Module 6, Capital Structure

Dividend policy concept questions follow the Capital Structure Problems

We are working through another "concept-heavy" module.
Knowing the effect of leverage on the firm is important and these practice questions and problems should help.

1 Which one of the following is the equity risk that is most related to the daily operations of a firm?

A. market risk
B. systematic risk
C. extrinsic risk
** D. business risk
E. financial risk

** Business risk is the risk that comes from the nature of the firm's operating activities. (see lecture notes on Capital Structure, slide 17)

Market risk and systematic risk are basically the same thing, they refer to the "overall market" and would be like interest rate increases, political unrest or change - those things that affect all financial investments and not related to a specific firm.

Extrinsic risk isn't a "thing" in our course, it is merely a distractor here.
Financial risk is the extra risk to shareholders that comes from debt financing.

2 Which one of the following states that a firm's cost of equity capital is directly and proportionally related to the firm's capital structure?

A. Capital Asset Pricing Model
B. M & M Proposition I
** C. M & M Proposition II
D. Law of One Price
E. Efficient Markets Hypothesis

Remember that on the exam, you won't need to remember the various M&M propositions by name. You will be given the setup and assumptions.

3 Which one of the following is the equity risk related to a firm's capital structure policy?

A. market
B. systematic
C. extrinsic
D. business
** E. financial

Refer back up to the notes on #1

4 The costs incurred by a business in an effort to avoid bankruptcy are classified as _____ costs.

A. flotation
B. direct bankruptcy
** C. indirect bankruptcy
D. financial solvency
E. capital structure

For more specifics on bankruptcy costs, go back to lecture notes on capital structure, slides 28-31

5 A firm should select the capital structure that minimizes taxes

TRUE
** FALSE

A firm should select the capital structure (as measured by debt to equity ratio or percent debt) that maximizes the value of the firm.

6 The optimal capital structure has been achieved when the:

A. debt-equity ratio is equal to 1.
B. weight of equity is equal to the weight of debt.
C. cost of equity is maximized given a pre-tax cost of debt.
D. debt-equity ratio is such that the cost of debt exceeds the cost of equity.
** E. debt-equity ratio results in the lowest possible weighted average cost of capital.

Go back to the capital structure lecture notes, particularly slides 33 & 34
The debt to equity ratio that results in the lowest possible weighted average cost of capital, and thereby, maximize the share price.

7 AA Tours is comparing two capital structures to determine how to best finance its operations. The first option consists of all equity financing. The second option is based on a debt-equity ratio of 0.45. What should AA Tours do if its expected earnings before interest and taxes (EBIT) are less than the break-even level? Assume there are no taxes.

A. select the leverage option because the debt-equity ratio is less than 0.50
B. select the leverage option since the expected EBIT is less than the break-even level
C. select the unlevered option since the debt-equity ratio is less than 0.50
** D. select the unlevered option since the expected EBIT is less than the break-even level
E. cannot be determined from the information provided

Review the lecture notes for Module 6, look at slide 8. When the EBIT is less than the break-even point, leverage puts the firm at a disadvantage.

The bottom line here is that if we expect EBIT to be greater than the break-even point, then leverage is beneficial to our stockholders.

If we expect EBIT to be less than the break-even point, then leverage is detrimental to the stockholders.

8 The business risk of a firm is dependent upon the relative weights of the debt and equity used to finance the firm.

TRUE
** FALSE

Business risk is the equity risk that comes from the nature of the firm's operating activities. The business risk has a positive relationship with the firm's cost of equity. The higher the business risk, the higher the cost of equity.

9 The capital structure that maximizes the value of a firm also:

A. minimizes financial distress costs.
** B. minimizes the cost of capital.
C. maximizes the present value of the tax shield on debt.
D. maximizes the value of the debt.
E. maximizes the value of the unlevered firm.

