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INVESTMENT VALUATION

Tools and techniques for determining the value of *any* asset

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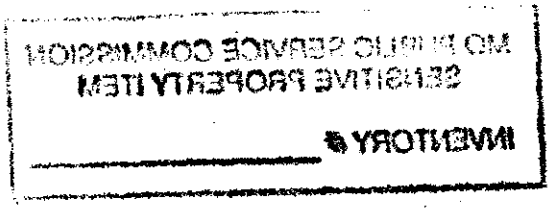

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Estimation of Discount Rates

The models of risk and return developed in the prior chapter are useful only if the risk parameters needed for the models can be estimated with relative ease and if these parameters can then be used to predict expected returns. This chapter looks at the contexts in which these valuation models can be used, the process of estimating risk parameters in each model, and the determinants of these parameters. It also develops two alternative measures of discount rates: the cost of equity and the cost of capital, and provides a contrast between the two.

COST OF EQUITY

The cost of equity is the rate of return that investors require to make an equity investment in a firm. There are two approaches to estimating the cost of equity: The first is to use a risk and return model, and the second is to apply a dividend growth model.

Using Risk and Return Models

The Capital Asset Pricing Model

As the discussion in Chapter 3 makes clear, the CAPM measures risk in terms of nondiversifiable variance and relates expected returns to this risk measure. The nondiversifiable risk for any asset is measured by its beta, which can be used to yield an expected return.

$$E(R) = R_f + \text{Equity Beta}(E[R_m] - R_f)$$

where R_f = riskfree rate
$E(R_m)$ = expected return on the market index

The return that investors expect to make on an equity investment, given its risk, becomes the cost of equity to managers in that firm.

A. Using the CAPM

The following inputs are required to use the CAPM: the current riskfree rate, the expected return on the market index, and the beta of the asset being ana-

lyzed. There are two practical issues in using the CAPM: 1) How do we measure the risk premium to be used in calculating the expected return on the market index? 2) What is the correct riskfree rate to use in the model?

1. Measurement of the Risk Premium. The risk premium used in the CAPM is generally based upon historical data, and the premium is defined to be the difference between average returns on stocks and average returns on riskfree securities over the measurement period. Two measurement questions remain: How long should the measurement period be? Should arithmetic or geometric averages be used to compute the risk premium? While measurement periods ranging from 10 years to longer (beginning in 1926) are used in practice, the use of the longest possible historical period seems justified absent any trend in premiums over time. In much of the analysis in this book, the average premiums based upon data from 1926 to 1990 will be used for U.S. stocks.

There is just as much disagreement among practitioners on the usage of the arithmetic versus the geometric mean. Those who use the arithmetic mean argue that it is much more consistent with the mean-variance framework of the CAPM and a better predictor of the premium in the next period. Use of the geometric mean is justified on the grounds that it takes into account compounding and that it is a better predictor of the average premium in the long term. There can be dramatic differences in premiums based upon the choices made at this stage, as illustrated in Table 4.1 based upon historical data on stock and bond returns.

The geometric mean generally yields lower premium estimates than the arithmetic mean. In the context of valuation, where cashflows over a long time horizon are discounted back to the present, the geometric mean provides a better estimate of the risk premium. Thus, the premium of 5.50% (the geometric mean of the premium over Treasury bonds) is used throughout this book for calculating expected returns.

While historical data on stock returns is most easily available and accessible in the United States, the premiums for other countries are updated in Ibbotson and Brinson. Reliable historical data are not available for as long a time period as is available for the United States. Table 4.2 shows risk premiums around the world. The premium earned by stocks over Treasury bonds has been much lower in the European markets (not counting the United Kingdom) than in

TABLE 4.1 Magnitude of the Risk Premium (percent)

	Stocks–Treasury Bills		Stocks–Treasury Bonds	
Historical Period	*Arithmetic*	*Geometric*	*Arithmetic*	*Geometric*
1926–1990	8.41	6.41	7.24	5.50
1962–1990	4.10	2.95	3.92	3.25
1981–1990	6.05	5.38	.13	.19