vrije Universiteit amsterdam

Exam Version: 1

School of Business and Economics

Exam:	Investments
Code:	E_EBE3_INVES
Examinator:	Teodor Dyakov
Co-reader:	Arjen Siegmann
Date:	July 02, 2020
Time:	14:00
Duration:	105 minutes
Calculator allowed:	**Yes**
Graphical calculator allowed:	**Yes**
Scrap paper	**Yes**
Open book	**Yes**
Number of questions:	3, each with subquestions
Type of questions:	Open
Answer in:	English

Remarks: Please submit your assignment by filling in ***Exam_Retake_Template.xlsx*** and uploading it on Canvas. In the spreadsheet, please only fill in the required cells, which are formatted in YELLOW. Do not change any other parts of the document. Importantly, please insert numbers using a dot as the decimal separator and without a separator for the thousands. For instance, 3.12 and 1000.56 are OK but 3,13 and 1,000.56 are not. Every question below stipulates how numbers should be reported, i.e. the number of decimals you should use. The maximum amount of points for the exam is 4. Please note that Canvas is set not to accept any submissions after the deadline.

Credit score:	4 (40% of your total grade)
Grades:	The grades will be made public latest on: July 15
Inspection:	Via an online appointment.
Number of pages:	4 (including front page)

Good luck!

Question 1: Portfolio Construction and Asset Pricing (1.7 points)

Part a. 0.4 points

You are a constructing an optimal portfolio of risky assets, which at a later stage you are going to combine with the risk-free asset. You use the insights from the Markowitz portfolio selection model for this task.

i) Do the weights of the risky assets in the portfolio of risky assets depend on your risk aversion? Explain.

ii) In order to decide how much to invest in the risky portfolio and how much in the risk-free asset, you construct an indifference curve. Explain how an increase in the risk-aversion affects the indifference curve. Would this change lead to a higher or lower weight in the optinal portfolio of risky assets?

Part b. 0.5 points

Consider the multifactor APT. There are two independent economic factors, F1 and F2.The risk-free rate of return is 2%. The following information is available about two well-diversified portfolios A and B:

Portfolio	beta on F1	beta on F2
A	0.2	0.8
B	0	1

In addition, the following information is available for the two independent risk factors F1 and F2

Factors	Expected return	Variance
F1	5%	8%
F2	6%	9%

i) Assuming no arbitrage opportunities exist, calculate the expected return of the two portfolios A and B

ii) Construct a portfolio of A and B that has exposure of 0.9 to F2. What are the weights of the two portfolios A and B? What is the exposure to F1 of the newly created portfolio?

Part c. 0.4 points

High book-to-market stocks typically outperform low book-to-market stocks. Why isn't the CAPM able to explain this outperformance? Explain.

Part d. 0.4 points

The Efficient Market Hypothesis states that stock prices are not predictable and that they reflect all publicly available information. Why are then so many resources spent by investors into predicting returns? Can markets be efficient while at the same time huge resources are spent by sophisticated investors researching publicly traded companies?

Question 2: Fixed Income (1.0 points)

Part a. 0.4 points

Consider the data on the following two coupon bonds:

Bond	Maturity	Coupon	Yield	Face Value
A	2	6%	4%	1000
B	3	7%	8%	1000

Note that maturity is expressed in years. Further assume that coupons are paid annually. Compute the prices, duration and the modified duration of the two bonds.

Part b. 0.4 points

Continue using the same data from Q2a. Construct a portfolio that is long 3 bonds A and long 5 bonds B. Compute the weights of bonds A and B in the portfolio, as well as the portfolio duration and modified duration.

Part c. 0.2 points

There are two main theories used to explain the shape of the term structure. How does the liquidity premium differ, according to the two theories?

Question 3: Derivatives (1.3 points)

Part a. 0.5 points

Bitterballen Corporation currently trades at a price of S0 per share. Consider the binomial tree for the evolution of the stock price of Bitterballen Corporation over the period of 12 months, assuming two steps (t=0, t=1, t=2). The semi-annual risk free rate is denoted by rf, and the price of Bitterballen Corporation can increase or decrease each period. The periodic percentage increase and decrease are denoted by up and down, respectively. Bitterballen Corporation does not pay dividends. Below is a your data:

S0	40.00
rf (semi-annual)	2.00%
up	5.00%
down	-3.00%

i) Construct the binomial tree for (t=0, t=1, t=2).

ii) Calculate the risk-neutral probabilities of an upward movement and that of a downward movement. Express the probabilities as numbers to 2 decimals (i.e. 0.20 and not 20%).

ii) You think that the price of Bitterballen Corporation is going to increase in the future. You want to take a bet on that prediction, and thus consider buying an at the money European call option that matures in 1 year. Calculate the option's premium.

Part b. 0.4 points

Suppose you are holding a put option on a non-dividend paying stock. You receive news that the risk-free rate of investment has increased. How does the value of the put option change in response to this news? Explain.

Part c. 0.4 points

What is a SWAP contract? Explain in your own words and provide a simple example.