School of Business and Economics

Exam: Finance (resit 2)
Code: E_IBA2_FIN

Examinator: Dr. M.B.J. Schauten
Co-reader: Prof. Dr. M.J. van den Assem

Date: 2 July 2021
Time: 9.00-11.00 hrs
Duration: 2 hours

Calculator allowed: yes
Graphical calculator allowed: no
Scrap paper allowed: yes
Open book exam: no

Type of questions: 16 multiple choice and 3 open questions
Answer in: English

Remarks:
Answer the **multiple choice questions** by filling the corresponding box. For each question, only one answer is correct (a, b, c or d). Answer all questions (giving no answer = giving a wrong answer). The answers to the **open questions** should be written in the space below the open questions. Numbers are in European (Dutch) format with decimal commas, and dots separating thousands (e.g. 1.234.567,89).

If you have to show a calculation when answering an open question, use "SQRT" followed by the number for the square root of that number (e.g. SQRT(4) for the square root of 4). For an exponent, use the "^" character followed by the exponent (e.g. 3^2 for 3 to the power 2). For multiplication use "×" or “*” and for dividing use ":" or "/". For addition and subtraction use "+" and "-" as usual. It is also allowed to describe your computation in words.

Credit score:
The maximum score for the mc questions is 72 points. To determine the score we take into account the expected number of correct answers when answers are given randomly. The maximum score for the open questions is 18 points. The final grade for this exam is: [total number of points + 10] / 10.

Grades:
At the latest the grades will be made public on 16 July March 2021

Inspection: tba

By taking this exam, you confirm that:
- You are the student who should participate in this exam;
- You will make this exam individually, without assistance of others, without using prohibited resources, as stipulated in the exam instructions and the SBE Regulations and Guidelines;
- You will adhere to academic standards and conduct, throughout the exam.

If you have **not** signed up for this exam, you will not receive a result. Through VUweb you can object to the fact that you can no longer sign up after the expiry of the registration deadline (and the fact that you will not receive a result for this exam). Submit your appeal online within one week after the exam. More information can be found at www.vu.nl/intekenen.

Part A: MC Questions (72 points)

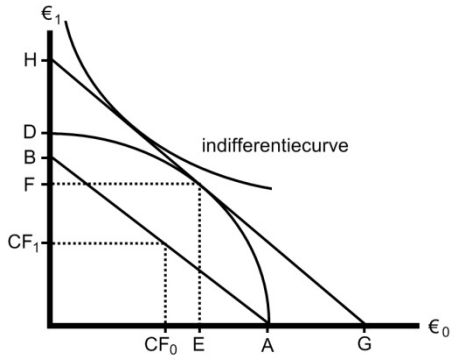
Number of points mc questions = (number of correctly answered questions – 4) × 6

1.
Assume a world according to the Hirshleifer model. Jelle's income at t = 0 and t = 1 is €80,00 (CF_0) and €45,90 (CF_1) respectively. At t = 0 Jelle borrows €30,00 and at t = 1 he pays €0,60 in interest. At t = 0 Jelle invests €60,00 in real investment projects. The proceeds of the real investment projects are €76,50 at t = 1.

Question: Jelle's consumption at t = 0 (C_0) and at t = 1 (C_1) is

a. €50,00 and €91,80 respectively.
b. €50,00 and €15,30 respectively.
c. €20,00 and €91,80 respectively.
d. €20,00 and €15,30 respectively.

2.
Assume a world according to the Hirshleifer model. Maximilien's income at t = 0 is €160,00 (CF_0) and at t = 1 his income is €142,80 (CF_1). At t = 0, Maximilien invests €75,00 in real investment projects (EA). At t = 0 Maximilien consumes his total wealth (C_0 = OG). The risk-free interest rate is 2,00%. The net present value of the real investment projects is €40,00 (AG). Consider the figure below (not drawn to scale).



Question: The amount Maximilien borrows at t = 0 is closest to

a. €250
b. €255
c. €260
d. €265

3.

Assume a perfect capital market. In this world there is no capital rationing. In the immediate vicinity of the Vrije Universiteit Amsterdam there is a piece of land on which a project is to be developed. One of the following mutually exclusive projects is being considered. The table below shows for each project the investment outlay at t = 0, the expected cash flow at t = 1 and the expected perpetual annual growth rate of the cash flow (g) and the internal rate of return (IRR). The cost of capital for each of the projects is 6,00%. When selecting one of the projects, value creation is the selection criterion.

