Time Series Analysis

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PhD School, XXV cycle

Course Description

This course attempts to give an introductory account of time series models and their application to modelling and prediction of data collected sequentially in time. The aim is to provide specific techniques for handling data and at the same time to provide some understanding of the theoretical basis for the techniques. Topics covered will include univariate non linear models (such as switching regime models) and state space models.

Objectives

The objectives of this course are:

- to introduce the students to the main developments in time series analysis;
- to learn theoretical, applied and computational methods for time series analysis and forecasting;
- to gain experience in model building;
- to learn state-space models and Kalman filter.

Schedule

7	September	10.00-13.00	Introduction to linear and nonlinear time series models.
8	September	10.00-13.00	Regime swiching time series models.
9	September	10.00-13.00	Non linear time series models in finance.
15	September	15.00-18.00	Introduction.Linear time series models in state space form.
16	September	10.00-13.00	Kalman filter, parameter estimation and forecasting.
17	September	9.00-12.00	Time series state space analysis: extensions and research developments.

Recommended texts

- Commandeur .J.F., Koopman, S.J. (2007), An Introduction to State Space Time Series Analysis, Oxford University Press.
- Fan J., Yao Q. (2003), Nonlinear time series, Springer-Verlag, New York.
- Tsay R.S., (2005) Analysis of Financial Time Series, Wiley-Interscience.
- Durbin, J., Koopman, S.J. (2001), Time Series Analysis by State Space Methods, Oxford University Press, Oxford, UK.
- Harvey A.C., (1993), Time Series Models, 2nd Edition, Harvester Wheatsheaf, Chapters 4 and 5.
- Harvey, A.C. (1989), Forecasting, Structural Time Series and the Kalman Filter, Cambridge University Press, Cambridge, UK. Chapters 2 and 3.
- Proietti, T. (2002), Forecasting with Structural Time Series Models, in Clements, M.P. and D. F. Hendry (eds.), A Companion to Economic Forecasting, Blackwell Publishers, Oxford.

Final Exam

To be defined