THE COST OF CAPITAL (CHAPTER 11)

The major theme of the last few sections of notes has been valuation; the time value of money concepts provides you with the computations to determine the value of any asset; the valuation sections (bonds and stocks) showed you how to determine the value of financial assets, such as bonds and stocks; and the capital budgeting section showed how to determine whether a real (tangivle) asset is an acceptable investment for the firm, which entails comparing the value of the asset to its cost (initial investment). To compute the value of any asset, regardless of whether it is a financial asset or a real asset, you must know the rate of return, r, that is required to invest in the asset. To this point, we have not discussed how the required rate of return is determined. The purpose of this section is to show you how the required rate of return for a firm (or for an individual for that matter) is determined and what the value for the required rate of return means. As you read this section, keep in mind that the reason a firm has to earn a particular rate of return on its assets is because investors who provide funds to the firm demand to receive a positive return on their funds. As a result, the firm must earn enough on its investments to provide the return investors demand—that is, r, or the required rate of return. The concept is the same as if you borrow money for the purposes of investing in the stock market. If your investments don't earn a return that covers the interest you are paying on the loan, which is your required rate of return in this case, then you lose money—that is, the net present value (NPV) of the investments is negative, which means you reduce your wealth.

- <u>The Logic of the Weighted Average Cost of Capital</u>—a firm generally uses more than one type of funds to finance its assets, and the costs of, or the returns associated with, those funds usually are not the same. For example, the existing assets of firm might be financed with some debt, which has a market return (cost) equal to 8 percent, and with some stock, or equity, which has a market return (cost) equal to 15 percent. If 40 percent of the firm's financing is debt, then the other 60 percent is financed with equity. Thus, 40 percent of the funds the firm is using costs 8 percent while the other 60 percent costs 15 percent, and the average rate that the firm is paying is 12.2 percent, which is the weighted average of the two costs ($12.2\% = 0.40 \times 8\% + 0.60 \times 15\%$).

- <u>Basic Definitions</u>
    - *Capital*—refers to the long-term funds used by a firm to finance its assets.
    - *Capital components*—the types of capital used by a firm. Generally, we include various kinds of debt, such as bonds, and equity, both preferred and common, in the capital of the firm.
    - *Cost of capital*—the cost associated with the various types of capital used by the firm. Each type of capital—that is, each component—has a cost, which, as we will see, is based on the rate of return required by the investors who provide the funds to the firm.
    - *Weighted average cost of capital, WACC*—the average percentage cost, based on the proportion each capital component makes up of the total capital, of all the funds used by the firm to finance its assets.
    - *Capital structure*—the mix of the types of capital used by the firm to finance its assets. For example, one firm's capital structure might consist of 40 percent debt and 60 percent common equity while another firm's capital structure might be 60 percent debt, 10 percent preferred equity, and 30 percent common equity.
    - *Optimal capital structure*—the mix of capital—that is, debt and equity—that minimizes the firm's WACC, thus maximizes its value. At this point, we assume that the firm's capital

structure is optimal.

- Cost of Debt, r_{dT}—the after-tax cost of debt, which is designated r_{dT}, is simply the yield to maturity (YTM) of the debt, which represents the bondholders' required rate of return, stated on an after-tax basis:

$$\begin{matrix}\text{After-tax component} \\ \text{cost of debt}\end{matrix} = \begin{pmatrix}\text{Bondholders' required} \\ \text{rate of return}\end{pmatrix} - \begin{pmatrix}\text{Tax savings} \\ \text{associated with debt}\end{pmatrix}$$

$$= \quad r_d \quad - \quad r_d \times T \quad = r_d\,(1\text{-}T)$$

where r_d is the required rate of return of investors who hold the firm's bonds (the bond's YTM) and T is the firm's marginal tax rate of the firm. Remember from the notes titled "Bonds—Characteristics and Valuation" that r_d is the rate of return that investors demand (require) to invest in the firm's bonds. This rate is also referred to as the market return or the yield to maturity (YTM) on the bond. Thus, effectively, investors who are the participants in the financial markets determine the firm's cost of debt. This is also the case for the other component costs of capital.

