Séries financières à temps discret

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Cours : 24 heures - TP : 8 heures

Objectives

This course covers econometric and statistical methods as applied to finance.

Plan

- An introduction to discrete time stochastics process: strict sense and weak-sense stationarity (autocorrelation functions, spectral measure), random walks, martingales, Markov chains
- Financial time series and their characteristics: price, returns, distributions of returns, multivariate returns, skewness, kurtosis, heavy-tailed...
- Linear time series: stochastic process filtering, properties of AR models (definition, estimation, forecasting), ARMA models (identification, estimation, forecasting)
- Unit root nonstationarity: random walk, random walk with drift, trend-stationarity, unit-root test
- Multivariate time series analysis: weak stationarity and cross-correlation matrices, Vector Autoregressive models (reduced and structural forms, stationarity conditions and moments, estimation of a VAR(p) model), Vector ARMA models, cointegration test.
- State-space models and Kalman filter: local trend model, linear state space models, Kalmna filtering and smoothing, applications (CAPM with time-varying coefficient, state-space representation of multivariate ARMA models, linear regression models with ARMA errors)
- Conditional heteroscedastic models: stylized fact of volatility; random coefficient autoregressive models (existence, strict sense stationarity, weak-sense stationarity), the ARCH model (properties of ARCH models, estimation, forecasting), GARCH models, Exponential GARCH models
- An introduction to non-linear models: bilinear models, threshold autoregressive, non-linear state space models

Bibliography

- Analysis of Financial time series, R. Tsay, Wiley
- Non-linear time series, R. Douc, E. Moulines, D. Stoffer, Wiley
- Modelling nonlinear economic time-series, T. Terasvirta, D. Tjostheim, C. Granger
- GARCH Models: Structure, Statistical Inference and Financial Applications, C. Francq, J.-M. Zakoian
- Time Series Analysis and Its Applications: With R Examples, R. Shumway, D. Stoffer, Springer Texts in Statistics)
- Multivariate Time Series Analysis: With R and Financial Applications, R. Tsay, Wiley