Chapter 15

Capital Structure Policy
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Learning Objectives

1. Describe a firm’s capital structure.
2. Explain why firms have different capital structures and how capital structure influences a firm’s weighted average cost of capital.
3. Use the basic tools of financial analysis to analyze a firm’s financing decision.
Principles Used in This Chapter

• Principle 2: There is a Risk-Return Tradeoff.
  – Managers are often tempted to take on more debt as it can increase the rate of return earned on the stockholders’ investment in the firm.
  – However, this higher return comes with a cost – the higher use of debt financing makes the firm’s stock riskier, which increases the required rate of return on stock.
  – In addition, it increases the default risk of the firm.
Principles Used in This Chapter (cont.)

  
  - Capital structure choice impacts the cash flows and thus affects the value of the firm.
15.1 A Glance at Capital Structure Choices in Practice
A Glance at Capital Structure
Choices in Practice

• The primary objective of capital structure management is to maximize the value of the shareholders’ equity.

• The resulting financing mix that maximizes shareholder value is called the optimal capital structure.
Defining the Firm’s Capital Structure

1. A firm’s **capital structure** consists of owner’s equity and its interest bearing debt, including short-term bank loans.

2. The combination of firm’s capital structure plus the firm’s non-interest bearing liabilities such as accounts payable is called the firm’s **financial structure**.
### Remember: The Balance Sheet

<table>
<thead>
<tr>
<th>Current Assets</th>
<th>Current Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>Accounts payable</td>
</tr>
<tr>
<td>Accounts Receivable</td>
<td>Short-term debt</td>
</tr>
<tr>
<td>Inventories</td>
<td>Other current liabilities</td>
</tr>
<tr>
<td>Other current assets</td>
<td>Total current liabilities</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long-term (fixed) assets</th>
<th>Long-term Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross PPE</td>
<td>Long-term debt</td>
</tr>
<tr>
<td>Less: Accumulated depreciation</td>
<td></td>
</tr>
<tr>
<td>Net property, plant and equip.</td>
<td></td>
</tr>
<tr>
<td>Other long-term assets</td>
<td>Owner’s Equity</td>
</tr>
<tr>
<td>Total long-term assets</td>
<td>Par value of common stock</td>
</tr>
<tr>
<td></td>
<td>Paid-in-capital</td>
</tr>
<tr>
<td></td>
<td>Retained earnings</td>
</tr>
<tr>
<td></td>
<td>Total equity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Assets</th>
<th>Total Liabilities and Owners’ equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Defining the Firm’s Capital Structure (cont.)

• A firm’s financial structure is often described by the **debt ratio**.

\[
\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}}
\]
Defining the Firm’s Capital Structure (cont.)

• The **Debt to Value ratio** is commonly used to describe a firm’s capital structure.

• This ratio includes only interest bearing debt and uses current market values rather than book values.

\[
\text{Debt to Value Ratio} = \frac{\text{Total Book Value of Interest-Bearing Debt}}{\text{Book Value of Interest-Bearing Debt + Market Value of Equity}}
\]
Defining the Firm’s Capital Structure (cont.)

- The total book value of interest-bearing (containing) debt includes:
  - Short-term notes payable (e.g., bank loans),
  - Current portion of long-term debt, (must be repaid in one years)
  - And Long-term debt (loans that mature more than one year).
Defining the Firm’s Capital Structure (cont.)

• Table 15-1 shows that the book value based debt ratio is always higher than the market value based debt to value ratio because:
  – Debt ratio is based on book value and book value of equity is always lower than its market value.
  – Debt to value ratio excludes non-interest bearing debt in the numerator resulting in a lower value.
Table 15.1  Financial and Capital Structures for Selected Firms (Year End 2008)

