

## Questions

### Capital Structure Decisions

#### Question 1

ABC Corporation is evaluating its capital structure. The balance sheet of the company is as follows (in millions):

Assets		Liabilities	
Fixed Assets	4000	Debt	2500
Current Assets	1000	Equity	2500

In addition, you are provided with the following information:

- i. The debt is in the form of long term bonds, with a coupon rate of 10%. The bonds are currently rated AA and are selling at a yield of 12% (the market value of the bonds is 80% of the face value).
  - ii. The firm currently has 50 million shares outstanding, and the current market price is \$80 per share. The firm pays a dividend of \$4 per share and has a price/earnings ratio of 10.
  - iii. The stock currently has a beta of 1.2. The six-month Treasury bill rate is 8%. The market risk premium is 5.5%.
  - iv. The tax rate for this firm is 40%.
- a. What is the debt/equity ratio for this firm in book value terms? In market value terms?
  - b. What is the debt/(debt+equity) ratio for this firm in book value terms? In market value terms?
  - c. What is the firm's after-tax cost of debt?
  - d. What is the firm's cost of equity?
  - e. What is the firm's current cost of capital (WACC)?

#### Question 2

ABC Corporation is considering a major change in its capital structure. It has three options:

**Option 1:** Issue \$1 billion in new stock and repurchase half of its outstanding debt. This will make it an AAA rated firm (AAA rated debt is yielding 11% in the market place).

**Option 2:** Issue \$1 billion in new debt and buy back stock. This will drop its rating to A-. (A- rated debt is yielding 13% in the market place).

**Option 3:** Issue \$3 billion in new debt and buy back stock. This will drop its rating to CCC (CCC rated debt is yielding 18% in the market place).

- a. What is the cost of equity under each option?
- b. What is the after-tax cost of debt under each option?
- c. What is the cost of capital under each option?
- d. From a cost of capital standpoint, which of the three options would you pick, or would you stay at your current capital structure?

### Question 3

As CEO of a major corporation, you have to make a decision on how much you can afford to borrow. You currently have 10 million shares outstanding, and the market price per share is \$50. You also currently have about \$200 million in debt outstanding (market value). You are rated as a BBB corporation now.

- i. Your stock has a beta of 1.5 and the six-month T.Bill rate is 8%.
- ii. Your marginal tax rate is 46%.
- iii. You estimate that your rating will change to a B if you borrow \$100 million. The BBB rate now is 11%. The B rate is 12.5%.

- a. Given the marginal costs and benefits of borrowing the \$100 million, should you go ahead with it?
- b. What is your best estimate of the weighted average cost of capital with and without the \$100 million in borrowing?

### Question 4

You have been hired as a management consultant by AD Corporation to evaluate whether it has an appropriate amount of debt (the company is worried about a leveraged buyout). You have collected the following information on AD's current position

There are 100,000 shares outstanding, at \$20/share. The stock has a beta of 1.15.

The company has \$500,000 in long-term debt outstanding and is currently rated 'BBB'. The current market interest rate is 10% on BBB bonds and 6% on T-Bills.

The company's marginal tax rate is 40%.

You proceed to collect the data on what increasing debt will do to the company's ratings:

Additional debt*	New Rating	Interest Rate
\$500,000	BB	10.5%
\$1,000,000	B	11.5%
\$1,500,000	B-	13.5%
\$2,000,000	C	15.0%

\* In addition to the existing debt of \$500,000

- a. How much additional debt should the company take on?
- b. What will the price per share be after the company takes on new debt?
- c. What is the weighted average cost of capital before and after the additional debt?

### Question 5

MVP Inc., a manufacturing firm with no debt outstanding and a market value of \$100 million is considering borrowing \$ 40 million and buying back stock. Assuming that the interest rate on the debt is 9% and that the firm faces a tax rate of 35%, answer the following questions:

- a. Estimate the annual interest tax savings each year from the debt.
- b. Estimate the present value of interest tax savings, assuming that the debt change is permanent.
- c. Estimate the present value of interest tax savings, assuming that the debt will be taken on for 10 years only.
- d. What will happen to the present value of interest tax savings, if interest rates drop tomorrow to 7% but the debt itself is fixed rate debt?

