

8.4 Choice of the Discount Rate

The calculation of the net present value and the other discounted cash flow techniques require a value for the discount rate. The choice of a value for the discount rate is essentially a strategic function and is done from the viewpoint of the entire organisation. In large organisations, the calculation of the discount rate is done by the corporate finance or financial planning department, and prescribed to the projects departments in different divisions. The results generated by using the discount cash flow techniques are sensitive to the value of the discount rate used, and, as a result, it is important to understand the concepts behind the calculation of the discount rate.

Terms such as the cost of capital and the hurdle rate are often used interchangeably with the discount rate. In addition, there are other terms in use, such as the minimum attractive rate of return (MARR), and the risk-adjusted discount rate (RADR). The value of the discount rate that is used can be the financial cost of capital, the economic cost of capital or the risk-adjusted discount rate. While the justification for the different methods for the calculation of the discount rates is discussed in Chapter 12, it is valuable to review these concepts here.

(i) Financial cost of capital: Weighted average cost of capital

The funding of a company comes from two main sources: the equity that owners initially put into the company and that which they leave in the company by not taking dividends, and the debt that the company raises. The price of the debt is the payment of interest. The return that debt-holders expect for the loan is the interest rate. The return that shareholders expect is a cost of equity. The cost of equity is dependent on the market conditions and the assessment by investors of the company's risk relative to the market risk. The determination of the cost of equity is discussed in

Chapter 12. The “cost” of these investments in the company is the return they must provide to the investors.

The weighted average cost of capital, WACC, is the combination of these two components, weighted by their relative contribution to the company’s total capital. The weighted average cost of capital is given by the following expression:

$$WACC = \left(\frac{E}{E + D} \right) R_E + \left(\frac{D}{E + D} \right) R_D \quad (8.17)$$

where E is the amount of equity, D is the amount of debt, R_E is the cost of equity, and R_D is the after-tax cost of debt. The after-tax cost of debt is relatively easy to obtain. It is the interest rate paid by the company on its loans adjusted for the fact that interest is tax-deductible. Thus, the cost of debt is usually estimated by the following expression:

$$R_D = R_{DBT} (1 - T) \quad (8.18)$$

where R_{DBT} is the interest rate on the company’s debts before tax, and T is the tax rate.

The cost of equity, expressed in the same form as an interest rate, is a little more difficult to obtain. The method for estimating the cost of equity is discussed in Chapter 12. A prerequisite for that chapter is an understanding of financial risk and return, which is presented in Chapter 11.

The weighted cost of capital can be used directly in the discounted cash flow techniques as the discount rate. The weighted cost of capital can be regarded as a financial cost of capital, that is, the cost of raising the monies needed to start the business and to keep it running. An alternative cost of capital is an economical cost of capital, that is, the cost of the opportunities that the company foregoes because it does not have the resources to execute the projects.

(ii) Economic cost of capital: Minimum attractive rate of return

The company’s resources are limited and usually there are more projects than resources will allow. As a result, even good projects can be rejected. As was discussed in Chapter 7, under conditions of capital rationing, the company may wish to select the projects with the highest profitability. The opportunity cost of capital is the return on the most profitable project that is not accepted. This is the *minimum attractive rate of return* (MARR). The opportunity cost of capital and the minimum attractive rate of return are terms that are used interchangeably to mean the same thing. They can be used directly in discounted cash flow analysis to assess the economic viability of the project.

The weighted average cost of capital is the *financial* cost of capital, the cost of raising funds from debt and equity sources. The opportunity cost of capital cannot be lower than the financial cost of capital. The opportunity cost of capital is the *economic* cost of capital.

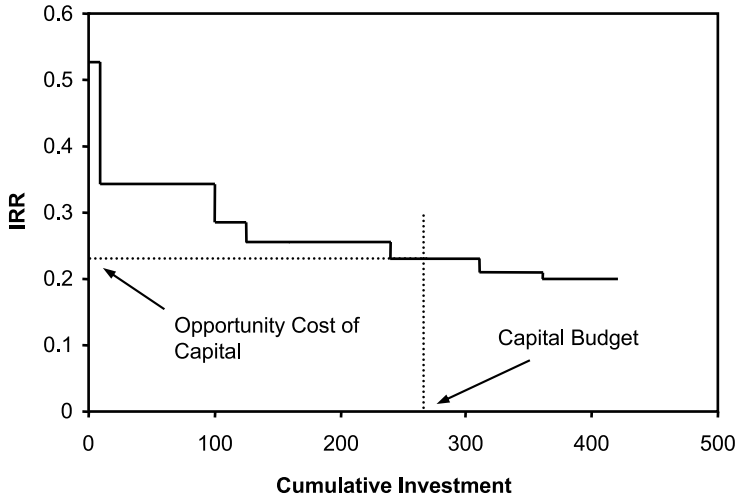


Figure 8.4 Opportunity cost of capital

The MARR or opportunity cost of capital can be obtained by ranking (independent) projects in terms of the *IRR* of each project as a function of their investment requirement. This is illustrated in Figure 8.4. The *IRR* at the limit of the capital budget represents the return of the worst project selected on the one side and the return of the best project rejected on the other. The opportunity cost of capital is the *IRR* at this budget cut-off.

This procedure seems slightly pointless from a practical implementation point of view. The projects need to be ranked prior to determining a discount rate (which will be used to select projects). If the projects can be ranked there is no need to determine a discount rate.

The ranking of projects for appraisal in this fashion is static, as if they are all ready now, either to be accepted or rejected. In a dynamic world, the company's planning of projects occurs over a horizon in which opportunities are in various states of development and it may be several years before they are ready for the investment decision.

Surveys of best practice in large companies have found that the opportunity cost of capital is not the method that is most used. Rather, the weighted average cost of capital is used. The weighted average cost of capital may be adjusted for risk of projects that have a risk profile different from that of the company as a whole. The adjustment of the discount rate to account for risk is discussed in the next section.