

2 Volume 4 Corporate Finance and Portfolio Management

2.1 Study Session 11: Corporate Finance

2.1.1 Reading 44 Capital Budgeting

2.1.1.1 Capital Budgeting Process

LOS 44a.

Explain the capital budgeting process, including the typical steps of the process, and distinguish among the various categories of capital projects.

There are four steps in the capital budgeting process:

- generating ideas
- analyzing individual proposals
- planning the capital budget
- monitoring and post-auditing.

2.1.1.2 Basic principles of capital budgeting

LOS 44b.

Discuss the basic principles of capital budgeting, including the choice of the proper cash flows.

LOS 44c.

Explain how the following project interactions affect the evaluation of a capital project: (1) independent versus mutually exclusive projects, (2) project sequencing, and (3) unlimited funds versus capital rationing.

2.1.1.3 Investment decision criteria

LOS 44d.

Calculate and interpret the results using each of the following methods to evaluate a single capital project: net present value (NPV), internal rate of return (IRR), payback period, discounted payback period, average accounting rate of return (AAR), and profitability index (PI).

We will talk about

- certain criteria, namely
 - ◊ net present value
 - ◊ internal rate of return
 - ◊ payback period
 - ◊ discounted payback period
 - ◊ average accounting rate of return
 - ◊ profitability index and
- problems with some criteria, namely
 - ◊ net present value,
 - ◊ internal rate of return and
 - ◊ conflicts between the two.

2.1.1.3.1 Certain criteria

We will be talking about

- net present value
- internal rate of return
- payback period
 - ◊ undiscounted and
 - ◊ discounted
- average accounting rate of return

- profitability index.

2.1.1.3.1.1 Net present value

Example 83:

Consider a machine that can be bought for € 1,000. It will lead to revenues of € 1,100 and € 800, respectively, in year 1 and 2. There will also be costs of € 300 and € 200 in those two years. The discount rate equals 5 percent.

Calculate the investment's net present value and the present value.

We get a net present value of

$$\begin{aligned}
 NPV &= -A_0 + CF_1/(1 + r_0) + CF_2/(1 + r_0)^2 + \dots + CF_n/(1 + r_0)^n \\
 &= -A_0 + CF_1/(1 + r_0) + CF_2/(1 + r_0)^2 \\
 &= -1,000 + (1,100 - 300)/(1 + 0.05) + (800 - 200)/(1 + 0.05)^2 \\
 &= -1,000 + 800/(1 + 0.05) + 600/(1 + 0.05)^2 \\
 &= -1,000 + 761.90 + 544.22 \\
 &= € 306,12.
 \end{aligned}$$

KEEP IN MIND:

You have to be able to use your computer to calculate this result.

2.1.1.3.1.2 Internal rate of return

The internal rate of return characterizes the discount rate r_0 at which the net present value equals 0:

$$NPV = -A_0 + CF_1/(1 + r_0) + CF_2/(1 + r_0)^2 + \dots + CF_n/(1 + r_0)^n = 0.$$

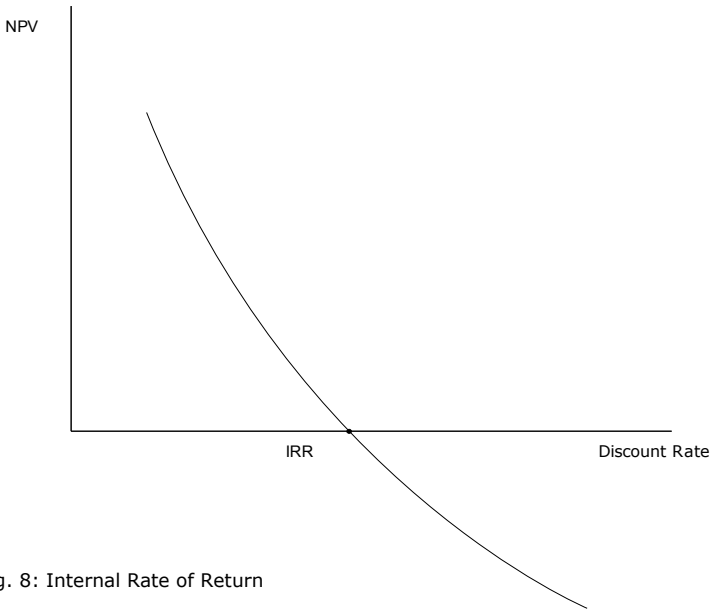


Fig. 8: Internal Rate of Return

Example 84:

Consider the machine of example 83. What is its internal rate of return?
How can we verify this result?

The internal rate of return, using a financial calculator, computes to $IRR = 27,189$ percent. We can verify this result by inserting it into the NPV-formula:

$$\begin{aligned}
 NPV &= -A_0 + CF_1/(1 + r_0) + CF_2/(1 + r_0)^2 + \dots + CF_n/(1 + r_0)^n \\
 &= -A_0 + CF_1/(1 + r_0) + CF_2/(1 + r_0)^2 \\
 &= -1,000 + (1,100 - 300)/(1 + 0.27189) \\
 &\quad + (800 - 200)/(1 + 0.27189)^2 \\
 &= -1,000 + 629.04 + 370.896 \\
 &= 0,
 \end{aligned}$$

as should be the case with the internal rate of return.