

Forecasting Methods and Applications

Applied Data Analysis School

Lecture 0

Introduction

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Forecasting Methods and Applications

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Format:

Lectures and lab sessions

Applications

Forecasting Methods and Applications

Plan of the course:

- 1 Introduction to Forecasting
- 2 Regression Analysis and Forecasting
- 3 Exponential Smoothing Methods
- 4 Univariate Time Series Models
- 5 Trend and Seasonality
- 6 Forecasting Volatility

Forecasting Methods and Applications

Required background in statistics and econometrics:

- Basic calculus
- Probability theory
- Linear regression model: Ordinary least squares estimation (OLS)
- Linear regression model: Inference for linear hypotheses (t and F tests)

Software:

- R

Software: R

- Open source software
- Flexible and object-oriented programming environment
- Superior graphics and extensive methods for data analysis
- Webpage: <http://www.R-project.org/>
- Download from Comprehensive R Archive Network (CRAN):
<http://CRAN.R-project.org/>
- Great graphical user interface: <http://www.rstudio.org/>

Software: R

- **Important:** There are many different statistics/econometrics software packages. Some caution is needed when comparing the results of computations. Differences can be due to differences in optimization routines, starting values, etc.
- R is a system for statistical computing with extension packages from CRAN.

Some CRAN packages used in this course:

- **AER** package for “Applied Econometrics with R”
<http://CRAN.R-project.org/package=AER>
- **TSA** package for “Time Series Analysis”
<http://CRAN.R-project.org/package=TSA>

Software: R

Some CRAN packages used in this course (contd.):

- **forecast** package for “Forecasting Functions for Time Series and Linear Models”
<http://CRAN.R-project.org/package=forecast>
- **fma** package for data sets from “Forecasting: Methods and Applications” by Makridakis, Wheelwright & Hyndman (1998)
<http://CRAN.R-project.org/package=fma>
- **fpp** package for data sets from “Forecasting: Principles and Practice” by Hyndman and Athanasopoulos (2012)
<http://CRAN.R-project.org/package=fpp>
- **expsmooth** package for “Forecasting with Exponential Smoothing”
<http://CRAN.R-project.org/package=expsmooth>
- **lmtest** package for “Testing Linear Regression Models”
<http://CRAN.R-project.org/package=lmtest>

Forecasting Methods and Applications

Main textbooks:

- Diebold, F. X. (2007), Elements of Forecasting, 4th edition, South-Western College Publishing.
- Montgomery, D. C., Jennings, C. L. and Kulahci, M. (2015), Introduction to Time Series Analysis and Forecasting, 2nd edition, Wiley.
- Brockwell, P. J. and Davis, R. A. (2002), Introduction to Time Series and Forecasting, 2nd edition, Springer-Verlag, New York.