Corporate Finance Exercises Example Summary

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Preface

Dear student,

You are now reading the Corporate Finance Exercises Summary for the study of International Business Administration. Slim Academy made many practice questions and a practice exam to prepare you for your exam, so that you may study in the best possible way. We would like to wish you good luck with studying!

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We would like to wish you good luck with studying and passing your exams!

Team Slim Academy

P.S. This summary is written in accordance with the author's own perception. It is still a summary that serves as an addition to the mandatory literature, not as a replacement!

STAR Event Calendar

Here is a calendar of all upcoming events at STAR. Go to https://rsmstar.nl/ for more info.

Table of Contents

Information About the Course

You are about to read the summary of one of the most feared courses in the International Business Administration curriculum. The reason is that the content is quite a lot to study, and because this course requires quite a bit of 'financial intuition'. But don't worry, we have written this summary with the aim of helping you through this course. Several top students, who have recently taken this course, have shared their expertise and worked on this summary to help you with the things most students struggle with when studying Corporate Finance.

Weekly overview

Week	Topic	Chapter / Lecture
1	Risk, Cost of Capital & Capital Budgeting	Ch. 12 Lecture 1 & 2 Workshop 1
2	Capital Structure I	Ch. 18 Lecture 3 & 4 Workshop 2
3	Capital Structure II	Ch. 18, 19 Lecture 5 & 6 Workshop 3
4	Dividend Policy	Ch. 21 Lecture 7 & 8 Workshop 4
5	Valuation for Levered Firms	Ch. 20 Lecture 9 & 10 Workshop 5
6	Corporate Finance and Options	Ch. 22 Lecture 11 & 12 Workshop 6
7	Short-term Finance	Ch. 13, 26 Lecture 13 & 14 Workshop 7

Source: SlimAcademy, 2022.

The exam
Your final mark for this course consists of one part: the final exam (100%).

The exam has open numerical and open theoretical questions. This eliminates the guessing factor. In order to pass the course, you must receive at least a 5.5.

There is an optional opportunity of gaining a 1.0 bonus point on top of the final grade (in case the exam was passed with at least 5.5).

This can be achieved by completing at least 6 out of the 7 weekly bonus assignments before the deadline. Bonus tests cannot be retaken, and the bonus point is valid for both the first and the resit exam. The bonus point is only valid for the current academic year.

What is the best way to study?
Practising is the key to a good grade for this exam. Because there are many ways in this course to ask questions, with many possible variations, you should try to make as many practice questions as possible so that you can train your financial intuition. This way you can answer the more complicated questions of the exam. Also make sure you understand the theory well, since 50% of your grade depends on your knowledge of that.

You will find these exercises in this booklet, in the seminars and on the online 'Connect' course. You can purchase the code with a book, or separately online. Do not worry if you do not have a code, because we have already included many exercises in this summary, so that you can practice sufficiently. However, it is highly recommended if you are struggling with this subject and want to practice even more.

Format of the summary
Our summary for this course consists of 3 parts: Corporate Finance Part 1 and Part 2 contain the summaries of the mandatory literature and the lectures. Additionally, there is an exercise booklet that allows you to practice the material. We ensured that we published the summary from the literature as early as possible at the start of the block. This way, you can prepare your lectures and start studying on time. This exercise booklet aims to prepare you for the exam as early as possible.

Good luck with studying!

Week 6: Corporate Finance and Options

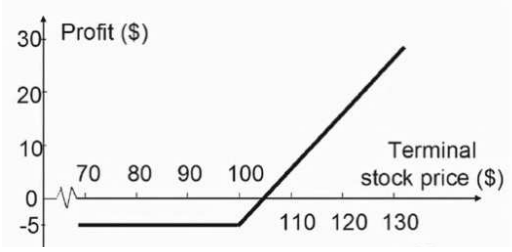
Option pay-off

1. Buying a call option (long call)

Imagine you *go long on a call option* for a share of eBay. The option has a strike price of $100 and expires in 2 months. The option contract costs $5. Your pay-off from the option on the day of expiry will look as follows:

- If on the expiration day, eBay's shares are traded for less than $100, you choose not to exercise your call option, since you can buy the stock for less than $100 in the market. You make a loss of $5;
- If on the expiration day, eBay's shares are traded at exactly $105, you are indifferent between exercising the option or buying directly from the stock market;
- If the share price on the expiration date is higher than $105, you choose to exercise the option and sell the stock at the current market price. Your profit will be S_T - $105. S_T is the stock price at expiration. You will make a profit if S_T is more than $105.

Figure 6.1: Long Call



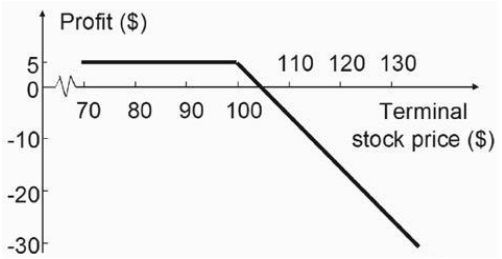
Lecture 8, Slide 12 - Florian Madertoner, 2020.

