



FINAL EXAM (17.01.2019) – 1:20 hours

Name/Nome: _____ Number/Número: _____

PLEASE READ THE FOLLOWING INFORMATION BEFORE SOLVING THE EXAM:

- 1) The exam has a version in English and a version in Portuguese (at the end).
- 2) You are allowed to keep your pens, pencils and a calculator with you.
- 3) The structure of the exam is the following:
 - In Group I each question (1 to 6) is multiple choice;
 - Groups II to IV require explaining all the steps in your solutions.
- 4) Grading:
 - Each correct multiple-choice answer is worth 1.5 points. Each incorrect multiple-choice answer does not penalize the student;
 - Group I is worth 9.0 points;
 - Group II is worth 4.0 points;
 - Group III is worth 3.5 points;
 - Group IV is worth 3.5 points.
- 5) Multiple choice questions must be answered by drawing a circle around the letter that, in your opinion, corresponds to the correct solution.
- 6) You are not allowed to un-staple the exam.

GOOD LUCK!

Group I (9.0 points)

Answer each question by drawing a circle around the letter that, in your opinion, corresponds to the correct solution.

1. The flow-to-equity approach has been used by the firm to value their capital budgeting projects. The total investment cost at time 0 is \$720,000. The company uses the flow-to-equity approach because they maintain a target debt to value ratio over project lives. The company has a debt to equity ratio of 0.5. The present value of the project including debt financing is \$855,445. What is the relevant initial investment cost to use in determining the value of the project? (Use two decimals in your computations)
 - a) \$720,000
 - b) \$437,703**
 - c) \$485,226
 - d) \$282,297

$$D/E=0.5 \rightarrow D/V=0.33 \qquad 855,445 * 0.33 = 282,296.85$$
$$720,000 - 282,296.85 = 437,703.15$$

2. The Webster Corp. is planning construction of a new shipping depot for its single manufacturing plant. The initial cost of the investment is \$1 million. Efficiencies from the new depot are expected to reduce costs by \$100,000 forever. The corporation has a total value of \$60 million and has outstanding debt of \$35 million. What is the NPV of the project if the firm has an after-tax cost of debt of 5% and a cost equity of 9%?
- a) \$385,658
 - b) \$900,000
 - c) \$500,000**
 - d) \$592,355

$$(35/60) \cdot 0.05 + (25/60) \cdot 0.09 = 0.0667 \qquad (100,000/0.0667) - 1,000,000 = 500,000$$

3. Jillian owns an option which gives her the right to purchase shares of WAN stock at a price of \$20 a share. Currently, WAN stock is selling for \$24.50. Jillian would like to profit on this stock but is not permitted to exercise her option for another two weeks. Which of the following statements apply to this situation?

- (I) Jillian must own a European call option
 - (II) Jillian must own an American put option
 - (III) Jillian should sell her option today if she feels the price of WAN stock will decline significantly over the next two weeks
 - (IV) Jillian cannot profit today from the price increase in WAN stock
- a) II and III only
 - b) I and IV only
 - c) II and IV only
 - d) I and III only**

4. You purchased three OLX call option contracts (each one to purchase of 100 shares) at a quoted price of \$0.25, with exercise price of \$40. What is your net gain or loss on this investment if the price of OLX is \$45 on the option expiration date?
- a) -\$1,500
 - b) \$1,425**
 - c) \$1,500
 - d) \$1,575

$$\text{Total profit} = (-\$0.25 - \$40 + \$45) \times 100 \times 3 = \$1,425$$

5. OLX stock has a current market price of \$50 a share. The one-year call on OLX stock with a strike price of \$50 is priced at \$5 while the one-year put with a strike price of \$50 is priced at \$1. What is the risk-free rate of return?
- a) 3.45%
 - b) 6.90%
 - c) 8.70%**
 - d) 10.00%

$$\$50 \div (1 + r) = -\$5 + \$50 + \$1 \Leftrightarrow r = 8.70\%$$

6. Rejecting an investment today forever may not be a good choice because:
- (I) the company is foregoing the future rights or option to the investment.
 - (II) there are always errors in the estimation of NPVs.
 - (III) the size of the firm will decline.
 - (IV) the option value is negative.
- a) I only**
 - b) III only
 - c) III and IV only
 - d) IV only

Group II (4.0 points)

LeonPaper is a Spanish company specialized in the paper & pulp industry with a market share of 43% within Iberia market. Analysts provided figures below to value the company as a whole.

