

Exam in SØK2010 Banking (Spring 2020)

Make the assumptions you find necessary. The weighting of the problems is only indicative.

Problem 1 — Yields (25%) A government bond pays annual coupons of 5 and has a face value of 100. The bond matures in three years. The interest rates for 1, 2, and 3 years are 4.00%, 4.50%, and 5.82%, respectively. Use simple interest rates for this problem.

- a) Calculate the value of the bond.
- b) Find the yield on the bond.
- c) What is the value of a corporate bond that promises the same payments as the government bond when investors require a credit spread of 3.2%?
- d) What is the relationship between the bond price and the yield?

Problem 2 — Terminology (25%) Give a short explanation of the following terms (short and concise answers are rewarded):

- a) Illiquid asset.
- b) Credit risk.
- c) Liquidity trap.
- d) Credit crunch.
- e) Deposit multiplier.

Problem 3 — Life insurance (25%) Assume you have bought a *whole life* insurance policy. The insurance will pay an amount of 1 (say, €1,000,000) on December 31 the year you die. For instance, if you die on May 17, 2045, the insurance policy gives a payout to your family on December 31, 2045. You buy the insurance at the beginning of the year. The fair premium is π . Show how to find π .

Problem 4 — Over-investment (25%) A firm has to pay its bank 1020 at time 1 (“Old debt”). However, the firm knows that the value of its assets will be only 1000 at time 1 and it can therefore not repay the bank in full. This information is not shared with the bank.

The firm finds an investment project. It requires an investment of 100 today and will give a payment at time 1 of either 50 or 148 with equal probability. A discount rate of 10% seems appropriate for this project. Assume all agents are risk neutral.

a) Show that this project is unprofitable.

The firm goes to the bank to get financing for the project. The bank only learns that the project will have a value of 148 at time 1, not that there is a 50% chance that it will have a value of 50. The bank therefore accepts to lend the firm 100 for one year at 10% interest.

b) Show that the owners of the firm benefit from pursuing this unprofitable project.

c) What is the highest amount of (old) debt the firm can have if this over-investment problem is to disappear? (*Hint:* When is the certain time 1 cashflow to the equityholders higher than the expected uncertain cashflow? To calculate this debt level, you can assume that the equityholders receive no cashflow in the state where the project is worth 50.)