Example: A firm is considering issuing a bond to raise funds to finance its assets. The bond will have a face value equal to $1,000, a coupon rate of interest equal to 8 percent with interest paid semiannually, and a 10-year life. The firm expects the market price of each bond in the issue to be $1,071. If the firm's marginal tax rate is 40 percent, what is r_{dT} for this bond? To determine the component cost of debt, first consider the fact that we know the following situation must exist:

$$\$1,071 = \frac{\$40}{\left(1+{r_d}/{2}\right)^1} + \frac{\$40}{\left(1+{r_d}/{2}\right)^2} + \cdots + \frac{\$40+1,000}{\left(1+{r_d}/{2}\right)^{20}}$$

Solving for r_d gives us the YTM for this bond. Remember that you can solve for the YTM by using: (1) trial-and-error—that is, plug in different values for r_d until the right side of the equation equals $1,071; (2) the TVM keys on your calculator—input N = 20 (20 interest payments), PV = -942.65 (market value), PMT = 40 (semiannual interest payment), and FV = 1,000 (maturity value), and then solve for I; or (3) a spreadsheet (see the section of the notes titled "Risk and Rates of Return" for an explanation). Whichever method you us, you should find $r_d/2$ in the previous equation equals 3.5 percent. But, because this result represents a six-month rate of return, it must be annualized to be useful. In other words, the YTM = 7% = 3.5% × 2 = r_d. Thus, to raise funds by issuing new debt, the firm must set the coupon rate of interest on the new bonds equal to 7 percent if it wants to issue each bond for $1,000. In other words, the new debt must yield the same return as the firm's existing debt.

Because r_d = YTM = 7% is computed without considering the fact that the interest the firm pays its bondholders is a tax deductible expense, r_d represents a before-tax amount that must be adjusted so it represents the actual cost to the firm—that is, the cost of the bond to the firm isn't really 7 percent. As an example of the tax deductibility of interest, consider the fact that when you finance your primary residence, the interest paid on the mortgage is tax deductible. Suppose the interest rate on a $110,000 mortgage is 4 percent and the mortgage calls for one payment per year (at the end of the year) for the next 10 years. The mortgage payment each year will equal $13,562 (you should be able to compute this value using TVM techniques discussed in earlier sections). In the first year, the portion of this payment that represents interest is $4,400 = 0.04 x $110,000; thus the remainder of the $13,562 annual payment, $9,162, represents repayment of the principal amount of the mortgage. Assuming you itemize your expenses when computing your taxes, this $4,400 interest is tax deductible, which means it reduces your taxable income by $4,400. If you are in the 30 percent tax bracket, this deduction reduces the amount of taxes you would otherwise have to pay by $1,320 = 0.30 × $4,400. Consequently, in reality the government helped subsidize your mortgage, and your *net* interest expense actually is $3,080, which is the $4,400 interest you pay less the $1,320 tax savings. On an after-tax basis, then, the interest rate you pay on the mortgage actually is 2.8% = 0.028 = $3,080 ÷ $110,000 = 4% × (1 - 0.30).

This logic just presented can be applied to the current situation to yield an after-tax cost of debt equal to 4.2% = 7% × (1 - 0.4) = r_{dT}. This is the cost of the debt issue to the firm.

