

# Understanding Financial Management: A Practical Guide

## Problems and Answers

### Chapter 11

#### Capital Structure

##### 11.2 Understanding Financial Risk

1. The Mickelson Company (TMC), which is currently all-equity financed, is considering enacting a debt-equity swap that would quickly increase the firm's debt financing to 50% of total assets. The debt would be issued at par value and carry an 8% coupon rate. TMC currently has 25,000 shares of common equity outstanding selling for \$40 per share. While TMC forecasts EBIT to be \$150,000 next year, the uncertain business and economic environment could cause EBIT to vary considerably with a low-side estimate of \$75,000 and a high-side estimate of \$225,000. TMC has a marginal tax rate of 40%.
  - A. Construct a table showing how earnings per share (EPS) will vary at EBIT levels of \$75,000, \$150,000, and \$225,000 for each financing mix (100% equity and 50% debt and 50% equity).
  - B. At what level of EBIT would TMC earn the same EPS?
2. An equity analyst has become bullish on firms in the publishing industry. Hooper Carter Publishing (HCP), which is more highly leveraged than most firms in the industry, has underperformed its competitors over the past few years based on its return on equity (ROE). Some analysts are concerned about the firm's relatively low ROE and partially attribute the firm's recent poor stock performance to it. If analysts expect operating earnings to increase for most firms in the publishing industry, including HCP, by 40 to 50 percent over the next three years, why might HCP be an attractive investment within that industry?

##### Section 11.3 Capital Structure and the Value of the Firm

3. Assume a world with perfect capital markets and no taxes. The Gordon Manufacturing Company (GMC) is currently all-equity financed with 10,000 shares selling for \$20 per share. GMC's cost of equity is currently 12 percent and its marginal tax rate is 40 percent. A junior analyst at GMC recommends that the firm enact a debt-equity swap to lever the firm up to 50% debt financing. Since GMC can issue debt at a cost of 8 percent, the analyst contends this transaction would lower GMC's overall cost of capital to 10 percent and increase firm value. Does the analyst's claim appear to be correct?

##### 11.4 The Modigliani-Miller Theorem with Corporate Taxes

4. Assuming perfect capital markets with corporate taxes, re-evaluate the junior analyst's recommendation for GMC in Problem 3 above.

5. The Riddick Scientific Corporation (RSC) has \$100 million of debt outstanding at 8 percent. If RSC's corporate tax rate is 40 percent, what is the present value of the firm's interest tax shield? Assume perfect capital markets with corporate taxes and perpetual debt.
6. Pavin Inc., which is an all equity-financed firm, has strong earnings and cash flows. A financial manager at Pavin suggested that the firm could issue a moderately low amount of debt without increasing the return required by shareholders because bankruptcy risk would still be negligible. Assess the financial manager's argument.
7. Unlever Company and Lever Company are similar firms that operate in the same industry. Both firms had EBIT of \$250 million last year, and both have marginal tax rates of 40%. Unlever is all equity financed, while Lever has \$625 million of debt financing selling at par value that carries an interest rate of 8%. Assume perfect capital markets with corporate taxes and perpetual debt.
  - A. For each firm, determine how last year's EBIT was distributed between bondholders, stockholders, and taxes to the government.
  - B. Based solely on the value of the interest tax shield, by what amount should the values of the two firms differ?
  - C. Which firm would have a higher cost of equity capital? Why?
  - D. Which firm would have the lower WACC? Why?
8. Park Inc. is an all equity-financed firm with 10 million shares that sell for \$50 a share and a cost of equity of 12 percent. The firm is considering issuing \$200 million of debt financing at an interest rate of 8 percent and using the proceeds to retire equity at the current market price. The corporate tax rate is 40 percent. Assume perfect capital markets with corporate taxes and perpetual debt.
  - A. What should be the value of the firm before and after the stock repurchase?
  - B. What should be the firm's WACC before and after the stock repurchase?

