

Practice Sheet 9

1 Classical Risk Analysis of a Model Bank

The task is to perform the (classical) risk analysis of a model bank as presented in slide series 11. The contracts of the bank's balance sheet are contained in the file `BankBilanzPositionen.csv`.

Remark: Please don't change this file, you risk to introduce formatting errors in the data formats. In addition, a file named `ZinsSzenarien.csv` with interest rate scenarios is provided.

A third file, named `StaticBankMC_Results.RData`, contains the results of the MC simulation because this simulation is rather long (30min).

The analysis date should be set to 2016-01-02.

Tasks:

1. Build a balance sheet structure according to the one in the slides, read in the contracts and attach the contracts to the leaf accounts.
2. Create the risk factor environment consisting of a spot rate curve defined by the following rates:

Tenor	3M	1Y	2Y	5Y	7Y	10Y
Rate [%]	-0.28	-0.26	-0.21	0.03	0.20	0.42

Create a discounting engine that uses this yield curve.

3. Simulate the bank with this environment, define yearly time buckets covering the years from 2016 till 2020, and compute nominal value, market value, liquidity and income.
4. Write a function for carrying out the Monte Carlo simulation with the provided interest rate scenarios.
5. Use this function to carry out a few steps of the simulation with the provided interest rate scenarios.
6. Read-in the file with the results of the full simulation and plot histograms for the interest rates for the different tenors. Look also at the summary statistics.
7. Extract the distribution of equity from the simulation results (for both, nominal value and market value) and compute VaR95 and ES95.
Use boxplots to display the time evolution of this distribution over the years.
Can you explain the different temporal behavior of nominal value and market value?

8. Carry out a similar study for liquidity (both, marginal and cumulative).
9. Carry out a similar study for income.