MBA 8135 - Corporate Finance
CUMULATIVE FINAL EXAM - Summer 2010

August 7, 2010

Name (please print) ____________________________

Instructor: _________________________________

PART I: MULTIPLE CHOICE – Choose the letter of the most correct answer for each question. Record only one answer per question. (4 pts each)

1) A financial institution promises that $100 deposited in their quarterly compounded CD will grow to $250 in 10 years. What nominal annual interest rate (APY) is the financial institution offering?
   a. 150.00%  
   b. 9.60%  
   c. 9.27%  
   d. 2.40%  
   e. 2.32%

   \[ N = 10 \times 4 = 40 \]
   \[ i = \frac{\text{2.3172} \times 4}{4} = 9.27\% \]

2) A fixed coupon bond with par value of $1,000 has a coupon of 8%, semiannually payable. The current annual nominal market interest rate (i.e., yield to maturity) for this bond is 6%. Therefore the bond is selling .......... and the bond’s current yield is ..........:
   a. at a discount; greater than 8%  
   b. at a premium; greater than 8%  
   c. at par value; at 8%  
   d. at a discount; less than 8%  
   e. at a premium; less than 8%

3) Two years ago an investor purchased a 4% semi-annual compounding coupon bond with a remaining maturity of 20 years at a price of (at that time) 90% of par. Today, i.e., two years after the purchase, the investor realizes that the bond has exactly the same price like it had two years ago (i.e. 90%). Based on this information, which of the following answers is correct:
   a. The YTM of the 4% Bond today is the same like two years ago. 
   b. Overall, the profit for the investor from this investment over the two years is Zero. 
   c. Over the remaining life of the bond, the value of the principal exceeds the value of the coupons. 
   d. If the investor held the 4% coupon bond until maturity, the overall return from this investment over the 18 years would be 100% minus 90%, i.e. 10% 
   e. None of the above answers is correct

4) Sotech Ltd just declared a dividend of $2 (D₀). Equity analysts following the firm estimate that the growth rate will be 6% forever. The firm’s required rate of return is 11%. You plan to buy the share today and sell it 10 years from now (at the end of year 10). What will be your capital gain over the ten year holding period?
   a. $33.5  
   b. $39.2  
   c. $78.0  
   d. $61.3  
   e. $67.6

   \[ P₀ = \frac{D₀ (1 + g)^t}{(1 + i)^t} \]
   \[ = \frac{2 (1.06)^{10}}{(1.11)^{10}} \]
   \[ = \frac{2 (1.06)^{10}}{1.3796} \]
   \[ = \frac{2 (1.6765)}{1.3796} \]
   \[ = \frac{3.3530}{1.3796} \]
   \[ = 7.593 \]
5) To the nearest half year, how many years will it take for $1 to triple with a stated interest rate of 9.6% and monthly compounding?
   a. 11 years
   b. 11.5 years
   c. 12 years
   d. 12.5 years
   e. 13 years

   \[ P_0 = 1 \quad P_m = 0 \]
   \[ F_0 = 3 \]
   \[ I = 9.6/12 \]
   \[ N = \frac{\ln(3)}{\ln(1 + 0.096/12)} \quad 13.787/12 \]

6) GHI Corp. wants to increase its leverage ratio from 30% debt/assets to 50% debt/assets (measured in market values). The current equity beta (at a 30% debt/assets ratio) is 1.2, and the current cost of debt are 6% before tax. Which of the following statements is most correct:
   a. The unlevered Beta will be less than 1.2
   b. After the recapitalization the equity beta will be greater than 1.2
   c. After the recapitalization the cost of debt will be higher than 6%
   d. The after-tax cost of debt are lower than the before-tax cost of debt
   e. All of the above answers are correct

7) A payday lender offers a loan of $400 that has to be repaid after 1 month in the amount of $448. Which effective annual rate is the lender charging (rounded to the nearest %)?
   a. 390%
   b. 290%
   c. 144%
   d. 48%
   e. 12%

   \[ \frac{448 - 400}{400} = 12\% \quad \text{Periodic} \]
   \[ 12\% \times 12 = 144\% \quad \text{Nominal} \]
   \[ \left(1 + 12\%\right)^{12} - 1 = 288.59\% \]

8) Which of the following statements is most correct?
   a. Unlimited life, easy transferability of ownership, limited liability, these are all typical characteristics of a sole proprietorship.
   b. In a partnership there is usually a limited liability for the owners (i.e. the partners).
   c. One of the disadvantages of sole proprietorships and partnerships is the fact that they are subject to a so-called “double-taxation”, i.e. the earnings per share are taxed at the firm’s level as well as at the investor’s level.
   d. The overall goal of a manager in a corporation should be to maximize the value of outstanding shares.
   e. One of the disadvantages of a corporation is the fact that it is - especially compared to a partnership - very difficult to transfer ownership or to raise relatively large sums of share capital.

