

Aims and Objectives

The course will show how economic and financial time series can be modelled and analysed. The aim is to provide understanding and insight into the methods used, as well as explaining the technical details.

Topics**1. Time series models**

Trends, cycles and seasonals. Stationary time series. ARMA models. Unobserved components and signal extraction.

ARIMA models. Long memory. Structural (unobserved component) time series models. Tests for nonstationarity. Explanatory variables and interventions.

2. State space models and the Kalman filter

State space models and derivation of the Kalman filter. Data irregularities.

3. Spectral Analysis

The spectrum and its interpretation. Estimation of the spectrum.

4. Trends and cycles in macroeconomic time series. Seasonality

Extracting trends and cycles from unobserved components models. Seasonality. Analysis of the effects of moving average and differencing operations.

5. Multivariate models and co-integration

Multivariate time series models. Co-integration and common trends. Vector autoregressions and vector error correction models. Control groups.

6. Nonlinear models and changing volatility

Independence, uncorrelatedness and martingale differences. Nonlinear models. Distributions of financial returns: quantiles and value at risk; stochastic volatility and GARCH; intra-day financial data.

7. Dynamic conditional score models

Dynamic location models. EGARCH models driven by the score. Models for positive variables. Multivariate models.

8. Correlation and association

Dependence, measures of association, copulas, estimation of dynamic models.

Assessment

The examination for this module will be by a 2-hour written exam.

Readings

- 1) Harvey, A. C., Time Series Models (TSM), 2nd Edition, Harvester Wheatsheaf, 1993.
- 2) Harvey, A. C. Dynamic Models for Volatility and Heavy Tails. Cambridge University Press, 2013. See also econ.cam.ac.uk/DCS; gas-model.com
- 3) Martin, V., Hurn, S. and D. Harris, (MHH) Econometric Modelling with Time Series: Specification, Estimation and Testing, 2013.
- 4) Mills, T. and R.N. Markellos, The Econometric Modelling of Financial Time Series, 3rd ed. Cambridge University Press, 2008.
- 5) Taylor, S. Modelling Financial Time Series, 2nd edition. World Scientific, 2008.
- 6) Taylor, S. Asset Price Dynamics, Volatility, and Prediction. Princeton University Press, 2005