

# Capital Structure Risk and Return

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# Problem 11, CMA June 2019

Home Place Hotels is entering into a 3 year re-modeling and expansion project. The construction will have a limiting effect on earnings during that time, but when it is complete, it should allow the company to enjoy much improved growth in earnings and dividends. Last year, the company paid a dividend of Tk.3.40. It expects zero growth in the next year. In years 2 and 3, 5% growth is expected, and in year 4, 15% growth is expected. In year 5 and thereafter, growth should be constant 10% per year. What is the maximum price per share that an investor who requires a return of 14% should pay for the Home Place Hotel's common stock

# Solution

## Cash flows

$$D_0 = 3.40 \quad D_1 = 3.40, \quad D_2 = 3.40(1.05) = 3.57, \quad D_3 = 3.57(1.05) = 3.75, \\ D_4 = 3.75(1.15) = 4.31$$

$$\text{Terminal value} = D_5 / (k_e - g) = 4.31(1.10) / (.14 - .10) = 118.60$$

$$\text{Value of stocks} = 3.40/1.14 + 3.57/1.14^2 + 3.75/1.14^3 \\ + (4.31 + 118.60)/1.14^4 \\ = 81.03$$

# Capital Structure

The Capital Structure and the Pie Theory

The value of the firm,  $V$ , is  $V = B + S$

$B$  = Market value of debt

$S$  = Market value of equity

If the goal of the Management of the firm is to make the firm as valuable as possible, the firm should pick the debt-equity ratio that makes the pie – the total value- as big as possible

# Capital Structure

Two questions

1. Why should the stockholders in the firm care about maximizing the value of the entire firm?
2. What ratio of debt to equity maximizes the shareholders' interests?

# Capital Structure Theories

## MM Propositions

Proposition 1:

Value of the levered firm is the same as the value of the unlevered firm.

$$V_L = V_{UL}$$

Homemade leverage

If the levered firms are priced too high, rational investors will simply borrow on their personal accounts to buy shares in unlevered firms.

# Capital Structure Theories

## MM Propositions

Proposition 2: The Expected return on equity is positively related to leverage because risk to equity holders increases with leverage

$$R_s = R_o + B/S(R_o - R_B)$$

Derived from  $R_{WACC} = [S/(B+S) \times R_s + B/(B+S) \times R_B]$

# Assumptions

1. No Taxes
2. No Transactions Costs
3. Individual and Corporation Borrow at same rate

# Limitations

There is no tax consideration

Individual may not be able to borrow beyond certain level to practice homemade leverage

There are transactions cost in real world

# Illustration for proposition I & II

Lauren Motors, an all-equity firm, has expected earnings of \$10 million per year in perpetuity. The firm pays all its earnings out as dividends to its 10 million shares outstanding. The cost of capital of the unlevered firm is 10 percent. In addition, the firm will soon build a new plant for \$4 million. The Plant is expected to generate additional cash flow of \$1 million per year.

Required: What is the value of the firm under the following circumstances:

1. If new project is financed with 100% stock
2. If new project is financed with 100% debt
3. If the new project is financed with 50% stocks and 50% debt

# Return on Equity: 100% stock financing

Cash flows on old assets + cash flows on new assets = \$10+\$1 = \$11

Cost of Equity =  $\$11/\$110 = 10\%$

# Return on Equity: 100% debt financing

Cash flows on old assets	10.00
cash flows on new assets	1.00
Less: Interest paid on debt	(0.24)
Net cash flow to equity holders	10.76

