

Pricing of Financial Securities and Derivatives

Final Exam 19.12.2019

Time: 4 hours

Examinator: Henrik Palmén

Calculator may be used

Minimum to pass:

1. Final exam only: min. 50 p

2. Midterm + Final exam: Midterm min 25p and theory section in Final Exam min 20p, altogether min 50p

PART I: Calculation (If you have passed the midterm you can skip this part. You may try to increase your points from the midterm in which case the better result of those two will be credited in the final grading.)

1. The yield on a 1-year zero-coupon bonds is currently 7%; the YTM on 2-year zeros is 8%. The treasury plans to issue a 2-year maturity coupon bond, paying coupons once a year with a coupon rate of 9%. The face value of the bond is \$100.
15p
 - a) At what price will the bond sell?
 - b) If the expectations theory of the yield curve is correct, what is the market expectation of the price that the bond will sell for next year?
 - c) Recalculate your answer to b) if you believe in the liquidity preference theory and you believe the liquidity premium is 1%.
2. A \$100 million interest rate swap has a remaining life of 10 months. Under the terms of the swap, six-month LIBOR is exchanged for 7% per annum (compounded semi-annually). The average of the bid-offer rate being exchanged for six-month LIBOR in swaps of all maturities is currently 5% per annum with continuous compounding. The six-month LIBOR rate was 4.6% per annum two months ago. What is the current value of the swap to the party paying floating? What is its value to the party paying fixed?
20p
3. A one-month European put option on a non-dividend-paying stock is currently selling for \$2.50. The stock price is \$47, the strike price is \$50, and the risk-free interest rate is 6% per annum. Set up an arbitrage strategy and calculate the profits?
15p

PART II: Theory

1. Briefly explain the following words and expressions
 - a) Financial intermediary
 - b) Par yield
 - c) Intermarket spread swap
 - d) Hazard rate
 - e) Dynamic hedging10p
2. Briefly (no more than 10 lines / answer!) answer the following questions. Remember to explain your answers!
 - a) What type of trading order might you give to your broker if you want to buy shares of a stock, but you believe that current stock price is too high given the firm's prospects. If the shares could be obtained at a price 5% lower than the current value, you would like to purchase shares for your portfolio.
 - b) The term structure of interest rates is upward sloping. Put the following in order of magnitude: The five-year zero rate, the yield on a five-year coupon-bearing bond, and the forward rate corresponding to the period between 4.75 and 5 years in the future.
 - c) Explain carefully the difference between hedging, speculation, and arbitrage.
 - d) What does it mean to assert that the delta of a call option is 0.7? How can a short position in 1,000 options be made delta neutral when the delta of each option is 0.7?
 - e) What changes to the basic Black-Scholes option pricing model is needed if you want to determine the price of a call option on a stock index like the SP 500?
20p

When answering the following two essay-type questions, start with a table of contents!

3. Collateralized debt obligations (CDO): Explain the idea of creating CDO:s and how a CDO is structured using a simple example with 3 tranches? (Hull, 8.1)
10p
4. Derivative mishaps and the lessons to be learned: what lessons are appropriate to all users of derivatives, whether they are financial or non-financial companies? (Hull ch. 35.1)
10p

$$c = S \times N(d_1) - Xe^{-rT} \times N(d_2) \quad d_1 = \frac{\ln\left(\frac{S}{X}\right) + \left(r + \frac{\sigma^2}{2}\right)T}{\sigma\sqrt{T}}$$
$$p = Xe^{-rT} \times N(-d_2) - S \times N(-d_1) \quad d_2 = d_1 - \sigma\sqrt{T}$$