#### **True or False**

#### **Question 6**

The key issue in the whole capital structure discussion is whether a firm can affect its total valuation and its cost of capital by changing its financing mix.

#### **Question 7**

According to the traditional approach, an optimal capital structure would probably not be a financing mix consisting entirely of debt.

#### **Question 8**

With corporate taxes, the value of the tax shield is the value of a leveraged firm less its value as an unleveraged firm.

#### **Question 9**

With corporate taxes, the use of any financial leverage will have an unfavorable impact on a company's total valuation.

#### **Question 10**

The traditional approach to capital structure implies that beyond some point,  $k_e$  rises at an increasing rate with leverage.

#### **Question 11**

The lower a firm's cost of capital,  $k_o$ , the higher the total valuation of the firm.

#### **Question 12**

In a world of taxes, bankruptcy costs, and other market imperfections, there is likely to be an optimal capital structure for the firm.

#### **Question 13**

The term "capital structure" refers to:

- a. long-term debt, preferred stock, and common stock equity.
- b. current assets and current liabilities.
- c. total assets minus liabilities.
- d. shareholders' equity.

#### **Question 14**

The traditional approach towards the valuation of a company assumes:

- a. that the overall capitalization rate holds constant with changes in financial leverage.
- b. that there is an optimum capital structure.
- c. that total risk is not altered by changes in the capital structure.
- d. that markets are perfect.

#### **Question 15**

The cost of monitoring management is considered to be a (an):

- a. bankruptcy cost.
- b. transaction cost.
- c. agency cost.
- d. institutional cost.

#### **Question 16**

The cost of capital for a firm -- when we allow for taxes, bankruptcy, and agency costs --

- a. remains constant with increasing levels of financial leverage.
- b. first declines and then ultimately rises with increasing levels of financial leverage.
- c. increases with increasing levels of financial leverage.
- d. decreases with increasing levels of financial leverage.

#### **Question 17**

When sequential long-term financing is involved, the choice of debt or equity influences the future financial \_\_\_\_\_ of the firm.

- a. timing
- b. flexibility
- c. liquidity

#### **Question 18**

An unlevered firm is a company that has

- a. an equal amount of debt and equity in the capital structure
- b. more debt than equity in the capital structure
- c. all debt in the capital structure.
- d. all equity in the capital structure
- e. none of the above

**Question 19**

A firm has a debt-to-equity ratio of .50. Its cost of debt is 12%. Its overall cost

- a. 13%
- b. 16%
- c. 15%
- d. 18%
- e. None of the above

**Question 20**

The positive value to the firm of adding debt to the capital structure in the presence of corporate taxes is

- a. due to the extra cashflow going to the investors of the firm instead of the tax authorities
- b. due to the earnings before interest and taxes being fully taxed at the corporate rate
- c. due to the generosity of the shareholders to protect the interests of the debtholders
- d. because personal tax rates are the same as corporate tax rates.
- e. because shareholders prefer to let financial managers choose the capital structure thus making their value independent of it.

**Question 21**

A firm has zero debt in its capital structure. Its overall cost of capital is 8%. The firm is considering a new capital structure with 50% debt. The interest rate on the debt would be 5%. Assuming that the corporate tax rate is 40%, its cost of equity capital with the new capital structure would be?

- a. 9.2%
- b. 9.8%
- c. 11.0%
- d. 8.90%
- e. None of the above

**Question 22**

A firm has a debt-to-equity ratio of 1.0. If it had no debt, its cost of equity would be 14%. Its cost of debt is 10%. What is its cost of equity if the corporate tax rate is 50%?