The Debt Ratio equals the ratio of total liabilities divided by the firm’s total assets. Total liabilities equal the sum of current and long-term liabilities, including both interest-bearing debt and noninterest-bearing liabilities such as accounts payable and accrued expenses. The Debt to Value ratio is the ratio of the firm’s total interest-bearing debt divided by the market value of the firm’s debt plus equity. Since the market value of a firm’s debt is difficult or impossible to obtain, the value of the firm’s debt plus equity (the denominator of the debt to value ratio) is typically calculated by summing the book value of the firm’s interest-bearing debt and the market value of the firm’s equity. The Times Interest Earned Ratio is equal to the firm’s earnings before interest and taxes (EBIT) divided by interest expense. The first two ratios measure the proportion of the firm’s investments that are financed by borrowing, whereas the latter ratio measures the ability of the firm to make the required interest payments to support its debt.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Debt Ratio</th>
<th>Debt to Value Ratio</th>
<th>Times Interest Earned Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Liabilities</td>
<td>Total Debt</td>
<td>EBIT</td>
</tr>
<tr>
<td></td>
<td>Total Assets</td>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>American Electric Power (AEP)</td>
<td>76.2%</td>
<td>12.6%</td>
<td>2.91</td>
</tr>
<tr>
<td>Barnes and Noble (BKS)</td>
<td>66.3%</td>
<td>0.0%</td>
<td>Undefined</td>
</tr>
<tr>
<td>Boeing (BA)</td>
<td>102.4%</td>
<td>21.1%</td>
<td>19.55</td>
</tr>
<tr>
<td>Colgate-Palmolive (CL)</td>
<td>80.7%</td>
<td>9.7%</td>
<td>29.72</td>
</tr>
<tr>
<td>Disney (DIS)</td>
<td>50.0%</td>
<td>25.4%</td>
<td>8.76</td>
</tr>
<tr>
<td>Ford (F)</td>
<td>107.8%</td>
<td>127.1%</td>
<td>Negative</td>
</tr>
<tr>
<td>J Crew (JCG)</td>
<td>73.8%</td>
<td>6.8%</td>
<td>11.30</td>
</tr>
<tr>
<td>US Airways (LCC)</td>
<td>96.0%</td>
<td>115.4%</td>
<td>Negative</td>
</tr>
<tr>
<td>Safeway (SWY)</td>
<td>61.2%</td>
<td>42.2%</td>
<td>5.17</td>
</tr>
<tr>
<td>Wal-Mart (WMT)</td>
<td>60.5%</td>
<td>18.7%</td>
<td>10.46</td>
</tr>
<tr>
<td>Average</td>
<td>77.5%</td>
<td>37.9%</td>
<td>12.55</td>
</tr>
<tr>
<td>Maximum</td>
<td>107.8%</td>
<td>127.1%</td>
<td>29.72</td>
</tr>
<tr>
<td>Minimum</td>
<td>50%</td>
<td>0.0%</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Financial Leverage

- The term financial leverage is often used to describe a firm’s capital structure.
- Leverage allows the firm to increase the potential return to its shareholders.

- For example, if the firm is earning 17% on its investments and paying only 8% on borrowed money, the 9% differential goes to the firm’s owners.
- This is known as favorable financial leverage.
Financial Leverage (cont.)

• However, if the firm earns only 6% on its investments and must pay 8% then the 2% differential must come out of the owner’s share and they suffer unfavorable financial leverage.

• So leverage is beneficial if the rate of return exceeds the borrowing cost.
15.2 Capital Structure Theory
Capital Structure Theory

- We begin with capital structure irrelevance theory that is based on unrealistic assumptions.
- And then relax these assumptions to examine how they influence a firm’s incentive to use debt and equity financing.
A First Look at the Modigliani and Miller Capital Structure Theorem

- Modigliani and Miller showed that, under idealistic conditions, it does not matter whether a firm uses no debt, a little debt or a lot of debt in its capital structure.
- The theory relies on two basic assumptions:
  1. The cash flows that a firm generates are not affected by how the firm is financed (no taxes, cost of bankruptcy).
  2. Financial markets are perfect (no cost of trading).
A First Look at the Modigliani and Miller Capital Structure Theorem (cont.)

- Assumption 2 of perfect market implies that the packaging of cash flows, that is whether they are distributed to investors as dividends or interest payments, is not important.

- When there are no taxes, the firm’s weighted average cost of capital is also unaffected by its capital structure.
Capital Structure, the Cost of Equity, and the Weighted Average Cost of Capital (cont.)

