

Finance 3310; Key to Final A: 8/11/15

Note: Unless I specifically state "Calculations required", you can just set up all problems and tell me what you are solving for in each step. If you are using the result of an unsolved equation in a later step, just make that clear. One way to do this, set up the equation and call your result "A" or "B", etc. If you prefer, you can solve everything.

Short Answer (15 points each)

1. What is one of the four initial public offering puzzles?

+15 one of: underpricing of IPOs, cyclical issues, high costs, poor long-term performance

2. What is one of the four kinds of securities issued by the U.S. Treasury?

+15 one of: Treasury bills, Treasury notes, Treasury bonds, Treasury Inflation-Protected Securities (TIPS)

3. Assume that ~~over~~ the returns on a stock over the past three years ^{equals} 3%, -15%, and 25%. Set up the calculations needed to determine the standard deviations of returns on the stock.

$$+3 \left(Ave = \frac{1}{3}(3 - 15 + 25); SD = \sqrt{\frac{1}{2}((3 - Ave)^2 + (-15 - Ave)^2 + (25 - Ave)^2)} \right) +3$$

⑦

⑧

4. Gradual Inc. is a private company with EBITDA of \$100 million, sales of \$400 million, excess cash of \$10 million, debt of \$200 million, and 2 million shares outstanding. Enterprise value to EBITDA for firms in Gradual's industry = 4.1x, 3.2x, 4.0x, 3.6x, 4.9x, 2.7x, 5.1x, and 2.4x. Using the average enterprise value to EBITDA, estimate Gradual's share price. ~~Note: Calculations required.~~

$$+3 \left(Ave = \frac{1}{8}(4.1 + 3.2 + 4.0 + 3.6 + 4.9 + 2.7 + 5.1 + 2.4) \right)$$

$$+4 \left(EV = Ave \times 100; Price = \frac{EV - (75 - 10)}{3} \right) +4$$

5. Under current law, why is there a personal tax disadvantage of debt?

+15 Interest income taxed at a higher rate than equity income

Problems (75 points each)

1. Towngroup bonds mature for \$1000 seven years from today. The bonds pay an annual coupon rate of 6% with semiannual coupons. Set up the calculations needed to determine the bond's yield to maturity if they currently trade for \$947.32. You don't need to solve anything. If in any step you are solving for something other than the left-hand side of the equation, indicate which variable you are solving for.

$$947.32 = \frac{30}{r} \left(1 - \left(\frac{1}{1+r} \right)^{14} \right) + \frac{1000}{(1+r)^{14}}$$

+8
+8

← solve for r +4

$$\text{YTM or APR} = r \times 2 \quad +8$$

2. A year from today, Speedy Coverage Inc. expects earnings of \$3.50 per share. For each of the next five years, Speedy plans to retain and reinvest 60% of its earnings. Retained earnings will be invested in new projects with an expected return of 25%. Six years from today, Speedy will drop its retention rate to 20% as the expected return on new investments drops to 5%. Set up the calculations to determine Speedy's stock price if Speedy's equity cost of capital equals 7%. If in any step you are solving for something other than the left-hand side of the equation, indicate which variable you are solving for.

$$DIV_1 = .4(3.50) \quad (6)$$

$$g_{2-6} = .6(.25) = A \quad (3) \quad \checkmark = +3$$

$$g_{>6} = .2(.05) = B \quad (3)$$

$$EARN_6 = 3.50(1+A)^5 \quad (15)$$

$$DIV_6 = .8 \times EARN_6 \quad (6)$$

$$P_0 = \underbrace{\left(\frac{DIV_1}{.07 - A} \right) \left(1 - \left(\frac{1+A}{1.07} \right)^5 \right)}_{(18)} + \underbrace{\left(\frac{DIV_6}{.07 - B} \right)}_{(15)} \underbrace{\left(\frac{1}{1.07} \right)^5}_{(9)}$$

3. Assume that Krafty Foods and Whole Cheese have identical assets that will pay off either \$100 million or \$150 million a year from today. Krafty is funded with equity that has a market value of \$120 million, but Whole Cheese is funded with equity and debt that matures for \$110 million one year from today. The market value of Whole Cheese bonds is \$95 million and of its equity is \$20 million. If markets are perfect, what set of transactions today will generate an arbitrage profit for you? Show that the conditions of arbitrage are met regardless of whether the firms' assets end up being worth \$100 million or \$150 million. Notes: 1) calculations required, 2) use "+" for inflows and "-" for outflows.

