Capital Budgeting

FINANCIAL ANALYSIS IN POWER BI

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What is capital budgeting?

Capital budgeting is the process of allocating money for new projects that generate cash flows.

- Analysts will estimate the cash flows from the project and give a recommendation
- Budgets are limited, resources are scarce, so many projects are **mutually exclusive**

Net present value (NPV)

Net present value is the sum of all discounted cash flows.

- Essentially just a series of present value calculations
- **NPV investment criteria**
  - If NPV > 0 then invest
  - If NPV < 0 then don't

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+i)^t}$$

where:

$CF = net\ cash\ flow$

$t = time\ period$

$i = discount\ rate$

[1] https://www.investopedia.com/terms/n/npv.asp

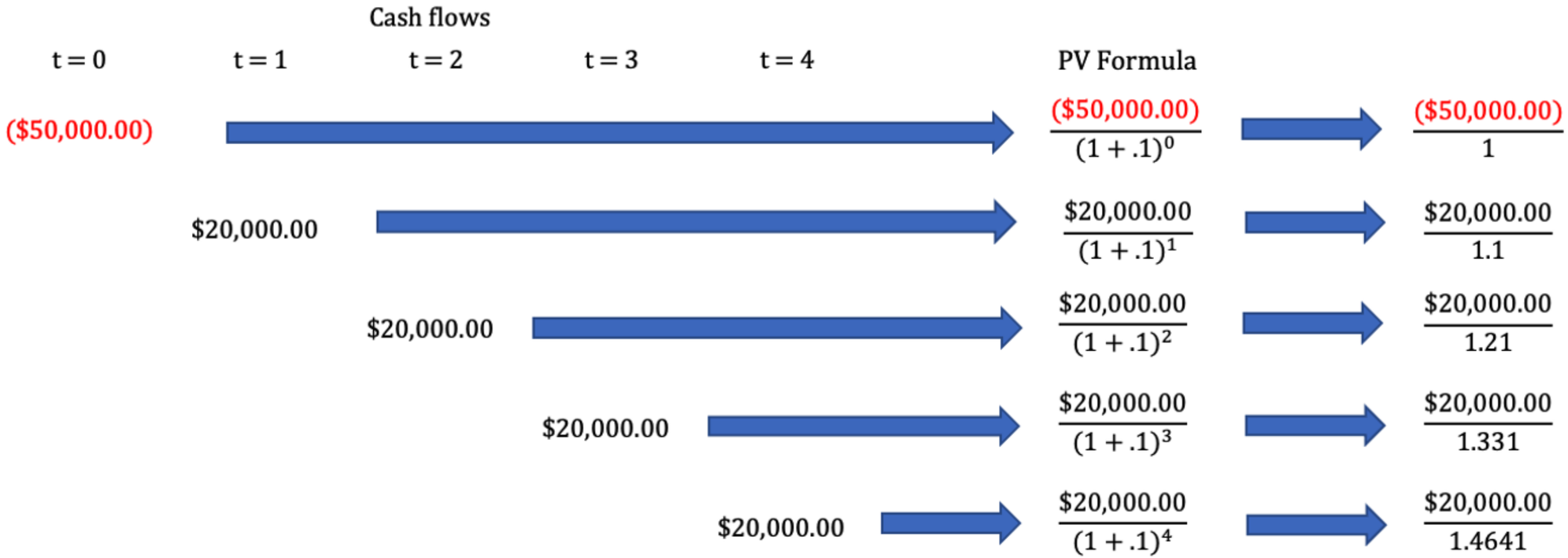
Net present value (NPV)

Example: Should a company invest in this project at a 10% discount rate?

Cash flows				
t = 0	t = 1	t = 2	t = 3	t = 4
($50,000.00)				
	$20,000.00			
		$20,000.00		
			$20,000.00	
				$20,000.00

Net present value (NPV)

Example: Should a company invest in this project at a 10% discount rate?



