

Capital Budgeting and Risk

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Capital Budgeting

Planning Process

Capital budgeting is a planning process which helps to identify projects which are worth investing in. Especially as capital budgets may be limited, the tools of capital budgeting can be used to rank all projects comparatively that have exceeded investment hurdles. One outcome should be being able to decide for those projects that optimally maximise the value of the company as well as maximise owners' wealth.

Risk

Analysing investment opportunities means evaluating the extent that the benefits of the investment exceed its costs. From an investor's perspective, the costs and benefits of a project are cash flows. As these cash flows are in the future, there is uncertainty with regard to amount and timing. Risk is the degree of uncertainty. Risky investments should earn higher returns than safe investments – and not simply due to the fact that many people are risk averse.

Company and Project Costs of Capital

A company's average cost of capital is the company's marginal cost of raising an additional euro of capital. This cost is termed "average" as this is the cost of raising capital for average risk investments in line with the company's overall risk. The company's cost of capital can be used as a discount rate for cash flows which are of average risk. Investment opportunities of greater or lesser risk than the company's existing business should be evaluated at the respective opportunity costs of the capital: higher costs for riskier projects and lower costs for safer projects. As it is difficult to know how much to adjust the discount rate, depending on the risk of the project, it is quite common to assign individual discount rates to different investment categories:

Category	Discount Rate
New Product	15%
Expansion of existing business	10%

Cost improvement 8%

The discount rate for the expansion of existing business is of average risk and set at the company cost of capital (in this case: 10%).

Setting discount rates for categories makes investment decisions easier because it is necessary to decide for the right category but not to identify appropriate discount rates for each individual project. It is strongly advised to use more than one discount rate because using just a single discount rate for all projects leads to

- rejecting profitable projects with a risk below the average risk because cash flows are discounted too much, and
- following up on unprofitable projects with above-average risk because cash flows are insufficiently discounted.

How to Determine Capital Cost

A company's capital (as well as the capital invested in a project) usually consists of debt and equity. The average cost for both – weighted by their proportion - yields the average cost of the company's capital. This is called *weighted-average cost of capital* or *WACC*.

$$WACC = \frac{\text{debt}}{\text{debt} + \text{equity}} \times r_{\text{debt}} + \frac{\text{equity}}{\text{debt} + \text{equity}} \times r_{\text{equity}}$$

Please be aware that the costs of debt (interest) are a tax-deductible expense for corporations and this should be reflected in an after-tax WACC' where T_C is the corporate tax rate.

$$WACC' = \frac{\text{debt}}{\text{debt} + \text{equity}} \times r_{\text{debt}} \times (1 - T_C) + \frac{\text{equity}}{\text{debt} + \text{equity}} \times r_{\text{equity}}$$

The values of debt and equity are market values. The market value may differ substantially from the book value for equity in particular. The rate of interest charged by the banks on recent loans is a good approach for r_{debt} being the expected rate of return for debt. The cost of equity r_{equity} is the return required by investors and consists of a “risk free” interest rate r_f plus a premium for the risk to be borne by the investor. In accordance with the capital asset pricing model (CAPM) r_{equity} is

$$r_{\text{equity}} = r_f + \beta(r_m - r_f)$$

where $r_m - r_f$ is the market risk premium adjusted by the factor β . Factor β is set to zero for an entirely safe investment and

increases in line with the risk of the investment. In the not unlikely case that beta cannot be identified properly on a company level, it is more likely to estimate a beta for industries. Betas below one indicate less than average risk. Betas exceeding one signify greater than average risk. Furthermore, high cyclicity businesses with high fixed costs have high betas. In the end, it is more likely that the company will be confronted with a return on equity expected by the investor rather than calculating costs of equity on its own.

The company's cost of capital is a good point of departure for assessing individual costs of capital for a particular project. Depending on the risk of the project, capital costs have to be adjusted for unusually risky as well as safe projects in order to dependably select the most profitable project(s).