- a. 18.0%
- b. 16.0%
- c. 14.0%
- d. 12.0%
- e. None of the above

## Answers

### Capital Structure Decisions

#### Question 1

a.

$$\text{Book value: } \frac{\text{Debt}}{\text{Equity}} = \frac{2,500}{2,500} = 100\%$$

$$\text{Market Value of Equity} = 50 \text{ million} \times \$80 = \$4,000$$

$$\text{Market value of Debt} = \$80 \times 2500 = \$2,000$$

$$\text{Market Value: } \frac{\text{Debt}}{\text{Equity}} = \frac{2,000}{4,000} = 50\%$$

b.

$$\text{Book value: } \frac{\text{Debt}}{\text{Debt} + \text{Equity}} = \frac{2,500}{2,500 + 2,500} = 50\%$$

$$\text{Market Value: } \frac{\text{Debt}}{\text{Debt} + \text{Equity}} = \frac{2,000}{2,000 + 4,000} = 33.33\%$$

c.

$$\text{After-tax Cost of Debt} = 12\% (1 - 0.4) = 7.20\%$$

d.

$$\text{Cost of Equity} = R_F + \beta(R_M - R_F) = 8\% + 1.2(5.5\%) = 14.6\%$$

e.

$$WACC = K_E \left( \frac{\text{Equity}}{\text{Value}} \right) + K_D \left( \frac{\text{Debt}}{\text{Value}} \right) = 14.6\% \left( \frac{4,000}{6,000} \right) + 7.20\% \left( \frac{2,000}{6,000} \right) = 12.13\%$$

#### Question 2

$$\text{Unlevered Beta} = \frac{\text{Levered Beta}}{1 + (1 - t_c) \left( \frac{\text{Debt}}{\text{Equity}} \right)}$$

$$\text{Unlevered Beta} = \frac{\text{Levered Beta}}{1 + (1 - t_c) \left( \frac{\text{Debt}}{\text{Equity}} \right)} = \frac{1.2}{1 + (1 - 0.4)0.5} = 0.923$$

#### Option 1

$$\text{Debt} = 1,000$$

$$\text{Equity} = 5,000$$

$$\text{Levered Beta} = 0.923 \times [1 + (0.6 \times 0.2)] = 1.033$$

$$\text{Cost of Equity} = R_F + \beta(R_M - R_F) = 8\% + 1.033(5.5\%) = 13.69\%$$

$$\text{After-tax Cost of Debt} = 11\% (1-0.4) = 6.60\%$$

$$WACC = K_E \left( \frac{\text{Equity}}{\text{Value}} \right) + K_D \left( \frac{\text{Debt}}{\text{Value}} \right) = 13.69\% \left( \frac{1,000}{6,000} \right) + 7.20\% \left( \frac{5,000}{6,000} \right) = 12.51\%$$

**a, b and c**

	D/E ratio	Beta	Cost of Equity	Cost of Debt	WACC
<b>Option 1</b>	20.00%	1.03	13.69%	6.60%	12.51%
<b>Option 2</b>	100.00%	1.48	16.12%	7.80%	11.96%
<b>Option 3</b>	500.00%	3.69	28.31%	10.80%	13.72%

**d.** From the cost of capital standpoint, option 2 is the best one.

### Question 3

**a.** Marginal Tax Benefit from borrowing \$100 million = Tax rate × Debt = 0.46 × \$100 million = \$46 million

Marginal Cost of borrowing \$100 million

Cost of debt increases from 11% to 12.5%

Increase in cost of debt on existing debt =  $(0.125 - 0.11) \times 200$  million = \$3.00 million

PV of increase in Cost of Debt = \$3.00 million / 0.125 = \$24.00 million (perpetuity).

Cost of equity increases as well: the beta of the stock goes up

*Old Cost of Equity* =  $8\% + 1.5(5.5\%) = 16.25\%$

$$\text{Unlevered Beta} = \frac{\text{Levered Beta}}{1 + (1 - t_c) \left( \frac{\text{Debt}}{\text{Equity}} \right)} = \frac{1.5}{1 + (1 - 0.46) \times \frac{200}{500}} = 1.23$$

$$\text{New Beta with additional debt} = 1.23 \times \left[ 1 + \left( 0.54 \times \frac{300}{500} \right) \right] = 1.63$$

$$\text{New Cost of Equity} = 8\% + 1.63(5.5\%) = 16.97\%$$

Increase in cost of equity on existing equity =  $(0.1697 - 0.1625) \times \$500$  million = **\$3.60 million**

PV of increase in Cost of Equity = \$3.60 million / 0.1697 = **\$21.21 million** (perpetuity).

