Homework 6: Structural Models

Credit Risk (MF772) Fall 2021 Instructor: Roza Galeeva

Due date: 8 am, Thursday October 21 Please, note that `late assignments will not be accepted.`

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1. Black Cox model: constant default threshold

- The asset value of the company $V_0 = 12.5$ million USD,
- The volatility of the asset value $\sigma_V = 20\%$.
- The principal of the debt $D = 10$ million USD and has maturity $T = 2$ years.
- The risk free rate is $r = 4\%$.
- The safety covenant (default threshold) , $K_1 \leq De^{-rT}$ is constant.
- Let $\rho = \frac{K_1}{De^{-rT}}$, $0 < \rho \leq 1$. Consider $\rho = 0.05, 0.1, 0.15, ...1$.

Work on the following questions:

a) For each ρ calculate:
   - The default probability and plot it as a function of ρ.
   - The credit spread s of the debt value (use definition from Merton model)

(b) Plot credit spread as a function of default probability

(c) Set up the asset prices scenarios by Monte Carlo. Consider $\rho = 0.9$ and $\rho = 0.0001$ Verify the analytical values for default probability by Monte Carlo simulations.