$$\text{Return on Equity} = 10.76/106 = 10.15\%$$

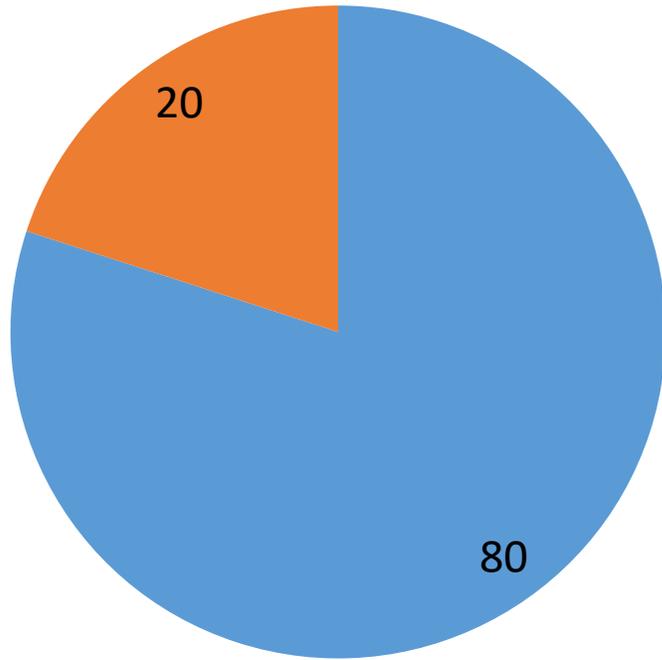
$$\begin{aligned} R_s &= R_o + B/S(R_o - R_B) \\ &= 10\% + 4/106(10\% - 6\%) \\ &= 10.15\% \end{aligned}$$

# Overall summary

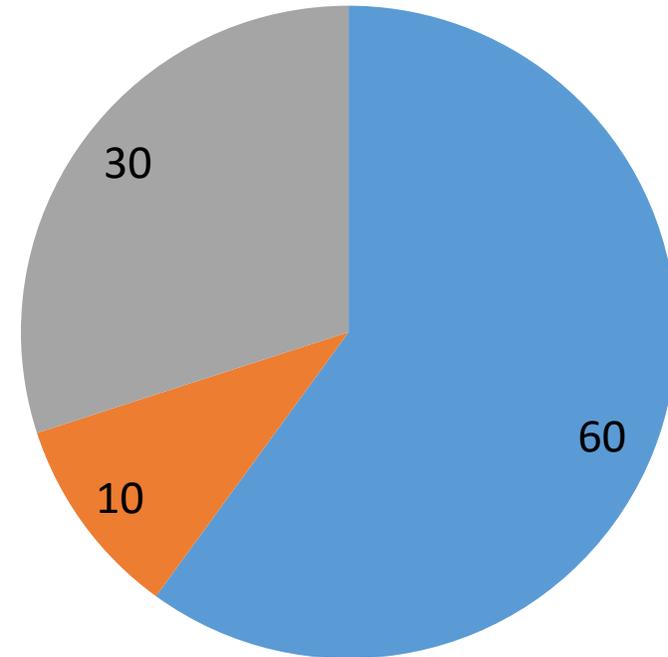
1. The overall cost of capital can not be reduced as debt is substituted for equity, even though debt appears to be cheaper than equity
2. The reason for this is that as the firm adds debt, the remaining equity becomes more risky. As this risk rises, cost of equity capital rises as a result.
3. In fact, MM prove that the two effects exactly offset each other, so that both the value of the firm and the firm's overall cost of capital are invariant to leverage.

# Introduction of Taxes affect capital structure theories

**Value of the Firm**



**Value of the Firm**



# Example

The Water products Company has a corporate tax rate,  $t_c$  of 35 percent and expected earnings before interest and taxes (EBIT) of \$1 million each year. Its entire earnings after taxes are paid out as dividends. The firm is considering two alternative capital structures. Under plan I, water products would have no debt in its capital structure. Under Plan II, the company would have \$4000,000 of debt,  $B$ . the cost of debt,  $R_B$  is 10 percent

# Present value of tax shield

$$\text{Interest} = R_B \times B$$

$$\text{Tax savings} = \text{Tax rate} \times R_B \times B$$

Assuming the cash flows is perpetual, it increase value of the firm by

$$= (T_c \times R_b \times B) / R_b$$

$$= T_c \times \text{Bond value}$$

# Value of the firm under corporate taxes

$$V_U = [\text{EBIT} \times (1 - t_c)] / R_o$$

$$\text{Value of levered firm} = V_U + T_c \times R_b \times B / R_b$$

$$= V_U + T_c \times B$$

# MM propositions under corporate taxes

## Assumptions:

1. Corporations are taxed at the rate of  $t_c$  on earnings after interest
2. No transaction costs
3. Individual and corporations borrow at same rate

## Results:

1.  $V_L = V_U + T_c \times B$
2.  $R_s = R_o + B/S (1 - T_c) (R_o - R_B)$

# Intuition

1. Because corporations can deduct interest payments but not dividend payments, corporate leverage lower tax payments
2. The cost of equity rises with leverages because the risk to equity rises with leverage.

