

# **MIDTERM EXAM SOLUTIONS**

Finance 40610 – Security Analysis

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**Multiple Choice (28 points)**

Choose the best answer for each of the following questions. The questions are worth 4 points each.

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1. You have decided to use historical data to estimate the market risk premium for use in your cost of capital calculations. Historical data for the U.S. equity market during the period from 1928-2004 is shown below. Based on this data, which of the following four choices would be the most appropriate market risk premium to use in your analysis?

Average Risk Premium	Arithmetic Average	Geometric Average
Relative to 30-day T-Bills	7.92%	6.02%
Relative to 10-year T-Bonds	6.53%	4.84%

- a) 7.92%
- b) 6.53%
- c) 6.02%
- d) 4.84%
2. You are valuing an Italian firm and have converted all cash flows to nominal \$U.S. As a first step in your analysis, you are trying to determine the appropriate risk-free rate to use in your cost of capital calculations. Which of the five government-issued bonds described below would be most appropriate to use for your risk-free rate?
- a) a 1-yr U.S. Government Treasury Bill with a yield of 4.07%
- b) a 10-yr U.S. Government Treasury Bond with a yield of 4.37%
- c) a 10-yr U.S. Government Inflation-Indexed Treasury Bond with a yield of 1.91%
- d) a 10-yr \$U.S.-denominated Italian Bond with a yield of 4.52%
- e) a 10-yr Euro-denominated Italian Bond with a yield of 3.58%
3. The book value of equity for XYZ Corp. as of year-end 2003 was \$327 million. During 2004, the firm earned net income of \$125 million, paid dividends of \$25 million, and repurchased \$50 million of stock. What is the book value of equity for XYZ Corp. at the end of 2004?
- a) \$327 million
- b) \$277 million
- c) \$377 million
- d) \$402 million

4. The returns on the S&P 500 for each of the past five years are shown below. What is the geometric average return on the S&P 500 during this five-year period?

Year	Return
2000	-25.9%
2001	-16.4%
2002	18.6%
2003	7.6%
2004	5.8%

- a) -2.1%
- b) -16.4%
- c) 1.7%
- d) -3.5%
5. Which of the following would NOT be a component of working capital?
- a) Wages payable
- b) Accounts receivable
- c) Deferred Taxes
- d) Inventory
6. New Venture, Inc. has equity with a book value of \$150 million and a market value of \$400 million. The firm also has debt worth \$100 million (assume the book value and market value of debt are equal). What is the weighted average cost of capital (WACC) for this firm if the cost of equity equals 11.8%, the pre-tax cost of debt equals 5.0%, and the firm's tax rate equals 35%?
- a) 10.1%
- b) 10.4%
- c) 8.4%
- d) 9.1%
7. Which of the following would result in a decrease in Return on Equity (ROE), assuming all other things are held constant?
- a) An increase in Return on Capital (ROC)
- b) An increase in leverage
- c) A increase in the after-tax cost of debt
- d) An increase in net income

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**Problems (72 points)**

Answer each of the questions below completely. You must show ALL your work to get full credit.

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**8. Levered Beta and the Cost of Equity (12 points)**

You are estimating the cost of equity for a firm that is expected to go public next month. Since the firm has no trading history, you decide to estimate the firm's Beta based on comparable firms in the same industry. You estimate the average unlevered Beta for the industry to be 1.3.

- a) (6 points) What is your estimate of the equity Beta for the IPO firm if you forecast a debt/equity ratio for the firm of 0.7 and the firm's tax rate is 40%?

$$\beta_E = (1 + .7(1 - .4))1.3 = 1.846$$

- b) (6 points) What is the IPO firm's cost of equity, assuming a market risk premium of 4.0% and a risk-free rate of 4.2%?

$$K_E = 1.2\% + 1.846(4\%) = 11.584\%$$

9. **Discounted Cash Flows (16 points)**

You are performing a valuation of a new dot-com advertising firm. Free cash flow to the firm (FCFF) in the most recent year was \$98 million (this is the time 0 cash flow). You expect these cash flows to grow at an annual rate of 12% for the next three years as the firm gains market share. You then expect growth to stabilize at a long run rate of 4.5% (in perpetuity). The firm's weighted average cost of capital is 8% and its cost of equity is 12%.

