Financial Derivatives 1 (NMFM531)
Homework
Due: November 5, 2018 (3:39pm CET), in paper form (not hand-written), PDF, Word or TeX format

Problem 1 A company enters into a short futures contract to sell 100 ounces of gold at the price \$1 235 per ounce. The initial margin is \$20 000 and the maintenance margin is \$5 000. What price change would lead to a margin call? Under what circumstances \$12 000 could be withdrawn from the margin account?

Problem 2 The current price of a stock is \$40 and 3-month in-the money European call option with strike price \$30 is worth \$0.6. A speculator who thinks that the price of the stock will increase is trying to decide between two strategies: buying 600 shares or buying 40 000 call options. What advice would you give? Draw the payoff charts and discuss various scenarios. How high does the stock have to rise for the option strategy to be more profitable compared to the stock strategy?

Problem 3 Consider quoted CZK 6-month (180 days), 12-month (360 days), 18-month (540 days) deposit rates are equal to 0.8%, 1.02%, 1.33% p.a. in the money market convention.

a. Calculate equivalent interest rates in continuous compounding.
b. Calculate equilibrium (non-arbitrage) rate of 12x18 FRA contract in continuous compounding.
c. Describe in detail the way how to use FRA contract when you want to lock the 6-month rate in a loan of 10 million CZK that should be settled and disbursed in 12 months.

What is the current market value of the fix-payer 12x18 FRA contract that is paying 3,6% p.a. (instead of the equilibrium rate) in the money market convention with the nominal equal to 10 million CZK? Discuss the results.

Problem 4 An investor has a portfolio of stocks worth \$12 million. The beta of the portfolio is 1.2. The investor does not expect the market to grow and would like to use the E-mini S&P 500 futures contracts to eliminate the systematic risk of the portfolio during the following six-month period.

(a) Find the current E-mini S&P 500 futures prices (www.cme.com) and propose an appropriate maturity.
(b) What position should the company take? Assume that the current short-term interest rate in USD is 0.7% p.a. and the S&P 500 dividend yield 0.6% p.a. Estimate the total outcome (profit/loss) if the S&P 500 index goes 10%, 15% up, or 10%, 15% down.
(c) Suppose that the investor changes her mind and decides to increase the beta of the portfolio to 2.1. What position in the futures contracts should she take?

Problem 5 A farmer plans to sell 450 000 bushels of corn from his storage in June 2019 on a local market. He would like to fix the prices quoted currently on the futures markets. Find the current prices on www.cme.com, propose and describe specific steps so that the farmer can use the futures prices, but avoid physical settlement on the futures market.

Remark: Please start your solutions always with a clear summary, brief and concise answer, and then continue with a more detailed explanation and/or calculation.