Project	Investment at t = 0	Expected cash flow at t = 1	g	IRR
Mini Aktion	€ 600.000	€ 65.000	2,00%	12,83%
Convenience store	€ 1.325.000	€ 80.000	4,00%	10,04%
Sushi restaurant	€ 400.000	€ 60.000	4,00%	19,00%
Theatre	€ 1.800.000	€ 110.000	5,00%	11,11%

Question: If a choice has to be made from one of the four projects, then the following project will be chosen:

a. Mini Aktion
b. Convenience store
c. Sushi restaurant
d. Theatre

4.
Assume a perfect capital market. Consider an investment project that requires €150.000 (at t = 0) and is expected to generate a cash flow of €25.000 at t = 1 and €15.000 at t = 2. The cash flow increases annually by 4,00% starting at t = 2 (the cash flow at t = 3 is €15.000 × 1,04 etc.). The required rate of return is 10,00%.

Question: The net present value and the internal rate of return (IRR) of the project are closest to

a. €100.000 and 12,2479% respectively.
b. €100.000 and 14,2479% respectively.
c. €122.727 and 12,2479% respectively.
d. €122.727 and 14,2479% respectively.

5.

For project SPACSTAR, the expected cash flows in euros before tax are shown in the table below. The applicable corporate tax rate is 15%. Ignore other taxes and inflation. The investment outlay (at t = 0) for project SPACSTAR is €500 and is depreciated to zero over 2 years using the straight-line method. The internal rate of return (IRR) of the project is 24,37% and the cost of capital is 10,00%.

Table 1: Expected cash flows before tax in euro's

CF_t	**Project SPACSTAR**
CF_0	– 500,00
CF_1	250,00
CF_2	500,00

Question: The net present value of the project is closest to

a. - €90
b. - €100
c. €110
d. €120

6.

Assume an efficient capital market. The nominal value of both bond A and bond B is €1.000. Both bonds are free of default risk. It is also given that the forward rate for year two is 3,00% ($_1f_2$ = 3,00%) and that the forward rate for year three is 4,00% ($_2f_3$ = 4,00%).

The following data of bonds A and B are known:

Bond	Maturity	Coupon	Price
A	1 year	2,00%	€1.000,00
B	3 year	2,00%	?

Question: The price of bond B is closest to:

a. €964
b. €968
c. €972
d. €976

7.

Assume a perfect capital market. In this market, bonds issued by the company T-Travel are traded. The nominal value per bond is €1.000, the remaining maturity is 1 year and the coupon is 0,00%. Given the probability of default, investors assume an expected cash flow at t = 1 of €520 per bond. The one-year spot rate (r_1) is 2,00%. At t = 0, the price of a T-bond is €400,00.

Question: The yield to maturity of the bond described above is closest to

a. 28%
b. 30%
c. 150%
d. 180%

8.

Assume a perfect asset market under certainty. The following information is given about company A:

	A
Price per share at t = 0	€250,00
Dividend pay-out ratio (constant)	50%
Earnings per share at t = 1 (EPS_1)	€10,00
Annual growth rate EPS	?
Return on new investments ('roni')	?

The applicable discount rate is 12,0%. The dividend pay-out ratio, the earnings per share growth rate and the return on new investments ('roni') remain constant. The company is fully financed with equity.

Question: The 'roni' of company A is closest to

a. 8%
b. 10%
c. 15%
d. 20%

9.
Assume a semi-strong efficient capital market. Company RAFTA expects earnings per share (EPS_1) of €10,00 for the coming year. The dividend payout ratio is 100%, the expected growth of the EPS and the dividend is 0%, and the current share price is €100,00 (= old situation).

Now suppose that RAFTA unexpectedly announces at t = 0 that it will reduce its payout ratio from 100% to 60% from t = 1 onwards and that it will use the retained earnings to expand, and that the return on new investments is 10% (roni = 10%). The cost of capital is not affected by the expansion investments (r old situation = r new situation). Assume further that the new payout ratio, the new growth rate, the roni and the cost of capital remain constant over time.

Question: When RAFTA announces the change in dividend policy and investment policy ...

a. the price per share increases from €100 to €110.
b. the price per share increases from €100 to €115.
c. the price per share decreases from €100 tot €90.
d. the price per share remains the same.