9) Today, long term (25 years) Aaa-rated bonds have a yield to maturity of 7.4%. Aa-rated bonds have a yield to maturity of 8.2%. If you own a 25 year, Aaa-rated bond with a 5% coupon (semi-annual payment), that is downgraded to Aa and follows the YTM-pattern described above, then the dollar amount of your gain or loss from a change in a $1,000 face value bond’s rating is closest to

   a. $66.31
   b. $66.31
   c. $65.95
   d. $65.95
   e. $64.24
   f. $68.02
10) Winslow, Inc. is considering the purchase of a $225,000 piece of equipment. The equipment is classified as 5-year MACRS property. The company expects to sell the equipment after four years at a price of $50,000. What is the after-tax cash flow from this sale if the tax rate is 35%? [MACRS 5-year property depreciation: 20.00%, 32.00%, 19.20%, 11.52% (11.52%; 5.76%)]
   a. $37,036
   b. $38,880
   c. $46,108
   d. $47,770
   e. $53,892
   
   1. $50,000
   2. (3,5800-5,000) 35% = -3892
   3. $0
   
   225000 x 17.88% = 40148

11) Wilson's Antiques is considering a project that has an initial cost today of $10,000. The project has a two-year life with cash inflows of $6,500 a year. Should Wilson's decide to wait one year to commence this project, the initial cost will increase by 5% and the cash inflows will increase to $7,500 a year. What is the value of the option to wait if the applicable discount rate is 10%?
   a. $1,006.75
   b. $1,235.54
   c. $1,509.28
   d. $1,606.76
   e. $1,735.54
   
   PV Semiannually = 1280.99
   PV Semiannually2 = 2287.75
   Delta = 1006.72

12) MMM & Co. purchased a corner lot five years ago at a cost of $640,000. The lot was recently appraised at $810,000. At the time of the purchase, the company spent $50,000 to grade the lot and another $4,000 to build a small building on the lot to house a parking lot attendant who has overseen the use of the lot for daily commuter parking. The company now wants to build a new retail store on the site. The building cost is estimated at $1.2 million. What amount should be used as the initial cash flow for this building project?
   a. $1,200,000
   b. $1,840,000
   c. $1,890,000
   d. $2,010,000
   e. $2,060,000
   
   From my handout
   1. -810000
   2. -1200000
   4. 0
   5. 0
   3. 0
   -2010000

13) Normal project A has an internal rate of return (IRR) of 15 percent. Normal project B has an IRR of 14 percent. Both projects have a cost of capital of 12 percent. Which of the following statements is most correct?
   a. Both normal projects have a positive net present value (NPV).
   b. Project A must have a higher NPV than Project B.
   c. If the cost of capital were less than 12 percent, Project B would have a higher IRR than Project A.
   d. Statements a and c are correct.
   e. Statements a, b, and c are correct.
**PART II: PROBLEMS** – solve each of the following problems. Show your work in the space provided for possible partial credit. Circle your final numerical answer.

14) Sigma Inc. has the following financing outstanding.

- 150,000 zero coupon bonds, principal = $1,000, YTM = 4.0538%, maturity = 30 years (use semiannual compounding for calculation of price)
- 50,000 bonds with an 3% coupon, semiannually compounded, principal = $1,000, price = 90%, 25 years maturity
- 600,000 preferred shares, 6% preferred dividend, par value = $100, price = $75
- 1,000,000 shares of common stock, price = $45, beta = 1.3

Additional information: Tax rate = 30%, return on the market = 9%, risk-free rate = 4%

Calculate the component cost of debt, preferred stock, and common stock. What is the WACC of the company? [round all numbers to two decimal places] (12 points)

\[
\text{Bond 1} \Rightarrow FV = 1000, I = \frac{4.0538\%}{2} = 2.0269, Pmt = 0 \\
N = 30 \times 2 = 60 \Rightarrow PV = 300.00 \\
150,000 \times 300 = 45,000,000 \\
\text{Bond 2} \Rightarrow FV = 1000, N = 25 \times 2 = 50, Pmt = 30/2 = 15, \\
PV = -900 \Rightarrow \text{YTM} = \frac{1.806\times 2}{5} = 3.61\% \\
50,000 \times 900 = 45,000,000 \\
\text{Cost of debt} = \frac{45}{50} (4.05\%) + \frac{45}{90} (3.61\%) = 3.94\% \text{ before tax} \\
\text{Cost of preferred} = \frac{6}{75} = 8\% \\
\text{Cost of equity} = 4\% + 1.3(9\%-4\%) = 10.5\% \\
\text{Value of debt} = 90,000,000 \\
\text{Value of preferred} = 600,000 \times 75 = 45,000,000 \\
\text{Value of Common} = 1000,000 \times 45 = \frac{45,000,000}{189,000,000} \text{ Total Value} \\
\]

\[
WACC = \left(\frac{90}{180}\right)(3.94\%)(1-30\%) + \left(\frac{45}{180}\right)(8\%) + \left(\frac{45}{180}\right)(10.5\%) \\
1.379 + 2 + 2.625 \\
\text{WACC} = 6.00\% \\
\]
15) A perpetuity pays $600 every 6 months, first payment occurring exactly 1 year from today. What is the PV of the perpetuity if the nominal interest rate is 6% per year, quarterly compounded? Show your work for partial credit. (6 points)