2. Selling a call option (short call)

Imagine you *go short on (write) the same call option* of the share of eBay. The option has a strike price of $100 and expires in 2 months. You sold the option contract for $5. Your pay-off from the option on the expiration date will look as follows:

- If on the expiration day, eBay's shares are traded for < $100, the buyer chooses not to exercise the call option, since they can buy the stock for less than $100 in the market. You make a profit of $5;
- If the share price on the expiration date is higher than $100, the buyer will choose to exercise the option, and you will have to buy the stock at the market price, and sell it for $100. Your profit would then be $100+$5-S_T. You will have a loss if S_T is more than $105.

Figure 6.2: Short Call

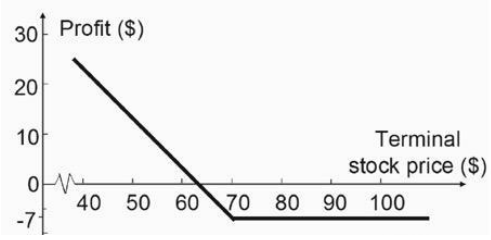


Lecture 8, Slide 14 - Florian Madertoner, 2020.

3. Buying a put option (long put)
Imagine you *go long on a put option* of a share of IBM. The option has a strike price of $70 and expires in 2 months. The option contract costs $7. Your pay-off from the option on the day of expiry will look as follows:

- If on the expiration day, IBM's shares are traded for < $70, you choose to exercise your option, since you can sell the stock for $70 to the counterparty. You make profit of $63 - S_T;
- If the share price on the expiration date is higher than $70, you choose not to exercise the option, since you can sell the shares of IBM in the market for more than $70. You make a loss of $7. You make a profit if S_T is less than $63.

Figure 6.3: Long Put

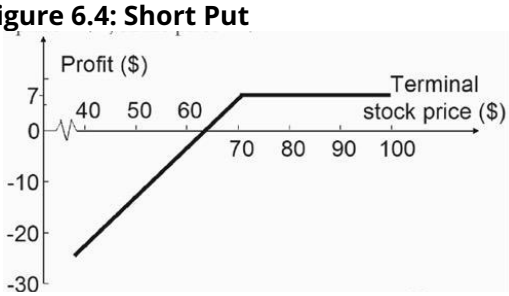


Lecture 8, Slide 16 - Florian Madertoner, 2020.

4. Selling a put option (short put)
Imagine you *go short on (write) the same put option* of the share of IBM. The option has a strike price of $70 and expires in 2 months. You sold the option contract for $7. Your pay-off from the option on the day of expiration will look as follows:

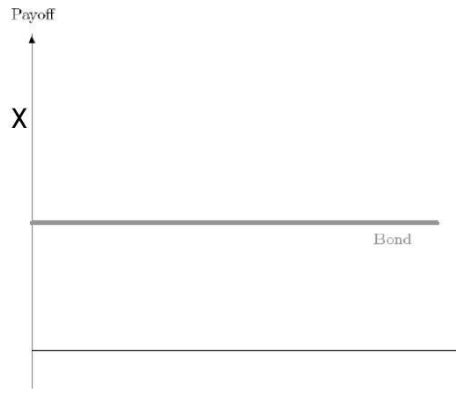
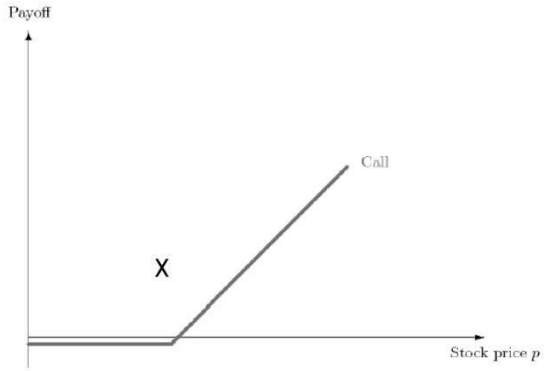
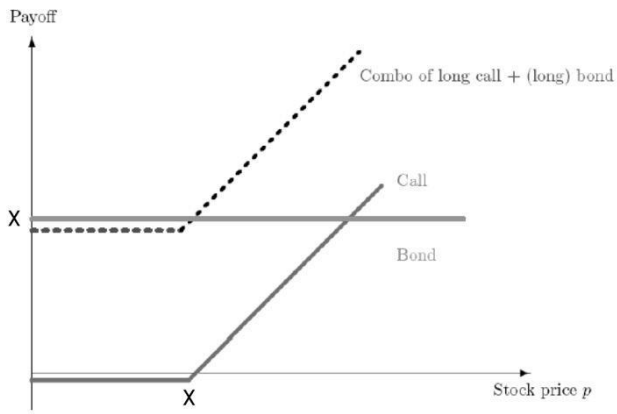
- If on the expiration day, IBM's shares are traded for less than $70, the buyer chooses to exercise the option. You have to pay $70 to buy the IBM share from the buyer, while it is trading for less than $70 in the market. Your profit would be $7+$S_T$ -$70
- If the share price on the expiration date is higher than $70, the buyer chooses not to exercise the option, since he can sell the shares of IBM in the market for more than $70. You make a profit of $7.

