predictive Ability," *Econometrica* 64, 1067-1084.\*
  - McCracken, M. (2000), "Robust Out-of-Sample Inference", *Journal of Econometrics* 99, 195-223.
  - West, K. (2006), "Forecast Evaluation", in: Granger, C., G. Elliott and A. Timmermann (eds.), *Handbook of Economic Forecasting* Vol. 1, Elsevier.
- Empirical applications
  - Alquist, R., L. Kilian and R. Vigfusson (2013)\*, "Forecasting the Price of Oil", *Handbook of Economic Forecasting* Vol. 2, forthcoming.\*

### 2. Special issues: nested models, null hypotheses, etc.

- Econometric theory
  - Clark, T. and M. McCracken (2001), "Tests of Equal Forecast Accuracy and Encompassing for Nested Models," *Journal of Econometrics* 105, 85-110.\*
  - Clark, T. and M. McCracken (2011), "Advances in Forecast Evaluation", in: G. Elliott and A. Timmermann (eds.), *Handbook of Economic Forecasting* Vol. 2, forthcoming.
  - Giacomini, R. and H. White (2006), "Tests of Conditional Predictive Ability," *Econometrica* 74(6).\*
  - Clark, T.E. and K.D. West (2006), "Using Out-of-Sample Mean Squared Prediction Errors to Test the Martingale Difference Hypothesis," *Journal of Econometrics* 135, 155-186.\*
  - Clark, T. and M. McCracken (2011), "Nested Forecast Model Comparisons: A New Approach to Testing Equal Accuracy", *mimeo*
- Empirical applications
  - Rossi, B. (2013), "Exchange Rate Predictability", *Journal of Economic Literature*, forthcoming.\*

- Chen, Y.C., K. Rogoff and B. Rossi (2010), “Can Exchange Rates Forecast Commodity Prices?,” *Quarterly Journal of Economics* 125(3).

### 3. Special issues: instabilities and forecast analyses

- Econometric Theory
  - Rossi, B. (2011), “Advances in Forecasting under Model Instabilities”, in: G. Elliott and A. Timmermann (eds.), *Handbook of Economic Forecasting* Vol. 2, forthcoming.\*
  - Giacomini, R. and B. Rossi (2010), “Forecast Comparisons in Unstable Environments,” *Journal of Applied Econometrics* 25(4), April 2010, 595-620.\*
  - Timmermann, A. (2005), “Forecast Combinations”, in: Granger, C., G. Elliott and A. Timmermann (eds.), *Handbook of Forecasting* Vol. 1.\*
  - Inoue, A. and B. Rossi (2012), “Forecast Tests Robust to the Window Size Choice”, *Journal of Business and Economic Statistics*.\*
  - Diebold, F and J. Lopez (1006), "Forecast Evaluation and Combination,” in G.S. Maddala and C.R. Rao (eds.), *Handbook of Statistics*, 241-268, Amsterdam: North-Holland.
  - Andrews, D.W.K. (1993), “Tests for Parameter Instability and Structural Change with Unknown Change Point”, *Econometrica* 61, 821-856.
  - Rossi, B. (2005), “Optimal tests for nested model selection in the presence of underlying parameter instability”, *Econometric Theory*.\*
  - Clark, T. and M. McCracken (2005), “The Power of Tests of Predictive Ability in the Presence of Structural Breaks”, *Journal of Econometrics* 124(1), 1-31.
- Economic applications
  - Stock, J. and M. Watson (1996), “Evidence on Structural Instability in Macroeconomic Time Series Relations”, *Journal of Business and Economic Statistics* 14(1), 11-30.\*
  - Stock, J. and M. Watson (1999), “Business Cycle Fluctuations in US Macroeconomic Time Series”, in *Handbook of Macroeconomics*, Vol. 1.\*
  - Estrella, A. and G. A. Hardouvelis (1991), “The Term Structure as a Predictor of Real Economic Activity”, *Journal of Finance* 46(2), 555-576.
  - 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* 68(s1), 783-795.
  - Rossi, B. and T. Sekhposyan (2010), “Have Models’ Forecasting Performance Changed Over Time, and When?”, *International Journal of Forecasting* 26(4).