- Cost of Preferred Stock, r_{ps}—as with debt, the cost of preferred stock is based on the rate of return required by the firm's preferred stockholders, which is determined by the market price of the preferred stock. Remember that the dividend associated with preferred stock is a perpetuity, which, as was noted in previous sections, can be valued as follows:

$$P_0 = \frac{D_{ps}}{r_{ps}}$$

where D_{ps} is the constant dividend paid to preferred stockholders and r_{ps} represents the rate of return investors require to purchase the preferred stock. Thus, in general terms, the cost of preferred stock can be stated as follows:

$$\begin{matrix}\text{Component cost} \\ \text{of preferred stock}\end{matrix} = r_{ps} = \frac{D_{ps}}{NP_0} = \frac{D_{ps}}{P_0(1-F)}$$

where NP_0 is the amount per share that the firm receives when issuing preferred stock. NP_0 is the market price of the stock less expenses that are associated with issuing the stock, which are called *flotation costs* (designated F in the above equation). Therefore, $NP_0 = P_0$ – Flotation costs = $P_0(1 - F)$, where F is stated in decimal form. (Note: If there are flotation costs associated with issuing *new debt*, they should be considered by reducing the market value of the debt by the amount of the flotation costs.)

Consider a firm that has preferred stock that is currently selling for $130 per share and pays a dividend equal to $12.35. If it will cost the firm 5 percent to issue new preferred stock, the cost of preferred stock, r_{ps} is:

$$r_{ps} = \frac{\$12.35}{\$130(1-0.05)} = \frac{\$12.35}{\$123.50} = 0.10 = 10.0\%$$

Notice that the final result is not adjusted for taxes. When we compute the component costs of equity there is no adjustment for taxes because dividends (preferred or common) are not tax-deductible expenses for the firm.

- Cost of Retained Earnings, r_s—this refers to the return that common stockholders require the firm to earn on the funds that have been retained and reinvested in the firm rather than paid out as dividends. Stockholders will permit a firm to retain earnings that could be paid out as dividends only if the firm can earn a return on the reinvested earnings that is sufficient to satisfy existing stockholders' demands. If this required return is not earned, then the stockholders will demand that the firm pay them the earnings in the form of dividends so that they can invest the funds outside the firm at a better rate. In essence, then, the common stockholders tell the firm that if it cannot invest at some minimum rate of return, then the earnings should be paid out as dividends so that the investors can invest the funds themselves.

  From the notes titled "Risk and Rates of Return," we know that we can estimate the cost of retained earnings, r_s, using the following relationships:

$$\begin{array}{ccc} \text{Required rate of return} & = & \text{Expected rate of return} \\ r_s = r_{RF} + (r_M - r_{RF})\beta_s & = & \dfrac{\hat{D}_1}{P_0} + g = \hat{r}_s \\ \text{CAPM} & = & \text{Constant growth model} \end{array}$$

  where the variables are defined previously as: r_{RF} is the risk-free rate of return, r_M is the return on the market, β_s is the beta coefficient associated with the firm's common stock, $\hat{D}_1$ is the dividend the firm expects to pay at the end of the year assuming constant growth exists, P_0 is the current market price of the stock, and g is the constant rate at which the firm is expected to grow in the future. Remember that in equilibrium $r_s = \hat{r}_s$. So, we can apply these two concepts to determine the cost of retained earnings. In addition, we can get a "rough guess" of r_s by using the "bond-yield-plus-risk-premium approach."

  - The CAPM Approach—using the CAPM, which is given in the above relationship, the cost of retained earnings is stated as follows:

$$r_s = r_{RF} + (r_M - r_{RF})\beta_s$$

    Thus, if the risk-free rate of return is 3 percent, the market risk premium is expected to be 7 percent, and the firm's beta coefficient is 1.5, then the cost of retained earnings is 13.5% = 3% + (7%)1.5.

    One of the assumptions associated with the CAPM is that the firm's stockholders are very well diversified. If this is not the case, then beta probably is not the appropriate measure of risk for determining the firm's cost of retained earnings. Also, we usually associate the risk-free return with Treasury securities. Because at any point in time there are many different rates for Treasuries that have different terms to maturity, the result of the CAPM computation depends on which Treasury security is used—that is, if different people use Treasury securities with different maturities, then the results will differ somewhat.