Figure 6.4: Short Put

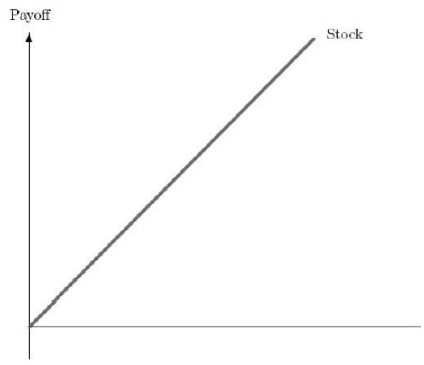
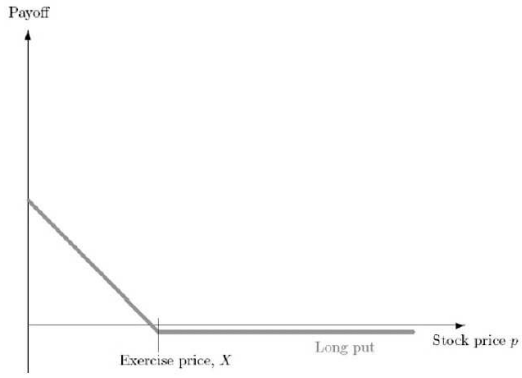


Lecture 8, Slide 18 - Florian Madertoner, 2020.

Combined payoff from holding one bond + one call option

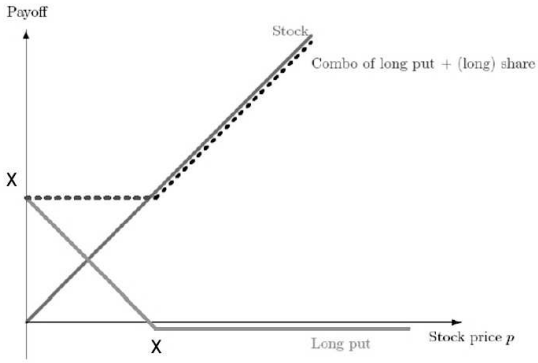
Long position in a bond	**Long position in a call**
For the bond, we will get a fixed payment: • $R_D \times D$; • When investing sum $\frac{x}{(1+r_f)^t}$, you will receive the following in t periods from now: $\frac{x}{(1+r_f)^t} * (1 + r_f)^t = x$; • Here, r_f is the periodic risk-free rate.	For the call, we will receive money if the price of the underlying is above the agreed exercise price. However, if the price of the underlying decreases below the strike price, we will not receive any profit, so the call expires worthless.
Figure 6.5: Long position in a bond  *Lecture 8, Slide 35 - Florian Madertoner, 2020.*	**Figure 6.6: Long position in a call**  *Lecture 8, Slide 35 - Florian Madertoner, 2020.*
The combined pay-off from the long position in a bond and long position in a call. **Figure 6.7: Long position in a bond and a call**  *Lecture 8, Slide 36 - Florian Madertoner, 2020.*	

Combined payoff from holding stock + put option

Long position in a stock	**Long position in a put**
The pay-off function for the share (or underlying) will be a linear function (in a 45° angle). ● The reason is that the underlying rises for every increment that the value of the underlying rises in the marketplace.	When the price of the underlying drops below the agreed strike price, the put becomes more valuable. However, in the marketplace, the underlying is worthless.
Figure 6.8: Long position in a stock  *Lecture 8, Slide 38 - Florian Madertoner, 2020.*	**Figure 6.9: Long position in a put**  *Lecture 8, Slide 38 - Florian Madertoner, 2020.*

The combined payoffs from the long position in a stock and the long position in a put

Figure 6.10: Long position in a put and a stock



Lecture 8, Slide 39 - Florian Madertoner, 2020.

Example
Using the put-call parity to calculate the price of a put option on the ING stock (which expires in May 2014), with a strike price of €10.