Marginal benefit of 46 million is **higher** than the marginal cost of 45.21 million (24.00 + 21.21)

**b.**

WACC without the 100 million

Cost of equity = 16.25%

After-tax Cost of Debt =  $11\% (1-0.46) = 5.94\%$

$$WACC = K_E \left( \frac{Equity}{Value} \right) + K_D \left( \frac{Debt}{Value} \right) = 16.25\% \left( \frac{500}{700} \right) + 5.94\% \left( \frac{200}{700} \right) = 13.30\%$$

WACC with the 100 million

Cost of equity = 16.97%

After-tax Cost of Debt = 12.5% (1-0.46) = 6.75%

$$WACC = K_E \left( \frac{Equity}{Value} \right) + K_D \left( \frac{Debt}{Value} \right) = 16.97\% \left( \frac{500}{800} \right) + 6.75\% \left( \frac{300}{800} \right) = 13.14\%$$

Note: This assumes that the 100 million in borrowing is invested in projects and not used to buy back stocks.

#### Question 4

First, we calculate the cost of capital at different levels of debt.

Additional Debt	Beta	Cost of equity	Rating	Cost of Debt	Cost of Capital
Current	1.15	12.33%	BBB	6.00%	11.06%
<b>500,000</b>	<b>1.30</b>	<b>13.15%</b>	<b>BB</b>	<b>6.30%</b>	<b>10.87%</b>
1,000,000	1.45	13.98%	B	6.90%	10.94%
500,000	1.60	14.80%	B <sup>-</sup>	8.10%	11.45%
2,000,000	1.75	15.63%	C	9.00%	11.94%

Current After-tax Cost of Debt = 10% (1-0.40) = 6.00%

Current Cost of Equity = 6% + 1.15(5.5%) = 12.33%

$$Current WACC = K_E \left( \frac{Equity}{Value} \right) + K_D \left( \frac{Debt}{Value} \right) = 12.33\% \left( \frac{2000}{2500} \right) + 6.00\% \left( \frac{500}{2500} \right) = 11.06\%$$

$$Unlevered Beta = \frac{Levered Beta}{1 + (1 - t_c) \left( \frac{Debt}{Equity} \right)} = \frac{1.15}{1 + (1 - 0.40) \times \frac{500}{2000}} = 1.00$$

**b.**

Effect of moving to the optimal on the stock price

Increase in firm value = 2,500,000 × (0.1106 – 0.1087) = **\$43,698**

Increase in Stock Price = \$43,698 / 100,000 = **\$0.44**

**c.**

See table above

#### Question 5

**a.**

Annual tax savings from debt = \$40 million × 0.09 × 0.35 = **\$1.26 million**



**b.**

PV of savings assuming savings are permanent = \$40 million × 0.035 = **\$14.00 million**

**c.**

$$\text{Annual Savings} \times \left[ \frac{1 - \frac{1}{(1+r)^n}}{r} \right] = 1.26 \times \left[ \frac{1 - \frac{1}{(1+0.09)^{10}}}{0.09} \right] = \$8.09 \text{ million}$$

**d.**

$$\text{Annual Savings} \times \left[ \frac{1 - \frac{1}{(1+r)^n}}{r} \right] = 1.26 \times \left[ \frac{1 - \frac{1}{(1+0.07)^{10}}}{0.07} \right] = \$8.85 \text{ million}$$

**True or False**

**Question 6**

True

**Question 7**

True

**Question 8**

True

**Question 9**

False

*Given the present tax deductibility of interests for a corporation, financial leverage provides a tax-shield benefit. Excessive leverage, however, will work to lower firm value*

**Question 10**

True

**Question 11**

True

**Question 12**

True

**Question 13**

The correct answer is “a”.

**Question 14**

The correct answer is “b”.

**Question 15**

The correct answer is “c”.

**Question 16**

The correct answer is “b”.

**Question 17**

The correct answer is “b”.

**Question 18**

The correct answer is “d”.

**Question 19**

The correct answer is “c”.

**Question 20**

The correct answer is “a”.

**Question 21**

The correct answer is “b”.

**Question 22**

The correct answer is “b”.