Summary

Erik Lindström

FMS161/(MAS229)MASM18 Financial Statistics
Linear Gaussian models

- Model:

  \[ X_t + a_1 X_{t-1} + \ldots + a_p X_{t-p} = e_t + c_1 e_{t-1} + \ldots + c_q e_{t-q} \]

- Properties

- Estimation (OLS/LS2/MLE)

- Identification and model validation
Non-linear models

- Can generate many (too many?) new features
- Larger model space!
- Difficult to identify - use prior knowledge!
Variance models

- Need to transform data
- GARCH-family
- Stochastic volatility
- Realized volatility/quadratic variation
We restricted most of the course to continuous Semimartingales (no jumps).

- Itô calculus
- Valuation using the RNVF, \( \pi_t = p(t, T) \mathbb{E}^Q[\phi(S_T)|\mathcal{F}_t] \).
- Connections to PDEs.
Continuous time II

Estimation of parameters

- Likelihood function generally unknown.
- Likelihood approximations (several methods)
- GMM
Partially observed models

In continuous or discrete time

- Linear methods - Kalman filters
- Approximate non-linear methods - EKFs, UKFs, IEKFs...
- Monte Carlo methods - particle filters