$$k_p = \frac{\text{div}}{P}$$

where k_p = The cost of preferred stock
div = The promised dividend on the preferred stock
P = The market price of the preferred stock

If the current market price is not available, use yields on similar-quality issues as an estimate. For a fixed-life or callable preferred stock issue, estimate the opportunity cost by using the same approach as for a comparable debt instrument. In other words, estimate the yield that equates the expected stream of payments with the market value. For convertible preferred issues, option-pricing approaches are necessary.

STEP 3: ESTIMATE THE COST OF EQUITY FINANCING

The opportunity cost of equity financing is the most difficult to estimate because we can't directly observe it in the market. We recommend using the capital asset pricing model (CAPM) or the arbitrage pricing model (APM). Both approaches have problems associated with their application, including measurement difficulty. Many other approaches to estimating the cost of equity are conceptually flawed. The dividend yield model (defined as the dividend per share divided by the stock price) and the earnings-to-price ratio model substantially understate the cost of equity by ignoring expected growth.

The Capital Asset Pricing Model

The CAPM is discussed at length in all modern finance texts (for example, see Brealey and Myers, 1999, or Copeland and Weston, 1992).[6] These detailed discussions will not be reproduced here. (In this section, we assume that you are generally familiar with the principles that underlie the approach.) The CAPM postulates that the opportunity cost of equity is equal to the return on risk-free securities plus the company's systematic risk (beta) multiplied by the market price of risk (market risk premium). The equation for the cost of equity (k_s) is as follows:

[6] T. Copeland and J. Weston, *Financial Theory and Corporate Policy*, 3rd ed. (Reading, MA: Addison-Wesley, 1992); and R. Brealey and S. Myers, *Principles of Corporate Finance*, 5th ed. (New York: McGraw-Hill, 1999).

$$k_s = r_f + [E(r_m) - r_f]\,(\text{beta})$$

where r_f = The risk-free rate of return
$E(r_m)$ = The expected rate of return on the overall market portfolio
$E(r_m) - r_f$ = The market risk premium
beta = The systematic risk of the equity

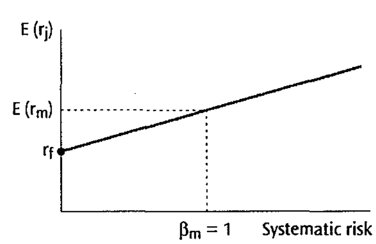
The CAPM is illustrated in Exhibit 10.3. The cost of equity, k_s, increases linearly as a function of the measured undiversifiable risk, beta. The beta for the entire market portfolio is 1.0. This means that the average company's equity beta will also be about 1.0. It is very unusual to observe a beta greater than 2.0 or less than 0.3. The market risk premium (the price of risk) is measured as the slope of the CAPM line in Exhibit 10.3, that is, the slope is $E(r_m) - r_f$.

To carry out the CAPM approach, we need to estimate the three factors that determine the CAPM line: the risk-free rate, the market risk premium, and the systematic risk (beta). The balance of this section describes a recommended approach for estimating each.

Determining the risk-free rate Hypothetically, the risk-free rate is the return on a security or portfolio of securities that has no default risk and is completely uncorrelated with returns on anything else in the economy. In theory, the best estimate of the risk-free rate would be the return on a zero-beta portfolio, constructed of long and short positions in equities in a way that produces the minimum variance zero-beta portfolio. Because of the cost and complexity of constructing minimum variance zero-beta portfolios, they are not practical for estimating the risk-free rate.

We have three reasonable alternatives that use government securities: the rate for Treasury bills, the rate for 10-year Treasury bonds, and the rate

Exhibit 10.3 The Capital Asset Pricing Model



$$E(r_j) = \overset{\text{Cost of equity}}{k_s} = \overset{\text{Risk free rate}}{r_f} + [\underbrace{E(r_m) - r_f}_{\text{Market risk premium}}]\,\overset{\text{Systematic risk (beta)}}{\beta_j}$$