

Boston College
MF 127: Corporate Finance
Professor Strahan
Answers to Final Exam

Name: _____

Instructions:

There are 100 points for the exam.

You are allowed to have 1 sheet of paper with formulas (two-sides) and a calculator.

Read all of the questions carefully!

There are 10 pages to the exam (some are blank). You have 2.5 hours.

Be brief, but show all relevant calculations (partial credit will be assigned).

Your answers must be legible. All answers must appear on the exam itself. If you need more space, use the back of the page.

Good luck.

True, False, Uncertain. (5 points each)

Explain why the following statements are true, false, or uncertain.

1. Firms with high operating leverage and high financial leverage generally have high equity betas.

T. Operating leverage and financial leverage add fixed costs of production and finance. This amplifies the variability of returns to equity, thus raising beta.

2. Bonds with sinking funds sell for lower prices (have higher yields) than otherwise identical bonds without sinking funds.

F. Sinking funds reduce risk, thus bond prices are higher and yields lower.

3. Companies where the CEO owns a small percentage of stock are more likely to face a hostile takeover.

T. CEO with small percentage ownership have a harder time defending against a hostile bid. Also, incentives are worse for these CEOs, so they may make more attractive targets.

4. When firms substitute risky assets for safe ones, bondholders are hurt and stockholders are helped.

T. Increase asset risk increases the value of the implicit default option sold from bondholders to stockholders.

5. The value of a previously purchased building that could be used in an investment is an example of a sunk cost.

F. This is an opportunity cost because you could sell the building and receive the market value rather than using the building for the project.

Long Problems (point totals vary)

1. Eminem, Inc is currently an all-equity firm reviewing its capital structure. It pays no taxes and has access to perfect capital markets. The firm has 1,000,000 shares outstanding and the whole firm is worth \$20 million. The risk-free interest rate is 10 percent.

Eminem is a risky firm. Each year, this firm generates cash flow of \$4 million if demand is high or \$1 million if demand is low, with equal probability. All of the cash flow is used to pay dividends.

a) Compute the expected return on equity.

Shareholders get a 20% return if times are good, and a 5% return if times are bad. So:

$$\text{Expected Return} = 20\%(0.5) + 5\%(0.5) = 12.5\%$$

b) Suppose that Eminem borrows \$10 million and uses the money to repurchase $\frac{1}{2}$ of its shares. What is the return to shareholders in the two demand scenarios after the change in capital structure? What is the expected return to shareholders?

After the capital structure change, Eminem has \$10 million in debt and \$10 million in equity. Interest on the debt is \$1 million per year. (Note that the debt is risk-free.)

After paying back the interest, shareholders get \$3 million (30%) or zero (0%) return.

$$\text{Expected Return} = 30\%(0.5) = 15\%$$

c) Your CFO comes to you and points out the results in part b. He advocates leveraging the company in order to reap the benefits of debt, arguing that shareholders would be better off because the borrowing rate is lower than the expected return on equity. Do you agree? If so why, if not, why not?

The CFO is confused. The expected return on equity did rise, but so did risk. In the unlevered firm, the return could vary between 5% and 20%; with leverage, return variation doubles, to 0%-30%. Thus, the equity has become twice as risky. This increase in risk offsets the benefit of the higher expected return, leaving shareholder wealth unchanged. That's the essence of M&M.

d) How would your answer change if Eminem faced a 40% corporate tax rate, and intended to keep its \$10 million in borrowing outstanding in perpetuity? (5 points)

In this case, the capital structure change would increase shareholder wealth by \$4 million.

2. Freeco is considering making an offer to acquire Port. The following information has been collected:

	<u>Freeco</u>	<u>Port</u>
P/E Ratio	15	12
Number of Shares	1,000,000	250,000
Total Earnings	\$1,000,000	\$750,000

Port's earnings and dividends (currently \$1.80 per share) are expected to grow forever at a constant 5% per year. However, the acquisition would increase this growth rate to 7% per year.