Year	Historical	Forecasts		
	0	1	2	3
Sales	801,100	841,800	882,900	923,200
EBITDA margin	16.5%	17.5%	18.0%	18.5%
Change in NWC	4,600	-14,350	17,850	5,350
CAPEX (change in gross fixed assets)	37,000	36,500	40,100	41,500
Depreciations & Amortizations	31,380	32,900	34,450	35,900

Gross Debt	165,000
Cash	5,000
# Shares Outstanding	135,000

Currently, the yield on default-free bonds is 2% and the market risk premium is 7%. The company's levered beta is 1.20 and it faces a spread on the cost of debt of 150 bps (+1.5%) over the riskless assets. The ratio E/V is currently at 85% and should remain stable. The marginal corporate income tax rate is 25%. Analysts expect a growth rate of cash flows in the valuation horizon of about 2.5%. The stock closed at EUR 8.00/sh in the last trading day.

- a) (3.5 points) What is LeonPaper's value per share using the WACC method? Is the stock trading at discount?

$$r_e = r_f + \beta(r_m - r_f) = 0.02 + 1.20 \times 0.07 = 0.104$$

$$r_d = r_f + \text{Spread} = 0.02 + 0.015 = 0.035$$

$$\text{WACC} = r_d \times \frac{D}{V} \times (1 - T) + r_e \times \frac{E}{V} = 0.035 \times 0.15 \times (1 - 0.25) + 0.104 \times 0.85 = 0.0923$$

$$(\text{WACC Method}) \rightarrow \text{FCFF} = \text{EBIT}(1 - T) + \text{D\&A} - \Delta\text{NWC} - \text{CAPEX}$$

Year	0	1	2	3
EBITDA		147,315	158,922	170,792
EBIT(1-t)		85,811	93,354	101,169
D&A		32,900	34,450	35,900
Change in NWC		14,350	-17,850	-5,350
CAPEX		-36,500	-40,100	-41,500
FCFF		96,561	69,854	90,219

Terminal Period @ T = 3

1,373,298



PV Terminal Period	1,053,645	83%
PV Forecasted FCFF (1-3)	216,161	17%
EV	1,269,807	
Net Debt	-160,000	
Equity	1,109,807	
# Shares Outstanding	135,000	
Price	8.22	

The stock is trading at premium

Trading price	10.00	+21.6%
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- b) (0.5 points) The government is planning to cut the corporate income tax rate. What is the expected impact on the company's value?

There are two contrary effects:

+ FCF will increase, which influences positively the company's value

- tax savings on the debt are reduced (interest tax shield), thus the discount rate (WACC) will increase

Both effects can cancel each other, at least partially

Because the company has very low leverage, the disadvantages from reducing the potential interest tax shield will be more than offset by the positive effect on the FCF

Therefore, we should expect a slight increase in the company's value per share

For highly levered companies, usually, the value of companies decreases with cuts in corporate income tax rates as they use to benefit from a significant interest tax shield

Sensitivity analysis

Tax rate	20%	25%	30%	35%
Company's value	8.88	8.22	7.56	6.89
Change in value	+17.5%	+8.8%		-8.9%

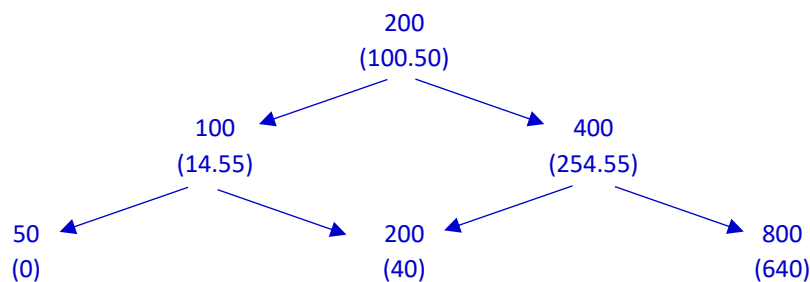
Group III (3.5 points)

XPTO is an auto company and its shares are quoted in the stock exchange. The current stock market price is 200 €. During each of the next two six months period, the market price may rise by 100% or fall by 50%. A one-year call option on XPTO shares has an exercise price of 160 €. If the six months risk-free interest rate is 10%, compute:

- a) (2.5 points) The value of call option.

