Capital Budgeting Overview

- Capital Budgeting is the set of valuation techniques for real asset investment decisions.
- Capital Budgeting Steps
  - estimating expected future cash flows for the proposed real asset investment (BH Chap 11)
  - estimating the firm’s cost of capital (BH Chap 9) based on the firm’s optimal capital structure
  - using a decision-making valuation technique which depends on the company’s cost of capital to decide whether to accept or reject the proposed investment (BH Chap 10)

BH Chapter 9
The Cost of Capital

- Estimating Home Depot’s Cost of Capital
- Air Jordan’s Divisional Cost of Capital

Chapter 9 Learning Objectives

- Describe the concepts underlying the firm’s cost of capital (known as weighted average cost of capital) and the purpose for its calculation.
- Calculate the after-tax cost of debt, preferred stock and common equity.
- Calculate a firm’s weighted average cost of capital.
- Adjust the firm’s cost of capital on a by division or by project basis.
- Use the cost of capital to evaluate new investment opportunities.
Cost of Capital

- The firm’s cost of raising new funds
- The weighted average of the cost of individual types of funding
- One possible decision rule is to compare a project’s expected return to the cost of the funds that would be used to finance the purchase of the project
- Accept if: project’s expected return > cost of capital

Cost of Capital Terms

- Capital Component = type of financing such as debt, preferred stock, and common equity
- \( k_d \) = cost of new debt, before tax
- \( k_d(1-T) \) = after-tax component cost of debt
- \( k_p \) = component cost of new preferred stock
- \( k_s \) = component cost of retained earnings (or internal equity, same as \( r \) and \( E(R) \) used in Chapters 5 and 7 of Megginson & Smart

More Cost of Capital Terms

- \( k_e \) = component stock of external equity raised through selling new common stock
- \( WACC = w_d k_d(1-T) + w_p k_p + w_s k_s \) = the weighted average cost of capital which is the weighted average of the individual component costs of capital
- \( w_i \) = the fraction of capital component \( i \) used in the firm’s capital structure
**Component Cost of Debt**

- Remember, a corporation can deduct their interest expense for tax purposes.
- Therefore, the component cost of debt is the after-tax interest rate on new debt.
  - $k_d(1-T)$
- Where $T$ is the company’s marginal tax rate.
- $k_d$ can be estimated by finding the YTM on the company’s existing bonds.

**Cost of Debt Example**

- We want to estimate the cost of debt for Home Depot which has a marginal tax rate of 35%.
- Let’s assume Home Depot would issue 20-year bonds, and we find the following bond quote.

<table>
<thead>
<tr>
<th>CoName</th>
<th>Rate</th>
<th>Mat. Date</th>
<th>Close</th>
</tr>
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<tbody>
<tr>
<td>HomeDep</td>
<td>6.45</td>
<td>Oct. 15,2025</td>
<td>114.21</td>
</tr>
</tbody>
</table>

- Annual coupon rate = 6.45%, $n = 20$ years, Price = 114.21% of par value, Semiannual coupons.
- Find YTM.

**Home Depot’s cost of debt**

- $1000$ par value, semi-annual coupons.
**Cost of Preferred Stock, \( k_{ps} \)**

- Cost of **new** preferred stock
- \( k_{ps} = \frac{D_p}{P_p} \)
- \( D_p = \) annual preferred stock dividend
- \( P_p = \) price per share from sale of preferred stock

**Preferred Stock Characteristics**
- Par Value, Annual Dividend Rate (% of Par)
- Generally: no voting rights; must be paid dividends before common dividends can be paid

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### Example

- Home Depot wants to sell new preferred stock. The par value will be $25 a share and Home Depot decides they will pay an annual dividend yield of 8%. Home Depot’s advisors say the stock will sell for a price of $26 if the dividend yield is 8%. What is the cost of this new preferred stock?

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**Cost of Retained Earnings, \( k_s \)**

- 3 different approaches can be used to estimate the cost of retained earnings, but I hate the Bond Yield Plus Risk Premium Approach. So, ignore it.
- The 2 remaining approaches assume that the company’s stock price is in equilibrium.
The CAPM Approach to the Cost of Retained Earnings

- The CAPM Approach: is the required rate of return from M&S Chapter 7.
- \[ k_s = k_{RF} + (k_M - k_{RF})b_i \]
- Example: The risk free rate is 3.7%, and the expected market return is 12%. What would Home Depot's CAPM cost of retained earnings be if its beta is 1.25

Discounted Cash Flow Approach for the Cost of Retained Earnings

- The expected return formula derived from the constant growth stock valuation model.
- \[ k_s = \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g \]
- In practice: The tough part is estimating \( g \).
- Security analysts' projections of \( g \) can be used.
- According to the journal, Financial Management, these projections are a good source for growth rate estimates.

DCF estimate for the Cost of Retained Earnings for Home Depot

- Recent Stock Price (\( P_0 \)): $38.16
- Current Dividend (\( D_0 \)): $0.40
- According to Value Line Investment Survey, earnings are expected to grow by 12%, and their dividend growth estimate is 14.5%.
- What to do? Average the rates? Why not.
- Our growth estimate(\( g \)): 13.2%
Difference in $k_s$ for Home Depot between the two approaches.

- CAPM estimate for cost of RE: 14.1%
- DCF estimate for cost of RE: 14.4%
- Although I’m not upset with this slight difference, why are they different?
  - Our estimates. For CAPM, maybe our market risk premium is too low.
  - Who knows about our $g$ estimate for Home Depot. Let’s explore this a little further.

