

On-line course materials

MATH48032 - Time Series Analysis and Forecasting in Finance

Year: 4 - Semester: 2 - Credit Rating: 15

Requisites

Prerequisites

good background in statistics, particularly hypothesis testing and regression

Aims

To introduce the basic concepts of the analysis of time series in the time domain and to provide the students with experience in analysing time series data.

Brief Description

This course unit covers a variety of concepts and models useful for empirical analysis of time series data.

Learning Outcomes

On successful completion of this course unit students will

- have understanding of the basic time series concepts;
- be able to build models to time series data and critically assess them using a variety of methods for exploration of time series data, identification and models selection.

Syllabus

- Introduction and examples of economic and financial time series, asset returns. Basic models: white noise, random walk, AR(1), MA(1). [2]
- Stationary time series. Autocovariance and autocorrelation functions. Linear Prediction. Yule-Walker equations. Estimation of autocorrelation and partial autocorrelation functions. [3]

- Models for stationary time series - autoregressive (AR) models, moving average (MA) models, autoregressive moving average (ARMA) models. Seasonal ARMA models. Properties, estimation and model building. Diagnostic checking. [6]
- Non-stationary time series. Non-stationarity in variance - logarithmic and power transformations. Non-stationarity in mean. Deterministic trends. Integrated time series. ARIMA and seasonal ARIMA models. Modelling seasonality and trend with ARIMA models. [4]
- Filtering, exponential smoothing, seasonal adjustments. [2]
- Non-linear models - threshold AR, bilinear models. Cointegration. [2]
- Multivariate time series. Stationarity, autocorrelation and crosscorrelation. Multivariate autoregressive model. Markov property. Representation of univariate autoregressive models in Markov form. [3]
- Model based forecasting, from ARMA and ARIMA. [3]
- Conditionally heteroskedastic models ARCH-type models. Volatility forecasting. [7]
- Regime switching models [1].

Teaching & Learning Process (Hours Allocated To)

Lectures	Tutorials/ Example Classes	Practical Work/ Laboratory	Private Study	Total
33	11	0	106	150

Assessment and Feedback

- Coursework: homework assignment weighting 20%.
- End of semester examination: three hours weighting 80%

Further Reading

- Cryer, Jonathan D and Chan, Kung-Sik. Time Series Analysis with Applications in R. Second edition. Springer, 2008.
- Mills, Terence C. The Econometric Modelling of Financial Time Series. Second edition. Cambridge University Press, 1999.
- Shumway, Robert H and Stoffer, David S. Time Series Analysis and Its Application: With R Examples. Second edition. Springer, 2006.
- Cowpertwait, Paul SP and Metcalfe, Andrew V. Introductory Time Series with R. Springer, 2009.

Staff Involved

Dr Georgi Boshnakov - Lecturer

Data source is EPS system

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