Exercise Price = 160
 $r = 10\%$ (6m)

$p = 0.4$
 $(1 - p) = 0.6$



$$c_d = \frac{(0.4 \times 40) + (0.6 \times 0)}{1.1} = 14.55$$

$$c_u = \frac{(0.4 \times 640) + (0.6 \times 40)}{1.1} = 254.55$$

$$c_0 = \frac{(0.4 \times 254.55) + (0.6 \times 14.55)}{1.1} = 100.50$$

- b) (0.5 points) The option delta for the second six months period, if the market price increases to 400 € and decreases to 100 €.

$$\Delta u = \frac{640 - 40}{800 - 200} = 1.00$$

$$\Delta d = \frac{40 - 0}{200 - 50} = 0.267$$

- c) (0.5 points) How does the call option delta vary with the level of the stock price? Justify.

The option call is 1.0 when the call is certain to be exercised and it is 0 when it is certain not to be exercised.

If the call is certain to be exercised, this is equivalent to buying the stock with a partly deferred payment:

\$1 (or €1) change in the stock price must be matched by a \$1 (or €1) change in the option price ($\Delta=1$)

Group IV (3.5 points)

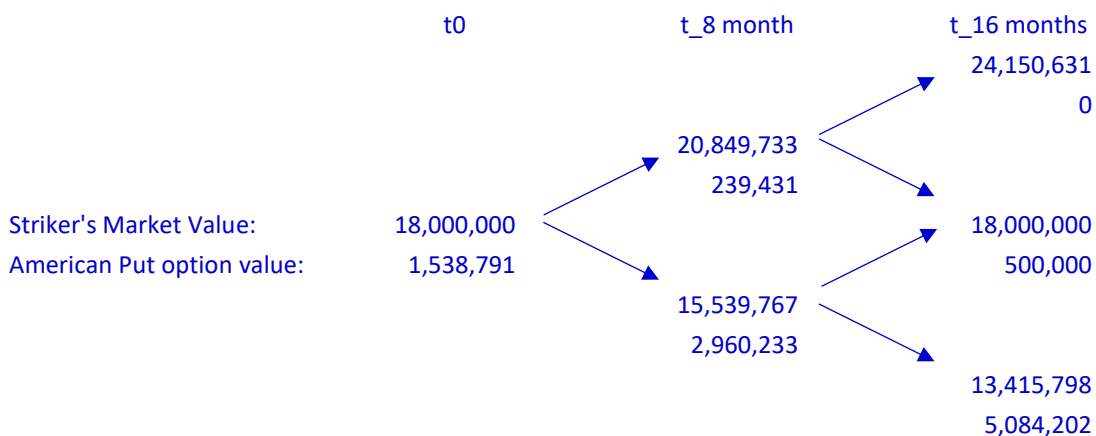
The Cordovil Halts, Ltd. has an average risk for the main business of 18% per year and the risk-free interest rate is 2.25% a year. The company's market value is € 18 million. The managing board wants to hedge the company's risk.

- a) (0.5 points) What is the type of the option you would advise the managing board to choose in order to hedge the company's risk? Why? Explain.

Buy Put Option. The company has a long position in the olive oil business risk. If market trend becomes negative, they will lose sales and the company's market value decreases. The company wants to avoid the negative impact of such decrease. The solution is to Buy a Put Option. If market value goes down, they lose in this leg, but they profit from owning a Put option. So they neutralize losses coming from the business leg with a long position on a Put option.

- b) (2.5 points) The managing board agrees on an option to hedge the company's risk with an exercise price of € 18.5 million with a maturity of 16 months but exercisable in eight months. What is the value of this option?

Strike price	18,500,000		
Risk-free return per year	2.25%		
Time to exercise	0.67 years		
Volatility per year	18.00%		
Risk-free return per semester	1.49%		
Upside return ($u = e^{(\sigma \cdot \text{SQRT}(\text{time}))}$)	1.1583	return =	15.83%
Downside return ($d = 1 / u$)	0.8633	return =	-13.67%
Probability Up (P)			51.40%
Probability Down (1-P)			48.60%



Value of an American Put option is 1,538,791



- c) (0.5 points) Consider that the olive oil market becomes more optimistic about Cordovil Halts business. Does this market mood have a positive or negative impact in the value of the option that hedges the risk owned by the company? Explain.

Decreases the value of the American Put option as the expected cash flows are higher and the Put option aims to avoid the risk of decrease in the business' value expectations.