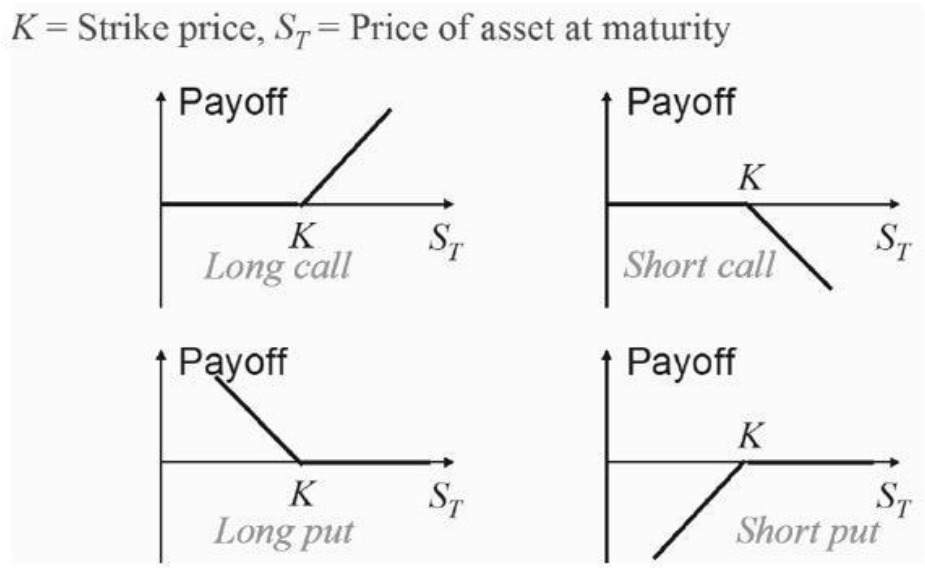
- $S(t) + P(t) = C(t) + Xe^{-r_f t}$;
  - Where $S(t) = €10.26$;
  - $C(t) = €0.46$;
  - $X = €10$;
  - $r_f = 0.025$.
- $€10.26 + P(t) = €0.46 + €10.00 \times e^{(-6.85*10^{-5}*14)}$;
- $P(t) = €0.19$.

Note: The value we calculated for the put option using the put-call parity (€0.19) is different to the one observed on the Euronext website (€0.15).

Why is this so?
- The put-call parity holds for European options only, however, the options were "American" options;
- The numbers were always rounded;
- The proper pricing might be hampered by a few cents due to transaction costs.

Summary of option payoffs
Hence, assuming a price of the option contract of €0, the following figure summarises all 4 concepts again.

Figure 6.11: Summary Pay-off Strategies



Source: Madertoner, 2019.

Practice Questions Week 6

Practice Question 1
What is the difference between a put and call option?

Practice Question 2
Call and put options of the company Oven Mitt stocks are traded on financial exchanges. Arbitrage is ruled out. The share price is $25 and the interest rate is 5%. The premium of the call option is $14 and the premium of the put option is $10, both with maturity of one year. Determine the present value of the exercise price.

Practice Question 3
The shares of the Company Pyjamas are selling for $125. Both the call and put option have a maturity of one year and a strike price of $125. The call option sells for $12 and the put for $7. Determine the risk-free rate.

Practice Question 4
Shares of Company Dutch are sold for $18. The call option you want to buy expires in three months and has a price of $12. Determine the minimum price you need to pay in order to buy this option today.

Practice Question 5
Company B has been approached to sell up to 6 million litres of petrol in three months at a price of $1.65 per litre. Petrol is currently selling on the wholesale market at $1.45 per litre and has a standard deviation of 43%. Calculate the value of the call in the upward movement.

Practice Question 6
What does risk neutrality mean?

Practice Question 7
A CEO has been granted 2 million executive share options. The share price was €39.71 and the options are at the money (Recall: at the money means that the exercise price is equal to the share price). The risk-free rate is 5% and the options expire in 5 years. The variance of the shares is 4.7%. Determine the market value of the options.

Practice Question 8
Company Butter has been approached to sell up to 2.6 million litres of petrol in three months at a price of €2.60 per litre. Petrol is currently selling on the wholesale market at €2.50 per litre and has a standard deviation of 56%. If the risk-free rate is 5.1%, what is the value of this option?

Practice Questions Week 6: Answers

Practice Question 1

A call option gives the owner the right to buy an asset during a particular period for a predetermined price (exercise price). A put option gives the holder the right to sell the share for a fixed exercise price. Both options give a buyer the right to do something, not the obligation.

Practice Question 2

Use the put-call parity to solve this question:

Price of underlying equity = price of call - price of put + present value of exercise price
25 = 14 - 10 + Present value of exercise price
→ Present value of exercise price = $21

Practice Question 3

Use the put-call parity:

Price of underlying equity = price of call - price of put + present value of exercise price
125 = 12 - 7 + present value of exercise price
→ present value of exercise price = $120

Because the present value of $125 strike price is $120, the implied risk-free rate is $\frac{(125-120)}{120} = 4.17\%$.

Practice Question 4

The price of the call option would rise until it is at least $6 ($current\ share\ price\ -\ exercise\ price$). The lower bound for the price or value of the call option prior to expiration is $6.

