universität innsbruck

Time Series Analysis

Syllabus

Instructor

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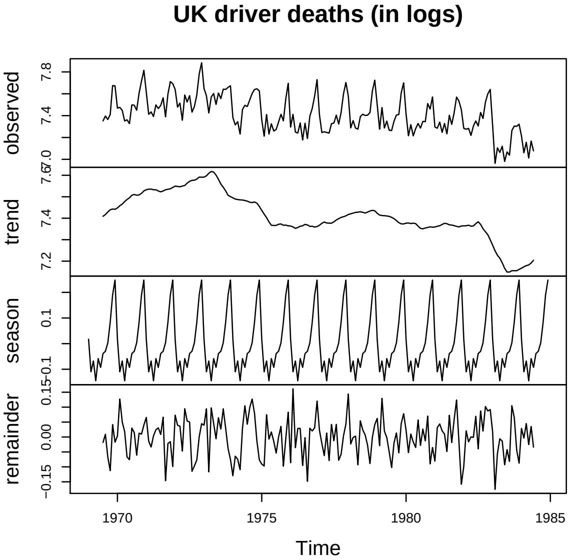
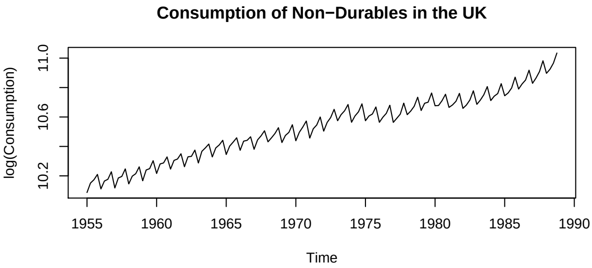
Overview

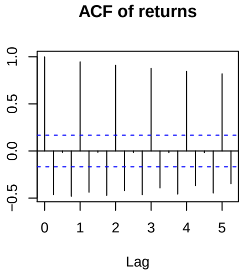
- Introduction
- Smoothing and decomposition methods
- Stochastic processes
- ARIMA models
- Stationarity, unit roots, and cointegration
- Time series regression and structural change
- GARCH models
- Multivariate time series models

