Advanced Financial Models

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0 Introduction

www.staslab.cam.ac.uk/ mike/AFM/ for course material. However lecture notes only come after lectures, so taking notes is still necessary..

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Assumptions for this course:
No dividends, zero tick size (continuous), no transaction costs, no short-selling constraints, infinitely divisible assets, no bid-ask spread, infinite market depth, agents have preferences for expected utility.

1 Discrete time models

We'll assume there are n assets with price P_t^i at time t for asset i. Apparently P_t^i is a random variable on some probability space $(\Omega, \mathcal{F}, \mathbb{P})$.

We'll use the notation $P = (P_t^1, ..., P_t^n)_{t \geq 0}$ which is a n-dimensional stochastic process.

Information available at time t is modelled by a σ-algebra $\mathcal{F}_t \subseteq \mathcal{F}$.

The assumption will be $\mathcal{F}_s \subseteq \mathcal{F}_t$ for $s \leq t$ (in other words, $\mathcal{F}$ is a filtration):

Definition. (Filtration)
A *Filtration* is a collection of σ-algebra $(\mathcal{F}_t)_{t \geq 0}$ such that $\mathcal{F}_s \subseteq \mathcal{F}_t$ for $s \leq t$.

We'll assume that $\mathcal{F}_0$ is trivial, i.e. if A is $\mathcal{F}_0$ measure then $\mathbb{P} = 0$ or 1.