by interest payments; preferred stockholders are compensated by fixed dividend payments; and the firm's remaining income belongs to its common stockholders and serves to "pay the rent" on stockholders' capital. Management may either pay out earnings in the form of dividends or retain earnings for reinvestment in the business. If part of the earnings is retained, an *opportunity cost* is incurred: Stockholders could have received those earnings as dividends and then invested that money in stocks, bonds, real estate, and so on. *Thus, the firm should earn on its retained earnings at least as much as its stockholders themselves could earn on alternative investments of equivalent risk.*

What rate of return can stockholders expect to earn on other investments of equivalent risk? The answer is k_s, because they can earn that return simply by buying the stock of the firm in question or that of a similar firm. Therefore, if our firm cannot invest retained earnings and earn at least k_s, then it should pay those earnings to its stockholders so that they can invest the money themselves in assets that do provide a return of k_s.

Whereas debt and preferred stocks are contractual obligations which have easily determined costs, it is not at all easy to estimate k_s. However, three methods can be used: (1) the Capital Asset Pricing Model (CAPM), (2) the discounted cash flow (DCF) model, and (3) the bond-yield-plus-risk-premium approach. These methods should not be regarded as mutually exclusive—no one dominates the others, and all are subject to error when used in practice. Therefore, when faced with the task of estimating a company's cost of equity, we generally use all three methods and then choose among them on the basis of our confidence in the data used for each in the specific case at hand.

SELF-TEST QUESTIONS

What are the two types of common equity whose costs must be estimated? Explain why there is a cost for retained earnings.

THE CAPM APPROACH

As we saw in Chapter 5, the Capital Asset Pricing Model is based on some unrealistic assumptions, and it cannot be empirically verified. Still, because of its logical appeal, the CAPM is often used in the cost of capital estimation process.

Under the CAPM we assume that the cost of equity is equal to the risk-free rate plus a risk premium that is based on the stock's beta coefficient and the market risk premium as set forth in the Security Market Line (SML) equation:

$$\begin{aligned} k_s &= \text{Risk-free rate} + \text{Risk premium} \\ &= k_{RF} + (k_M - k_{RF})b_i. \end{aligned}$$

Given estimates of (1) the risk-free rate, k_{RF}, (2) the firm's beta, b_i, and (3) the required rate of return on the market, k_M, we can estimate the required rate of

return on the firm's stock, k_s. This required return can then be used as an estimate of the cost of retained earnings.

ESTIMATING THE RISK-FREE RATE

The starting point for the CAPM cost of equity estimate is k_{RF}, the risk-free rate. There is really no such thing as a truly riskless asset in the U.S. economy. Treasury securities are free of default risk, but long-term T-bonds will suffer capital losses if interest rates rise, and a portfolio invested in short-term T-bills will provide a volatile earnings stream because the rate paid on T-bills varies over time.

Since we cannot in practice find a truly riskless rate upon which to base the CAPM, what rate should we use? Our preference—and this preference is shared by most practitioners—is to use the rate on long-term Treasury bonds. Here are our reasons:

1. Capital market rates include a real, riskless rate (generally thought to vary from 2 to 4 percent) plus a premium for inflation which reflects the expected inflation rate over the life of the security, be it 30 days or 30 years. The expected rate of inflation is likely to be relatively high during booms and low during recessions. Therefore, during booms T-bill rates tend to be high to reflect the high current inflation rate, whereas in recessions T-bill rates are generally low. T-bond rates, on the other hand, reflect expected inflation rates over a long period, so they are far less volatile than T-bill rates.

2. Common stocks are long-term securities, and although a particular stockholder may not have a long investment horizon, most stockholders do invest on a long-term basis. Therefore, it is reasonable to think that stock returns embody long-term inflation expectations similar to those embodied in bonds rather than the short-term expectations in bills. Therefore, the cost of equity should be more highly correlated with T-bond rates than with T-bill rates.

3. Treasury bill rates are subject to more random disturbances than are Treasury bond rates. For example, bills are used by the Federal Reserve System to control the money supply, and bills are also used by foreign governments, firms, and individuals as a temporary safe haven for money. Thus, if the Fed decides to stimulate the economy, it drives down the bill rate, and the same thing happens if trouble erupts somewhere in the world and money flows into U.S. dollars seeking safety. T-bond rates are also influenced by Fed actions and by international money flows, but not to the same extent as T-bill rates. This is another reason why T-bill rates are more volatile than T-bond rates and, most experts agree, more volatile than k_s.

4. T-bills are essentially free of price risk, but they are exposed to a relatively high degree of reinvestment rate risk. Long-term investors such as pension funds and life insurance companies are as concerned about reinvestment rate risk as price risk. Therefore, most long-term investors would feel equally exposed to risk if they held bills or bonds.

5. When the CAPM is used to estimate a particular firm's cost of equity over time, bond rates produce more reasonable results. When T-bill rates were low in 1977