- Discounted cash flow (DCF) approach—if the firm is expected to grow at a constant rate, then we have the following relationship:

$$P_0 = \frac{\hat{D}_1}{r_s - g} \qquad \text{or} \qquad r_s = \hat{r}_s = \frac{\hat{D}_1}{P_0} + g = \begin{pmatrix}\text{Dividend}\\ \text{yield}\end{pmatrix} + \begin{matrix}\text{Capital}\\ \text{gain}\end{matrix}$$

Thus, if our illustrative firm expects the next dividend payment to be \$3.80 per share, the price of its stock currently is \$40, and it is estimated that the firm will grow at a constant rate of 5 percent, then this information suggests that the cost of retained earnings should be:

$$r_s = \frac{\$3.80}{\$40} + 0.05 = 0.145 = 14.5\%$$

- Bond-yield-plus-risk-premium approach—studies have shown that the return on equity for a particular firm is approximately 3 to 5 percentage points higher than the return on its debt. Thus, as a general rule of thumb, firms often compute the YTM for their bonds and then add 3 to 5 percent to the result. For example, earlier we found that the before-tax return (YTM) on our illustrative firm is 7 percent. Thus, as a rough estimate, we might say the cost of retained earnings is 11% = 7% + 4%.

For our illustrative firm, the three approaches we used to determine the cost of retained earnings give three different results. This is not unexpected, because the three approaches are based on different assumptions. As was mentioned, the CAPM approach assumes investors are extremely well diversified; the DFC approach assumes the firm grows at a constant rate; and the bond-yield-plus-risk-premium approach assumes that the return on equity is related to the return on the firm's debt. In an ideal situation (the perfect world), all three approaches should give the same result. But, when we find different values and we don't have any reason to discard any of them, generally we simply average the results. In this case, the average is 13.0% = (13.5% + 14.5% + 11.0%) ÷ 3. Like preferred stock, this figure is not adjusted for taxes because dividends, regardless of the type, are not tax deductible expenses for the firm.

As you can tell from the discussion to this point, determining the cost of retained earnings requires some judgment—there is no one simple rule that can be used when computing the cost of retained earnings. But, this cost must be estimated so that we can compute an accurate weighted average cost of capital (WACC).

- <u>Cost of Newly Issued Common Stock, or External Equity, r_e</u>—this refers to the rate of return required by common stockholders after considering the cost associated with issuing new stock. The cost of external equity is determined in exactly the same manner as the cost of retained earnings, except we recognize the fact that there are costs involved with issuing new stock and these costs reduce the total amount of funds that can be used by the firm for financing new assets. Because the firm has to provide the same gross return to new stockholders as existing stockholders, when the flotation costs associated with a common stock issue are considered, the cost of new common stock must always be greater than the cost of existing stock (that is, the cost of retained earnings). If we modify the DCF approach for computing the cost of retained earnings to include flotation costs, the cost of newly issued common stock is stated as follows:

$$r_e = \frac{\hat{D}_1}{P_0(1-F)} + g = \frac{\hat{D}_1}{NP_0} + g$$

where the variables are the same as previously defined.

If the flotation costs associated with issuing new stock is 17.5 percent, then the cost of external equity for our firm is:

$$r_e = \frac{\$3.80}{\$40(1-0.175)} + 0.05 = \frac{\$3.80}{\$33.00} + 0.05 = 0.165 = 16.5\%$$

As you can see, the cost of external equity, 16.5 percent, is greater than the cost of retained earnings we computed earlier using the DCF approach, which was 14.5 percent. This means the firm must earn a return equal to 16.5 percent on new issues of common stock so that it can pay new stockholders the same dividend it pays existing stockholders, which is $3.80 per share.

