

The Cost of New Common Stock and the WACC

In the text we calculated the WACC when all of the new common equity comes from retained earnings. Equation 10A-1 is a modified version of the WACC equation that allows equity to come from either retained earnings or new common stock:

$$\begin{aligned} \text{WACC} &= \left(\begin{array}{c} \% \\ \text{debt} \end{array} \right) \left(\begin{array}{c} \text{After-tax} \\ \text{cost of} \\ \text{debt} \end{array} \right) + \left(\begin{array}{c} \% \\ \text{preferred} \\ \text{stock} \end{array} \right) \left(\begin{array}{c} \text{Cost of} \\ \text{preferred} \\ \text{stock} \end{array} \right) + \left(\begin{array}{c} \% \\ \text{common} \\ \text{equity} \end{array} \right) \left(\begin{array}{c} \text{Cost of} \\ \text{common} \\ \text{equity} \end{array} \right) & \text{(10A-1)} \\ &= w_d r_d (1 - T) + w_p r_p + w_c r_s \text{ or } w_c r_e \end{aligned}$$

Recall, Allied's target capital structure calls for 45 percent debt, 2 percent preferred stock, and 53 percent common equity. In Chapter 10, we saw that Allied's before-tax cost of debt is 10 percent; its after-tax cost of debt is $r_d(1 - T) = 10\% (0.6) = 6.0\%$; its cost of preferred stock is 10.3 percent; its cost of common equity from retained earnings is 13.4 percent; and its marginal tax rate is 40 percent. We also noted that if all of its new equity comes from retained earnings, then its WACC, designated WACC_1 , would be 10.0 percent:

$$\begin{aligned} \text{WACC}_1 &= w_d r_d (1 - T) + w_p r_p + w_c r_s \\ &= 0.45(10\%)(0.6) + 0.02(10.3\%) + 0.53(13.4\%) \\ &= 10.0\% \end{aligned}$$

Under these conditions, every dollar of new capital that Allied raises would consist of 45 cents of debt with an after-tax cost of 6 percent, 2 cents of preferred stock with a cost of 10.3 percent, and 53 cents of common equity (all from additions to retained earnings) with a cost of 13.4 percent. The average cost of each whole dollar, or the WACC, would be 10 percent.¹ This WACC is good to be used in a variety of analyses (for example, capital budgeting and managerial performance), so long as the equity requirement in the optimal capital budget can be fully funded by retained earnings. But, what if new equity is required? When will we know when new common stock must be issued? What WACC must be used then?

In Chapter 10, we also calculated Allied's retained earnings breakpoint and the cost of issuing new common stock. Recall that the retained earnings breakpoint can be calculated as follows:

$$\text{Retained earnings breakpoint} = \frac{\text{Addition to retained earnings}}{\text{Common equity fraction}}$$

Recall from Chapter 3, Allied's addition to retained earnings in 2006 is expected to be \$68 million, and its target capital structure consists of 45 percent debt, 2 percent preferred, and 53 percent equity. Therefore, its retained earnings breakpoint is shown below.

$$\text{Retained earnings breakpoint} = \$68/0.53 = \$128 \text{ million}$$

¹ The WACC is the cost of investor-supplied capital used to finance new projects. The debt component of the target capital structure includes only interest-bearing, investor-supplied debt—long-term bonds and bank notes payable. It does not include accounts payable and accruals because those items are not provided by investors.

In calculating the cost of new common stock, we modified the DCF approach to account for flotation costs using the following equation:

$$\text{Cost of equity from new stock issues} = r_e = \frac{D_1}{P_0(1 - F)} + g \quad (10A-2)$$

Here F is the percentage flotation cost required to sell the new stock, so $P_0(1 - F)$ is the net price per share received by the company.

Assuming that Allied has a flotation cost of 10 percent, its cost of new common equity, r_e , would be calculated as shown below.

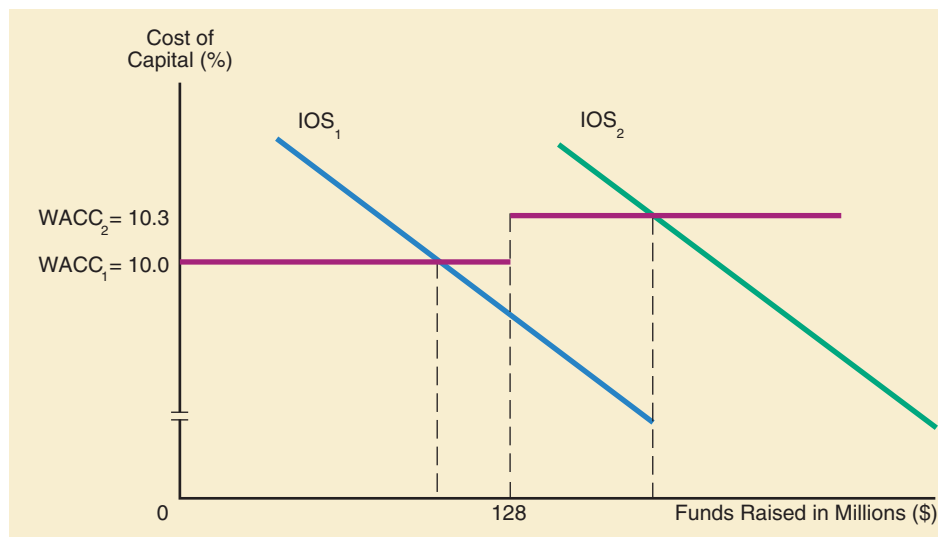
$$\begin{aligned} r_e &= \frac{\$1.24}{\$23(1 - 0.10)} + 8.0\% \\ &= \frac{\$1.24}{\$20.70} + 8.0\% \\ &= 6.0\% + 8.0\% = 14.0\% \end{aligned}$$