(use sufficient decimal places for your calculation, and round the final result to the nearest $)

1. Find effective rate for 6 months
   \[(1 + 1.5\%)^2 - 1 = 3.0225\]

2. Find value of perpetuity in 6 months, since 1st payment is 1 year away
   \[
   \frac{600}{3.0225\%} = 1985.12
   \]

3. Use #2 as FV, to find PV today
   \[
   FV = 1985.12 \quad N = 1 \quad I = 3.0225\% \quad PV = 1926.872
   \]

16) Amerigo, Inc. is considering a project that will result in initial after-tax cash flow of $8 million at the end of the first year, and this cash flow will grow at a rate of 6 percent per year indefinitely. The firm has a target debt/equity ratio of 0.5, a cost of equity of 15 percent, and an after-tax cost of debt of 9 percent. This cost-saving proposal is somewhat riskier than the usual project the firm undertakes; management uses the subjective approach and applies an adjustment factor of +3 percent to the cost of capital for such risky projects. How much of maximum initial investment should Amerigo be willing to make to take on the project as a positive NPV project? Show your work for partial credit. (8 points)

0. \[A = D + E \quad \frac{.5 \times D}{E} \Rightarrow wd = 33.33\% \quad ws = 66.67\% \]

0. \[\text{WACC} = .333(9) + .667(15) = 13\% \]

0. Project risk = 13 + 3 = 16\%

0. \[\text{PV} = \frac{8000000}{16\% - 6\%} = 80,000,000 \]

Invest up to
17) You plan to buy a $240,000 house with a 20 year mortgage with a 4.8% nominal annual rate (=A.P.R.) Payments are monthly, interest is monthly compounded, and you did not make a down payment. Assume you make all payments on time, at the end of the month. Answer the following questions. (10 points)

a) How much is each monthly payment? [2 decimal places]
b) How much interest will you pay with (=in) your 75th payment? [2 decimal places]
c) Now assume you have made payments such that you only owe $150,000 on the mortgage. You decide to increase your payments by $100 per month. How many payments will it take to pay off your mortgage?

\[ PV = 240000 \quad N = 20 \times 12 = 240 \]
\[ i = 4.8/12 = .4 \quad FV = 0 \]
\[ \text{PMT} = -1552.50 \]

b) Without using a calculator
\[ PV = 240000 \quad N = 74 \]
\[ i = .4 \quad \text{PMT} = -1552.50 \]
\[ CPT \quad FV = 188663.49 \]
\[ \text{Interest} = 188663.49 \times .4\% = 754.65 \]

c) \[ PV = 150000 \quad N = 112.58 \]
\[ \text{with} \quad \text{some calculations} \]
\[ \text{PMT} = 1552.50 + 100 \]
\[ i = .4 \]
\[ FV = 0 \]
18) Omniair Inc. is a private airline serving executives who prefer a more personalized travel experience. The company is considering the purchase of a new Challenger 850 Jet which will cost $20 million and it is classified in the 7-year MACRS class. The purchase of the plane will require an increase in net working capital of $2 million in year 0 and another $1 million in year 1, which are both recovered in the final year (i.e. the fourth year) of the project. The plane will increase the firm’s sales by $18 million per year, but will also increase costs (excluding depreciation) by $10 million per year. The plane is expected to be used for 4 years, and then sold for 65% of the purchase price. The firm’s marginal tax rate is 25% and the project’s cost of capital is 15%. Use the following MACRS rates for 7-year property: 14%, 24%, 17%, 12%, 10%, 9%, 9%, 5%.

Calculate the cash flows in years 0, 1, 2, 3, 4, and the NPV of the Project. (12 points)

Feel free to use the matrix on the following page.
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<td>(20000-13000) × 25%</td>
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**Dropped 000 for brevity**

1. \( 20000 \times 14\% = 2800 \)
2. \( 20000 \times 25\% = 4800 \)
3. \( 20000 \times 17\% = 3400 \)
4. \( 20000 \times 12\% = 2400 \)

\[ \text{Book Value} = \text{Cost} - 20000 \]
\[ \text{Acc} \frac{13000}{2800+4800+\text{Depr} \ 6600} \]

\[ \text{NWC} \ 15\% = 4,911,560.49 \]
Formulas:

- Standard Deviation of a 2-asset portfolio (given the individual standard deviations):

\[
\sigma_{\text{Portfolio}} = \sqrt{w_A^2 \cdot \sigma_A^2 + w_B^2 \cdot \sigma_B^2 + 2 \cdot w_A \cdot w_B \cdot \sigma_A \cdot \sigma_B \cdot \text{Corr}_{A,B}}
\]

- Hamada Equation:

\[
\beta_{\text{levered}} = \beta_{\text{unlevered}} \left[ 1 + (1 - t) \cdot \frac{D}{E} \right]
\]