Back to capital structure lecture notes 33&34

Specific other topics to review for the exam:

Review the M&M Propositions (starts on slide 13). I am looking for the big picture here. What were Modigliani and Miller trying to show about capital structure?
Proposition I is about the firm's value while Proposition II is about the firm's cost of capital.
Understand the role of the interest tax shield and its effect on the cost of debt vs. cost of equity
What is the Pecking Order theory and what is the "order" for funding sources?

10 Zingo Corp. is debating between a leveraged and an unleveraged capital structure. The all equity capital structure would consist of 80,000 shares of stock. The debt and equity option would consist of 50,000 shares of stock plus $400,000 of debt with an interest rate of 8 percent. What is the break-even level of earnings before interest and taxes between these two options? Ignore taxes.

The idea behind Breakeven EBIT is to be sure that the expected level of EBIT is sufficient to support the required interest on the additional debt. The interest is deductible, lowering taxes; but, if there EBIT isn't high enough, the firm is losing money and the tax break is meaningless.

# shares if all equity	80,000	<-- these are the "unlevered" share, which are the number of shares outstanding without debt
# shares if mix of debt/equity	50,000	<-- these are the "levered: shares, which are the number of outstanding shares after the firm takes on debt to buy back shares
Debt if mix of debt/equity	$400,000	
Interest rate on debt	8%	

Note: We see that they are taking on debt and the number of outstanding shares drops. That means the firm is taking on debt to buy back stock.

Interest on debt is deductible, and in this case, we were told to ignore taxes. That means that net income (ignoring taxes) is equal to EBIT/unlevered number of shares and after debt is taken on and shares are bought back, net income = EBIT - interest.

If algebra makes your head hurt, skip to the alternate solution below.

Step 1, set earnings (EBIT) per share equal under both options

Building on the note above, EPS (NI/# shares) is the same as EBIT/# shares for a firm with no debt when taxes are ignored. For a firm with debt, EPS (ignoring taxes still) = (EBIT - interest on debt)/# shares.

EBIT/80,000 = ((EBIT - (400,000*.08))/50,000
EBIT * 50,000/80,000 = EBIT - 32,000
.625 EBIT = EBIT - 32,000
Put the two EBIT values on one side
32000 = EBIT - 0.625 EBIT *Add 32,000 to both sides*
32000 + 0.625 EBIT= EBIT *Subtract 0.625 EBIT from both sides*
32000 = EBIT - 0.625 EBIT = EBIT(1-0.625)
32000 = 0.375*EBIT
32000/.375 = EBIT = $85,333

Alternate solution, **this works only for situations where we are comparing the "no debt, all equity" and "some debt, some equity" positions for a firm**. This is from lectures M6, slide 9.

Breakeven EBIT = (issued debt*interest rate)/[1 - (levered shares / unlevered shares)]
*(issued debt * interest rate) = annual interest payment required every year*
In the above example, this is:
(400,000 * .08)/(1 - (50,000/80,000)) = 32,000/(1-0.625) = $85,333

If management believes that their EBIT will be greater than $85,333, then the new capital structure is beneficial. Earnings per share will be higher given the tax break on debt. However, if the EBIT is expected to be below the breakeven amount, the firm should stay with the current structure.

Breakeven EBIT level (levered vs. unlevered)

11 Holly's is currently an all equity firm that has 9,000 shares of stock outstanding at a market price of $45 a share. The firm has decided to leverage its operations by issuing $120,150 of debt at an interest rate of 9.5 percent. This new debt will be used to repurchase shares of the outstanding stock. The restructuring is expected to increase the earnings per share. What is the minimum level of earnings before interest and taxes that the firm is expecting? Ignore taxes.

As above, additional debt needs to have sufficient earnings to support the additional interest expense. The interest is deductible, lowering taxes; but, if there EBIT isn't high enough, the firm is losing money and the tax break is meaningless. In order for the firm to consider the additional debt, they must believe they are going to earn at more than the breakeven level of EBIT. This question is identical to #10.

