Chapter 9 Risk and the Cost of Capital

OVERVIEW

The chapter elaborates on how modern theories about risk and return, discussed in previous chapters, are applied to capital budgeting decisions. The main focus is on the estimation of beta, company and divisional cost of capital, and project cost of capital – including international projects. Estimation of the discount rate for risky projects is shown. The chapter ends with a discussion of the certainty equivalent method of calculating the present value of risky cash flows.

LEARNING OBJECTIVES

- Be able to estimate company, divisional, and project cost of capital
- Understand and analyse complex projects where the risk of the project changes over the life of the project

Company and project costs of capital

The company cost of capital is defined as the expected return on a portfolio of all the company's existing securities. It is also the opportunity cost of capital for investment in the firm's assets and hence the appropriate discount rate for the firm's average-risk projects. The authors emphasize the idea of relative risk of projects, which is quite intuitively appealing to practitioners. One way to estimate the company cost of capital is to use the weighted average of the expected returns on the firm's securities:

$r_{assets} = (D/V)(r_{debt}) + (E/V)\ (r_{equity})$

This is called the weighted average cost of capital (WACC)

The after-tax weighted average cost of capital (WACC) is estimated as follows:

$WACC = r_{debt}(1-T_c)(D/V) + (r_{equity})(E/V)$; where T_c = marginal corporate tax rate.

Measuring the cost of equity

To calculate the weighted cost of capital, it is necessary to estimate the cost of equity first. We can use the capital asset pricing model: $r = r_f + \beta(r_m - r_f)$, to estimate the cost of equity. The main problem is to estimate the beta of the firm's securities. An obvious way to measure the beta of a stock is to look at how its price has responded in the past to market movements. The text illustrates how beta can be estimated from past stock prices; looks at how well these estimates predict the future. Finally, the text illustrates how industry betas may be used to estimate the costs of capital. Using examples in the textbook, estimation of betas for Amazon, Disney and Campbell Soup was demonstrated.

In the textbook, the estimation of the cost of equity for Union Pacific Corp was illustrated. The beta estimate of a portfolio of four large railroad companies was used to calculate the cost of equity capital. This assumes that Union Pacific Corp. has the same debt-equity ratio as the average of four railroad companies, which is close to the situation in reality.

Analysing project risk

The company cost of capital is the correct discount rate for projects that do not change the company's risk. But not all projects are equally risky. Therefore, firms need to use a discount rate that recognizes the risk of the particular project. There are no simple formulas that will allow the manager to estimate the beta of an individual project, but the text covers some things that should be taken into account, such as the volatility of revenues (cyclicality) and the operating leverage. It also warns against "fudge factors" added to the discount rate to cover "things that can go wrong." The following relationship between "beta" of assets and the "beta" of revenues show that alternatives with higher ratio of fixed costs to project value will have higher project beta.

$$\beta_{assets} = \beta_{revenues} [\ 1 + PV(\text{fixed cost})/PV(\text{assets})]$$

Certainty equivalents — Another way to adjust for risk

One can adjust for risk in net present value calculations either by discounting the expected cash flows at a risk-adjusted discount rate or by discounting the certainty equivalent flows at the risk-free rate. It also examines when it might be reasonable to use the same risk-adjusted discount rate to discount all the cash flows from a project. Sometimes, it is appropriate for a project to have two different discount rates for two stages of the project.