### 4. Tests of Absolute Forecasting Performance (or Forecast Optimality Tests)

- Econometric theory

- West, K. and M. McCracken (1998), "Regression-Based Tests of Predictive Ability," *International Economic Review* 39(4), 817-40.\*
- Mincer, J. and V. Zarnowitz (1969), "The Evaluation of Economic Forecasts", in J. Mincer, ed., *Economic Forecasts and Expectations* (New York: National Bureau of Economic Research, pp. 3-46).
- Rossi, B. and T. Sekhposyan (2011), "Forecast Optimality Tests in the Presence of Instabilities", *ERID Working Paper 109*, Duke University.
- Economic applications
  - Romer, Christina D., and David H. Romer (2000), "Federal Reserve Information and the Behavior of Interest Rates," *American Economic Review* 90, no. 3: 429-57.\*
  - Edge, Rochelle and Refet S. Gürkaynak (2010), "How Useful Are Estimated DSGE Model Forecasts for Central Bankers?", *Brookings Papers on Economic Activity*, 209-259.\*

## 5. Predictive Densities

- Econometric Theory
  - Diebold, F., Gunther and Tay (1998), "Evaluating Density Forecasts with Applications to Financial Risk", *International Economic Review* 39(4).\*
  - Amisano, G. and R. Giacomini (2007), "Comparing Density Forecasts via Weighted Likelihood Ratio Tests," *Journal of Business and Economic Statistics* 25, 177-190.\*
  - Rossi, B. and T. Sekhposyan (2012), "Alternative Tests for Correct Specification of Conditional Forecast Densities", *mimeo*.\*
  - Corradi, V. and N. Swanson (2001), "Predictive Density Evaluation", in: Granger, C., G. Elliott and A. Timmermann (eds.), *Handbook of Economic Forecasting* Vol. 1, Elsevier
- Economic applications
  - Diebold, F., Gunther and Wallis (1999), "Evaluating Density Forecasts of Inflation: the Survey of Professional Forecasters". In: Engle R.F. and H. White, *Cointegration, Causality, and Forecasting: A Festschrift in Honour of Clive W.J. Granger*, Oxford University Press, 76-90.
  - Clark, T.E. (2011), "Real-Time Density Forecasts From Bayesian Vector Autoregressions with Stochastic Volatility", *Journal of Business and Economic Statistics* 29(3), 327-341.
  - Clements, M.P. and J. Smith (2000), "Evaluating the Forecast Densities of Linear and Non-linear Models: Applications to Output Growth and Unemployment", *Journal of Forecasting* 19, 255-276.
  - Jore, A.S., J. Mitchell and S.P. Vahey (2008), "Combining Forecast Densities from VARs with Uncertain Instabilities", *Journal of Applied Econometrics* 25, 621-634.
  - Rossi, B. and T. Sekhposyan (2012), "Evaluating Predictive Densities of US Output Growth and Inflation in a Large Macroeconomic Data Set", *International Journal of Forecasting*.

## II. SELECTED METHODS FOR FORECAST ESTIMATION

### 1. Forecasting with Many Predictors

- Econometric Theory
  - Stock, J.H. and M.W. Watson (2006), “Forecasting With Many Predictors”, in: G. Elliott, C. Granger and A. Timmermann (eds.), *Handbook of Economic Forecasting* Vol. 1, North Holland: Elsevier.
- Economic applications
  - Faust, J. and J. Wright (2009), “Comparing Greenbook and Reduced Form Forecasts using a Large Realtime Dataset”, *Journal of Business and Economic Statistics* 27, 468-479

### 2. Forecasting with Model Combinations

- Econometric Theory
  - Timmermann, A. (2006), “Forecast Combinations”, in: G. Elliott, C. Granger and A. Timmermann, *Handbook of Economic Forecasting* Vol. 1, North Holland: Elsevier
- Economic applications
  - Stock, J.H. and M.W. Watson (2004), “Combination Forecasts of Output Growth in a Seven Country Data Set”, *Journal of Forecasting* 23, 405-430

### 3. Forecasting with UCSV and BMA models

- Econometric Theory
  - Stock, J.H. and M.W. Watson (2007), “Why Has Inflation Become Harder to Forecast?”, *Journal of Money, Credit and Banking* 39 (1), 3-34
- Economic applications
  - Faust, J. and J. Wright (2009), “Comparing Greenbook and Reduced Form Forecasts using a Large Realtime Dataset”, *Journal of Business and Economic Statistics* 27, 468-479.