

Stochastic Methods + Lab

Session 4

September 13, 2016

Note: The computational work is to be submitted up to one week after the session via `git`. For this task sheet, it is sufficient to submit the code so long as it runs and produces the requested output. Theoretical questions may be submitted handwritten on paper.

1. Use `timeit` to compare the efficiency of Newton's method, the secant method, and Brent's method for computing the IRR of the test case from Lab Session 2. Repeat for $N = 200$ and $P = 1\,500\,000$.
2. The *yield to maturity* of a level coupon bond is the IRR of its cash flow. Compute the yield to maturity of a 10-year level coupon bond sold at 75% of par with a coupon rate of 10% paid **semiannually**.
3. Plot the price vs. time to maturity for level coupon bonds with annual coupon rates of 2%, 6%, and 12% paid semiannually. Assume a yield of 6% and a par value of EUR 1 000.
4. (From Ross, p. 45.) An individual who plans to retire in 20 years has decided to put an amount A in the bank at the beginning of each of the next 240 months, after which she will withdraw EUR 1000 at the beginning of each of the following 360 months. Assuming a nominal yearly interest rate of 6% compounded monthly, how large does A need to be?
5. Suppose the coupon rate for a level coupon bond is the same as the market rate. Show that this bond will be sold at par.