

9. Don't Use the Internal Rate of Return (IRR)

Before we close this chapter on valuation, we would like to urge you not to use the IRR as a financial performance measure in any of your investment decisions, project ranking or budget allocation. It is a pity that generations of students – including the author of this book – have ever been taught about the IRR, as this indicator is in the best case misleading, in the worst case dangerous, and in all cases confusing. Although widely used in literature in the 1980s, the IRR seems to have come out of fashion now in academic books, but not always in corporations. Just don't use it as there is no easy interpretation, and most financial managers misunderstand the term.

The IRR is the cost of capital that leads to $NPV = 0$ over the time horizon of the valuation, assuming no terminal value for the business. It shows how high the cost of capital would have to be so that no value is created over the time period used. You can also say that this is the cost of capital that makes the NPV break even over the time horizon considered. In most projects, the terminal value will be significant and not nil; in other projects with substantial decommissioning costs (for instance the nuclear industry), the project terminal value might be negative. But assuming a terminal value equal to zero doesn't seem to make much sense.

Another way to look at the IRR is to interpret it as equivalent to the yield to maturity on a corporate bond with variable interest rates i.e. variable coupon and nil redemption value at maturity of the bond. The variable coupons are equivalent to the positive cashflow generated by the business. In the initial phase though the cashflows will often be negative i.e. the interest rate would be negative, and you would be expected to return money to the corporation, a sort of negative coupon. This would make our bond a very strange and unusual bond indeed.

The IRR is often thought to be a compound average ROIC but this is not correct. So you can conclude that the IRR is a mathematically derived figure without any simple economic interpretation beyond the complex ones mentioned above.

Usually, when the IRR is greater than WACC, then the NPV is positive, so the project should be undertaken, while when the NPV is negative, the IRR is lower than WACC. The equivalence between $NPV > 0$ and $IRR > WACC$ does not always hold however. For some cashflow patterns and projects the IRR does not exist, and for some others, multiple IRRs exist. This happens when there is more than one change in the sign of the cashflow. It can even

happen that the NPV is negative, however the IRR is positive and larger than the cost of capital!

Also, when multiple projects should be ranked, a higher IRR for a project does not imply a higher NPV, so that ranking of projects IRR and NPV are not the same. This happens even when project cashflows display the classical U shape. Think about the following: if you have to choose between project 1 with 100% IRR and NPV=€100m or project 2 with 15% IRR but NPV = €1bn, it is more important to you to become €900m richer or have the intellectual satisfaction of generating a 100% IRR, assuming that you would be able to finance any of the two projects? Choose the project you like best.

In addition, there are alternative financial parameters to the IRR that are easier to understand and are much more useful for decision making, in particular the peak cash requirement and cashflow pay-back make the IRR redundant. These results complement the value creation measure provided by the NPV, are easy to understand and relate to the important practical issue of how much funding is required for the project. Funding might be a real constraint, and a project be chosen instead of another because it requires less funding, although its value creation might be lower.

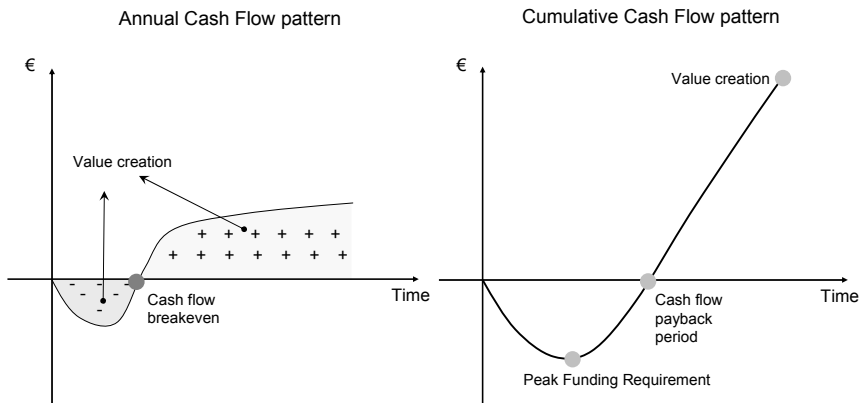


Figure 5.14: The IRR summarises an overall cashflow pattern [Source: INVESTAURA].

Broadly speaking, one might say that the IRR is a parameter summarising an entire cashflow pattern, and captures such key results as the peak cashflow requirement, the long-term value creation and the cashflow pay-back period in a single measure.

We now turn to a numerical example to illustrate the difficulties associated with the IRR.

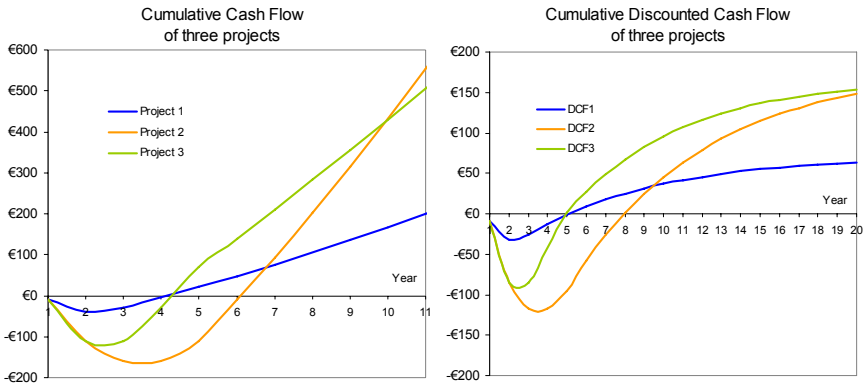


Figure 5.15: Cumulative and Discounted Cashflows for three projects [Source: INVESTAURA].

	NPV	IRR
Project 1	€64m	48%
Project 2	€148m	35%
Project 3	€154m	48%

Figure 5.16: NPV and IRR over 20 years for the three projects shown in Figure 5.15 [Source: INVESTAURA].

When faced with an investment decision and selection between mutually exclusive projects, you can use the following decision rules:

- If two projects have the same NPV, choose the one with the higher IRR. It will typically have lower peak cash requirement and/or shorter cashflow pay-back (Project 3 should be preferred to Project 2).
- However, very often, a project has a higher NPV but a lower IRR (Project 1 and 2) which usually means a longer pay-back period and larger peak funding requirement for the project with the lower IRR.
- Also two projects can have the same IRR but one has a higher NPV (Project 1 and 3), which can happen with a larger peak funding requirement, the same pay-back period and a higher positive cashflow for the project with the higher NPV.

As these examples show, rather than blindly relying on a single measure such as the IRR, it is better to analyse the cumulative cashflow pattern of the business and in particular the peak cash requirement and break-even period. The right way to rank projects is to use the NPV that they generate and their required peak funding, not the IRR.