The number of new shares will be 9000 - $120,150/45 = 9000-2670 = 6,330
The firm currently has 9000 shares and they borrowed $120,150 to buy back stock selling at $45 per share. That means the number of shares that can be purchased = $120,150/$45 per share = 2670. The old number of shares is 9000, the new shares will be (9000 - 2670) = 6330
"net income" without taxes = EBIT with no debt
"net income" with debt and no taxes = (EBIT - interest of $120,150 * .095) = EBIT - 11,414.25
Set EPS old = EPS new (we know EPS = net income / # shares)
EBIT/9,000 = [EBIT - ($120,150 × 0.095)]/6330
EBIT * 6330/9000 = EBIT - 11,414.25
11,414.25 = EBIT(1 - 6330/9000) or 11,414.25 = EBIT * 0.2967 *0.2967 is 1 - 6330/9000 (without rounding, this is 0.296666666…)*
EBIT = 11,414.25/.2967 = $38,470.67 or $38475 with no rounding on (1-6330/9000) <-- the company feels it will have at least this level of EBIT, or the debt wouldn't make sense

Verify: 38,470.68/9000 = EPS of $4.27 per share and (38,470.68 - 11414.25)/6330 = $4.27 per share
The minimum level of EBIT that the firm must be expecting is the breakeven EBIT.

Alternate solution
Breakeven EBIT = (issued debt*interest rate)/[1 - (levered shares / unlevered shares)] ***yes, this should be on your equation sheet!!***
*(issued debt * interest rate) = annual interest payment required every year*
In the above example, this is:
(120,150 * .095)/(1 - (6330/9000)) = 11,414.25/(1- 0.7033) = $38,470.68

Depending on rounding that may be done on this type of problem, you may get a slightly different answer, but the concepts re all the same.

EPS at Breakeven EBIT

12 Sewer's Paradise is an all equity firm that has 5,000 shares of stock outstanding at a market price of $15 a share. The firm's management has decided to issue $30,000 worth of debt and use the funds to repurchase shares of the outstanding stock. The interest rate on the debt will be 10 percent. What are the earnings per share at the break-even level of earnings before interest and taxes? Ignore taxes.

This problem is basically identical to #11. You calculate the breakeven EBIT, then solve for the EPS. You should have the same EPS for BE EBIT/old shares and for (EBIT - interest)/new shares.

If the stock is selling at $15 per share and the firm uses $30,000 to buy back shares:
Number of shares repurchased = $30,000/$15 = 2,000
# of shares under the new structure with debt = 5000 - 2000 = 3000 shares

As in #11, EPS = Net income/# shares. We are ignoring taxes, so Net income = EBIT - interest, but there is only interest under the new structure (with debt).
EPS under old structure = EBIT/50000 shares
EBIT under new structure = (EBIT - interest on debt)/3000 shares
EBIT/5,000 = [EBIT - ($30,000 × .0.10)]/(5,000 - 2,000)
EBIT/5,000 = (EBIT - 3000)/3000
Multiply both sides by 5000
EBIT = (EBIT - 3000) * (5000/3000)
EBIT = (EBIT - 3000) * 1.667
Multiply the 1.667 through
EBIT = 1.667 EBIT - 5000
add 5000 to both sides
5000 + EBIT = 1.667 EBIT
Subtract EBIT from both sides
5000 = 0.667EBIT
5000/0.667 = Breakeven EBIT = 7500 (you may get slightly different results based on rounding)
New structure EPS = [$7,500 - ($30,000 × 0.10)]/(5,000 - 2,000); EPS = $1.50
Old EPS = 7500/5000 shares = $1.50/share

Using the alternate solution above, I will first solve for the breakeven EBIT, then move on to the EPS at that level.

Breakeven EBIT = (issued debt*interest rate)/(1-levered shares / unlevered shares)
In the above example, this is:
(30,000 * .10)/(1 - (3000/5000)) = 3000/(1-0.60) = $7500, the breakeven EBIT
EPS under the old structure = EBIT/# shares = $7500/5000 = $1.50 per share
EPS under the new structure = (EBIT - annual interest amount)/# shares
EPS under the new structure = ((7500-(30,000*.1))/3000 = $4500/3000 = $1.50 per share

Value of a firm, ignoring taxes

13 Pewter & Glass is an all equity firm that has 80,000 shares of stock outstanding. The company is in the process of borrowing $600,000 at 9 percent interest to repurchase 12,000 shares of the outstanding stock. What is the value of this firm if you **ignore taxes**?