# Other basic knowledge

EPS calculation

DPS calculation

Impact of Dividend Cash dividend Stock Dividend

Stock Split

Calculation of value of shares

Repurchase of shares

Impact of leverage on the EPS, DPS and MPS.....

# Practice Problem # 1, CMA Dec 2018

A consultant has collected the following information regarding Young Publishing:

	USD million		
Total Assets	\$3000	Tax Rate	40%
Operating Income	800	Debt ratio	0%
Interest Expense	0	WACC	10%
Net Income	480	M/B ratio	1.00
Share Price	32	EPS=DPS	\$3.20

The company has no growth opportunities ( $g=0$ ), so the company pays out all of its earnings as dividends. Young's stock price can be calculated by simply dividing earnings per share by required return on capital, currently equals the WACC because the company has no debt.

The consultant believes that the company would be much better off if it were to change its capital structure to 40 percent debt and 60 percent equity. After meeting with investment banker, the consultant concludes that the company could issue \$1200 million of debt at a before tax cost of 7 percent, leaving interest expenses of \$ 84 million. The debt amount will be used to repurchase stock at \$32 per share. EBIT will be unchanged, however, cost of equity will move to 11%. If the firm follows the consultant's advice, what would be its estimated stock price after the capital structure change.

# Solution

Existing number of shares =

EPS = Net income/ Number of shares

3.20 = 480/No of shares

= 480/3.20

= 150 million

Repurchase of shares = 1200/32 = 37.50 million

Remaining shares = 150 – 37.50 million = 112.50 million

Net Income after issuance bond = EBIT- Interest- Tax

= (800-84)\*1-.40

= 429.60

EPS

= 429.60/112.50 = 3.82

Value of share

= 3.82/.11

= 34.77

As share price will move from existing \$32 to \$34.77, we can implement the consultant's proposition.

## Practice Problem #2 CMA June 2019

- a. Suppose the BDJ Corporation has decided in favor of a capital restructuring that involves increasing its existing Tk.80 million in debt to Tk. 125 million. The Interest rate on the debt is 9 percent and is not expected to change. The firm currently has 10 million shares outstanding and the prices per shares is Tk.45. if the restructuring is expected to increase the ROE, what is the minimum level for EBIT that BDJ's Management must be expecting? Ignore taxation in your answers.
- b. G Company expects an EBIT of TK. 10,000 every year forever. G can borrow at 7 percent. Suppose G currently has no debt, and its cost of equity is 17 percent. If the corporate tax rate is 35 percent, what is the value of the firm? What will be if G borrows TK. 15000 and uses the proceeds to repurchase stock? [ Use M&M proposition I with corporate taxes]

$$\text{Present EPS} = (\text{EBIT} - 7.20)/10$$

$$\text{Proposed EPS} = (\text{EBIT} - 11.25)/(10 - 1)$$

$$(\text{EBIT} - 7.20)/10 = (\text{EBIT} - 11.25)/(10 - 1)$$

$$= -7.20 + 11.25 = \text{EBIT}$$

$$= 47.70$$

Minimum EBIT would need to \$ 47.70 million to make indifferent for the decision.

- Unlevered firm value =  $EBIT(1-T)/K_0$   
 $= (10000 * .65) / 0.17$   
 $= 6500 / 0.17$   
 $= 38235$

Value of Levered firm =  $V_u + B * T$   
 $= 38,235 + 15000 * 35\%$   
 $= 43,485$

Alternative Method

Present value of tax savings =  $(\text{Bond value} * \text{interest} * \text{Tax rate}) / \text{Interest rate}$   
 $= (15000 * 7% * 35%) / 7\%$   
 $=$

# Practice Problem #3 CMA April 2019

- a. At the end of 2015, Long Life Light Bulb Corporation announced a gross profit of 1 million. The company has also established that over the course of this year, it has incurred \$345,000 in operating expenses and \$125,000 in interest expenses. The company is subject to 30% tax rate and has declared \$57,000 of total preferred stock dividends.
- i. Calculate the earnings available for common stock holders
  - ii. Compute the increased retained earnings for 2015 if the company were to declare a \$4.25 common stock dividend. The company has 15,000 shares of common stock outstanding
- b. “In the MM’s setting of perfect capital markets, firms could use any combination of debt and equity to finance their investments without changing the value of the firm” Do you agree with this statement. Explain with example.

