dante

Digital Area for Networking
Teachers and Educators

Co-funded by
the European Union

Internal rate of return

IRR, MIRR, flaws & limitations, context

Outline

- IRR
- MIRR
- Excercises
- Limitations
- NPV / IRR vs dates

IRR – meaning

- A project´s internal rate of return (IRR) is the discount rate at which its NPV equals zero.
- Alternatively, it is considered as a „break-even“ rate, at which the discounted cash inflows would equal required investment.
- It is an alternative to NPV, because in some cases, we could compute the IRR for a project and base a „go or no-go“ investment decision on it rather than on the NPV.

IRR – calculation

- Trial & Error
  - To find the IRR, we simply compute NPV for a given project´s cash flows and required investment using an arbitrary discount rate. If the resulting NPV is positive (negative), we raise (lower) the discount rate and recompute NPV repeatedly until we find the discount rate at which NPV equals zero.
- Excel (or FinCalc)

$$0 = CF_0 + \frac{CF_1}{(1+IRR)} + \frac{CF_2}{(1+IRR)^2} + \frac{CF_3}{(1+IRR)^3} + \ldots + \frac{CF_n}{(1+IRR)^n}$$

$$\boldsymbol{IRR = i_L + \frac{NPV_L}{NPV_L - NPV_U} * (i_U - i_L)}$$

IRR – decisions

- **To rank and compare projects**
  - Based on their projected yield.

- **Investment with the highest internal rate of return is usually preferred**
  - When the IRR of a project exceeds the appropriate risk-adjusted discount rate k (i.e., if IRR > k), the project should be accepted. The intuition is that when IRR exceeds k, the expected return on the project is greater than the opportunity cost of funds.

MIRR

- The goal of the method is to eliminate the unrealistic assumption of reinvestment of funds at the IRR rate (interest rate = IRR), but on the contrary to support the principle of reinvesting money at the market interest rate.
- Pros:
  - Takes into account the time value of money.
  - Uses actual reinvestment rates.
- Cons:
  - Requires the additional effort of making realistic assumptions for financing and reinvestment rates.
  - More theoretical than practical.

MIRR – calculation

$$MIRR = \sqrt[n]{\frac{FVCF}{PVCF}} - 1$$

- FVCF: The future value of positive cash flows discounted at the reinvestment rate.
- PVCF: The present value of negative cash flows discounted at the financing rate.
- n: Number of periods.

TAPs

- IRR is best used when project cash flows exhibit a conventional pattern: outflows first, inflows later,
- Use combination of IRR and NPV, not mutual exclusive,
- IRR should be used carefully or not at all, when the cash flow pattern is unconventional, particularly when the sign of the cash flows changes more than once .

- Check excel file for excercises.

dante

Digital Area for Networking Teachers and Educators

Project Number: 2020-1-CZ01-KA226-HE-094368

Háskólinn á Akureyri
University of Akureyri

VŠB TECHNICKÁ UNIVERZITA OSTRAVA | EKONOMICKÁ FAKULTA

TECHNICAL UNIVERSITY OF KOŠICE

Uniwersytet Ekonomiczny w Katowicach

POLITÉCNICO DE SANTARÉM