Firm value (currently unlevered) is # current shares * share price
If the firm is borrowing $600,000 to purchase 12,000 shares, the stock price is $600,000/12,000 or $50 per share.
Firm value = 80,000 × ($600,000/12,000) = $4 million
At present, the firm is all equity, and the value of equity is the market capitalization.
When debt is added and we ignore taxes, there is no tax advantage and the firm value does not change.

Value of a firm, ignoring taxes

14 Stacy owns 38 percent of The Town Centre. She has decided to retire and wants to sell all of her shares in this closely held, all equity firm. The other shareholders have agreed to have the firm borrow $650,000 to purchase her shares of stock. What is the total market value of The Town Centre? **Ignore taxes.**
Firm value = $650,000/0.38 = $1,710,526
If her 38% is worth $650,000, then the entire firm is worth 650,000/.38
We are ignoring taxes, that is why we didn't add the PV of the tax break on debt.

REMEMBER WHAT I SAID IN THE INTRO TO THIS MODULE, DON'T WORRY ABOUT WHICH PROPOSITION OR WHICH CASE EACH OF THESE ARE BASED ON. YOU WILL BE PROVIDED WITH THE NECESSARY INFO AND TOLD WHETHER TO INCLUDE OR IGNORE TAXES.

Cost of equity (Prop II, Case 1), ignore tax effect

15 Winter's Toyland has a debt-equity ratio of 0.65. The pre-tax cost of debt is 8.7 percent and the required return on assets is 16.1 percent. What is the cost of equity if you **ignore taxes**?

$R_E = R_U + [(R_U - R_D)(D/E)]$

$D/E = 0.65$ (which means \$0.65 debt for every \$1 of equity)

R_D (remember R_D is pre-tax cost of debt) = 8.7%

$R_A = 16.1\% = R_U$ (equivalent to the cost of equity for an unlevered firm)

$R_E = 0.161 + ((0.161 - 0.087) \times 0.65) = 20.91$ percent

R_E, the firm's cost of equity
R_E, the firm's cost of equity
R_U, the firm's cost of assets assuming no debt (unlevered)
R_D, the firm's pretax cost of debt
D/E is the ratio of debt to equity
example, if 40% debt and 60% equity, D/E = .4/.6 = 0.67

Recall that the required return on assets is defined as the "cost" of the firm's business risk, and is the risk of the firm's assets. Here, when the firm is initially unlevered, the cost of assets Ra = Ru.

The second term in the equation above: (RU – RD)(D/E) is the cost of the firm's financial risks. This is also the **additional return** required by stockholders to compensate for the risk of leverage.

Cost of equity with taxes (Prop II, Case 2), incorporate the tax break on debt

16 In the same question (from #15), what if we were to include taxes, with a rate of 22%? What would the cost of equity be under these circumstances?

$R_E = R_U + [(R_U - R_D)(D/E)(1 - T_C)]$

$R_E = 0.161 + ((0.161 - 0.087) * 0.65* (1 - 0.22)) = 19.85\%$

Cost of equity once debt is taken on and including tax effects

17 A firm has zero debt and an overall cost of capital of 14.6 percent. The firm is considering a new capital structure with 30 percent debt. The interest rate on the debt would be 8.5 percent and the corporate tax rate is 22 percent. What would be the cost of equity with the new capital structure if you include the effect of corporate taxes? (Case 2)

The cost of capital for the firm is 14.6%, this is based on the risk of the assets and the firm's projects

For an all-equity firm, the cost of capital (RA) = the cost of unlevered equity (RU)

$R_A = 14.6\% = R_U$ = WACC <-- firm's cost of capital

$D/E = .3/.7$ We have 30% debt, which means 70% of capital structure must be equity)

$R_D = 8.5\%$ This is the pre-tax cost of debt

As debt is taken on, the WACC or RA doesn't change, what changes is the cost of equity (RE), this becomes more and more costly (higher rate) as the debt to equity ratio increases.

