

# Investments Projects – Internal Rate of Return (IRR)

## Example:

The XYZ Company evaluates to buy an additional machine that will increase future profits/cashflows by

- 20 USD in t1,
- 50 USD in t2,
- 70 USD in t3,
- 100 USD in t4,
- 50 USD in t5. (each cf at period's end)

The machine costs 200 USD (Investment in t<sub>0</sub>). Calculate the **Project's Internal Rate of Return (IRR)** and evaluate whether XYZ should pursue the project. XYZ's required rate of return (Cost of Capital) is 6%.

## Formula:

$$NPV = I_0 + \sum_{t=1}^N \frac{CF_t}{(1 + IRR)^t} = 0$$

NPV: Net Present Value

$I_0$ : Initial Investment (negative)

$CF_t$ : cashflow @ timestamp t

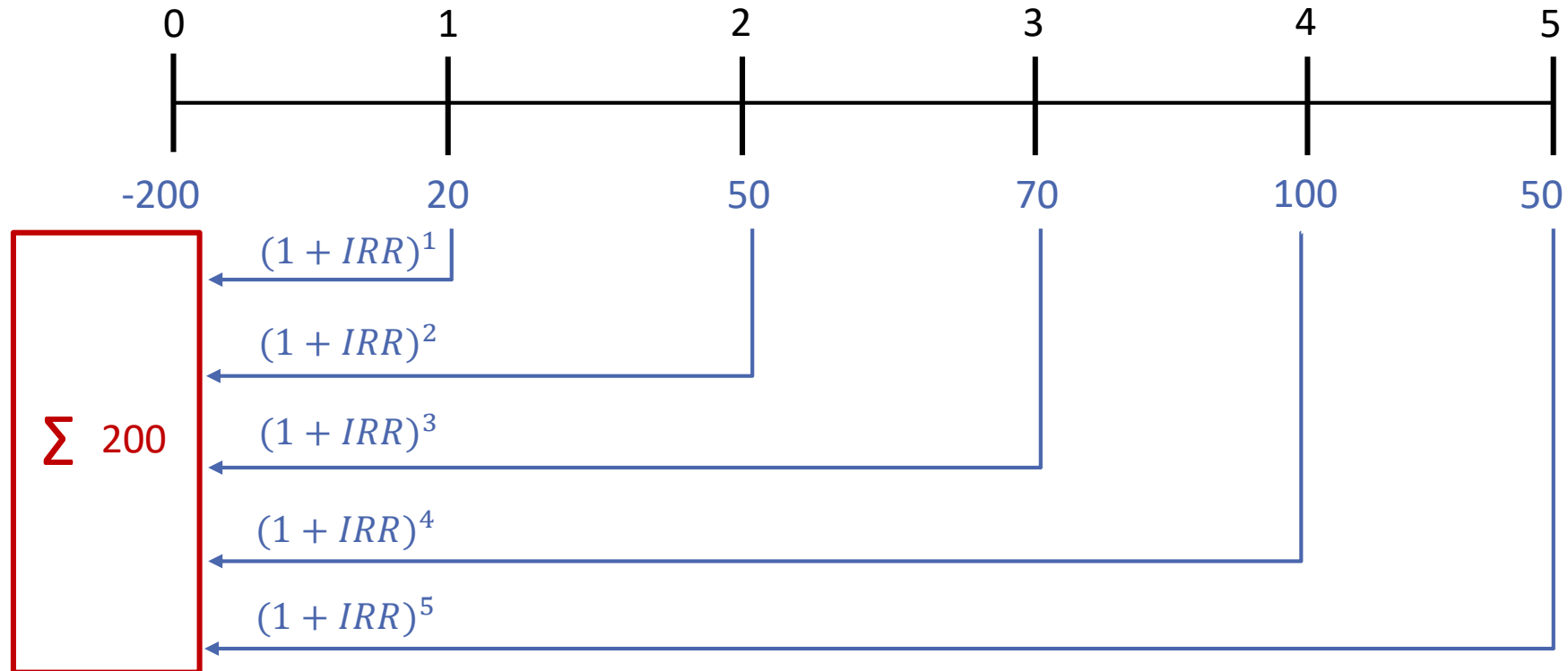
N: Total number of periods

IRR: Internal Rate of Return (NPV = 0)

t = timestamp (0, 1, ..., N)

## Re-arranging for IRR?

IRR = ... Not possible (with simple Arithmetic)



# IRR – Solution

Iterative Process (Trial-and-Error):

1. **Make a guess (IRR = 6%)**
2. **Calculate NPV based on guess**
3. **If NPV > 0: Increase guess (IRR = 6.1%)**
4. **If NPV < 0: Decrease guess (IRR = 5.9%)**

Repeat Steps 1-4 until NPV  $\approx$  0

# Investments Projects and IRR

## Simple Decision Rule:

**Accept the Project if  $IRR > \text{Required Rate of Return}$**   
**Reject the Project if  $IRR < \text{Required Rate of Return}$**

## Interpretation of IRR:

- **(Hypothetical) Rate of Return where  $NPV = 0$**
- **Leads to exactly the same decisions as NPV Decision Rule**

For single /  
independent  
projects!