• Assume, we are valuing a firm whose cash flows are a level perpetuity. The value of the firms is then represented by the following equation.

\[
\text{Firm Value} = \frac{\text{Firm Cash Flow}}{\text{Weighted Average Cost of Capital (} k_{\text{wacc}} \text{)}}
\]

\[
k_{\text{wacc}} = \left[ \frac{\text{Cost of Debt (} k_d \text{) \times Debt to Value (} D/V \text{)}}{\text{Value (} D/V \text{)}} \right] + \left[ \frac{\text{Cost of Equity (} k_e \text{) \times Equity to Value (} E/V \text{)}}{\text{Value (} E/V \text{)}} \right]
\]
Capital Structure, the Cost of Equity, and the Weighted Average Cost of Capital (cont.)

- Since firm value and firm cash flows are unaffected by the capital structure, the firm’s weighted average cost of capital is also unaffected.
Capital Structure, the Cost of Equity, and the
Weighted Average Cost of Capital (cont.)

Cost of Equity

- $k_{\text{unlevered}}$ - cost of capital for an unlevered firm, which does not use debt.
- $K_d$ - cost of debt
- D/E – Debt / Equity ratio

$$
\text{Cost of Equity} (k_e) = k_{\text{unlevered}} + (k_{\text{unlevered}} - k_d) \left( \frac{D}{E} \right)
$$
Conclusions:

- The cost of equity will increase with the debt to equity ratio (D/E).

- However, if there is no financial leverage the WACC (equation 15-5) does not change and is always equal to the cost of capital of an unlevered firm.
Capital Structure, the Cost of Equity, and the Weighted Average Cost of Capital (cont.)

• Example 15.1

• JNK’s cost of capital if it uses no financial leverage is 11% (unlevered).

• It has a debt-to-equity (D/E) ratio of 1.0, the cost of debt is 8% (kd), and weighted average cost of capital (WACC) is 10%.

• What is the cost of equity for JNK?
Cost of Equity ($k_e$) = $k_{unlevered} + (k_{unlevered} - k_d) \left( \frac{D}{E} \right)$

- Cost of equity = \(0.11 + (0.11 - 0.08) \times 1.0\)
  = \(0.14\) or 14%
Why Capital Structure Matters in Reality?

- In reality, financial managers care a great deal about how their firms are financed.
- Indeed, there can be negative consequences for firms that select an inappropriate capital structure, which means that, in reality, at least one of the two M&M assumptions is violated.
Violation of Assumption 2

- Transaction costs (lawyer fee etc.) can be important and because of these costs, the rate at which investors can borrow may differ from the rate at which firms can borrow.
- When this is the case, firm values may depend on how they are financed because individuals cannot substitute their individual borrowings to achieve a desired level of financial leverage.
Violation of Assumption 1

• There are three reasons why capital structure affects the total cash flows available to its debt and equity holders:
  1. Interest is a tax-deductible expense, while dividends are not. (In US.)

  After taxes, firms have more money to distribute to equity holders.
Violation of Assumption 1 (cont.)

2. Debt financing creates a fixed legal obligation. If the firm defaults on its payments, the creditors can force the firm into bankruptcy and the firm will incur the added cost that this process entails.

3. The threat of bankruptcy can influence the behavior of a firm’s executives as well as its employees and customers.
Corporate Taxes and Capital Structure

• Since interest payments are tax deductible, the after-tax cash flows will be higher if the firm’s capital structure includes more debt.

• An illustration follows.
Corporate Taxes and Capital Structure (cont.)

- Consider two firms identical in every respect except for their capital structure.
  - Firm A has no debt and has total equity financing of $2,000.
  - Firm B has borrowed $1,000 on which it pays 5% interest and raised the remaining $1,000 with equity.
  - Each firm has operating income of $200
  - The corporate tax rate is 25%.
## Corporate Taxes and Capital Structure (cont.)

<table>
<thead>
<tr>
<th></th>
<th>Firm A</th>
<th>Firm B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income</td>
<td>$200</td>
<td>$200</td>
</tr>
<tr>
<td>Less: Interest Expense</td>
<td>-</td>
<td>-$50</td>
</tr>
<tr>
<td>EBT</td>
<td>$200</td>
<td>$150</td>
</tr>
<tr>
<td>Less: Taxes (25%)</td>
<td>-$50</td>
<td>-37.50</td>
</tr>
<tr>
<td>Net Income</td>
<td>$150</td>
<td>$112.50</td>
</tr>
</tbody>
</table>
Corporate Taxes and Capital Structure (cont.)

