Valuing Individual Equities: The CAPM

Our book discussion of the fundamental value focused on applying the dividend-discount model to the pricing of individual stocks to the valuation of the stock market as a whole. That is, we examined how to evaluate the appropriate level for a value-weighted measure such as the Standard and Poor's 500 composite index or the Wilshire 5000. At one point in the discussion, we noted that the expected return on a portfolio that is composed of such an index, what we will call the *market portfolio*, is equal to the risk-free interest rate (*rf*) plus risk premium (*rp*). (See page 190 of Chapter 8.) To make things slightly easier, we will labels this expected return on the market portfolio $rm = rf + rp$.

So far, we haven't said anything about the valuation of individual stocks. But with a firm understanding of the expected return on the market portfolio, *rm*, this is a straightforward problem. To see how to do it, first recall from Chapter 5 that the definition of risk tells us to evaluate the possible payoffs *relative to a benchmark*. (See page 91.) For an individual stock the benchmark must be the market as a whole, so the question then is how volatile is the return relative to the market.

The risk associated with holding an individual stock will be higher than the risk of holding the market as a whole. The reason for this is that the market portfolio is diversified, as the various stocks in the market do not rise and fall in value simultaneously. Recall that diversification reduces risk. The more volatile the return on an individual stock is relative to the market, the higher the risk and the higher the return. This means that enticing investors to hold individual stocks will require offering them returns in *excess of the market*.

This is a description of the Capital Asset Pricing Model, or CAPM. The CAPM is a simple method that is used for categorizing the risk of holding individual stock. The idea behind the CAPM is that if you take an investment portfolio that is composed of the entire market, such as the S&P500, and add an additional share of a single stock, you change the level of risk. A term called *beta*, represented by the Greek letter β, measures the magnitude of this change. For a given stock, call it stock *j*, we can write this as

(10) $$r_j = rf + \beta_j(rm - rf).$$

That is, the return required to hold stock *j* has two parts. The first is the risk free interest rate, and the second is the risk premium, measured as the market risk premium times the factor β_j.

To see the implications of this, if the market risk premium is 4 percent, then the return on the market is 8 percent. A stock with a beta of 1.0 would have a similar required return of 8 percent. If, however, a stock has a beta of 1.5, then the return would have to be 4 plus 1.5 times 4, or 10 percent.

The actual computation of β is somewhat complex, and involves looking at the correlation between return on the market index and the return to an individual stock. If an individual stock's return moves more than one-for-one with the market, then its beta will exceed one. If, as is relatively rare, a stock's return is completely unrelated to the market, going up and down virtually independently, then its beta will be zero.

Finally, you will notice that the expected return to holding an individual stock does not depend in any way on its own risk characteristics. That is, r_j is unrelated to volatility in stock *j* that is not common to all other stocks in the market portfolio. Such fluctuations would be what we called idiosyncratic risk in Chapter 5. They are the sort of risk that can be hedged and there for eliminated. According to the CAPM, investors are not compensated for idiosyncratic risk, only for market-wide (systematic) risk.