

Each question is all or none on grading. To receive credit you must show each percent answer to 2 decimal places (e.g., 12.24%) and each price answer to the nearest \$.01 (e.g., \$5.16).

1. Use the following information for the next several questions. Consider a world of Perfect Capital Markets. This world has no corporate or personal taxes, all investors have homogeneous expectations, no bankruptcy costs, and M&M's no-tax theory of capital structure is true. Company Y is financed has the following market value balance sheet:

Assets = \$407
Liabilities = \$0
Equity = \$407

The firm had \$46.00 in EBIT last year, and has just paid its annual dividend. The firm has 80 shares outstanding. The firm expects these same returns for the foreseeable future. The firm is a zero growth firm that pays out all excess earnings as a once per year end of year dividend. Any time the firm changes its capital structure, it changes only the debt/equity mix and does not change its total physical assets. The firm's liabilities consists entirely of perpetual debt with annual interest payments. The firm's debt is risk-less, selling at par, and has a 5% current yield. If the firm were to change its capital structure, new debt would still have a 5% yield. The expected return on the market portfolio is 10%. Given this information, answer the following questions:

- (1 point) What is the firm's return on equity? Solve for net income = $46 - 0 = 46 - 0 = 46$, then $ROE = NI/E = 46/407 = 11.30\%$
- (1 point) What is the firm's current weighted average cost of capital. Since all equity, $WACC = ROE = 11.30\%$
- (1 point) What is the current price per share? $407/80 = \$5.0875$
- (1 point) What is the beta of the firm? $11.30 = 5 + (10-5)*B \Rightarrow B = 1.26$
- (1 point) What is the firm's dividends per share? $NI/\text{Number of Shares} = 46/80 = \5.75

Now assume that the above firm issues \$250 in debt and uses the funds to repurchase equity. This change in capital structure reveals no new information about future firm prospects.

- (1 point) What is the beta of the firm's levered equity?

Work backwards solving G first, 3.2

- (1 point) What is the overall firm's new return on levered equity?

Work Backwards solving H, then $WACC = wd*rd*(1-t) + ws*rs \Rightarrow 11.30 = (250/407*5\%) + (157/407*rs) \Rightarrow rs = 21.33\%$

Alternate method, 2) Solve for new net income, $46 - 12.50 = 33.50 - 0 = 33.50$. Then compute $ROE = NI/E = 33.50/157 = 21.33\%$

Alternate method 2 would be to do the alternate method using per share figures.

- (1 point) What is the firm's new Weighted Average Cost of Capital? By theory, it is unchanged, thus 11.30%

- (1 point) Now assume that you are at the end of 10 years, just before paying the annual dividend and interest, what is the expected stock price? Under perfect capital markets, the firm value and WACC does not change, so therefore the stock price of \$5.0875 does not change.

Method 1, recognize that stock goes up in value by the amount of the return on equity of 21.33% per year (from step g), thus the beginning of the year value of 5.0875 is a present value, $n=1$, $I=21.33\%$ and $FV = \text{End of Year Value} = \6.17

Method 2, Step 1) solve for the new number of shares, old shares (80) - shares repurchased ($250/5.0875 = 49.14$) = new shares (30.86 shares). Price per share = value of equity ($157 + 33.50 = 190.5$) / number of shares (30.86) = \$6.17

2. Now consider a DIFFERENT COMPANY in a world that of perfect capital markets, with one change, CORPORATE TAXES DO EXIST. This world has no personal taxes, all investors have homogeneous expectations, no bankruptcy costs, and M&M's with corporate taxes theory of capital structure is true. Company Y is financed has the following market value balance sheet:

Assets = \$ 301
Liabilities = \$150
Equity = \$151

The firm had \$37 in EBIT last year, and has just paid its annual dividend. The firm has 20 shares outstanding. The firm expects the same return/profits for the foreseeable future. The firm is a zero growth firm that pays out all excess earnings as a once per year end of year dividend. Any time the firm changes its capital structure, it changes only the debt/equity mix and does not change its physical/fixed assets. Liabilities consist only of the firm's debt. The debt is riskless, perpetual, selling at par, has annual payments and has a 7% pre-tax yield. If the firm were to change its capital structure, new debt would still have a 7% pre-tax yield. The firm's tax rate is 35%. The return on the market portfolio is 14%. Given this information, answer the following questions:

- (1 point) What is the value of the firm's perpetual debt tax shield? $\text{Tax rate} * \text{Debt} = 35\% * 150 = 52.5$
- (1 point) What is the current weighted average cost of capital (WACC)? Step 1, Find r_s which equals ROE. $\text{Ebit } 37 - \text{Interest } 10.50 = \text{EBT } 26.50 - \text{Taxes } 9.275 = \text{Net Income } 17.225$. $ROE = \text{Net Income} / \text{Equity} = 17.225/151 = 11.4\%$. step 2, solve for WACC = $(150/301*7\%*(1-35\%)) + (151/301*11.4\%) = 2.267 + 5.719 = 7.99\%$
- (1 point) What is the firm's dividends per share? $\text{Net income} / \text{number of shares} = 17.225/20 = \0.86125

Now assume the firm redeems \$150 in debt and issues \$150 in equity.

- (1 point) What is the firm's Weighted Average Cost of Capital? Step 1, solve for new firm value, $VL = VU + TD \Rightarrow 301 = VU + 52.5 \Rightarrow VU = 248.5$. Step 2, solve for new Net Income $\text{Ebit } 37 - \text{Interest } 0 = \text{EBT } 37 - \text{Taxes } 12.95 = \text{Net Income } 24.05$. Solve for $r_s = ROE = NI/\text{Equity} = 24.05/248.5 = 9.68\%$ rounds to 9.7%. Since firm is all equity $r_s = WACC = 9.7\%$

- (1 point) What is the firm's unlevered equity beta? Use CAPM. $9.7 = 7 + B(14-7) \Rightarrow B = .386$

- (1 point) What is the firm's new stock price? Key point is that in M&M perfect markets world, stock price will change when change in capital structure change is announced, meaning the firm value will drop from 301 to 248.5. Thus the balance sheet goes from $301 = 150 + 151$ to $248.5 = 150 + 98.5$. $98.5/20 \text{ shares} = \4.925

- (1 points) Now assume that you are at the beginning of 11 years, just after paying the annual dividend and interest, write out with labels the firm's balance sheet? Since firm pays out all dividends each year, balance sheet is unchanged, $248.5 = 0 + 248.5$

- (1 point) Now assume that you are at the beginning of 11 years, just after paying the annual dividend, what is the expected stock price? Again, since all dividends are now paid, and balance sheet is unchanged, then stock price is unchanged \$4.925

Now assume the firm can change its capital structure to be any combination of debt and equity, but that the level of fixed assets cannot be changed. i. (1 point) Write out the balance sheet that corresponds with the maximum firm value? Multiple answers were accepted here. Here are two. To do this we must find out how much debt can be supported. Since debt is perpetual, then $\text{Value} = \text{Payment} /$

$\text{Discount rate} = 37/7\% = 528.57$. Thus one answer is $528.57 = 528.57 + .00001$. Another possible solution is also based on the maximum debt of 528.57, but yields a strange answer. Let $VL = VU + (T*D) = 248.5 + (528.57*35\%) = 248.5 + 185 = 433.5$, thus the balance sheet is $433.5 = 528.57 + - 95.07$. This question demonstrates some of the problems with the M&M no taxes theory. A third solution was to keep reducing the debt from 528.57 until equity went to 0.