Practice Question 5

In the binomial model, the number of periods (n) and the standard deviation (σ) imply a certain percentage increase in the underlying:

$$u = e^{\sigma/\sqrt{n}} = e^{0.43/\sqrt{12/3}} = 1.2399$$
$$d = \frac{1}{u} = \frac{1}{1.2399} = 0.8065$$

$$S_{1U} = 1.2399 * 1.45 = \$1.80$$
$$S_{1D} = 0.8065 * 1.45 = \$1.17$$

The value of our call in the upward movement is $\$1.80 - \$1.17 = \$0.63$.

Practice Question 6

Risk neutral individuals are indifferent to risk. Hence, the expected return on all securities is the risk-free rate.

Practice Question 7

S = 39.71
E = 39.71
R = 0.05
$\sigma^2 = 0.047$
t = 5

$$d_1 = \frac{\ln ln\left(\frac{S}{E}\right) + \left(R + \frac{\sigma^2}{2}\right)t}{\sqrt{\sigma^2 t}} = \frac{\ln ln\left(\frac{39.71}{39.71}\right) + \left(0.05 + \frac{0.047}{2}\right)*5}{\sqrt{0.047*5}} = 0.7581$$

$$d_2 = d_1 - \sqrt{\sigma^2 t} = 0.758 - \sqrt{0.047 * 5} = 0.2733$$

$N(d_1) = N(0.758) \approx 0.7764$
$N(d_2) = N(0.273) \approx 0.6064$

$$C = S * N(d_1) - E * e^{-Rt} * N(d_2) = €39.71 * 0.7764 - €39.71 * e^{-0.05*5} * 0.6064 \approx €12.($$

Practice Question 8

Since the contract is to sell up to 2.6 million litres, it is a call option.
Step 1: Find the values for u and d:

$u = e^{\sigma/\sqrt{n}} = e^{0.56/\sqrt{12/3}} = 1.3231$
$d = \frac{1}{u} = \frac{1}{1.3231} = 0.7558$

Step 2: Calculate the gas price and the value of the option:
Now we know that the gas price will either increase by 32.31% or fall by 0.2442% ($1 - 0.7558$).
We can calculate the gas price in the upper and down state:

$S_{1U} = 1.3231 * €2.50 = €3.31$
$S_{1D} = 0.7558 * €2.50 = €1.89$

The option is worthless if the price decreases. If the price increases, the value of the option per gallon is:

$Value\ of\ the\ option = €3.31 - €2.60 = €0.71$

Step 3: Find the risk neutral probability of a price increase or decrease:
$Risk - free\ rate = Probability\ of\ rise * return\ of\ rise + (1 - probability\ of\ rise) * return\ of\ fa$
$\frac{0.051}{\frac{12}{3}} = Probability\ of\ rise * 0.3231 + (1 - probability\ of\ rise) * - 0.2442$
$Probability\ of\ rise = 0.4529$

The probability of a decrease is $1 - 0.4529 = 0.5471$

The contract will not be exercised if the petrol prices fall, so the value of the contract with a price decrease is 0. So, the value per gallon of the call-option contract will be:

$$C = \frac{0.4529 * €0.71 + 0.5471 * 0}{1 + \frac{0.051}{\frac{12}{3}}} = €0.3175$$

The value of the entire contract will be:
$Value\ of\ entire\ contract = €0.3175 * 2,600,000 = €825,500$

Practice Exam

MC Question 1
What is the CAPM return on a stock with a beta of 1.8, given that the risk-free rate is 3%, and the market risk premium is 7.5?

A. 12%
B. 14.5%
C. 15%
D. 16.5%

MC Question 2
What is the WACC if $\frac{D}{E} = 0.7$, cost of equity is 18%, cost of debt is 7%, and the tax rate is 35%

A. Below 10%
B. Between 10% and 11%
C. Between 11% and 12%
D. More than 12%

MC Question 3
By taking on more leverage, you increase the…

A. Equity beta
B. Asset beta
C. Both answer A and B
D. Leverage beta

MC Question 4
What is the value of a firm without debt, given a perpetual EBIT of €10,000 per year, with current cost of equity=10%, and a 30% tax rate?

A. 60,000
B. 70,000
C. 80,000
D. 90,000

MC Question 5
An all-equity firm has 500,000 shares outstanding. The company is in the process of borrowing 6 million at an 8% interest rate to repurchase 100,000 shares. What is the value of the firm if you ignore taxes?

A. 15M
B. 18M
C. 20M
D. 23M

MC Question 6
What is the value of a firm if $V_U = 60mln$, 10% interest over 20mln debt, and Tc=34%?