## Answers

1A. The EBIT-EPS table for each financing mix is shown below:

<b>Variability of EPS as a Function of EBIT for TMC</b>			
Partial Income Statement	Scenario		
	Low	Moderate	High
	(in millions \$)		
<b>TMC Financed with 100% Equity</b>			
EBIT	\$75	\$150	\$225
Interest expense	0	0	0
EBT	75	150	225
Taxes (40%)	30	60	90
Net income	\$45	\$90	\$135
Earnings per share (EPS)	\$1.80	\$3.60	\$5.40
<b>TMC Financed with 50% Debt and 50% Equity</b>			
EBIT	\$75	\$150	\$225
Interest expense	40	40	40
EBT	35	110	185
Taxes (40%)	14	44	74
Net income	\$21	\$66	\$111
Earnings per share (EPS)	\$1.68	\$5.28	\$8.88

1B. First, basic EPS, given no preferred stock in the financing mix, is calculated as follows:

$$\text{EPS} = \frac{(\text{EBIT} - \text{interest})(1 - t)}{\text{Number of shares}} \quad \text{Where } t = \text{the firm's marginal tax rate.}$$

With 100% equity financing, EPS is calculated as follows:

$$\text{EPS} = \frac{(\text{EBIT} - \$0)(1 - 0.40)}{25,000 \text{ shares}}$$

With 50% debt and 50% equity financing, EPS is calculated as follows:

$$\text{EPS} = \frac{(\text{EBIT} - \$40,000)(1 - 0.40)}{12,500 \text{ shares}}$$

To solve for the level of EBIT where TMC earns the same EPS, set the two equations equal to each other and solve for EBIT:

$$\frac{(\text{EBIT} - \$0)(1 - 0.40)}{25,000 \text{ shares}} = \frac{(\text{EBIT} - \$40,000)(1 - 0.40)}{12,500 \text{ shares}}$$

$$\text{EBIT} = \left( \frac{25,000}{12,500} \right) (\text{EBIT} - \$40,000)$$

$$\text{EBIT} = 2 \text{EBIT} - \$80,000$$

$$\text{EBIT} = \$80,000$$

The following provides a check of this calculation.

Partial Income Statement	Financing Mix	
	100% Equity	50% Debt and 50% Equity
	(in millions \$)	
EBIT	\$80	\$80
Interest expense	0	40
EBT	80	40
Taxes (40%)	32	16
Net income	\$48	\$24
Earnings per share (EPS)	\$1.92	\$1.92

- When operating earnings increase, more highly leveraged firms typically experience greater increases in EPS and ROE than their less-leveraged competitors, all else equal. HPC's recently low ROE may have resulted by having a higher percentage of debt in its financing mix.

Table 11.2 illustrates this effect. When EBIT is \$500 million (the "low" scenario), EPS and ROE are lower in Panel B (50% debt and 50% equity financing) than in Panel A (100% equity financing). But look what happens when EBIT increases under the "moderate" and "high" scenarios. Both EPS and ROE increase more dramatically in Panel B than in Panel A.

- The analyst is incorrect. In perfect capital markets with no taxes, the firm's cost of equity will increase as the firm uses debt financing. Initially, when the firm is all equity-financed, the firm's WACC would be 12 percent.

If the firm were to enact a leveraged recapitalization to 50 percent debt and 50 percent equity, the firm's cost of equity would increase (per MM proposition II) to 16 percent, and the firm's WACC would remain at 12 percent.

$$\text{WACC} = (0.50)(8\%) + (0.50)(16\%) = 12\%$$

Since both WACC and the firm's level of EBIT will not be affected and, with no taxes, the total cash flows paid out to bondholders and stockholders will not change, the value of the firm will not change.