To see what the cost of external equity really means, suppose a firm (different than in our illustration) has $200,000 total assets, a cost of retained earnings equal to 18 percent, and that all earnings are paid out as dividends (this assumption is made so that the example does not get too complex). If the firm has 10,000 shares of common stock outstanding, then its dividend is $3.60 per share = ($200,000 × 0.18)/10,000, and the price of its stock is $20 = $3.60/0.18. Now suppose the firm sells 5,000 new shares of common stock at the current market price ($20), for which it nets $18 per share (flotation costs equal 10 percent). The new issue will raise a total of $90,000 (= $18 x 5,000 shares) that the firm can use, and the total assets will increase to $290,000 = $200,000 + $90,000. If these funds are invested to earn the same 18 percent that was earned before the new issue, then the total earnings generated by the firm will be $52,200 = 0.18 × $290,000 and the dividend per share will be $3.48 = $52,200/15,000, which is less than the most recently paid dividend of $3.60. If the firm pays a dividend equal to $3.48 its value will drop to $19.33 = $3.48/0.18, which probably would upset stockholders. To ensure the price of the stock does not drop, the firm must earn a return on the funds generated by the *new* stock issue that equals the cost of external equity, or 20% = $3.60/$18 + 0, so that its new total earnings will be $54,000 = (0..20 × $90,000) + (0.18 × $200,000) = (earnings from new stock investments) + (earnings from existing stock investments), the dividend per share for all stockholders is $3.60 = $54,000/15,000 and the price of the stock remains at its current level of $20 per share.

- <u>Weighted Average Cost of Capital, WACC</u>—in the previous sections, we showed that our illustrative firm has an after-tax cost of debt equal to 4.2 percent, a cost of preferred stock equal to

10.0 percent, a cost of retained earnings equal to 13.0 percent, and a cost of external equity (new common stock) equal to 16.5 percent. To make decisions about capital budgeting projects, we must combine these costs into a single required rate of return. The concept for combining these values to provide a single value, which is called the *weighted average cost of capital*, or WACC, is very simple—compute the weighted average of these costs using as the weights the proportion each type of financing makes up of the total financing of the firm. For example, suppose our illustrative firm has the following capital structure:

Type of Financing	Percent of total	After-tax Cost, r
Debt	30.0	4.2%
Preferred stock	10.0	10.0
Common equity	60.0	13.0 or 16.5
	100.0	

Using the values we computed earlier, if the firm does *not* have to issue new common stock, then its weighted average cost of capital, WACC, is

$$WACC_1 = 0.3(4.2\%) + 0.1(10.0\%) + 0.6(13.0\%) = 10.06\%$$

According to the information given here, each dollar of funding that is attributed to debt costs the firm 4.2 percent, each dollar raised using preferred stock costs the firm 10 percent, and each dollar of retained earnings that is used to finance the firm costs 13 percent. But, because the firm does not use each type of financing in equal proportions, the average cost is not a simple average of these individual costs. If you think about it, the information in the above table indicates that for every dollar of financing the firm has, 30¢ is in the form of debt, 10¢ is preferred stock, and 60¢ is common equity. Thus, the average cost of the firm's financing, its WACC, is 10.06 percent, which represents the average rate of return the firm must earn on new investments that are finance partially with retained earnings (i.e., new common stock is not issued) to ensure the value of the firm does not decrease—that is, WACC = r = required rate of return. In general terms, WACC is calculated as follows:

$$WACC = \left[\begin{pmatrix}\text{Proportion}\\ \text{of debt}\end{pmatrix} \times \begin{pmatrix}\text{After-tax}\\ \text{cost of debt}\end{pmatrix}\right] + \left[\begin{pmatrix}\text{Proportion of}\\ \text{preferred stock}\end{pmatrix} \times \begin{pmatrix}\text{Cost of}\\ \text{preferred stock}\end{pmatrix}\right] + \left[\begin{pmatrix}\text{Proportion of}\\ \text{common equity}\end{pmatrix} \times \begin{pmatrix}\text{Cost of}\\ \text{common equity}\end{pmatrix}\right]$$