A. 66.8
B. 71.2
C. 76.9
D. 80.4

MC Question 7
You hold 50 shares of a firm financed solely through equity. You'd prefer to hold 50% debt. To create this position, you can:

A. Borrow some money and buy 50 additional shares
B. Borrow some money and buy 100 additional shares
C. Sell 50 shares and loan it out
D. Sell 100 shares and loan it out

MC Question 8
You are holding 200 shares in a company financed with equity. The company will be moving to a debt-equity ratio of $\frac{1}{4}$. You do not like this. What can you do to unlever your position?

A. Borrow money and buy 40 additional shares
B. Borrow money and buy 50 additional shares
C. Sell 40 shares and loan it out
D. Sell 50 shares and loan it out

MC Question 9
A firm expects its EBIT to be €50,000 in perpetuity. The firm can borrow at 12%. It is currently an all-equity company, with a cost of equity of 20%. The tax rate is 30%. What is the value of the firm if they borrow €40,000 and use the proceeds to buy back shares?

A. 12,000
B. 175,000
C. 187,000
D. 200,000

MC Question 10
A company has €2 mln in free cash flow and 1 mln stock outstanding. The company is trying to decide what to do with this. They can choose to invest in a project requiring an investment of 2mln today, with a positive NPV of 2.5 mln. It can also decide to buy back shares at €10. Alternatively, it can offer a €2 dividend to its shareholders. What should the company do?

A. Use the 2 mln for the project
B. Distribute dividends
C. Buy back shares
D. There is not enough information

MC Question 11
A company with a market capitalization of €500,000 has 10,000 shares outstanding. It spends €100,000 on buying back shares. How many shares outstanding will there be after the share buy-back?

A. 2,000
B. 5,000
C. 8,000
D. 10,000

MC Question 12
A company has 40,000 shares outstanding with a share price of €100. A 2-for-1 stock split is announced. What is the new share price?

A. €5
B. €10
C. €15
D. €20

MC Question 13
Which of the following techniques is best used in a Leveraged Buy-out model? (LBO)

A. APV
B. FTE
C. WACC
D. EBITDA

MC Question 14
A project with a present value of cashflows of €700, an initial investment of €900, and a €300 tax shield of debt would be…

A. Accepted only with debt financing
B. Accepted only with equity financing
C. Accepted either way
D. Rejected either way

MC Question 15
A firm has risk-free debt of €150 mln, and equity worth €700 mln. The asset beta is 0.7. Tc is 25%. What is the equity beta?

A. 0.54
B. 0.62
C. 0.82
D. 0.91

MC Question 16
A firm has risk-free debt of €150 mln, and equity worth €700 mln. The asset beta is 0.7. Tc is 25%. Given a risk-free rate of 3% and an expected market return of 12%, what is the discount rate used with the FTE approach?

A. 0.08
B. 0.10
C. 0.14
D. 0.23

MC Question 17
You are holding a one-year call option and the expiration date is today. The exercise price is €1.60 and the current share price is €1.90. What is the value of your call option?

A. €0
B. €0.30
C. €1.60
D. €1.90

MC Question 18
We have a share selling for €10.95, and a call option is selling for €0.35 with an exercise price of €10.95. The risk-free rate is 0.5% per month. The expiration date is in 3 months. What is the price of the put option?

A. Less than €0.10
B. Between €0.10 and €0.20
C. Between €0.20 and €0.30
D. More than €0.30

MC Question 19
We have an option with an exercise price of €49, with 199 day-interval in years to maturity. The current share price is €50. The annual risk-free interest rate (continuously compounded) is 7%. The variance of the shares is 0.09 per year. What is the value of d1 in the Black Scholes formula?

A. Less than 0.4
B. Between 0.4 and 0.5
C. Between 0.6 and 0.7
D. More than 0.7

MC Question 20
Which of the following does not need to be considered when determining the appropriate amount of short-term borrowing?

A. Cash reserves
B. Maturity hedging
C. Market outlook
D. Term structure

Open Question 1

a) What factors determine the beta of an equity?

b) An all equity firm is considering the following projects:

Project	**Beta**	**Expected return (%)**
W	0.8	6
X	0.7	5
Y	1.15	9
Z	1.7	13

Source: Slim Academy, 2021.

The T-bill rate is 3% and the risk premium is 4.5%

i) Which projects have a higher expected return than the firm's 12 per cent cost of capital?
ii) Which project should be accepted?

c) Given is the following data:

D/E = 1.0; D+E=120; EBIT=14 million; Beta leveraged = 2.778; Tc = 0.28

Calculate the unlevered equity beta.

Open Question 2
Vattenfall is currently an all-equity firm. They face a corporate tax rate of 40%. There are currently 700,000 shares outstanding. The CFO of Vattenfall is considering the option of buying back 300,000 shares, using leverage of 8%. The stock price is currently €0.80. The expectation is that the company will be able to realise an EBIT of €250,000 in perpetuity, starting at the end of this year.

a) Calculate the return in an all-equity situation.
b) Calculate the value of Vattenfall in the levered situation as described above.
c) What is the required return on equity in the levered situation?