A. What is the synergy of this merger? (5 points)

Value pre-merger = $12 * 750,000 = 9$ million

Compute r:

$$9,000,000 = 250,000(1.8)(1.05) / r - 0.05 \implies r = 10.25\%$$

So:

Value with synergy = $1.8(1.07) / (0.1025 - 0.07) = 14,815,385$

$$\underline{\text{So, synergy} = 5,815,385}$$

B. If Freeco offers to pay \$40 cash for each share of Port, what is the Premium of the merger? (5 points)

Total cost = $40 * 250,000 = \$10$ million

$$\text{So, premium} = 10,000,000 - 9,000,000 = \underline{\$1 \text{ million}}$$

C. What is the NPV of the merger at \$40 per share? (5 points)

$$\underline{\text{NPV} = \text{Synergy} - \text{Premium} = 4,815,385}$$

D. If Freeco issues 600,000 new shares and exchange these for Port's shares, what is the NPV of the merger? (5 points)

Value of combined firms = $14,815,385 + 15,000,000 = 29,815,385$

Total purchase price = $(600,000 / 1,600,000) * 29,815,385 = 11,180,769$

$$\text{NPV} = \text{Synergy} - \text{Premium} = 5,815,385 - 2,180,769 = 3,634,616$$

3. Jimmy's Ice Cream, Inc. is currently an unlevered firm but is considering a capital restructuring in which it will borrow \$500 for the next 4 years. At the end of year 4, Jimmy's will pay back the debt in full.

Jimmy's expects to generate \$200 in cash flow before interest and taxes in perpetuity. Its cost of debt is 10 percent and the corporate rate is 34 percent. Unlevered firms in the ice cream business have a cost of equity capital of 20 percent.

A. Use APV to compute the total value of Jimmy's after the change in capital structure. (5 points)

$$\text{Unlevered firm} = 200(1-0.34) / 0.2 = 660$$

$$\text{Value of Tax Shield} = 50(0.34)*\text{AF}(10\%, 4 \text{ years}) = 53.89$$

$$\underline{\text{APV} = 713.89}$$

B. What is the WACC after the change in capital structure? (5 points)

$$\text{After change: } B=500; S = 213.89;$$

$$r_s = 0.2 + (500/213.89)(0.1)(0.66) = 0.3543$$

So:

$$\underline{\text{WACC} = 0.3543(213.89/713.89) + (500/713.89)(0.66)0.1 = 0.1524}$$

C. Use the WACC method to compute the value of Jimmy's after the capital structure change. (5 points)

$$\underline{\text{Levered firm} = 200(1-0.34) / 0.1524 = \$866.14}$$

D. Why are your answers in A and C different? (5 points)

WACC assumes perpetual debt, higher tax savings

E. Which valuation is correct (A or C)? (5 points)

A is correct.

4. SunkenTreasures.Com is a boating and scuba-diving company that takes people on dives to explore old sunken sea vessels. Through their research on ill-fated ocean liners, they have discovered a letter from Molly Brown (the “unsinkable” one) about her experiences on the Titanic. In the letter, Brown comments on a diamond necklace that she lost when the boat went down. The letter had enough detail to suggest that the necklace would be worth \$10 million today.

The owners of SunkenTreasures are trying to decide whether to send a special unmanned submarine down to the wreckage of the Titanic to try to recover the necklace. They estimate that they have a 50/50 chance of finding the necklace after searching for 1 year, and that the cost of sending the sub would be \$4.5 million. SunkenTreasure is all-equity financed, with an equity beta of 1.5. The current risk-free interest rate is 5% and the market risk premium is 7%. There are no taxes.

Should SunkenTreasure try to find the necklace? (15 points)

The key here is to recognize that the project beta is 0. Whether or not they find the necklace is a coin toss, so there is no systematic risk. This, we PV the expected cash flows at the risk free rate.

$$\text{NPV} = \$5\text{m} / 1.05 - \$4.5\text{m} = \$0.26\text{m}.$$

So, they should try to find the necklace.