10.
Consider a world in which the assumptions of the portfolio theory hold. For securities A and B the following table shows the probabilities and corresponding returns for 3 different states of the world:

State of the world	Probability	Return A	Return B
1	25%	4%	12%
2	50%	10%	10%
3	25%	16%	8%

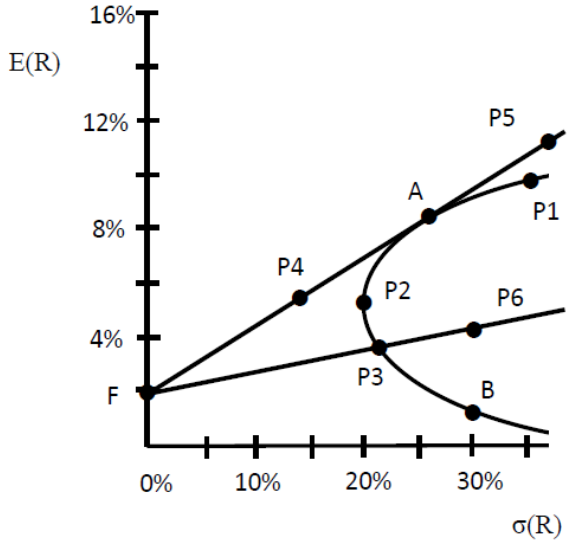
The variance of the returns of A and B is 0,00180 and 0,00020 respectively. The expected return of both A and B is 10,00%.

Question: The correlation coefficient between the returns of A and B is closest to

a. -1,0
b. -0,75
c. -0,25
d. 0,0

11.

Consider a world where the assumptions of portfolio theory hold. In this world, only two risk-bearing securities A and B are traded, as presented in the figure below. Short-selling is allowed. In this world the curve through P1, A, P2, P3 and B represents the minimum-risk frontier of the risk-bearing securities. It is possible to borrow and lend against the risk-free rate F of 2%.



Question: Which of the following statements is **false**?

a. P3 consists of long positions in both A and B.
b. The Sharpe ratio of P4 is equal to the Sharpe ratio of P5.
c. P6 consists of a short position in F and long positions in both A and B.
d. Portfolios on line segment F-P3 cannot be composed.

12.
Assume a world in which the assumptions of the CAPM hold. In this world, in addition to a risk-free investment object F with a 2,00% return, only the three risk-bearing investment objects A, B and C are traded. The following is known about these securities:

Security	A	B	C
E(R)	5,00%	14,00%	15,00%
Number of outstanding shares	40.000	20.000	400.000
Standard deviation return	14,00%	17,00%	?
Price per share at t = 0	€50,00	€30,00	€6,00

Investor X, operating optimally in this world, has a wealth of €200,000. Investor X borrows €60.000 at 2,00% and goes long for €140.000 in market portfolio M. The risk of M expressed as the standard deviation of the return is 20,00%.

Question: Which of the following statements is **false**?

a. The number of shares A in the optimal portfolio for X is 1.120.
b. The expected return of the optimal portfolio for X is 8,22%.
c. The risk of the optimal portfolio for X, expressed as the standard deviation of the return, is 14%.
d. The Sharpe ratio of the optimal portfolio for X cannot be calculated on the basis of the data provided.

13.
Consider a world in which the assumptions of the CAPM hold. The covariance of the returns of security A with those of market portfolio M is 0,03. The standard deviation of the return of A is 30,00% and of M 20,00%. The expected return of M is 9,00% and the risk-free interest rate is 2,00%.

Question: Which of the following statements is **false**?

a. The correlation coefficient between the returns of A and M is 0,5.
b. The unique risk of A expressed as the standard deviation of the return is 15%.
c. The systematic risk of A expressed as the standard deviation of the return is 0,5 × 30%.
d. The expected return of A is 8,75%.

14.
Assume a perfect capital market. Company DSN has two different divisions. One of the divisions is engaged in the production of plastics. For this division (FANTASTIC-PLASTICS division), the management of DSN wants to determine the cost of capital by using data for the comparable listed firm SUNNY-FABRICS.

SUNNY-FABRICS is a company engaged in the same type of activities as the FANTASTIC-PLASTICS division of DSN. Unlike DSN, SUNNY-FABRICS is fully financed with equity. SUNNY-FABRICS also has a considerable amount of surplus cash which is invested risk-free. The amount is 40% of the market value of the equity. The beta of the equity of SUNNY-FABRICS is 1.2.

DSN is 50% financed with equity and 50% financed with debt. The market value of both the equity and debt of DSN amounts to €4 billion. The required return by the debtholders (R_D) is 4,00%. DSN does not have any surplus cash at its disposal.

The market risk premium (MRP) is 8,00%. The risk-free interest rate is 2,00%.

Question: The cost of capital for the FANTASTIC PLASTICS division of DSN is closest to:

a. 16%
b. 18%
c. 20%
d. 22%

15.