Practice Exam: Answers

MC Question 1

The correct answer is D.

MC Question 2

The correct answer is D.

MC Question 3

The correct answer is A.

MC Question 4

The correct answer is B.

MC Question 5

The correct answer is C.

MC Question 6

The correct answer is A.

MC Question 7

The correct answer is A.

MC Question 8

The correct answer is C.

MC Question 9

The correct answer is C.

MC Question 10

The correct answer is A.
A company should never pass on a project with a positive NPV to increase dividends.

MC Question 11

The correct answer is C.

MC Question 12

The correct answer is A.

MC Question 13

The correct answer is A.

MC Question 14

The correct answer is A.

MC Question 15

The correct answer is C.

MC Question 16

The correct answer is B.

MC Question 17

The correct answer is A.

MC Question 18

The correct answer is B.

MC Question 19

The correct answer is A.

MC Question 20

The correct answer is C.

Open Question 1a

Operating leverage refers to the degree to which a company's costs of operations are fixed, compared to variables.

Cyclicity of revenues: Businesses that are highly dependent on the overall economy are said to have cyclical revenues.

Financial leverage refers to the extent to which a firm relies on debt.

Open Question 1b

i) As can be seen in the table, only project Z has a higher return than 12%, namely 13%.

ii) Using the CAPM to consider the projects, we need to calculate the expected return of each project given its level of risk. The expected return should then be compared to the expected return of the project. If the calculated return is lower than the project's expected return, the project should be accepted. If not, the project should be rejected.
For each project we use the CAPM formula: $R_E = R_F + \beta_e(R_M - R_F)$.

Return of project W: $R_W = 0.03 + 0.8(0.045) = 0.066 = 6.6\%$; 6.6>6, so reject W.

Return on project X: $R_X = 0.03 + 0.7(0.045) = 0.0615 = 6.15\%$; 6.15>5, so reject X.

Return on project Y: $R_Y = 0.03 + 1.15(0.045) = 0.0.818 = 8.18\%$; 8.18<9, so accept Y.

Return on project Z: $R_Z = 0.03 + 1.7(0.045) = 0.1065 = 10.65\%$; 10.65<13, so accept Z.

Open Question 1c

Because the D/E ratio is 1, indicating that debt and equity are equal, and the debt and equity together are 120, debt is 60 and equity is 60. (Assume βdebt is zero).

$$\beta_{Assets} = \frac{E}{E+D(1-t_c)} * \beta_{E,\,levered}$$

$$\beta_{Assets} = \frac{60}{60+60(1-0.28)} * 2.778 = 1.615$$

Open Question 2a

There are currently 700,000 shares outstanding for €0.80 per share. This represents an all-equity value of $700,000 * €0.80 = €560,000$
The company generates €250,000 in EBIT, leaving for the shareholders:
$250,000 * (1 - 0.4) = €150,000$ per year

$$R_a = \frac{150{,}000}{560{,}000} = 26.79\%$$

Open Question 2b

To buy back 300,000 shares, the company would need to issue debt:
$300,000 * €0.80 = €240,000$
The value of the levered firm can be found using the following formula:

$$V_l = V_u + \frac{t_c * R_d * D}{R_d}$$

where: $V_U = \frac{EBIT*(1-t_c)}{R_a}$

$$V_l = \frac{250{,}000*(1-0.4)}{0.2679} + \frac{0.4*0.08*240{,}000}{0.08} = 655,910.41$$

Because of this, the value of shareholder's equity will be:
$655,910.41 - 240,000 = 415,910.41$

Question 2c

$$R_e = R_a + \frac{D}{E} * (1 - t_c) * (R_a - R_d) = 0.2679 + \frac{240{,}000}{415{,}910.41} * (1 - 0.4) * (0.2679 - 0.08)$$

Formula Sheet

$$V_L = V_U + \left[1 - \frac{(1-T_c)(1-T_e)}{(1-T_p)}\right] \times D$$

$$\beta_u = \frac{E}{E + (1-T_c)D}\beta_e$$

$$PV = CF \times \left[\frac{1 - \left(\frac{1+g}{1+r}\right)^T}{r-g}\right]$$

$$r_e = r_a + \frac{D}{E} \times (1-T_c)(r_a - r_d)$$

$$C = P + S - Xe^{-r_f t}$$

$$C^x = \Delta S^x - B(1+r)$$

$$\Delta S_1^u - C_1^u$$

$$C_0 = \frac{pC_1^u + (1-p)C_1^d}{(1+r_f)}$$

$$p = \frac{r_f - D}{(U-D)} \quad \text{with } D \text{ and } U \text{ in } \%$$

$$C = SN(\delta_1) - Ee^{-Rt}N(\delta_2)$$

$$\delta_1 = \frac{\ln\left(\frac{S}{E}\right) + \left(r_f + \frac{1}{2}\sigma^2\right)t}{\sqrt{\sigma^2 t}}$$