- If we assume that both firms payout 100% of earnings in common stock dividends, we get the following:

<table>
<thead>
<tr>
<th></th>
<th>Firm A</th>
<th>Firm B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equity Dividends</strong></td>
<td>$150</td>
<td>$112.50</td>
</tr>
<tr>
<td><strong>Interest Payments</strong></td>
<td>-</td>
<td>$50.00</td>
</tr>
<tr>
<td><strong>Total Distributions (to stockholders and bondholders)</strong></td>
<td>$150.00</td>
<td>$162.50</td>
</tr>
</tbody>
</table>
Corporate Taxes and Capital Structure (cont.)

- The $12.50 additional distribution to Firm B can be traced to the tax benefits of interest payments, $0.25 \times $50 = $12.50.

- This is referred to as interest tax savings.

- These tax savings add value to the firm and provide an incentive to the firm to include more debt in the capital structure.
Corporate Taxes and Capital Structure (cont.)

Conclusions:

• If the firm saves $12.50 in taxes every year, then the present value of these tax savings is the extra value added by using debt financing.

• The tax deductibility of interest expense causes the firm’s weighted average cost of capital to decline as it includes more debt in the capital structure.
Corporate Taxes and the WACC (cont.)

- Example 15.2
- JNK’s cost of capital if it uses no financial leverage is 11%. It has a debt equity ratio of 1.0, the cost of debt is 8% before taxes, and the tax rate is 40%.
- What will be the cost of equity and weighted average cost of capital if the debt to equity ratio is 1 (i.e. 50% debt and 50% equity) before and after taxation?
Corporate Taxes and the WACC (cont.)

\[
\text{Cost of Equity (} k_e \text{)} = k_{unlevered} + (k_{unlevered} - k_d) \left( \frac{D}{E} \right)
\]

Before Tax

Cost of equity = \(0.11 + (0.11 - 0.08)(1)\)

= 0.14 or 14%

\[
\text{Cost of Equity (} k_e \text{)} = k_{unlevered \text{ Equity}} + \left[ (k_{unlevered \text{ Equity}} - k_d) \left( \frac{D}{E} \right) \times \left( 1 - \text{Tax Rate} \right) \right]
\]

After Tax

Cost of equity = \(0.11 + (0.11 - 0.08)(1)(1 - 0.40)\)

= 0.128 or 12.8%
Corporate Taxes and the WACC (cont.)

Before tax:

\[ k_{wacc} = \left[ \frac{\text{Cost of Debt} \times \text{Debt to Value (D/V)}}{\text{Value (D/V)}} \right] + \left[ \frac{\text{Cost of Equity} \times \text{Equity to Value (E/V)}}{\text{Value (E/V)}} \right] \]

\[ k_{WACC} = 0.08 \times 0.50 + 0.14 \times 0.50 \]

\[ k_{WACC} = 0.11 \text{ or } 11\% \]
Corporate Taxes and the WACC (cont.)

After tax:

\[
\begin{align*}
\text{k}_{\text{WACC}} &= 0.08(1-0.40) \times 0.50 + 0.128 \times 0.50 \\
\text{k}_{\text{WACC}} &= 0.088 \text{ or } 8.8\% 
\end{align*}
\]
Bankruptcy and Financial Distress Costs

• However, a firm cannot keep on increasing debt because if the firm’s debt obligations exceed it’s ability to generate cash, it will be forced into bankruptcy and incur financial distress costs.

• Furthermore, debt financing also severely limits financial manager’s flexibility to raise additional funds.
The Tradeoff Theory and the Optimal Capital Structure

• Thus two factors can have material impact on the role of capital structure in determining firm value and firms must tradeoff the pluses and minuses of both these factors:
  – Interest expense is tax deductible.
  – Debt makes it more likely that firms will experience financial costs.
Capital Structure Decisions and Agency Costs

• It is argued that debt financing can help reduce agency costs.

• For example, debt financing by creating fixed dollar obligations will reduce the firm’s discretionary control over cash and thus reduce wasteful spending.
Managerial Implications

1. Higher levels of debt can benefit the firm due to tax savings and potential to reduce agency costs.

2. Higher levels of debt increase the probability of financial distress costs and offset tax and agency cost benefits of debt.
Key Terms

- Debt to value ratio
- Financial distress costs
- (Un)favorable financial leverage
- Optimal capital structure