- Since the corporate taxes paid by the firm are tax-deductible, debt financing will shield some of the firm's taxable income. Thus, more of the firm's EBIT will flow through to the firm's bondholders and shareholders. Assuming the debt is a perpetuity, the value of the firm will increase by the present value of this interest tax shield (see Equation 11.5). The firm's WACC will decline because the interest deduction lowers the firm's after-tax cost of debt. Ignoring the costs of financial distress, which are discussed in Section 11.5, the value of the firm would theoretically be maximized with almost 100 percent debt financing. In practice, however, this is an implausible situation.

5. Equation 11.5 shows that the present value of the interest tax shield is equal to:

$$\text{PV of interest tax shield} = \frac{t_c k_D D}{k_D} = \frac{(0.40)(0.08)(\$100 \text{ million})}{0.08} = 0.40(\$100 \text{ million}) = \$40 \text{ million}$$

6. Even if bankruptcy risk remains negligible, the return required by the firm's shareholders will increase. Recall from section 11.2 that financial risk has two components: (1) the increased variability in returns to the shareholders caused by debt financing and (2) the risk of default and bankruptcy. Shareholders will require a higher return to compensate for the increased variability in returns to equity. M&M's Proposition II shows us how the required return increases linearly with a firm's debt-equity ratio.
- 7A. The distribution of EBIT is shown in the table below:

<b>Distribution of EBIT for Unlever and Lever Companies</b>		
	Unlever Company	Lever Company
Interest expense paid to bondholders	\$0	\$50 million
Taxes paid to government	100 million	80 million
Net income available to stockholders	150 million	120 million

- 7B. Under perfect capital markets with corporate taxes, the value of the levered firm should exceed the value of the unlevered firm by the present value of the levered firm's interest tax shield. The present value of Lever Company's interest tax shield is:

$$\text{PV of interest tax shield} = \frac{t_c k_D D}{k_D} = \frac{(0.40)(0.08)(\$625 \text{ million})}{0.08} = 0.40(\$625 \text{ million}) = \$250 \text{ million}$$

Thus, the value of Lever Company should exceed that of Unlever Company by \$250 million.

- 7C. Lever Company would have a higher cost of equity capital. M&M's Proposition II shows that the cost of equity increases as the debt-equity ratio increases.

$$\text{Proposition II: } k_S = k_A + \frac{D}{S}(k_A - k_D)(1 - t_c)$$

- 7D. Lever Company should have the lower WACC. As Figure 11.5 illustrates, a firm's WACC declines when the debt-equity ratio increases due to the tax-deductibility of the interest payments.

- 8A. The value of the firm before the stock repurchase is (10 million shares)(\\$50 per share) = \$500 million. Assuming the newly issued debt is a perpetuity, the value of the firm after the recapitalization will increase by the present value of the interest tax shield.

$$\text{PV of interest tax shield} = \frac{t_c k_D D}{k_D} = \frac{(0.40)(0.08)(\$200 \text{ million})}{0.08} = 0.40(\$200 \text{ million}) = \$80 \text{ million}$$

According to M&M's Proposition I with corporate taxes:  $V_L = V_U + t_c D$ . Thus, the value of the firm after the stock repurchase would be \$500 million + \$80 million = \$580 million.

- 8B. The firm's WACC before the stock repurchase is equal to the 12.0 percent cost of equity. After the bond issuance and subsequent stock repurchase, WACC, which is the weighted average cost of debt and equity, will decrease. The firm's cost of equity must first be computed using M&M's Proposition II.

$$k_S = k_A + \frac{D}{S}(k_A - k_D)(1 - t_c)$$

$$k_S = 12\% + \frac{200}{380}(12\% - 8\%)(1 - 0.40) = 12\% + 1.26\% = 13.26\%$$

The firm's WACC can now be computed:

$$\text{WACC} = \left(\frac{200}{580}\right)(8.0\%)(1 - 0.40) + \left(\frac{380}{580}\right)(13.26\%) = 1.66\% + 8.69\% = 10.35\%$$