$T_C = 0.22$ or 22%

We need the tax rate, as the pre-tax cost of debt must be adjusted by the tax break on debt. The following equation allows us to calculate the new cost of equity now that the firm has added debt.

$R_E = R_U + [(R_U - R_D)(D/E)(1 - T_C)]$

$R_E = 0.146 + [(0.146 - 0.085) \times .3/.7 * (1-.22)] = 16.64\%$

18 Donut Galaxy is currently an all equity firm with a required return on assets of 16.75%. Donut Galaxy is considering taking on debt which would mean its debt to equity ratio would be 0.62. If the required interest rate on debt is 7.9% and the firm is in the 21% tax bracket, what is the new cost of equity for the firm? Include the effect of corporate taxes.

$D/E = 0.62$

$R_D = 7.9\%$

$R_A = 16.75\% = R_U$ = WACC

$T_C = 0.21$ or 21%

$R_E = R_U + [(R_U - R_D)(D/E)(1 - T_C)]$

$R_E = 0.1675 + [(0.1675 - 0.079) *.62 * (1-.21)] = 21.08\%$

Value of leveraged firm vs. unlevered

19 Windfall Tree Trimming is currently an all equity firm that has 320,000 shares of stock outstanding with a market price of $19 a share. The current cost of equity is 15.4 percent and the tax rate is 34 percent. The firm is considering adding $1.2 million of debt with a coupon rate of 8 percent to its capital structure. The debt will be sold at par value. What is the levered value of the equity?
The coupon rate is a red herring. You have the info, but it isn't needed for anything.

$V_U = EBIT(1-T_C)/R_U$ But in this case, we have an unlevered firm with 320,000 shares at a market price of $19 per share

V_U =320,000 shares * $19/share = $6,080,000 <-- Value of unlevered (debt-free) firm
$V_L = V_U + DT_C$
$V_L = (320{,}000 \times \$19) + (0.34 \times \$1.2m) = \$6.488m$ <-- Value of levered firm (one with debt), when we consider the tax effects

Value of a levered firm = Value of debt + value of equity -- This is the value of the firm as a whole, but what amount is really available to the equity (share) holders? The entire amount of the debt must be paid off, then whatever is left is for the shareholders (equity holders).
Value of equity = value of levered firm - value of debt
we were given that the debt can be sold at its par value.
V_E = $6.488m - $1.2m = $5.288m <-- Value of equity, (amount shareholders would get once the debt is paid off)

We take the value of the levered firm, $6.488mm and deduct the full amount of the debt, $1.2mm and that is what is left for the equity holders = $5.288mm. This problem has us look at how much of the firm value is allocated to the equity holders now that there is some debt. Without debt, the full firm value would have been allocated to the shareholders. Now, with the debt, we first "pay off" the debtholders at the full market value of the debt and then whatever is left goes to the shareholders, reducing their overall value from 6,080,000 to $5,288,000.

Value of equity for a firm with debt

20 L.A. Clothing has expected earnings before interest and taxes of $48,900, an unlevered cost of capital of 14.5 percent, and a tax rate of 34 percent. The company also has $8,000 of debt that carries a 7 percent coupon. The debt is selling at par value. What is the value of this levered firm? Also, what is the value of equity for this levered firm?

Here you have been given the EBIT and the unlevered cost of capital. Remember that the value of an investment is the PV of the future cash flows, discounted at the appropriate rate. Further, the cash flows need to on an after-tax basis.

