1st objective: Calculating things

- Numerical techniques. Computers must be taken seriously; but it’s not a course in programming or numerical analysis.


- Empirical/implementational issues. What do we want to calculate & how do we do that?

2nd objective: Eventually a thesis must be written ...

- Book: We start with Seydel. But much looser structure than I&F-teori or MatFin. There will be lots of supplementary literature. And probably some notes too, but not on weekly basis.

- Evaluation: Projects (& deadlines). My suggestion

  - 2 common projects. Groups of up to 3. Pass/"do over"-grading.

  - 1 larger project at the end. Possibly forceful diversification. Groups OK for “pass/no pass”, but DIY if you want a grade on the 13-scale.
• Exotic option topics: American options, Asian options, static hedging of barrier options.

• Possible application: Interest rate guarantees.

• Possible application: Optimal mortgage choice.

• Possible, but I don’t think you want it: Dynamic optimal control.

• Not possible: Credit risk.

Course outline

• Simulation techniques; pricing by Monte Carlo.

• Solving (parabolic) PDEs numerically.


• Black/Scholes-extensions: Stochastic volatility, processes with jumps.
• Sometimes I use EXCEL. And if you learn a little about the pro-
gramming language VBA then you can do all most things with it.

• If there’s a real “need for speed” I use C. Maybe you know C[whatever],
Java, Pascal, Fortran; fine too. Fast and rarely do we have to do
anything fancy. Requires better coding skills + risk of reinventing
the wheel.

“Which software should I use?”

Anything you like. That’s a lot less helpful than it seems. Let’s name
names:

• What I use most often: R. A high-level language that’s good with
matrices & has excellent skills for statistical computations. Free;
I might even dig up some installation CDs. Not compiled, high
level: Slow. Especially if you have to do large loops. Maple,
Matlab, Mathematica, Gauss can probably do just the same.
Today:

- Pricing by “no arbitrage”; a reminder of I&F-teori, MatFin.
- LLN & CLT
- Random numbers from computers. Normal random numbers from computers.
- Black/Scholes example.
- Variance reduction: Anti-thetic & control variates.