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COST OF CAPITAL

Applications and Examples
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Common academic practice in empirical studies of rates of return realized on portfolios of stocks in excess of a risk-free rate is to benchmark stock returns against realized monthly returns of "risk-free" 90-day T-bills or one-year government bonds. A T-bill rate is the purest risk-free base rate because it contains essentially no maturity risk. If inflation is high, it does reflect the inflation component, but it contains little compensation for inflation uncertainty. Problems in using such a risk-free security as a benchmark are that (1) T-bill rates may not reflect market-determined investor return requirements on long-term investments due to central bank actions affecting the short-term interest rates, and (2) rates on short-term securities tend to be more volatile than yields on longer maturities.

Long-term government bonds are free of default risk but are not "risk-free." Long-term government bonds are sensitive to future interest fluctuations. Investors are not sure of the purchasing power of the dollars they will receive upon maturity or the reinvestment rate that will be available to them to reinvest the interest payments received over the life of the bond. As a result, the long-term empirical evidence is that returns on long-term government bonds on the average exceed the returns on T-bills.[5]

The long-term premium of government bond returns in excess of the average expected interest rates on T-bills (average of future forward rates) is commonly referred to as the *horizon premium.* The horizon premium compensates the investor for the maturity risk of the bond. The horizon premium equals the added return expected *on the average* on long-term bonds due to inflation and interest rate risk. As interest rates change unexpectedly in the future, the bond price will vary. That is, bonds are subject to market risk due to unexpected changes in interest rates. The horizon premium compensates investors for that market risk.

MATCHING RISK-FREE RATE WITH ERP

In theory, when determining the risk-free rate and the matching ERP you should be matching the risk-free security and the ERP with the period in which the investment cash flows are expected. For example (where b is a risk measure for the investment):

Short-term cash flows: Current T-bill rate $+ b \times$ (*RPm* over T-bills)

Cash flows expected in:

Year 1: 1-year government bond rate $+ b \times$ (*RPm* over1-year bonds)

Year 2: 2-year forward rate on government bonds $+ b \times$ (*RPm* over 2-year bonds)

Year 3: 3-year forward rate on government bonds $+ b \times$ (*RPm*) over3-year bonds), and so on

Cash flows expected in the long-term: Current long-term government bond rate $+ b$ $\times$ (*RPm* over long-term government bonds)

MEASURING THE AVERAGE PERIOD OF THE EXPECTED CASH FLOWS

Can one measure the "average" period of expected cash flows and use an average maturity period for the risk-free security and the ERP? One measure of the length of planning horizon over which cash flows are expected is the *duration* of cash flows. We introduced the concept of duration in Chapter 6 as a measure of the effective time period over which you receive cash flows from bonds.

In a similar manner, you can calculate the expected duration of any stream of expected cash flows for any project. For valuation of a "going-concern" business, for example, assume you expect the cash flow in the first year following the valuation date of $1 million to increase at an average

[5] When short-term interest rates exceed long-term rates, the yield curve is "inverted."