Other growth rate projections for Home Depot

- Other growth rate estimates (revenues, dividends, cash flow, book value) might be used.
- A $g$ estimate method suggested by the text:
  - $g = (\text{Retention rate})(\text{expected ROE}) = (1 - \text{dividend payout ratio})(\text{exp. ROE})$
- Expected ROE and dividend payout for 2006 for Home Depot according to Value Line: 19.5% and 16%.
  - $g = (1- 0.16)(19.5%) = 16.4\%$, DCF $k_s = 17.6\%$
- Arrgh! Still over-shot the CAPM by quite a bit

What to do about the different cost of retained earnings estimates?

- CAPM: 14.1%
- DCF: 14.4%
- Average the two or choose one or the other?
  - Choosing DCF estimate makes for an easier cost of new common stock (external equity) estimate.
  - However, if you wanted to be conservative, go with the higher estimate. Aggressive, go with lower estimate
- Since there isn’t much difference, let’s go with the slightly higher DCF of 14.4% for $k_s$. 
Adjusting for flotation costs of new security issues.

- Include flotation costs for funds raised for a project as an additional initial cost of the project. OR adjust the component cost of capital.
- For example, for selling new common & preferred stock.
- \( k_e = \frac{D_1}{P_0(1 - F)} + g; \) \( k_p = \frac{D}{P_0(1 - F)} \)
- where \( F = \) flotation (underwriting) cost %
- \( P_0(1 - F) \) is the net price per share the company actually receives from selling new stock

Home Depot’s estimated cost of newly issued common equity, \( k_e \)

- Let’s go back to our original DCF estimates:
- \( P_0: $38.16, D_0: $0.40, g = 13.2\% \)
- Assume new stock can be sold at the current market price and Home Depot will incur a 15% floatation cost per share.
- \( k_e = \frac{[0.40(1.132)]}{38.16(1-0.15)} + 13.2\% = 14.6\% \)
- DCF \( k_e = 14.4\%. \) Difference = 0.2%  
- So, if you want to use the CAPM estimate for \( k_e \) then your \( k_e \) estimate would be 14.1% + 0.2% = 14.3%

Flotation costs

- Flotation costs depend on the risk of the firm and the type of capital being raised.
- The flotation costs are highest for common equity. However, since most firms issue equity infrequently, the per-project cost is fairly small.
- We will frequently ignore flotation costs when calculating the WACC.
Weighted Average Cost of Capital, WACC

- WACC = \( w_d k_d (1-T) + w_p k_p + w_c k_s \)
- \( w_i \) = the fraction of capital component \( i \) used in the firm's capital structure
- What is Home Depot's WACC if their market value target capital structure is 15% debt, 5% preferred stock, and 80% common equity financing through retained earnings?

Home Depot's Weighted Average Cost of Capital, WACC

- Recall our previous estimates for Home Depot
- \( k_d (1-T) = 3.4\% \), \( k_p = 7.7\% \), \( k_s = 14.4\% \)
- \( w_d = 15\% \) or 0.15, \( w_{ps} = 5\% \) or 0.05, \( w_c = 80\% \) or 0.8

What factors influence a company's composite WACC?

- Market conditions.
- The firm's capital structure and dividend policy.
- The firm's investment policy. Firms with riskier projects generally have a higher WACC.
Some Problems in estimating Cost of Capital

- Small firms without dividends: DCF approach is out.
- Firms that aren’t publicly traded: no beta data, CAPM approach is difficult.
- What about depreciation? Large source of funds. Cost of depreciation funds = WACC with RE.
- WACC is just for average risk projects.

Adjusting for project risk

- The WACC is for average risk projects.
- A company should adjust their WACC upward for more risky projects and downward for less risky projects = project’s Risk-Adjusted Cost of Capital.
- A company can also make this adjustment on a divisional basis as well.

Estimating Project Risk

- Stand-alone risk = measured by the variability of the project’s expected returns.
- Corporate, or Within Firm, Risk = measured by the project’s impact on uncertainty about the firm’s future earnings.
- Market, or Beta, Risk = measured by the project’s impact on the firm’s beta coefficient.
**Using the CAPM for Risk-adjusted Cost of Capital**

- Can use this model to estimate a project cost of capital, \( k_p \)
- \( k_p = k_{RF} + (k_M - k_{RF})b_p \)
- where \( b_p \) is the project's beta
- Note: investing in projects that have more or less beta (or market) risk than average will change the firm's overall beta and required return.

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**Jordan Air Inc.: a Divisional Cost of Capital Example**

- Jordan Air is a sporting goods apparel company which has recently divested itself from the sports franchise ownership business.
- Jordan Air is starting a golf equipment division to go along with its sports apparel division.
- The company uses only debt and common equity financing and thinks they should use different cost of capital for each division.

The company has a 40% tax rate and uses the CAPM method for estimating the cost of equity.

- Apparel Division: 35% debt and 65% equity financing. Before-tax cost of debt is 8%. Beta = 1.2.
- Golf Division: 40% debt and 60% equity financing. Before-tax cost of debt 8.5%. Estimated beta = to Callaway Golf's beta of 1.6.
Jordan Air’s Apparel Division’s Cost of Capital Calculation

- The company has a 40% tax rate and uses the CAPM method for estimating the cost of equity with Krf = 4.5%, Km = 11%.
- Apparel Division: 35% debt and 65% equity financing. Before-tax cost of debt is 8%. Beta = 1.2.

Jordan Air’s Golf Division’s Cost of Capital Calculation

- The company has a 40% tax rate and uses the CAPM method for estimating the cost of equity with Krf = 4.5%, Km = 11%.
- Golf Division: 40% debt and 60% equity financing. Before-tax cost of debt 8.5%. Estimated beta = to Callaway Golf’s beta of 1.6.

Risk and the Cost of Capital

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<th>Rejection Region</th>
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