Question: Which of the following statements is **true**?

a. If the capital market is efficient in the weak form of the EMH, shares that have generated positive abnormal returns in the recent past will continue to do so in the near future.
b. If the capital market is efficient in the semi-strong form of the EMH, announcements by companies regarding expected earnings for the coming year will never lead to price adjustments.
c. A capital market that is efficient in the strong form of the EMH is also efficient in the semi-strong form.
d. In a capital market that is efficient in the strong form of the EMH, diversification to reduce unique risk does not make sense.

16.
Company B wants to acquire company T. The market value of B as a stand-alone entity is €600 million. The market value of T as a stand-alone entity is €450 million. Company B is financed for €400 million with debt, company T for €100 million.

Table: Data of enterprises B and T as separate firms

	Firm B	Firm T
Market value equity	€200 million	€350 million
Market value debt	€400 million	€100 million
Total value firm	€600 million	€450 million

The acquisition of T by B is fully financed by the issue of new B shares. The synergy from the acquisition of T by B is €40 million. The merger of the two companies reduces the risk for the lenders of both B and T. As a result, the market value of B's debt increases from €400 million to €404 million and the market value of T's debt from €100 million to €103 million. Immediately after the acquisition, the interest of T's shareholders in B's equity equals 65%. The interest of B's shareholders in company B decreases from 100% immediately before the acquisition to 35% immediately after the acquisition.

Question: The net present value of the acquisition for the shareholders of T is closest to:

a. €27 million
b. €29 million
c. €31 million
d. €33 million

On the following pages is part B: the open questions.

Part B: Open questions (18 points)

17. (6 points)
Assume a perfect and efficient capital market. In this market, bonds and shares issued by company KPNN are traded. The nominal value per bond is €1.000, the remaining maturity is 1 year and the coupon is 6,00%. The probability of default is 20,00%. In the event of default, the payment to bondholders is only €800 per bond. The one-year spot rate (r_1) is 2,00%. The term structure of interest rates is flat. The risk premium for KPNN bonds is 4,00%.

The expected dividend per KPNN share at t = 1 is €10,00. The beta of KPNN's equity is 1,20 and the market risk premium is 7,00%. The expected perpetual growth of the dividend is 2,00% per year.

Questions:
a. Calculate the price of one bond KPNN in euros and show your calculations. (3 points)
b. Calculate the price of one share KPNN in euros and show your calculations. (3 points)

18. (6 points)

Consider a world in which the assumptions of portfolio theory hold. Assume there are only the two securities A and B. The returns of these securities are given:

	A	B
E(R)	20,0%	10,0%
σ(R)	35,0%	17,5%

The correlation coefficient between the returns of A and B is 1,00.

Questions:

a. Calculate the expected return of the portfolio with the lowest risk. Round your answer to two decimals (e.g. 1,23%). It is not necessary to show your calculations. (4 points)

b. Calculate the risk expressed as the standard deviation of its return for a portfolio consisting of a long position of €1.500 in A and a short position of €500 in B. Round your answer to two decimals (e.g. 1,23%). It is not necessary to show your calculations. (2 points)

19. (6 points)

Cornelis Breweries N.V. wants to launch the product ‘WiseBright’ on the market in the Netherlands. The product will first be launched on the market experimentally for two years in the province of Utrecht. This will involve an initial investment of €50.000 (at t = 0). This phase will not entail any cash flows but will make the consumer's wishes clear. Apart from the initial outlay, the net cash flow in years 1 and 2 is zero.

The probability of sufficient demand is estimated at 80 per cent. In that case, Cornelis Breweries will spend €250.000 immediately after year 2 (at t = 2) to market the product nationwide. The expected cash flow then is €40.000 at t = 3 and €60.000 at t = 4. The expected cash flow is expected to increase annually by 4,00% from t = 4 onwards. The expected cash flow at t = 5 for example is €60.000 × 1,04. If demand proves insufficient after the experimental phase, ‘WiseBright’ will be withdrawn from the market and not marketed nationwide. The net cash flow after year 2 will then remain to be zero.

The risk of the project is high during the first two years. If the product proves successful, the risk drops significantly. The CFO of Cornelis Breweries assumes a required rate of return of 20% for both years 1 and 2, and 10% annually from year 3 onwards - provided the project proves successful.

Questions:

a. Calculate the net present value of the project at t = 2 under the assumption that the demand for the product during the experimental period is sufficient. Round your answer whole euros and show your calculations. (4 points)

b. Calculate the net present value of the project at t = 0. Round your answer to whole euros and show your calculations. (2 points)