# Practice Problem #4 CMA April 2019

D'Anconia Copper is an all equity firm with 60 million shares outstanding, which are currently trading at \$20 per share. Last month they announced that it will change its capital structure by issuing \$300 million in debt. The \$200 million raised by this issue, plus another \$200 million in cash that they already has, will be used to repurchase existing shares of stock. Assume that capital markets are perfect.

- i. What is the market capitalization of D'Anconia Copper before this transaction takes place?
- ii. What is the market capitalization of D'Anconia Copper after this transaction takes place?
- iii. How many number of shares they will repurchase at the conclusion of this transaction?
- iv. How many number of shares they will have outstanding at the conclusion of this transaction?
- v. Determine the value of a share of D'Anconia Copper at the conclusion of this transaction?
- vi. Suppose you are a shareholder in D'Anconia Copper holding 300 shares, and you disagree with the decision to lever the firm? How can you undo the effect of this decision

Market Capitalization before change = 60 million \* \$20  
= \$1200 million

Number of shares repurchased = 400 million/20  
= 20 million

New position of shares outstanding = 60 millions – 20 million  
= 40 million

Market capitalization after the change = 40 millions shares \* 20  
= 800 million

Now value of the company = 1200 million – 400 million = 800 million/40 million shares = \$ 20 per shares

Leverage ratio of the company = Debt/total Assets  
= 200/1000  
= 20%

I will sell 300 shares at \$20 = 6000

I will invest 6000\*80% = 4800 will be used to buy shares of a unlevered company

Remaining amount 6000\*20% = 1200 will be lent out to gain interest

# Practice Problem #5 CMA April 2019

EGL is a firm with no debt and its 20 million shares are currently trading for \$16 per share. Based on the prospects for EGL's new hand held video game, management feels the true value of firm is \$20 per share. Management believes that the share price will reflect this higher value after the video game is released next fall. EGL has already announced plans to raise \$100 million from investors to build a new factory.

- i. Assume that EGL decides to raise the \$100 million through issuance of new shares prior to the release of the new video game. Determine the number of new shares that EGL will issue. =  $100/16 = 6.25$  million shares
- ii. Assume that EGL decides to wait until after the release of video game before they raise the \$100 million through issuance of new shares prior to the release of the new video game. Determine the number of new shares that EGL will issue. =  $100/20 = 5$  million
- iii. Assume that EGL decides to raise the \$100 million through issuance of new shares prior to the release of the new video game. Determine the EGL's share price following the release of the new video game. =  $20 \text{ million} * 20 + 6.25 * 16$   
=  $400 + 100 / 26.25 = \$19.047$
- i. Assume that EGL decides to wait until after the release of video game before they raise the \$100 million through issuance of new shares prior to the release of the new video game. Determine the EGL's share price following the release of the new video game.
- ii. =  $(400 + 100) / 20 + 5 = \$20$  per share

# Practice Problem #6 CMA April 2019

Hayley's Optical has a stockholders' equity account as shown below. The firm's common stock is currently sells for Tk.20 per share.

Preferred stock	Tk.500,000
Common stock ( 2 million <a href="#">shares@ Tk.1</a> par)	2,000,000
Paid in capital in excess of par	10,000,000
Retained earnings	11,600,000
Total Stockholders' equity	24,100,000

- i. What is the maximum dividend per share Hayley's Optical can pay? (Assume capital includes all paid in capital)
- ii. Recast the partial balance sheet (the stockholders' equity accounts) to show independently:
  1. A 2 for 1 stock split of the common stock
  2. A cash dividend of Tk.1.5 per share
  3. A stock dividend of 5% on the common stock
- ii. At what price would you expect Hayley's optical stock to sell after
  1. Stock split
  2. The stock dividend

# Practice Problem#7 CMA, June, 2018

Furniture Magnate Carl Thomson couldn't believe the amount of pressure security analyst could put on a firm.....

# Homework

Solve all capital structures related problems from previous questions as back as possible

Solve problems from Ross Book.

Q&A