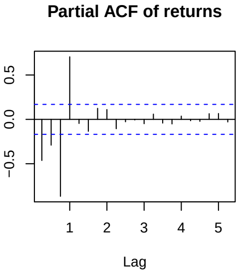
Time series decomposition



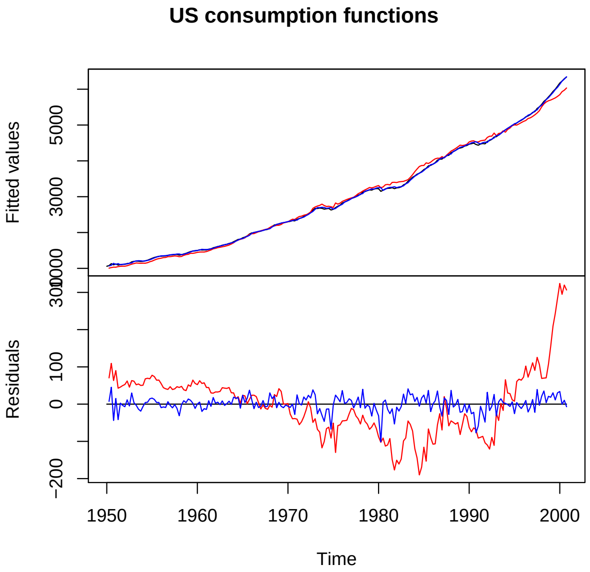
ARIMA models



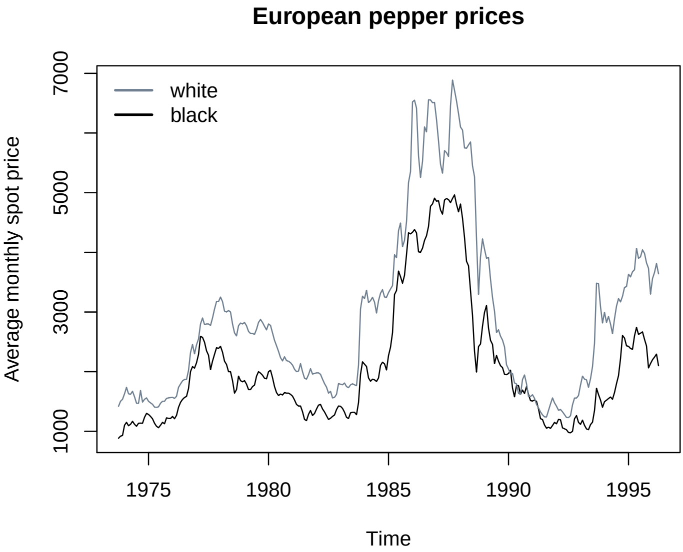




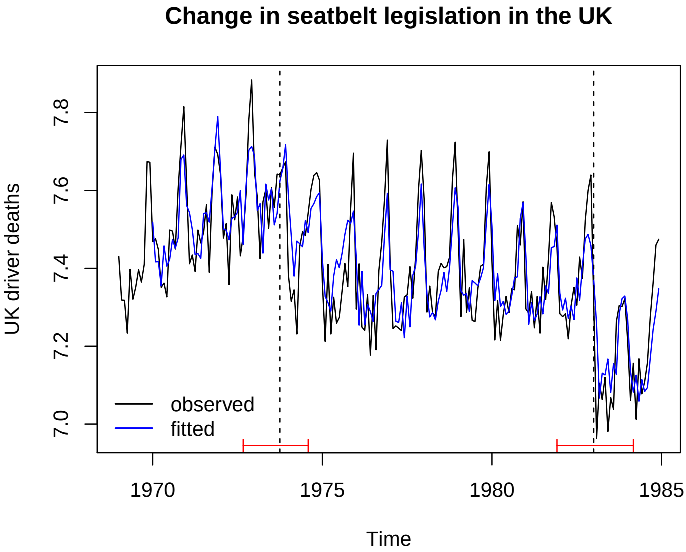
Time series regression



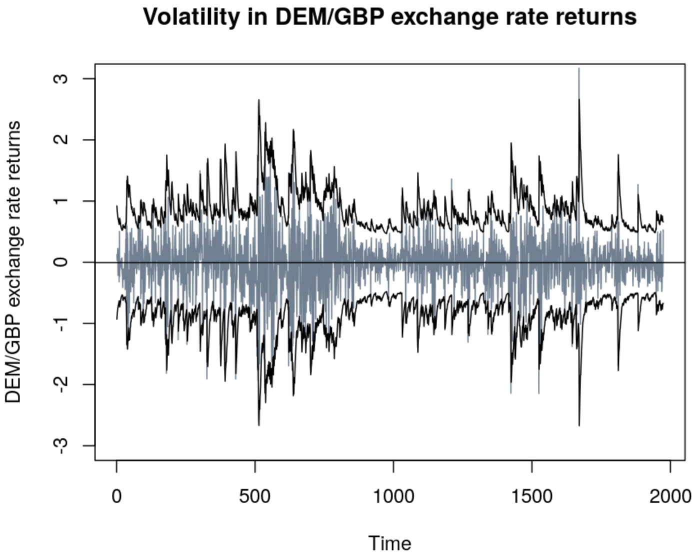
Cointegration



Structural change analysis



GARCH models



Requirements

Linear regression:

- Ordinary/weighted/generalized least squares estimation
- Gauss-Markov theorem
- Inference (*t* and *F* tests) for linear hypotheses
- Robust standard errors
- Regression diagnostics
- Factors and interactions
- Model selection

Books

Primary reference:

- Cryer JD, Chan KS (2008). *Time Series Analysis – With Applications in R*, 2nd ed. New York: Springer-Verlag.

Econometrics with R:

- Kleiber C, Zeileis A (2008). *Applied Econometrics with R*. New York: Springer-Verlag.

Further references:

- Brockwell PJ, Davis RA (2002). *Introduction to Time Series and Forecasting*, 2nd ed. New York: Springer-Verlag.
- Cochrane JH (2005). *Time Series for Macroeconomics and Finance*. Lecture Notes, Graduate School of Business, University of Chicago.

Books

- Franke J, Härdle W, Hafner C (2004). *Einführung in die Statistik der Finanzmärkte*. New York: Springer-Verlag.
- Hamilton JD (1994). *Time Series Analysis*. Princeton: Princeton University Press.
- Kirchgässner G, Wolters J (2005). *Einführung in die moderne Zeitreihenanalyse*. München: Verlag Vahlen.
- Lütkepohl H (2005). *New Introduction to Multiple Time Series Analysis*. New York: Springer-Verlag.
- Neusser K (2006). *Zeitreihenanalyse in den Wirtschafts-wissenschaften*. Wiesbaden: Vieweg+Teubner Verlag.
- Tsay RS (2005). *Analysis of Financial Time Series*, 2nd ed. Hoboken, NJ: John Wiley & Sons.
- Zivot E, Wang J (2006). *Modelling Financial Time Series with S-PLUS*, 2nd ed. New York: Springer-Verlag.

R

- Open-source software, freely available under GPL
  `https://www.R-project.org/`
- Current version: 3.5.2
- Comprehensive R Archive Network
  `https://CRAN.R-project.org/`
- Windows setup program
  `https://CRAN.R-project.org/bin/windows/base/`
- Econometrics task view:
  `https://CRAN.R-project.org/view=Econometrics`
- Time series task view:
  `https://CRAN.R-project.org/view=TimeSeries`
- Extension package *AER* for “Applied Econometrics with R”
  `https://CRAN.R-project.org/package=AER`
- Extension package *TSA* for “Time Series Analysis”
  `https://CRAN.R-project.org/package=TSA`

Format

- Credit hours
  VU: 3
- Time/place
  Thu, 13:00–17:00, SR 7 (Sowi)
- Content
  V part: Theory + application in R
  U part: Exercises, practical case studies, discussions
- Exam
  Oral exam
  Regular participation in VU activities (exercises, . . .)