

Advanced Corporate Finance
Part II

Final Exam

Your Name: *Suggested answers to the exam*

Student I.D.: _____

- This examination is closed book and closed notes. You are, however, permitted to use a pocket calculator.
- Please answer all questions in English; bad grammar will not cost you points.
- To answer the multiple choice questions, please circle the number at the left of the correct answer(s). There may be more than one correct answer, but there is at least one. Selecting a wrong answer, or failure to clearly (i.e. unambiguously) mark your answer will cost you points.
- Please keep all answers brief and to the point. Do not provide irrelevant information, but show all steps that are necessary to solve a problem.
- This exam consists of 8 pages. There is a total of 5 questions.
- You should take about 90min to complete the exam. Good luck!

Please sign here: _____

Score:	Question 1	(15 points)	_____
	Question 2	(15 points)	_____
	Question 3	(15 points)	_____
	Question 4	(40 points)	_____
	Question 5	(45 points)	_____
	Total Score:	(130 points)	_____

Question I and II: Choose the right answer(s) based on the Marriott case.

- I. The cost of capital for each division is the same as the corporate cost of capital. (15 POINTS)
- a) True, as long as investors are diversified.
 - b) True, because it is Marriott Corporation that pays back investors, not the operating divisions.
 - c) True, as long as the new investment in each division has the same risk as the division's existing assets.
 - d) ***False, because the new investment in each division has a different risk than the average risk of Marriott assets.*** (True)
 - e) False, because the new investment in each division has a different risk than the assets of other divisions.
- II. As a result of leverage a division carrying more debt faces lower weighted average cost of capital. (15 POINTS)
- a) False, because debt is always cheaper than equity.
 - b) False, because debt increases the required rate of return on the equity.
 - c) ***True, because debt offers a tax shield.*** (True)
 - d) True, because any amount of debt creates agency conflicts.
 - e) True, because equity is always more expensive than debt.
- III. Consider two firms, C and D, that differ only in terms of their payout policy. Both firms are all-equity financed, and hold initially some risky assets (which are identical for both firms), plus \$ 1 million in excess cash. Firm D decides to distribute the excess cash as a dividend to its shareholders, whereas firm C decides to retain the cash within the firm. Which of the following statement(s) is (are) true: (15 POINTS)
- a) ***After D has distributed the cash dividend investors will require a higher rate of return for holding stock D than for holding stock C.*** (True)
 - b) After D has distributed the cash dividend investors will require a lower rate of return for holding stock D than for holding stock C.
 - c) Because answer 'a)' is correct, the stock price of firm D is expected to drop by more than the amount of the cash distribution.
 - d) Because alternative 'b)' is correct, the stock price of firm D is expected to react positively (increase) upon the dividend announcement.
 - e) ***On the day of the dividend payment the stock price of firm D is expected to drop exactly by the amount of the cash distribution.*** (True)

Question IV

The management of firm A is considering to start a new project. The project requires an initial investment equal to \$ 1,000,000. The risk of the project is identical to that of the firm's current risky assets. The expected rate of return on the new project is 15% annually, forever.

The firm's balance sheet (market values) prior to the announcement of the investment project is as follows:

Risky Assets	\$ 5,000,000	Equity	\$ 4,000,000
Cash	1,000,000	Debt	2,000,000
	<hr/>		<hr/>
	\$ 6,000,000		\$ 6,000,000

There are 100,000 shares outstanding.

The beta of the firm's stock is equal to 1.35, the beta of its debt is equal to 0.15.

The risk-free rate is equal to 4%, and the expected market risk premium is 7%.

- a) Calculate (1) the Beta of the firm, and (2) the Beta of the firm's risky assets.

(10 POINTS)

(1) BETA OF THE FIRM:

Market value of equity: 4,000,000

Market value of debt: 2,000,000

Beta of the firm is equal to the weighted average of the beta of debt and equity:

$$\mathbf{Beta(Firm) = 4/6 * 1.35 + 2/6 * 0.15 = 0.90 + 0.05 = 0.95}$$

(2) BETA IF THE RISKY ASSETS:

The beta of the risky assets will be different from the beta of the firm, since the firm also holds cash, which has a beta equal to zero:

$$\mathbf{5/6 * Beta\ of\ risky\ assets + 1/6 * Beta\ of\ the\ cash = Beta\ of\ the\ firm}$$

$$\mathbf{5/6 * Beta\ of\ the\ risky\ assets = 0.95}$$

$$\mathbf{Beta\ of\ the\ risky\ assets = 6/5 * 0.95 = 1.14}$$

b) Calculate the NPV of the new project. Ignore tax considerations.

(10 POINTS)

REQUIRED RATE OF RETURN:

Project risk is identical to the risk of “Risky Assets”, hence

$$\text{Beta of Project} = 1.14$$

Required rate of return for the project:

$$R = \text{Risk-free rate} + \text{Project beta} * \text{Market risk premium}$$

$$= 4\% + 1.14 * 7\% = 11.98\% \text{ (its fine if you rounded to 12\%)}$$

The investment yields an expected annual CF of:

$$15\% * 1,000,000 = 150,000$$

The project payoff is a perpetuity, so that:

$$PV = 150,000 / 0.1198 = 1,252,086.8$$

To find the net present value we have to subtract the investment outlay:

$$NPV = PV - I = 1,252,086.7 - 1,000,000 = 252,087$$

(250,000 is fine, too)

- c) Within the board of directors there is a discussion about the optimal financing choice. The CFO prefers debt since this increases the firm's profit per share, and, thus, the value of the shares.