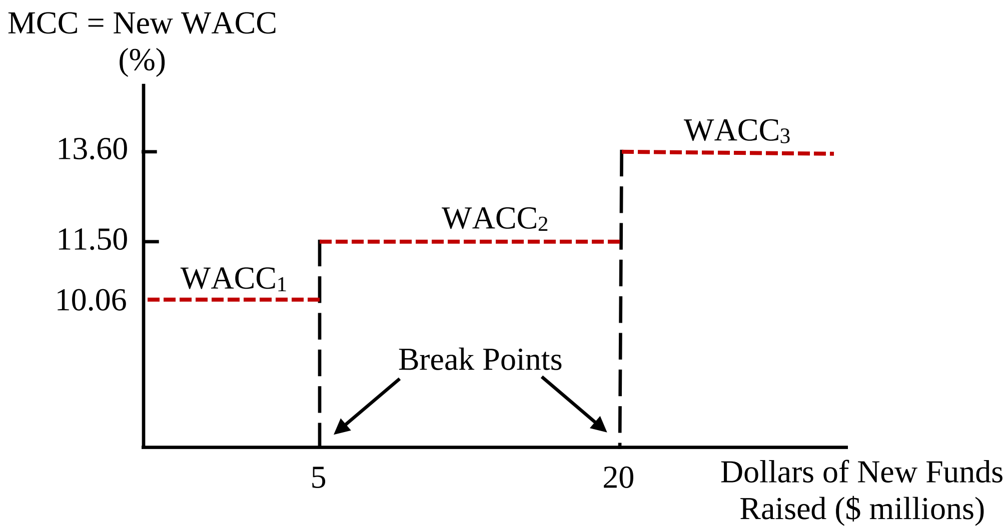
$$= w_d r_{dT} + w_{ps} r_{ps} + w_s (r_s \text{ or } r_e)$$

If the firm does not have enough retained earnings to satisfy the common equity portion of the total new funds required to purchase new investments, the WACC is:

$$WACC_1 = 0.3(4.2\%) + 0.1(10.0\%) + 0.6(16.5\%) = 12.16\%$$

In this case, the firm must issue new common equity to raise the needed funds, which causes the WACC to increase from 10.06 percent to 12.16 percent.

- The Marginal Cost of Capital, MCC—the weighted average cost of raising *additional* funds. Often, the marginal cost of capital is greater than the existing WACC—that is, the cost of new funding increases—because either the firm's risk increases, which causes investors to require a higher rate of return, the costs of issuing new funds (flotation costs) increase, or both.
  - The MCC schedule—a graph that shows the average cost of funds at various levels of new financing—for example, the cost might be 10.06 percent if the firm raises less than $5 million, the cost might jump to 11.5 percent if the firm raises $10 million to $20 million in new financing, and the cost jumps to 12.16 percent if the firm needs more than $20 million. An MCC schedule might look something like the following:



As you can see from the graph, there are points, which we call *break points*, where the WACC increases—that is, at $5 million the WACC increases from 10.06 percent to 11.50 percent and at $20 million the WACC increases from 11.50 percent to 13.60 percent. What causes these break points? Look at the equation given at the end of the last section—if any of the component costs of capital change, then so does the WACC. For example, if the after-tax cost of debt for our illustrative firm increases from 4.2 percent to 9 percent at $5 million of new funds ($1.5 million of new debt because debt represents 30 percent of total capital), then WACC = 11.50% = 0.3(9.0%) + 0.1(10.0%) + 0.6(13.0%). Then if the cost of equity increases from 13 percent to 16.5 percent when the firm raises more than $20 million of new funds (more than $12 million of new common stock because common equity represents 60 percent of total capital), WACC = 13.60% = 0.3(9%) + 0.1(10.0%) + 0.6(16.5%). Consequently, as you can see, the WACC changes whenever any of the component costs of capital change.

