

TIME SERIES ECONOMETRICS

Petr Zemčik, Office: 302, Office hours: tbd, Phone: (+420) 224 005 154

E-mail: petr.zemcik@cerge-ei.cz, Web page: <http://home.cerge-ei.cz/petrz>

Teaching assistant: tbd

COURSE DESCRIPTION

The first part of the course (about 60%) is devoted to standard time series topics, such as univariate and multivariate models, both stationary and non-stationary. The acquired knowledge is brought in together in the CERGE-EI Forecasting Model (<http://www.cerge-ei.cz/forecast/>), which uses many of the mainstream techniques. The other part of the course focuses on selected themes of interest, such as non-linear models, Generalized Method of Moments, and some financial applications. The course is quantitatively oriented and students are expected to use TSP, Eviews, or Matlab to solve homework assignments.

GRADING

There will be four homework assignments, each worth 10% of the grade (40% in total), a midterm exam worth 30%, and a non-cumulative final exam worth 30%.

MAIN TEXT

Walter Enders (2004), *Applied Econometric Time Series*, 2nd ed., John Wiley & Sons, Inc., New Jersey.

Evžen Kočenda and Alexander Černý (2007), *Element of Time Series Econometrics: An Applied Approach*, Karolinum press, Prague.

SUPPLEMENTARY TEXTS

Bruce L. Bowerman, Richard T. O'Connell, and Anne B. Koehler (2005). *Forecasting, Time Series, and Regression*. Thomson/Brooks-Cole.

Keith Cuthbertson and Dirk Nitzsche (2004), *Quantitative Financial Economics*, 2nd ed., John Wiley & Sons, Inc., New Jersey.

Michael P. Clements and David F. Hendry (1999). *Forecasting non-stationary economic time series*. Cambridge, MA [US] : MIT Press.

James D. Hamilton (1994), *Time Series Analysis*, Princeton University Press, New Jersey.

Andrew C. Harvey (1992). *Forecasting, Structural Time Series Models and the Kalman Filter*. Cambridge, GB : Cambridge University Press.

Thomas J. Sargent (1986) , *Macroeconomic Theory*, 2nd edition, New York: Academic Press.

Jeffrey M. Wooldridge. *Introductory Econometrics: A Modern Approach*. 2nd ed, Thomson/South-Western, 2003.

COURSE OUTLINE

Regression Analysis with Time Series Data (1 class)

Wooldridge, Ch. 10-12; Kočenda and Černý, Ch. 1

Difference Equations (4 classes)

Sargent, Ch. 9-11; Kočenda and Černý, Ch. 2

Stationary Time-Series Models (2 classes)

Enders, Ch.2; Kočenda and Černý, Ch. 3.1-3.3

Volatility (2 classes)

Enders, Ch. 3; Kočenda and Černý, Ch.3.7

Unit Roots (4 classes)

Univariate processes

- Enders, Ch. 4
- Dickey, D.A. and W.A. Fuller, 1979, "Distribution of estimators for autoregressive time series with a unit root," *Journal of the American Statistical Association* 74, 427-431.
- Dickey, D.A. and W.A. Fuller, 1981, "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root," *Econometrica* 49, 1057-1072.
- Kočenda and Černý, Ch. 3.4-3.5

Panel data unit roots

- Im, K.S., Pesaran, M.H., and Y. Shin (2003), "Testing for Unit Roots in Heterogeneous Panels," *Journal of Econometrics* 115, 53-74.
- Pesaran M.H. (2004), "General Diagnostic Tests for Cross Section Dependence in Panels," CESIFO Working Paper 1229.
- Pesaran M.H. (2007), "A Simple Panel Unit Root Test in the Presence of Cross Section Dependence," *Journal of Applied Econometrics*, 22:2, 265-312.
- Zemčík, P., and V. Mikhed, 2009, "Testing for Bubbles in Housing Markets: A Panel Data Approach," *The Journal of Real Estate Finance and Economics* 38:366-386.