The question asks for the value of the firm. We can see that this is a firm with some debt. The value of a firm is the value of the unlevered firm (Vu) plus the value of the interest tax break. We will start with the value of the unlevered firm, we have expected EBIT and the unlevered cost of capital. There is no interest, so net income will be EBIT - taxes, which is equal to EBIT * (1 - Tc). We calculate the PV of those earnings as a perpetuity: EBIT * (1 - Tc)/unlevered cost of capital.

$V_U = EBIT(1-T_C)/R_U$
$V_U = [\$48{,}900 \times (1 - 0.34)]/0.145 = \$222{,}579$ <-- Value of unlevered (debt-free) firm
Go back to the lecture slides for a derivation of the interest tax shield
The annual tax interest shield is the interest rate multiplied by the tax rate = 8000*.07*.34

This is a perpetuity, we determine its PV as cash flow/appropriate discount rate. As this is debt, the appropriate interest rate is 7%

This leaves us with 8000*.07*.34/.07 which is the same as amount of debt * tax rate, or DTc
We are valuing the unlevered firm as a perpetuity. There is no debt, so no interest. EBIT is the same as taxable income.
*Earnings after taxes are EBIT * (1 - tax rate); we discount this at the unlevered cost of capital.*
Once we have the value of the unlevered firm, we add in the value of the tax break on debt.
*The PV of the tax-break is the amount of outstanding (perpetual) debt * the tax reate.*

$V_L = V_U + DT_C$ or, the value of a levered firm is the value of an all equity firm (no debt) plus the tax benefit of debt, which is market value of debt * tax rate

$V_L = \$222{,}579 + 0.34\ (\$8{,}000) = \$225{,}299$ <-- Value of levered firm (one with debt), when we consider the tax break on debt
V_E = $225,299 - $8000 = $217,299

PRACTICE QUESTIONS FOR DIVIDEND POLICY
There will be no numeric dividend policy problems on the exam, review the lecture notes and be prepared for a few concept questions.
1 The key dividend policy(ies) discussed in the lecture notes were: (select all that apply)
** a) Stable dividend policy
b) Market dividend policy
** c) Residual dividend policy

d) Internal funding dividend policy

a and c. A stable dividend policy is where the payout ratio is determined so that the dividend remains relatively stable over time. The market "likes" stable dividends. This reduces the uncertainty surrounding expected future dividends and should decrease the risk attributed to the

2 The trade-offs that a firm needs to consider in its dividend policy are:

a) Management bonus pool vs. payouts to shareholders

** b) internal vs. external financing fund availability

c) cash availability considerations

How much is paid out in dividends determines how much is left for internal financing of projects (the amount of net income allocated to retained earnings at the end of the year.

Review lecture slides 5 & 6

3 If a firm pays out a larger percentage of net income in dividends, less profit is retained in the firm. True or False?

TRUE

Net income is the firm's end of fiscal year profit. It can then "split" between dividends to shareholders and added back to retained earnings, where it can be used for future growth.

4 If a firm pays out a small percentage of net income in dividends, it will require higher external equity financing. True or false.

FALSE

As above, the more that is paid out, the less there is available for financing, requiring the firm to go out for more funds, whether through debt or equity. In either case, it is a trade-off for the investors.

5 A firm's dividends send "signals" to the market. True or False

TRUE

Financial evidence shows tha large and unexpected changes in dividends impact stock prices. Remember that most firms prefer a stable dividend policy and management knows that a drop in dividends sends the signal that the future is not looking so good for the firm (unless

An increase in a dividend generally indicates to the market that the firm has strong prospects and thinks that it can maintain the new, higher dividend.

6 Clientele effect is where one group of investors will receive a higher dividend than another group for a firm's stock. True or False

FALSE

Clientele effect refers to the fact that investors can have different preferences for dividend payouts. Some investors want minimal dividends now, so that they don't pay taxes on the distributions. These investors would prefer that the firm is reinvesting the profits for future growth, whereby the stock price would grow more quickly. Other investors may want higher dividends, the classic example is for those in retirement, where investors want a steady income stream for living expenses.

Common share investors at any firm all receive the same dividend payout (on a per share basis). The investors build their stock portfolios based on their preferences.