If we know the level at which a particular type of financing will increase, the break point stated in terms of total new funds can be written as follows:

$$\text{Break point} = \frac{\text{Total amount of a given type of capital at the lower cost}}{\text{Proportion of this type of capital in the capital structure}}$$

In our example, the after-tax cost of debt is 4.2 percent if the firm raises from $1 (one dollar) to $1.5 million and then it increases to 9 percent for every dollar of new debt greater than $1.5 million, the break point caused by an increase in the cost of debt is:

$$\text{Break point} = \frac{\$1{,}500{,}000}{0.30} = \$5{,}000{,}000$$

Notice that the $5 million is the amount of *total* new funds the firm can raise before WACC increases from 11.06 percent to 11.50 percent. The reason for the increase in WACC is because above $5 million in total financing the amount of debt funding that is needed is greater than $1.5 million, and this new debt will have an after-tax cost of 9 percent rather than 4.2 percent.

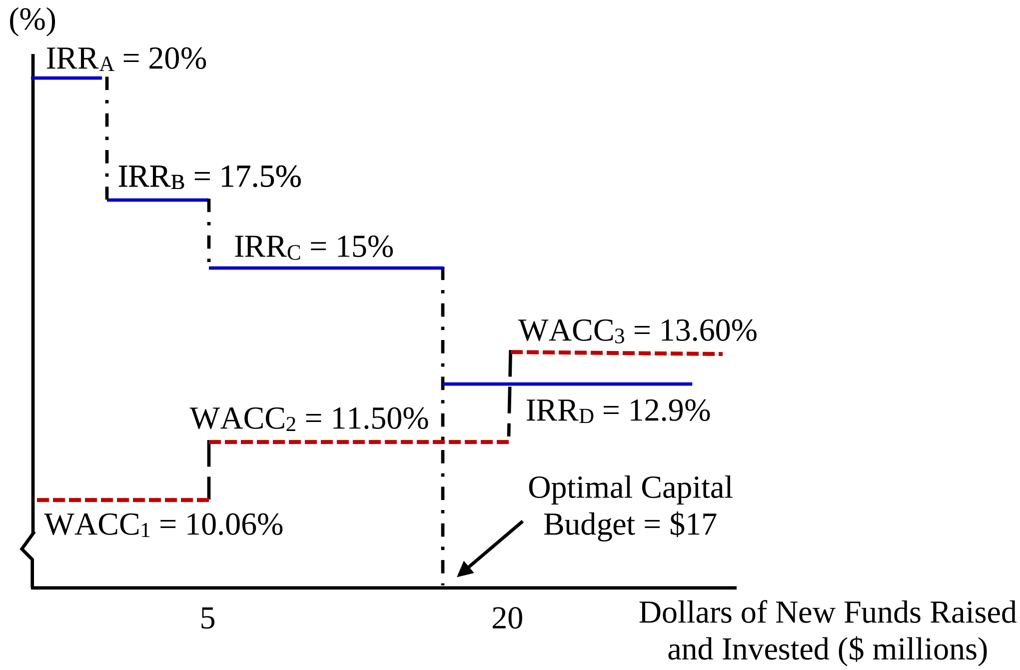
One place we know there will always be a break point is when the amount of income that is not paid out as dividends—that is, the addition to retained earnings in the current period—is exhausted. Once the current addition to retained earnings is exhausted, then the firm must issue new common stock to satisfy the contribution of common equity to the total financing needs of the firm. Looking at the MCC schedule, you can see that the firm must issue new common stock when it wants to raise more than $20 million in total funds, which is the point where the expected addition to retained earnings is not sufficient to satisfy the common equity portion of the total funds needed. As a result, the firm expects to generate $12 million of retained earnings next year (= 0.6 x $20 million). We know the cost of new equity is greater than the cost of retained earnings; that is, $r_e > r_s$.