Seasonal unit roots

- Dickey, D.A., H.P. Hasza, and W.A. Fuller, 1984, "Testing for unit roots in seasonal time series," *Journal of the American Statistical Association* 79, 355-367.
- Hylleberg, S., R.F. Engle, C.W.J. Granger and B.S. Yoo, 1990, "Seasonal integration and cointegration," *Journal of Econometrics* 44, 215-238.
- Franses, P.H. and B. Hobijn, 1997, "Critical values for unit root tests in seasonal time series," *Journal of Applied Statistics*, Vol. 24, No. 1, 25-47.

Vector Autoregression (4 classes)

Multiequation time series models

- Enders, Ch. 5
- Hamilton, Ch.11
- Kočenda and Černý, Ch. 4.1

Smoothing

- Holt-Winters with additive seasonal component, Bowerman, O'Connel, Koehler, Ch.8

Bayesian VAR

- Hamilton, Ch.12

CERGE-EI Forecasting Model (3 classes)

State Space Models - Kalman Filter

- Hamilton, Ch. 13
- Harvey

Dynamic factor models/ Diffusion indexes

- Stock, J.H. and M. W. Watson (1998). "Diffusion Indexes" NBER Working Paper No. 6702.
- Bernanke, B.S., J. Boivin, and P. Eliasch (2004), „Measuring the Effects of Monetary Policy: A Factor-Augmented Vector Autoregressive (FAVAR) Approach,“ NBER Working Paper No. 10220.

Discounted Least Squares

- Harvey , Ch.2

Forecasts on forecasts

- Krkoska L. and U. Teksoz (2005). „Accuracy of growth forecasts for transition countries: Assessing ten years of EBRD forecasting,“ EBRD Working Paper 94.
- Krkoska L. and U. Teksoz (2005). „Forecasting inflation for transition countries: How accurate are the EBRD forecasts?,“ EBRD Working Paper 98.

Merging Forecasts

- Fischer, I. and N. Harvey (1999), "Combining Forecasts: What Information Do Judges Need to Outperform the Simple Average?" International Journal of Forecasting. July 1999; 15(3): 227-246.
- Hendry, D. F. and M. Clemens (2004), "Pooling of Forecasts" Econometrics Journal. 2004; 7(1): 1-31.

Cointegration and Error Correction Models (3 classes)

Univariate processes

- Enders, Ch. 6

Multiple time series

- Kočenda and Černý, Ch. 4.2-4.3

Panel data cointegration tests

- Pedroni, P. (1999), "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors," Oxford Bulletin of Economics and Statistics 61, 653-70
- Pedroni, P. (2004), "Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the PPP Hypothesis" Econometric Theory 20, 597-625.
- Zemčík, P., and V. Mikhed, 2007, "Testing for Bubbles in Housing Markets: A Panel Data Approach," The Journal of Real Estate Finance and Economics 38:366-386.

- Kočenda and Černý, Ch. 4.4

Nonlinear Time-Series Models (2 classes)

Enders, Ch. 7

Mehra, R. and E. C. Prescott, 1985, "The Equity Premium: A Puzzle," *Journal of Monetary Economics* 15 (2), 145-162.

Zemčík, P., 2001, "Mean Reversion in Asset Returns and Time Non-Separable Preferences," *International Review of Economics and Finance* 10, 223-245.

Testing the Capital Asset Pricing Model (CAPM) & Extensions (2 classes)

Cuthbertson and Nitzsche, Ch. 8

Fama, E.F. and K.R. French, 1992, "The cross section of expected stock returns," *The Journal of Finance* 47, 427-465.

Fama, E.F. and K.R. French, 1993, "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics* 33, 3-56.

Gilbert, S. and P. Zemčík (2009), "Notes on Performance of Linear Factor Models: Alphas and Idiosyncratic Risk."

Generalized Method of Moments (2 classes)

Zemčík, P. (2009), "Notes: Generalized Method of Moments."

Hansen, L. P. and K. J. Singleton, 1982, "Generalized Instrumental Variables Estimation of Non-linear Rational Expectations Models," *Econometrica* 50 (5), 1269-1286.

den Haan, W. and Levin, A. (1996). "Inferences from parametric and non-parametric covariance matrix estimation procedures," NBER Working paper 0195.

Gilbert, S. and P. Zemčík, (2004), "Inter-Asset Comparisons of Betas and Returns to Small and Large Firms' Stocks."