Lancaster University
Management School

AcF302: Corporate Finance

Revision Session: Weeks 11-13

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Session Outline

1. End-of-term Test.
2. Final Exam Structure
3. How to Revise for Final Exam?
4. Overview of topics covered in Weeks 11-13.

End-of-Term Test

- 113 students took the test.
- Average mark: 54%
  - Average mark for Weeks 1-3 questions: 36%
- Around 20% of students managed to do well and scored 70% or higher (Highest mark: 95%).

2) Which of the following statements is FALSE?

1. With a constant interest coverage policy, the value of the interest tax shield is proportional to the project's cash flows.
2. When a company has a target leverage ratio and is borrowing to finance a project, if the company's debt is risk free, the interest tax shields on this debt should be discounted using the risk-free interest rate.
3. In the real option context, the strike price of the option corresponds to the current market value of the asset.

A) Statement 2.
B) Statement 3.
C) Statements 2 and 3.
D) Statements 1, 2 and 3.

2) Which of the following statements is FALSE? (Average: 21%)

1. With a constant interest coverage policy, the value of the interest tax shield is proportional to the project's cash flows. TRUE (WS2 Q5)

$$\text{Interest Paid in Year } t = k \times FCF_t$$

$$PV(\text{Interest Tax Shield}) = PV(\tau_c k \times FCF) = \tau_c k \times PV(FCF)$$

$$= \tau_c k \times V^U$$

2. When a company has a target leverage ratio and is borrowing to finance a project, if the company's debt is risk free, the interest tax shields on this debt should be discounted using the ~~risk-free interest rate~~ unlevered cost of capital. (WS1 Q6)

3. In the real option context, the strike price of the option corresponds to the ~~current market value of the asset~~ initial cost of the project. (Lec 3 S13)

C) Statements 2 and 3

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4) Which of the following statements is FALSE?

1. At-the-money real options have a positive value.
2. In-the-money real options have a positive value.
3. Out-of-the-money real options have a negative value.

A) Statement 1.
B) Statement 3.
C) Statements 1 and 3.
D) Statements 2 and 3.

4) Which of the following statements is FALSE? (Average: 19%)

1. At-the-money real options have a positive value. TRUE
2. In-the-money real options have a positive value. TRUE
3. Out-of-the-money real options have a ~~negative~~ positive value. FALSE

   WS3 Q1 St2

A) Statement 1.
B) Statement 3.
C) Statements 1 and 3.
D) Statements 2 and 3.

6) Which of the following statements is FALSE?

A) When a company has a target leverage ratio and is borrowing to finance a project, the interest tax shields on the project's debt should be discounted using the weighted average cost of capital.

B) The lower the volatility of a project's future cash flows, the less attractive the option to wait becomes.

C) When a firm has permanent debt, the cost of debt is not required to calculate the present value of the interest tax shield.

D) Firms with a target leverage ratio adjust their leverage to maintain a constant equity-to-value ratio.

6) Which of the following statements is FALSE? (Average: 35%)

A) When a company has a target leverage ratio and is borrowing to finance a project, the interest tax shields on the project's debt should be discounted using the ~~weighted average cost of capital~~ unlevered cost of capital. FALSE WS1 Q1 St6

B) The lower the volatility of a project's future cash flows, the less attractive the option to wait becomes. TRUE WS3 Q1 St3

C) When a firm has permanent debt, the cost of debt is not required to calculate the present value of the interest tax shield. TRUE PV(ITS) = Tc * D WS2 Q4a

D) Firms with a target leverage ratio adjust their leverage to maintain a constant equity-to-value ratio.

1) Mobinil Technologies is considering the acquisition of another firm in its industry. The acquisition is expected to increase Mobinil's free cash flow by £8 million the first year, and this cash flow is expected to grow at a rate of 3.5% per year from then on. Mobinil has negotiated a purchase price of £170 million. Mobinil currently maintains a debt-to-equity ratio of 0.5, its corporate tax rate is 35%, its cost of debt is 6%, and its cost of equity is 9.5%. Mobinil will maintain a constant debt-to-equity ratio for the acquisition.

The debt that Mobinil must use to finance the acquisition is closest to:

A) £64.52 million.
B) £56.67 million.
C) £85 million.
D) £83.33 million.

Average: 36%
Question exactly similar to WS1 Q4

FCF = £8 million

g = 3.5%

Cost = £170 million

D/E ratio = 50%

Rd = 6%, Re = 9.5%, Tc = 35%

$$V_L = \frac{FCF}{r_{WACC} - g} \qquad D_0 = \frac{D}{V} \times V_L$$

$$R_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

R_{wacc} = 2/3 (0.095) + 1/3 (0.06) (1 – 0.35) = 7.6333333%

V_L = £8 million/(0.0763333 – 0.035) = £193.54 million

To maintain its debt-to-equity ratio of 50%, Click must increase its debt by:
£193.54 million * 1/3 = **£64.52 million**

3) Global Industries adjusts its debt so that its free cash flow is constantly five times its interest expenses. Global is considering a project that will generate free cash flows of £2.5 million this year which are expected to grow at a rate of 4% per year from then on. Suppose Global's unlevered cost of capital is 9% and its marginal corporate tax rate is 36%.

The levered value of the project is closest to :

A) £140 million.
B) £53.6 million.
C) £50 million.
D) £51.1 million.