- Combining the MCC and Investment Opportunity Schedules—once we have constructed an MCC schedule, we can use the information it provides to make decisions concerning the acceptability of capital budgeting projects. To make capital budgeting decisions, simply plot the IRRs of the projects on the same graph as the MCC schedule and purchase the projects that have an IRR greater than the WACC that corresponds to the amount of funds needed to purchase the projects. Keep in mind that the WACC is the firm's required rate of return, which we designated as r in the "Capital Budgeting" section of the notes.

  To illustrate the MCC/IOS schedules, let's assume that our illustrative firm has evaluated a group of capital budgeting projects, and the following information was determined:

Project	Cost (millions)	IRR
A	$ 2	20.0%
B	3	17.5
C	12	15.0
D	10	12.9

  Plotting these projects on the same graph as the MCC schedule, we have the following:



According to the graph, Projects A, B, and C are acceptable projects. Project D is not acceptable if it is an "all or nothing" (indivisible) project because its $10 million cost will cause the WACC to increase to 13.6 percent, which is greater than IRR_D = 12.9%. If the project is divisible, then the firm can invest in $3 million of Project D, because at a total capital budget equal to $20 million WACC is 11.5 percent, which is less than IRR_D = 12.9%. Just like we did in the "Capital Budgeting" section of the notes, the decision to accept projects is based on the relationship of the project's IRR to the firm's required rate of return, which we have now identified as its WACC. Thus, as long as IRR > WACC = r, a project is acceptable.

- Chapter 11 Summary Questions—You should answer these questions as a summary for the chapter and to help you study for the exam.
  - What is the weighted average cost of capital (WACC)? How is WACC computed? How is WACC used to make financial decisions?
  - Why is the cost of debt adjusted for taxes whereas the costs of equity, whether preferred stock or common equity, are not?
  - Why is there a cost associated with retained earnings? Why is the cost of retained earnings *always* less than the cost of issuing new (external) equity?
  - What makes the WACC change? What are break points and how are they computed? What is one break point that a firm normally faces?
  - How is the WACC used to make capital budgeting decisions?

WACC Versus Required Rates of Return

Investor's Required Rate of Return/Firm's Cost of Capital:

$$\text{Investor's required rate of return} = r = r_{RF} + \begin{bmatrix} \text{Risk} \\ \text{premium} \end{bmatrix} = r_d, r_{ps}, \text{ or } r_s = \text{Firm's component cost of capital}$$

Financial Asset	Financial Asset's Market Value	Return to Investors		Cost to Firms	
Debt, r_d	$P_0 = \frac{INT}{(1+YTM)^1} + \cdots + \frac{INT+M}{(1+YTM)^N}$	YTM = r_d	= return investors require to purchase the firm's debt	r_d = YTM r_{dT} = $r_d(1\text{-}T)$	= before-tax cost of debt = after-tax cost of debt
Preferred Stock, r_{ps}	$P_0 = \frac{D_{ps}}{r_{ps}}$	$r_{ps} = \frac{D_{ps}}{P_0}$	= return investors require to purchase the firm's preferred stock	$r_{ps} = \frac{D_{ps}}{P_0(1-F)}$	= cost of preferred stock
Common Equity, r_s (internal) or r_e (external)	$P_0 = \frac{\hat{D}_1}{r_s - g}$; (constant growth firm)	$r_s = \frac{\hat{D}_1}{P_0} + g$	= return investors require to purchase the firm's common stock	$r_s = \frac{\hat{D}_1}{P_0} + g$ $r_e = \frac{\hat{D}_1}{P_0(1-F)} + g$	= cost of retained earnings (internal) = cost of new common equity (external)

Variable Definitions:

r_{RF} = nominal risk-free rate of return
P_0 = market value of the financial asset
INT = dollar interest payment
M = maturity (face) value
N = number of remaining interest payments
g = constant growth rate of the firm

YTM = yield to maturity
T = the firm's marginal tax rate
D_{ps} = preferred stock dividend
$\hat{D}_1$ = next period's dividend
F = cost of issuing new stock (in decimal form)