

DEPARTMENT OF FINANCE AND STATISTICS
Pricing of Financial Securities and Derivatives (Vasa)

Exam on January 13th, 2011. 12 points for each question.

Time 5h
Can be taken away
Calculator allowed

1. Give a short description of the following concepts:
 - a. The unbiased expectations hypothesis
 - b. Par yield
 - c. European style option
 - d. Invoice price
 - e. Limit order book (LOB)
 - f. Investment grade bond
2. Show how a futures contract should be priced assuming...
 - a. ...You are using a simple interest rate and the underlying security pays no income.
 - b. ...You are using a continuously compounded interest rate and the underlying security pays no income.
 - c. ...You are using a simple interest rate and the underlying security pays two dividends during the lifetime of the futures contract.
 - d. ...You are using a continuously compounded interest rate and the underlying security pays a continuous dividend yield.
3. Explain (separately for the call and the put) how and why the price of a European stock option is affected by the following variables:
 - a. The stock price
 - b. The exercise price
 - c. The return volatility of the stock
 - d. The risk-free rate of interest
 - e. Time to maturity
 - f. Dividends
4. Fixed income securities in general have several special features that warrant a special treatment compared to e.g. common stocks, although the basic valuation principles (mainly the Net Present Value approach) is the same. Which are the most important of these special features?
5. Give an overview of the market for bonds. Which types of bonds are available? What is meant by a benchmark bond? Why are agencies such as Moody's and Standard & Poor's significant for the bond market?

GOOD LUCK !!!

Test 1 (10 p / question)

1. Consider the following bonds:

	<u>Time to maturity</u>	<u>Coupon</u>
Bond 1	3 years	0.0%
Bond 2	3 years	4.0%
Bond 3	3 years	6.0%

Interest payments are annual and the first coupon will be paid after exactly one year. The face value of each bond is 1m€. Furthermore assume that one year, two year and three year spot rates are: $r_1 = 2.0\%$, $r_2 = 3.0\%$, $r_3 = 3.8\%$. Also assume that there is a forward interest rate market where 1-year forwards are available up to three years from now.

- Your investment horizon is 3-years. Use annual holding period return to determine which bond is the best investment.
 - Calculate the par yield.
 - Assume that an investor buys the 4.0% coupon bond, sells it after one year when all actual spot rates are 30 bp higher than predicted by the pure expectations hypothesis when the bond was bought.
2. You are buying a bond with 10 m€ face value and an annual coupon of 8%. The bond has a maturity of 3 years and 145 days. The current yield is 6.5%.
- Calculate the present value of the bond.
 - Calculate the accrued interest and the clean price.
 - Assume that you sell the bond one year from now and that the yield is 7.5% when you sell it. What is the new present value?
 - What is the return on your one-year investment assuming you reinvest the coupon at a rate of 5.5% ?

Test 2 (10 p / question)

- 1.** You have estimated the following spot rates (annually compounded in per cent) for EUR:

Year	EUR
1	3.00
2	3.30
3	3.40
4	3.55

- Calculate the swap rate for the fixed leg in a fixed-for-floating interest rate swap.
 - Use forward rates to verify that your swap in a) is correct. That is, forecast the floating payments with forward rates and compare the present values of both legs.
 - Calculate the PV of the swap for the floating rate payer when the swap has 2 years left to maturity. Assume a notional principal of EUR 10 000 000, and a 2-years swap rate of 2.80% (use this rate for discounting). Assume the NPV of the floating leg is zero.
- 2.** You are currently short in 10 000 stock option calls with the exercise price 100. The call premium is 1.94, the call's delta 0.55 and the gamma 0.10. How would you construct a delta and gamma neutral position by combining your call position with 1) a position in an otherwise similar call but with $X=105$ (premium 0.35, delta 0.16 and gamma 0.05) and 2) a position in the underlying stock?