Now suppose that Allied has so many attractive new projects (that is, projects whose expected returns exceed the company's cost of capital) that its capital requirements exceed the \$128 million breakpoint calculated above. In that case, each dollar up to \$128 million will still cost 10 percent, but each dollar beyond \$128 million will include higher-cost equity (14 percent versus 13.4 percent) raised by selling new common stock. This will cause the WACC to increase from 10.0 percent to $WACC_2 = 10.3\%$:

$$\begin{aligned} WACC_2 &= w_d r_d(1 - T) + w_p r_p + w_c r_e \\ &= 0.45(10\%)(0.6) + 0.02(10.3\%) + 0.53(14.0\%) \\ &= 10.3\% \end{aligned}$$

Figure 10A-1 shows a graph of this situation. The WACC is constant at $WACC_1 = 10\%$ out to \$128 million of total capital, then it increases to $WACC_2 = 10.3\%$ and

FIGURE 10A-1 Relationship between WACC and the Amount of Funds Raised



remains at that level going on out. We also show two Investment Opportunity Schedules, or IOS curves, on the graph. If IOS_1 were Allied's actual IOS curve, this would indicate that the firm has relatively few good investment opportunities, hence a capital budget that is small enough so that all the necessary equity can come from retained earnings. In this case, the WACC is 10 percent. If IOS_2 is a graph of the firm's investment opportunities, then Allied will have to supplement its retained earnings with funds from the sale of new common stock, and in that situation its WACC will increase to $WACC_2 = 10.3\%$.

While Figure 10A-1 illustrates that the WACC would increase if the firm raises a relatively large amount of capital during a given year, WACC would probably not take the sharp jump that we actually show here. Rather, the firm would make adjustments to its capital structure and/or its dividend payments, and these adjustments would cause the WACC curve to increase slowly and smoothly beyond the breakpoint. We will return to this point in the dividend chapter, where we discuss changes in dividend policy to reflect changes in investment opportunities.

QUESTIONS

- 10A-1** A firm is analyzing its portfolio of investment opportunities and has calculated its WACC and determined flotation costs if new equity is required. The WACC using only retained earnings is 11.5 percent, while the WACC with new common stock ($WACC_2$) is 12.0 percent. At the point where the firm has exhausted retained earnings there are still projects with returns greater than 11.5 percent; however, the remaining projects' returns are less than 12.0 percent. Should the firm issue new common stock and accept these projects? Explain.
- 10A-2** A firm's managers know that the firm's investment opportunities are relatively modest and can be satisfied with retained earnings. However, the managers want to issue new common stock, as they hope to buy most of the new common stock and gain more control over the company. A manager has suggested just pushing the firm's IOS curve out to the right (creating more favorable opportunities). What is wrong with this argument?
- 10A-3** It has been demonstrated that a firm can have more than one corporate WACC ($WACC_1$ and $WACC_2$) because it may have to issue new common stock at some point. Is it possible for a firm to have even more potential WACCs? What are the circumstances in which this might happen?

PROBLEMS

- 10A-1 WACC with new common stock** Anthony Auto Parts wants to calculate its WACC. The company's CFO has collected the following information:
- The company's long-term bonds currently offer a yield to maturity of 8 percent.
 - The company recently paid a dividend of \$2 a share ($D_0 = \2.00).
 - The dividend is expected to grow at a constant rate of 6 percent a year.
 - The company's stock price is \$32 a share ($P_0 = \32).
 - The company pays a 10 percent flotation cost whenever it issues new common stock ($F = 10$ percent).
 - The company's target capital structure is 75 percent equity and 25 percent debt.
 - The company's tax rate is 40 percent.
 - The firm's net income for the coming year is expected to be \$96 million.
 - The firm's dividend payout ratio is 40 percent.

- a. What is the company's WACC if the equity portion of the capital budget is completely satisfied by retained earnings?
- b. What is Anthony's retained earnings breakpoint?
- c. If the firm's optimal capital budget is \$144 million, what marginal WACC should be used to evaluate projects?

- 10A-2 Cost of external equity** Fisher Electric has a capital structure that consists of 70 percent equity and 30 percent debt. The company's long-term bonds have a before-tax YTM of 8.4 percent. The company uses the DCF approach to determine the cost of equity. Fisher's common stock currently trades at \$45 per share. The year-end dividend (D_1) is expected to be \$2.50 per share, and the dividend is expected to grow forever at a constant rate of 7 percent a year. The company estimates that it will have to issue new common stock to help fund this year's projects and the flotation cost associated with issuing new common stock is 10 percent. The company's tax rate is 40 percent.
- a. If the firm did not have to issue new equity, what would be the firm's WACC?
 - b. If new equity is issued, what is the firm's WACC?
 - c. Assume new equity is issued. Over what range of returns will projects not be acceptable, but they would appear to be okay if the firm mistakenly used the WACC in which no new equity is issued?