

CHAPTER 9

The Cost of Capital

- Sources of capital
- Component costs
- WACC
- Adjusting for flotation costs
- Adjusting for risk

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Learning Objectives

- Understand WACC and its components
- Understand and be able to calculate the Cost of Debt component
- Understand and be able to calculate the Cost of Preferred Stock component
- Understand and be able to calculate the Cost of Retained Earnings component
- Be able to calculate WACC

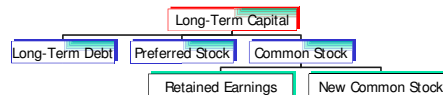
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How do we finance business opportunities?

SEBRING CORPORATION: BALANCE SHEET

		2002	
Assets:			
Cash and marketable securities	\$	36.0	
Accounts receivable		540.0	
Inventories		540.0	
Total current assets	\$	1,116.0	
Net plant and equipment		900.0	
Total assets	\$	2,016.0	
Liabilities and equity:			
Current liabilities	\$	741.0	
Long-term bonds		450.0	
Total debt	\$	1,191.0	K _d (w - 59.1%)
Common stock		150.0	
Retained earnings		675.0	
Total common equity	\$	825.0	K _s (w - 40.9%)
Total liabilities and equity	\$	2,016.0	9-3

What sources of long-term capital do firms use?



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Calculating the weighted average cost of capital

$$WACC = w_d k_d (1-T) + w_p k_p + w_c k_s$$

- The w's refer to the firm's capital structure weights.
- The k's refer to the cost of each component.

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Should our analysis focus on before-tax or after-tax capital costs?

- Stockholders focus on A-T CFs. Therefore, we should focus on A-T capital costs, i.e. use A-T costs of capital in WACC. Only k_d needs adjustment, because interest is tax deductible.

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Should our analysis focus on historical (embedded) costs or new (marginal) costs?

- The cost of capital is used primarily to make decisions that involve raising new capital. So, focus on today's marginal costs (for WACC).

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How are the weights determined?

$$WACC = w_d k_d (1-T) + w_p k_p + w_c k_s$$

- Use accounting numbers or market value (book vs. market weights)? It depends on if you must keep the structure constant (%D/%E)
- Use actual numbers or target capital structure? Actual is from the liability side of the Balance Sheet

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Component cost of debt

$$WACC = w_d k_d (1-T) + w_p k_p + w_c k_s$$

- k_d is the marginal cost of debt capital.
- The yield to maturity on outstanding L-T debt is often used as a measure of k_d .
- Why tax-adjust, i.e. why $k_d(1-T)$?

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Component cost of debt

- Interest is tax deductible, so
$$A-T k_d = B-T k_d (1-T)$$
$$= 10\% (1 - 0.40) = 6\%$$
- Use nominal rate.
- Flotation costs are small, so ignore them.

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Component cost of preferred stock

$$WACC = w_d k_d (1-T) + w_p k_p + w_c k_s$$

- k_p is the marginal cost of preferred stock.
- The rate of return investors require on the firm's preferred stock.

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What is the cost of preferred stock?

- The cost of preferred stock can be solved by using this formula:

$$k_p = D_p / P_p$$
$$= \$10 / \$111.10$$
$$= 9\%$$

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Component cost of preferred stock

- Preferred dividends are not tax-deductible, so no tax adjustments necessary. Just use k_p .
- Nominal k_p is used.
- Our calculation ignores possible flotation costs.

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Component cost of equity

$$WACC = w_d k_d (1-T) + w_p k_p + w_e k_s$$

- k_s is the marginal cost of common equity using retained earnings.
- The stockholders have an opportunity cost for each dollar that you reinvest in the business (retained earnings), thus an opportunity cost rate needs to be assigned to retained earnings P. 363-364
- The rate of return investors require on the firm's common equity using new equity is k_s .

Why is there a cost for retained earnings?

- Earnings can be reinvested or paid out as dividends.
- Investors could buy other securities, earn a return.
- If earnings are retained, there is an opportunity cost (the return that stockholders could earn on alternative investments of equal risk).
 - Investors could buy similar stocks and earn k_s .
 - Firm could repurchase its own stock and earn k_s .
 - Therefore, k_s is the cost of retained earnings. 9-15

Three ways to determine the cost of common equity, k_s

- CAPM: $k_s = k_{RF} + (k_M - k_{RF}) \beta$
- DCF: $k_s = D_1 / P_0 + g$
- Own-Bond-Yield-Plus-Risk Premium:

$$k_s = k_d + RP$$

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If the $k_{RF} = 7\%$, $RP_M = 6\%$, and the firm's beta is 1.2, what's the cost of common equity based upon the CAPM?