- a) (10 points) What is the total value of this firm's cash flows?

$$TerminalValue_3 = \frac{143.88}{(.08 - .045)} = \$4110.857$$

$$PV = \frac{109.76}{(1.08)^1} + \frac{122.93}{(1.08)^2} + \frac{137.68}{(1.08)^3} + \frac{4110.857}{(1.08)^3} = \$3579.62mil$$

- b) (6 points) In addition to the cash flows described above, the firm also has cash and marketable securities worth \$250 million and total debt of \$1,200 million. What is the value of the firm's equity? (Hint: this solution will be based on your answer to part (a). You do not need to do another discounted cash flow analysis.)

$$Equity = 3579.62 + 250 - 1200 = \$2629.62mil$$

10. **R&D Adjustments (24 points)**

You are valuing Microsoft and have decided to capitalize the firm's R&D expenses. The firm's R&D expenses for the past four years are listed below.

Year	R&D Expense (\$ millions)
2001	4,307
2002	4,659
2003	7,779
2004	6,184

- a) (10 points) Calculate the unamortized value of Microsoft's R&D asset in 2004 assuming a three-year life for R&D.

Year	R&D Expense	2004 Amortization	Unamortized Amount Remaining in 2004	
2001	4,307.0	1435.7	0.0%	0.0
2002	4,659.0	1553.0	33.3%	1553.0
2003	7,779.0	2593.0	66.7%	5186.0
2004	6,184.0	0.0	100.0%	6184.0
Total		5581.67	12923.00	

Unamortized value = \$12,923

- b) (6 points) Microsoft had operating income in 2004 equal to \$14,561 million. Calculate adjusted operating income after accounting for the capitalization of R&D.

*Pre - Tax:*

$$14561 + 6184 - 5581.67 = \$15163.33$$

*After - Tax :*

$$14561(1 - .35) + 6184 - 5581.67 = \$10066.98$$

- c) (8 points) During 2004, Microsoft also spent \$1,200 million on capital expenditures and had an increase in working capital of \$630 million. The firm's tax rate was 35%. Estimate free cash flow to the firm (FCFF) for Microsoft in 2004.

The R&D Adjustment has no effect on cash FCFF. FCFF equals:

14561(1-.35)		10066.98
- 1200	OR	- (1200 + 6184 - 5581.67)
- 630		- 630
<u>\$7634.65</u>		<u>\$7634.65</u>

11. **Operating Lease Adjustments (20 points)**

Future operating lease commitments for Lowe's are shown below. In 2004, the firm had operating lease commitments of \$271 million, operating income of \$3,712 million, net income of \$2,176 million, and total debt of \$6,920 million. The firm's cost of debt was 6%.

Year	Operating Lease Commitments (\$ millions)
2005	248
2006	246
2007	245
2008	244
2009	243
>2009	2,614

- a) (14 points) What is the adjusted value of debt for Lowe's as of 2004 after accounting for operating lease commitments?

Average lease payment 2005-2009 = \$245.2

Lease pymts >2009 can be approximated as an annuity of \$245.2 per year for 11 years, since  $2614/245.2 = 10.66$  (you could also use 10.66 years).

$$PV = \frac{248}{(1.06)^1} + \frac{246}{(1.06)^2} + \frac{245}{(1.06)^3} + \frac{244}{(1.06)^4} + \frac{243}{(1.06)^5} + \frac{245.2 \left( \frac{1 - (1.06)^{-11}}{.06} \right)}{(1.06)^5} = \$2478.55$$

$$\text{Adjusted Debt} = 6920 + 2478.55 = \$9398.55$$

- b) (6 points) What is the adjusted value of operating income for Lowe's in 2004 after accounting for operating lease commitments?

$$\text{Adjusted Operating Income} = 3712 + 271 - \left( \frac{2478.55}{16} \right) = \$3828.09$$

OR

$$\text{Adjusted Operating Income} = 3712 + (2478.55)(.06) = \$3860.71$$