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Department of Economics

Examination paper for SØK2005 Financial Markets

Examination date: 28.05.2024

Examination time (from-to): 15:00 – 19:00

Permitted examination support material: C
Mathematical manual and calculator

Academic contact during examination: Snorre Lindset
        Phone:95 16 23 91

Academic contact present at the exam location: No

OTHER INFORMATION

Get an overview of the question set before you start answering the questions.

Read the questions carefully and make your own assumptions. If a question is unclear/vague, make your own assumptions and specify them in your answer. The academic person is only contacted in case of errors or insufficiencies in the question set. Address an invigilator if you suspect errors or insufficiencies. Write down the question in advance.

Hand drawings/tablet*: The questions can be answered directly in Inspera and/or on handwritten sheets or tablet.

***Hand drawings:** At the bottom of the question you will find a seven-digit code. Fill in this code in the top left corner of the sheets you wish to submit. We recommend that you do this during the exam. If you require access to the codes after the examination time ends, click "Show submission".

***Tablet:** Save the file on your computer and upload the file in the file-upload task at the end of the exam.

File upload: 15 minutes are added for file upload. The time is included in the time shown at the top left of the test, and the time is reserved for file upload.

Weighting: *Problem 1: 25%, Problem 2: 25%, Problem 3: 25%, Problem 4: 25%*

Notifications: If there is a need to send a message to the candidates during the exam (e.g. if there is an error in the question set), this will be done by sending a notification in Inspera. A dialogue box will appear. You can re-read the notification by clicking the bell icon in the top right-hand corner of the screen.

Withdrawing from the exam: If you become ill or wish to submit a blank test/withdraw from the exam for another reason, go to the menu in the top right-hand corner and click "Submit blank". This

cannot be undone, even if the test is still open.

Access to your answers: After the exam, you can find your answers in the archive in Inspera. Be aware that it may take a working day until any hand-written material is available in the archive.

1 Exam

Skriv ditt svar her

Words: 0

Maks poeng: 10

2 **File Upload**

Upload your file here if you have used the tablet

Last opp filen her. Maks én fil.

Alle filtyper er tillatt. Maksimal filstørrelse er **50 GB**.

📂 Velg fil for opplasting

Maks poeng: 10

Question 1

Attached

Exam in SØK2005 Financial markets (Spring 2024)

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

Problem 1 (25%)

You are given the following information: The risk-free interest rate $r_f = 0.04$, the standard deviation of the return on the market portfolio $\sigma_M = 0.2$, and the Sharpe-ratio of the market portfolio is $S_M = 0.3$. An investor invests a fraction a of his wealth in the market portfolio and a fraction $1 - a$ in the risk-free asset.

a) Find an expression for the standard deviation σ_p of the return on the investor's portfolio.

b) Find an expression for the investor's expected portfolio return $E[r_p]$.

The investor has utility function

$$U = E[r_p] - \frac{5}{4}\sigma_p^2.$$

c) What is the optimal fraction a^* of the investor's wealth to invest in the market portfolio?

d) Show that the investor's maximum utility $U^* = 0.082$.

Problem 2 (25%)

You are given the following forward rates:

$$f_{0,1} = 0.05, \quad f_{1,2} = 0.060024, \quad f_{2,3} = 0.070071, \quad f_{3,4} = 0.080142.$$

a) Show that the yield curve is given by

$$r_{0,1} = 0.05, \quad r_{0,2} = 0.055, \quad r_{0,3} = 0.06, \quad r_{0,4} = 0.065.$$

A four-year bond has face value 100 and pays annual coupons of 6.42.

b) Calculate the price of the bond.

c) What is the price of a four-year zero-coupon bond with face value 100?

d) Show how you can use zero-coupon bonds to synthetically construct the four-year bond.

Problem 3 (25%)

The price of stock A will either go up by a factor of $3/2$ or down by a factor $2/3$ each year. The current stock price is 90. The risk-free interest rate is 5% per year, i.e., $r_f = 0.05$.

a) Find the current value of a European at-the-money call option maturing in two years.

b) Find the value of the corresponding European put option.

c) What is the value of the corresponding American put option?

Problem 4 (25%)

The expected return on the market portfolio is $E[r_M] = 0.09$ and the risk-free interest rate $r_f = 0.05$. The standard deviation of the return on the market portfolio is $\sigma_M = 0.2$. The standard deviation of the returns on stock A is $\sigma_A = 0.4$, while the correlation between the two returns is $\rho = 0.625$. Firm A expects earnings next year of $E_1 = 100$. It retains 25% of its earnings and expects a return on equity (ROE) of 20%.

Calculate the value of firm A's growth opportunities (PVGO).