Fixed Income Analysis
Exercise Sheet 11

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Please hand in your solution on Wednesday 11.12.2019 at the beginning of the lecture.

Exercise 1: Consider the Merton model with a constant risk-free rate $r = 5\%$.

a) Compute the value of the equity and the debt at time $t = 0$ when $\mu = 0.15$, $\sigma = 0.25$, the assets are worth $V_0 = 100$, and the firm's debt consists of a single zero-coupon bond with face value $B = 50$ to be reimbursed at date $T = 5$.

b) Let $L = B/V_0$ be the leverage of the firm. Plot the credit spread $c(0, T)$ as a function of (i) the time to maturity T and (ii) the asset volatility σ for $L = 0.3$, 0.6, and 0.9 (i.e. you should have three 3D-plots). What do you observe?

c) Prove that $c(0, T) \to 0 \quad$ as $T \to 0$ when $V_0 > B$

5 points

Exercise 2: Consider the 1-year rating-transition probabilites:

	A	B	C	D
A	0.95	0.05	0	0
B	0.05	0.8	0.1	0.05
C	0	0.2	0.5	0.3
D	0	0	0	1

There are three firms with the following ratings at time $t = 0$ and characteristics under the Merton's model:

- Firm 1: $\mu_V = 0.20$, $\sigma_V = 0.3$ and rated A at $t = 0$.
- Firm 2: $\mu_V = 0.15$, $\sigma_V = 0.25$ and rated B at $t = 0$.
- Firm 3: $\mu_V = 0.1$, $\sigma_V = 0.2$ and rated C at $t = 0$.

Compute the corresponding thresholds of transition $\tilde{d}_{j,k}$ whcih are defined in slide 611.

5 points