Value of WC = $95 + 20 = 115 < 120 = \text{Value of Krafty}$

⇒ Buy WC + sell Krafty

| <u>Transaction</u> | <u>CF₀</u> | <u>CF₁</u> | |
|----------------------------------|-----------------------|-----------------------|----------------|
| | | <u>100</u> | <u>150</u> |
| +5 Buy WC stock | -20 +5 | ∅ +5 | +40 +5 |
| +5 Buy WC bonds | -95 +5 | +100 +5 | +110 +5 |
| +5 <u>shortsell Krafty stock</u> | <u>+120 +5</u> | <u>-100 +5</u> | <u>-150 +5</u> |
| <u>Total</u> | +5 +5 | ∅ +5 | ∅ +5 |

4. Assume that Goggle Search Inc. is considering whether to invest in a new plant to manufacture virtual-reality goggles. The new facility will cost \$100 million today and \$150 million a year from today. This cost is in addition to the \$200 million Goggle spent a year ago developing the goggles. The factory will produce its first net annual cash flow of \$125 million two years from today and net cash flows are expected to grow by 2% per year through the closing of the factory 25 years from today. If Goggle builds the factory, the firm's net working capital will increase by \$50 million two years from today but will return to its present level when the factory is closed.

The beta of the factory (1.5) exceeds the beta of Goggle's existing factories (1.1). Similarly, the standard deviation of returns on the factory (45%) and exceeds the standard deviation of returns on Goggle's existing factories (32%).

The market risk premium equals 6% and the risk-free interest rate varies by maturity as follows: 1-year = 0.1%, 2-year = 0.5%, 3-year = 0.9%, 4-year = 1.4%, 5-year = 1.7%, 6-year = 1.9%, 7-year = 2.1%, 8-year = 2.4%, 9-year = 2.5%, 10-year = 2.6%, 15-year = 2.9%, 20-year = 3.1%

Set up the calculations needed to determine whether Goggle should build the factory. Note: you only need to set up the calculations. You don't need to solve anything. If in any step you are solving for something other than the left-hand side of the equation, indicate which variable you are solving for.

$$+8(r = .026 + 1.5(.06)) \quad (17)$$

$$NPV = \overset{+3}{-100} - \frac{\overset{+3}{150}}{\overset{+4}{1+r}} - \frac{\overset{+3}{50}}{\overset{+4}{(1+r)^2}} + \frac{\overset{+3}{125}}{\overset{+3}{r-.02}} \left(1 - \frac{\overset{+4}{1.02}}{\overset{+4}{1+r}} \right)^{24} \left(\frac{\overset{+4}{1}}{\overset{+4}{1+r}} \right)^1 + \frac{\overset{+3}{50}}{\overset{+4}{(1+r)^{25}}} \quad (18)$$

add: The risk-free rate equals 3% + the expected return on the market equals 11%

5. Scorched Earth has a stock price of \$50 per share with 15 million shares outstanding. The beta of Scorched Earth stock is 1.1 and the standard deviation of returns on its stock is 35%. Scorched Earth also has outstanding bonds with a market value of \$350 million. The yield to maturity on this debt equals 9%. There is an 8% chance that Scorched Earth will default on these bonds, and in the case of default, the expected loss rate is 55%. The corporate tax rate equals 35%.
- Set up the calculations needed to solve for the expected return on Scorched Earth's bonds.
 - Set up the calculations needed to solve for Scorched Earth's equity cost of capital.
 - Set up the calculations needed to solve for Scorched Earth's unlevered cost of capital.
 - Set up the calculations needed to solve for Scorched Earth's weighted average cost of capital.

$$a. r_D = .09 - .08(.55) + 6 \quad (21)$$

$$b. r_E = .03 + 1.1(.11 - .03) + 6 \quad (24)$$

$$c. E = 50 \times 15 \quad (8)$$

$$r_U = \left(\frac{E}{E+350} \right) r_E + \left(\frac{350}{E+350} \right) r_D + 6 \quad (11)$$

$$d. r_{WACC} = \left(\frac{E}{E+350} \right) r_E + \left(\frac{350}{E+350} \right) r_D (1 - .35) + 6 \quad (11)$$