Average: 56%
Question exactly similar to Week 12 Lecture example on slides 9-10

FCF = £2.5 million

g = 4%

k = 20%

Ru = 9%, Tc = 36%

$$V_L = (1 + \tau_c k) V_U \qquad k = Interest/FCF$$

$$V^U = \text{FCF} / (ru - g) = 2.5 / (9\% - 4\%) = £50 \text{ million}$$

$$V^L = (1 + \tau_c\, k)\, V^U = (1 + 0.36 \times 0.20)\, 50 = \textbf{£53.6 million.}$$

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5) Octopus Trains is considering a £200 million investment to launch a new rail line. The project is expected to generate a free cash flow of £30 million per year forever, and its unlevered cost of capital is 10%. Octopus's marginal corporate tax rate is 35%. Suppose that to fund the investment Octopus will take on £100 million in permanent debt with the remainder of the investment funded through issuance of new equity. Assume Octopus will incur a 2% (after-tax) underwriting fee on the new debt issue and a 5% underwriting fee on the issuance of new equity. If management believes Octopus's current share price of £20 is £2 less than its true value.

The NPV of Octopus's new rail line is closest to:

A) £83 million.
B) £128 million.
C) £135 million.
D) £118 million.

Average: 38%
Question exactly similar to WS2 Q4

NPV = V_L – Initial cost - issuance cost – mispricing cost

= (V_U + PV(ITS)) - Investment - issuance cost – mispricing cost

V_U = FCF/Ru = £30 million/ 0.10 PV(ITS) = Tc * D = 35% × £100 million

Initial cost = £200 million

Issuance cost: Debt = 2% × £100 million Equity = 5% × £100 million

Mispricing cost = # shares issued * mispricing cost per share = 5 million shares × £2

NPV = (£30 million/ 0.10) + (35% × £100 million) - £200 million – (2% × £100 million) – (5% × £100 million) – (5 million shares × £2) = **£118 million**

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7) Your firm is thinking of making an investment. If you invest today, the project will generate $7 million in free cash flow at the end of the year and will have a continuation value of either $100 million (if the economy improves) or $30 million (if the economy does not improve). If you wait until next year to invest, you will lose the opportunity to make $7 million in free cash flow, but you will know exactly what the continuation value of the investment will be. The cost of capital for this investment is 10%, and the probability that the economy improves is 60%. The cost of investing is $50 million irrespective of whether you start today or next year.

The NPV of waiting for 1 year is closest to:

A) £20 million.
B) £300 million.
C) £27.3 million.
D) £23.5 million.

Average: 49%
Question exactly similar to WS3 Q3

If you wait, you will only invest if the economy is in a good state, since otherwise the NPV of investing would be negative ($30<$50).

$$NPV\ (Wait) = \frac{[0.6 \times (100 - 50)] + (0.4 \times 0)}{1.1} = \$27.3\ million$$

Final Exam Structure

- Exam duration: 2 hours (+15 minutes reading time).
- Structure: Similar to last two years (2022 and 2023 papers).
- Section A: 10 MCQs (3 marks each) [Total 30 marks].
- MCQs types:
  - Identifying false statement(s).
  - Picking correct answer.
- Section B: Answer all questions in this section [Total 35 marks].
- Section C: 2 Questions (Answer only 1 question) [Total 35 marks].
- Sections B & C: Mix of numerical and open-ended questions.
- Weight of the first 3 weeks in the exam:
  - Similar to last year (around 33%).

How to Revise for Final Exam?

- Go over lectures in detail.
- Go over workshop questions. Make sure you understand why a question is solved in a particular way. Don't just memorize the steps.
- The book elaborates more on the conceptual material in lectures
  - This can be particularly helpful for open-ended questions.
- Attempt the past papers from the last 6 years: 2018-2023.
- For additional practice:
  - End-of-chapter questions.
  - MyLab Finance: Similar questions to end-of-chapter questions. Advantage: solutions are provided. You will need to register and pay for it.

Topics covered in the first 3 weeks

1. Capital budgeting taking firm's leverage policy into consideration.

2. Real options and how they affect valuation.

1. Capital Budgeting

- Constant debt-to-equity ratio: WACC, APV, Flow-to-equity.
  - WACC: WS1 Q3, Q4, Q6, 2021 Exam Q12aiii, 2022 Exam Q11
  - APV & FTE: WS2 Q2, 2021 Exam Q12a, 2022 Exam Q11(iv)
- Constant interest coverage: APV.
  - Lecture 2 example (slides 9-10), 2020 Exam Q11a
- Predetermined debt level: APV.
  - WS2 Q3, WS1 Q6
- + Issuance and mispricing costs: APV.
  - WS2 Q4, 2018 Exam Q12d
- + Periodical debt adjustment: WACC / APV.
  - WACC: WS2 Q5, APV: Lecture 2 example (slides 22-23), 2019 Exam Q12d (typo: Ru not Re = 11%)
- + Personal taxes: APV.
  - Lecture 2 example (slides 27-29), 2019 Exam Q11a, 2021 Exam Q12a, 2022 Exam Q11(v), 2023 Exam Q11

2. Real Options

- Option to delay:
  - Black-Scholes valuation: WS3 Q2 Q3, 2020 Exam Q11d, 2023 Exam Q14a
- Growth Option:
  - Lecture example (slides 24-27), 2021 Exam Q12c
  - R&D project with development stage: WS3 Q4, 2020 Exam Q12e, 2022 Exam Q15a, 2023 Exam Q14a
- Abandonment Option:
  - Lecture example (slides 28-34)
- Comparing Mutually Exclusive Investments with Different Lives:
  - Lecture example (slides 35-42), 2019 Exam Q12a
- Optimally staging an investment: Failure cost index.
  - WS3 Q6, 2018 Exam Q11a, 2022 Exam Q16a