CAPM P. 364

$$k_s = k_{RF} + (k_M - k_{RF}) \beta$$

$$= 7.0\% + (6.0\%) 1.2 = 14.2\%$$

- Beta is a measure of the extent to which the returns of a given stock move with the Market. 1.0 mirrors the market level of risk, > 1.0 is more volatile than the market (& vice-versa)

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If $D_0 = \$4.19$, $P_0 = \$50$, and $g = 5\%$, what's the cost of common equity based upon the DCF approach?

DCF P. 365

$$D_1 = D_0 (1+g)$$

$$D_1 = \$4.19 (1 + .05)$$

$$D_1 = \$4.3995$$

$$k_s = D_1 / P_0 + g$$

$$= \$4.3995 / \$50 + 0.05$$

$$= 13.8\%$$

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What is the expected future growth rate?

- The firm has been earning 15% on equity (ROE = 15%) and retaining 35% of its earnings (dividend payout = 65%). This situation is expected to continue.

$$g = (1 - \text{Payout}) (\text{ROE}) \\ = (0.35) (15\%) \\ = 5.25\%$$

- Very close to the g that was given before.

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Can DCF methodology be applied if growth is not constant?

- Yes, nonconstant growth stocks are expected to attain constant growth at some point, generally in 5 to 10 years.
- May be complicated to compute.

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If $k_d = 10\%$ and $RP = 4\%$, what is k_s using the own-bond-yield-plus-risk-premium method?

OBYP RP

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- This RP is not the same as the CAPM RP_M .
- This method produces a ballpark estimate of k_s , and can serve as a useful check.

$$k_s = k_d + RP \\ k_s = 10.0\% + 4.0\% = 14.0\%$$

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What is a reasonable final estimate of k_s ?

Method	Estimate
CAPM	14.2%
DCF	13.8%
$k_d + RP$	<u>14.0%</u>
Average	<u>14.0%</u>

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Why is the cost of retained earnings cheaper than the cost of issuing new common stock?

- When a company issues new common stock they also have to pay flotation costs to the underwriter.
- Issuing new common stock may send a negative signal to the capital markets, which may depress the stock price.

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If issuing new common stock incurs a flotation cost of 15% of the proceeds, what is k_e ?

$$k_e = \frac{D_0(1+g)}{P_0(1-F)} + g \\ = \frac{\$4.19(1.05)}{\$50(1-0.15)} + 5.0\% \\ = \frac{\$4.3995}{\$42.50} + 5.0\% \\ = 15.4\%$$

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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.

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Ignoring flotation costs, what is the firm's WACC?

$$\begin{aligned} \text{WACC} &= w_d k_d (1-T) + w_p k_p + w_c k_s \\ &= 0.3(10\%)(0.6) + 0.1(9\%) + 0.6(14\%) \\ &= 1.8\% + 0.9\% + 8.4\% \\ &= 11.1\% \end{aligned}$$

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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.

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Should the company use the composite WACC as the hurdle rate for each of its projects?

- NO! The composite WACC reflects the risk of an average project undertaken by the firm. Therefore, the WACC only represents the "hurdle rate" for a typical project with average risk.
- Different projects have different risks. The project's WACC should be adjusted to reflect the project's risk.

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What are the three types of project risk?

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- Stand-alone risk
- Corporate risk
- Market risk

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How is each type of risk used?

- Market risk is theoretically best in most situations.
- However, creditors, customers, suppliers, and employees are more affected by corporate risk.
- Therefore, corporate risk is also relevant.

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Problem areas in cost of capital

- Depreciation-generated funds
- Privately owned firms
- Measurement problems
- Adjusting costs of capital for different risk
- Capital structure weights

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How are risk-adjusted costs of capital determined for specific projects or divisions?

- Subjective adjustments to the firm's composite WACC.
- Attempt to estimate what the cost of capital would be if the project/division were a stand-alone firm. This requires estimating the project's beta.

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Finding a divisional cost of capital: Using similar stand-alone firms to estimate a project's cost of capital

- Comparison firms have the following characteristics:
 - Target capital structure consists of 40% debt and 60% equity.
 - $k_d = 12\%$
 - $k_{RF} = 7\%$
 - $RP_M = 6\%$
 - $\beta_{DIV} = 1.7$
 - Tax rate = 40%

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Calculating a divisional cost of capital

- Division's required return on equity
 - $k_s = k_{RF} + (k_M - k_{RF})\beta$
 $= 7\% + (6\%)1.7 = 17.2\%$
- Division's weighted average cost of capital
 - $WACC = w_d k_d (1 - T) + w_c k_s$
 $= 0.4 (12\%)(0.6) + 0.6 (17.2\%) = 13.2\%$
- Typical projects in this division are acceptable if their returns exceed 13.2%.

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