Do you agree with the CFO (ignore taxes!)? Motivate your answer. (10 POINTS)
(Limit your answer to a maximum of 3 sentences!)

Financing with debt will indeed increase expected EPS.

However, leverage will also increase the friskiness of the firm's equity.

The two effects cancel each other out, so that the value of the shares is unaffected.

The CFO's argument is therefore not correct.

- d) The CEO also wants to finance with (risk-free) debt. However, she claims that due to a tax advantages of debt financing, using risk-free debt will reduce the firm's weighted average cost of capital (WACC), and thus also the hurdle rate for future investments.

Do you agree with the CEO? Again, motivate your answer. (10 POINTS)
(Limit your answer to a maximum of 3 sentences!)

The CEO is right that the tax advantage of debt implies that debt financing reduces the firm's WACC.

However, it is not quite clear whether financing this project with debt would also reduce the hurdle rate for future investments. The latter depends of the risk of the future projects, and on the degree to which this future investment can be financed with debt (because of the tax advantage of debt financing).

Question V

Consider an economy with three different types of firms that we will refer to as the Good (G), the Bad (B), and the Ugly (U). The firm type is known only to the manager, who acts in the best interest of the firm's original shareholders. The uninformed investors consider all three types equally likely (type G, type B, and type U are each encountered with probability 1/3).

Each firm has access to an investment project that requires an investment outlay of \$3million. The firm types differ in terms of the NPV of this investment project, as well as in terms of the value of their assets in place (all numbers represent \$ million):

	Value of assets in place	Investment	NPV
Good (G)	8	3	2
Bad (B)	10	3	-1
Ugly (U)	3	3	-1
Average	7	3	0

Firms are all-equity financed. The only way to raise capital for the new investment project is by issuing equity to the public. A firm that issues equity has to undertake its investment project.

- a) Assume initially that all firm types issue equity and invest. What fraction of the firm's equity has to be offered to the public to raise \$3 million in the equity offering?
(10 POINTS)

The firm type is known only to the manager. This means that the outside investors who are supposed to purchase the issue will not know whether an individual firm is good, bad, or ugly. They will have to act based on the assumption that they deal with the "average" firm.

The average firm value after the offering is equal to $7 + 3 + 0 = 10$ (\$ million).

This means that the new shareholders will demand at least $3/10$ (or 30%) of the firms' equity in order to break even, in expectation.

- b) Based on your answer in part a), which firms will find it profitable to undertake the equity offering? (10 POINTS)

To see whether it is profitable to undertake the equity offering we have to compare the original shareholders' wealth after the offering (70% of the total firm value after the investment), with their wealth if no offering takes place (100% of the assets in place):

Good: $7/10 * (8 + 3 + 2) = 9.1 > 8$ **Issue and invest!**

Bad: $7/10 * (10 + 3 - 1) = 8.4 < 10$ **Don't issue!**

Terrible: $7/10 * (3 + 3 - 1) = 3.5 > 3$ **Issue and invest!**

Only the Good and the Ugly type are going to issue and invest. The shareholders of the Bad type are better off without the new investment.

- c) Now suppose that managers decide whether to issue equity or not. Based on your answer in part b), what fraction of the equity will the issuing firms now have to give to the outside investors in order to be able to raise \$3 million? (10 POINTS)

Investors will realize that the Bad type will not issue. This means that the "average" firm that issues equity now consists to 50% of the Good, and to 50% of the Ugly type.

After the issue, this average issuing firm will therefore be worth

$$0.5 * (8 + 3 + 2) + 0.5 * (3 + 3 - 1) = 0.5 * (13 + 5) = 9$$

In order to raise \$3 million, the issuing firms will therefore have to offer

$3/9 = 1/3 = 33.3%$ of the equity to the new shareholders.

- d) Based on your answer(s) in part b) and/or c), what will be the market value of an issuing firm be AFTER the announcement of the equity offering, but BEFORE the actual equity issue takes place? (5 POINTS)

Only G and U issue. After the announcement, but prior to the offer the market value of these firms will be equal to the sum of the average value of the assets in place, and the average project NPV.

$$0.5 * (8 + 3) + 0.5 * (2 - 1) = 6 \text{ (\$ million)}$$

- e) You may have found that certain firm types in this example will overinvest (undertake negative NPV-projects), or underinvest (forego positive-NPV projects). For each firm type, provide a short intuitive explanation for why this type firm does or does not invest. (10 POINTS)

(Limit your answer to a maximum of 2 sentences per type!)

Good: The equity issue is very costly since shares can be issued only at a price below their true value. This creates an incentive to underinvest. However, the new investment is profitable enough, so that the Good type will invest anyway.

Bad: The firm has a negative NPV project. In addition, because of its high value of assets in place, its equity issue would be undervalued (the true value of the firm after the issue would be \$12, compared to an average of \$10). The firm therefore has no reason to (and will not) invest.

Ugly: Firm type has only a negative NPV project. However, the value of its assets in place is very low, so that issuing overvalued equity is sufficiently profitable for the old shareholders to more than offset the negative NPV of the new investment. The ugly type will therefore overinvest.