$$\delta_2 = \delta_1 - \sqrt{\sigma^2 t}$$

$$Dividend\ change = s \times (t \times EPS_1 - Div_0)$$

$$S_1 = S_0 \times \frac{1+i_{fc}}{1+i_{hc}}\ ,\ \frac{F_1}{S_0} = \frac{1+R_{fc}}{1+R_{hc}}\ ,\ F_t = S_0\left[1 + (R_{fc} - R_{hc})\right]^t$$

$$E(S_1) = S_0\left[1 + (h_{fc} - h_{hc})\right]$$

$$R_{hc} - h_{hc} = R_{fc} - h_{fc}$$

Epilogue

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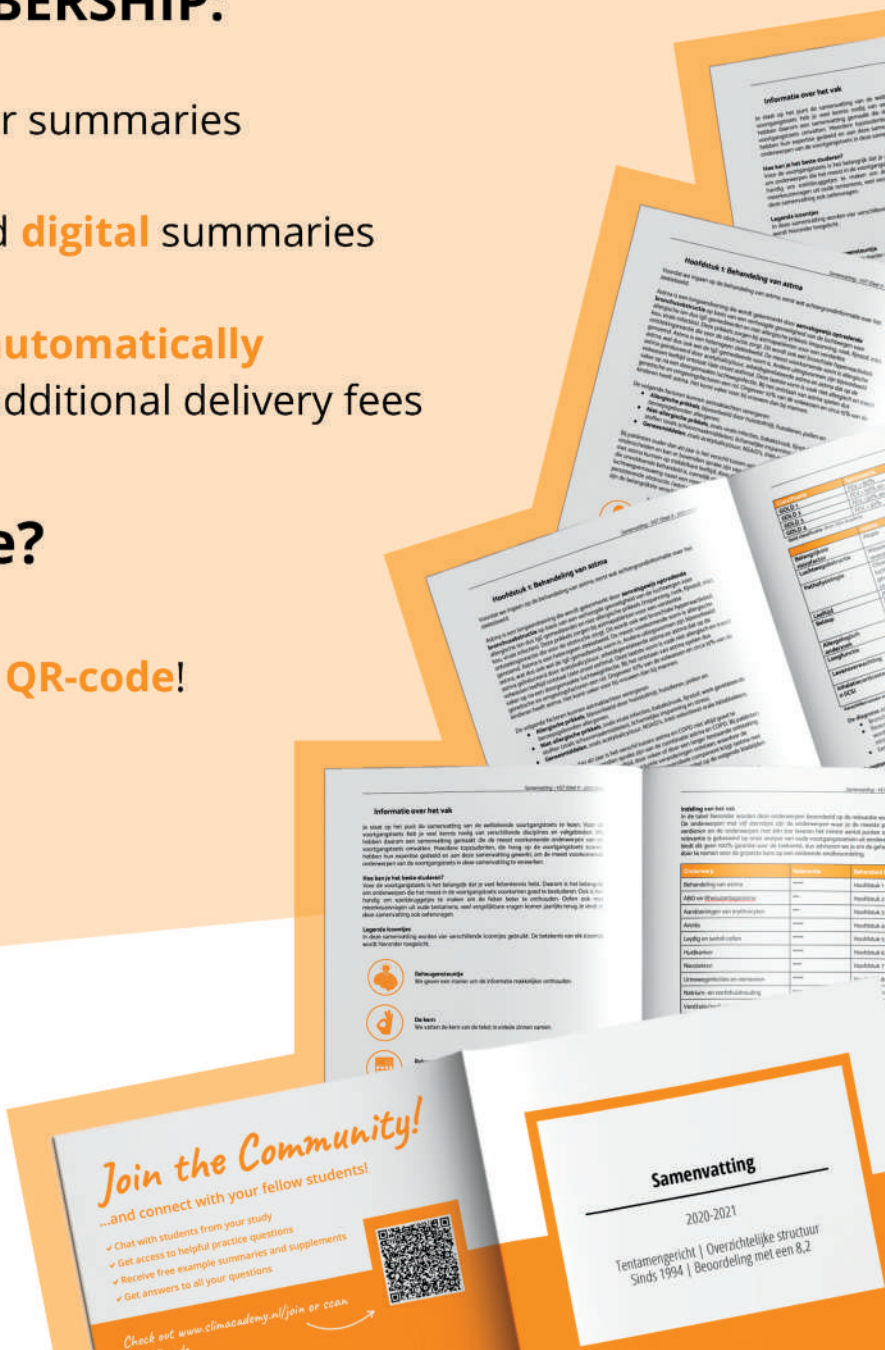

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