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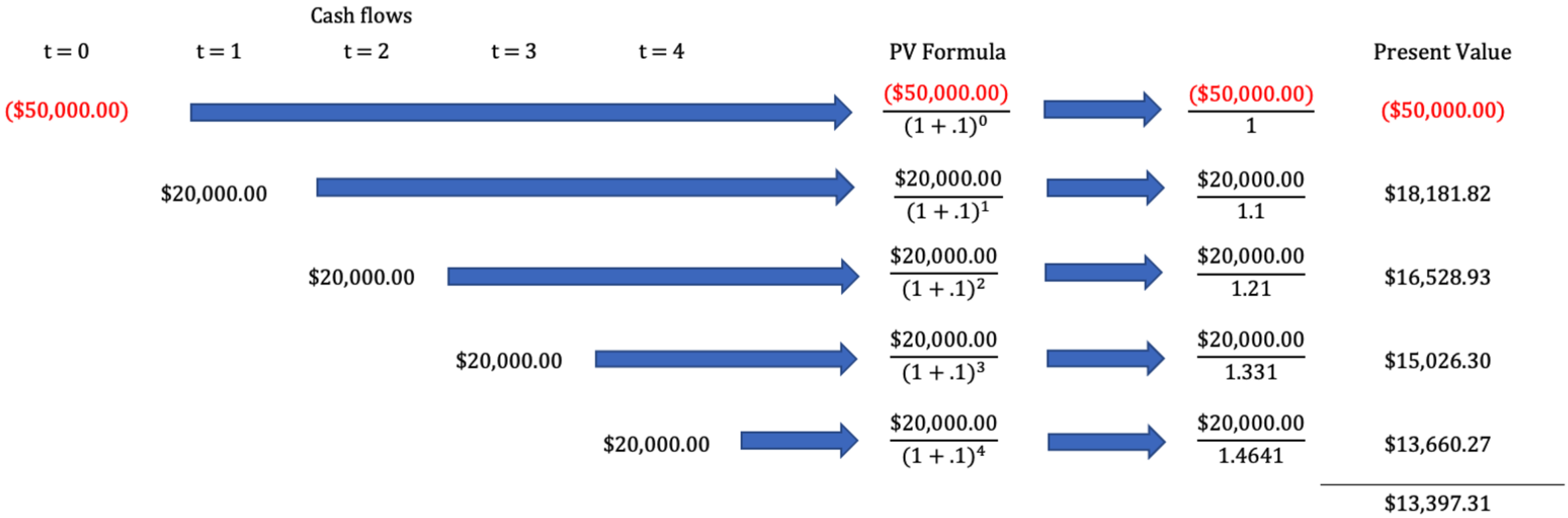
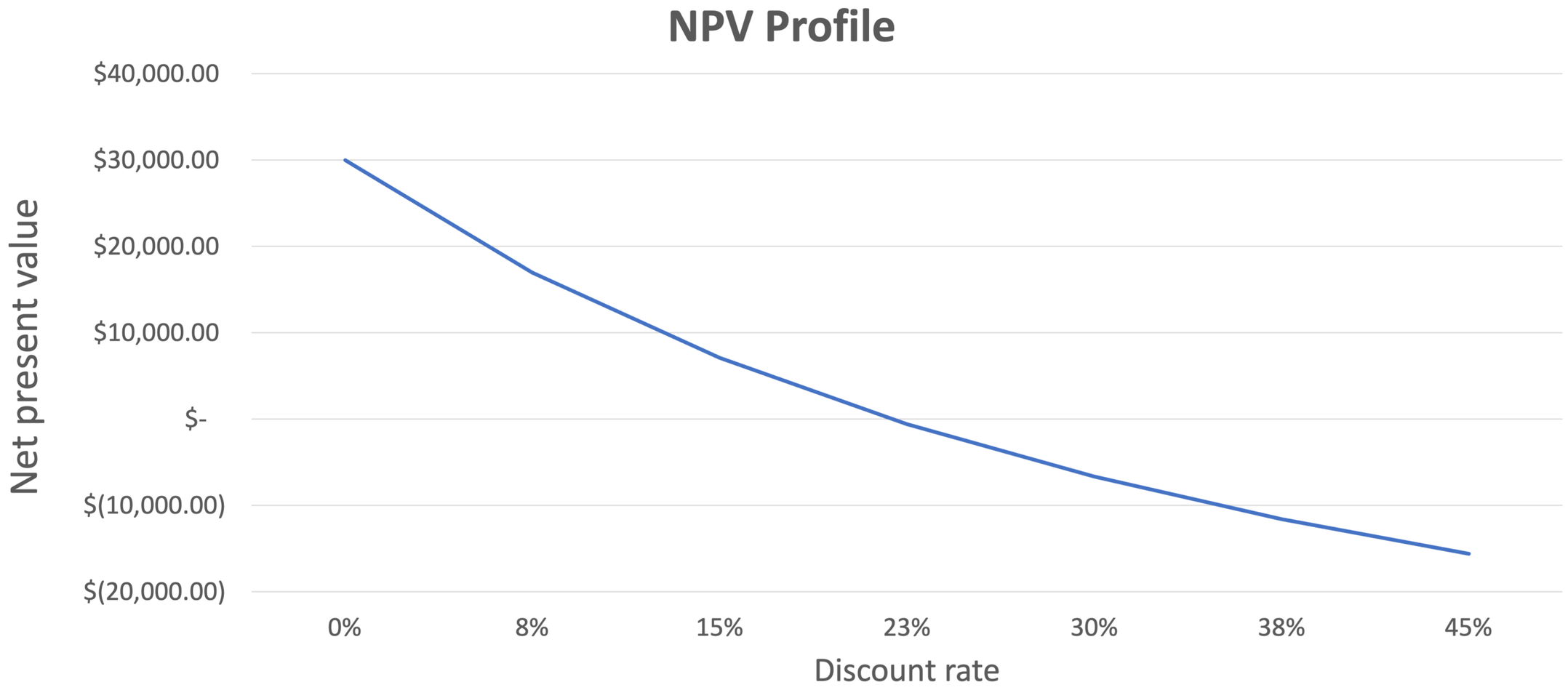


Discount rates and NPV



Where do discount rates come from...

Opportunity cost

is the next best alternative return that was given up to pursue the selected project

- i.e. bonds, stocks, other investments

Cost of capital

is the cost of raising money for the project

- Made up by debt and equity
- **Weighted average cost of capital (WACC)** is the combination of the cost of debt and equity

[1] https://www.investopedia.com/terms/c/costofcapital.asp

Profitability index (PI)

- **Profitability index** is a ratio of NPV that gives dollar earned per dollar spent

$$PI = 1 + \frac{NPV}{Invested\ Amount}$$

- Useful in prioritizing projects when capital is limited
- Anything less than one should not be undertaken (NPV would be negative)

Example:

```
PI = 1+(NPV/Invested amount)

PI = 1+($13,397.31/$50,000.00)

PI = 1+0.27

PI = 1.27
```

[1] https://www.investopedia.com/terms/p/profitability.asp

Choosing the right project

Choose the investment with the highest NPV

- "The golden rule"
- NPV represents a real dollar amount

NPV has it's limitations:

1. Cash flows are estimates
2. Does not consider qualitative risks or business objectives
    - Other metrics can be used depending on the case

Let's practice!

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Net present value and profitability index

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Internal rate of return and payback period

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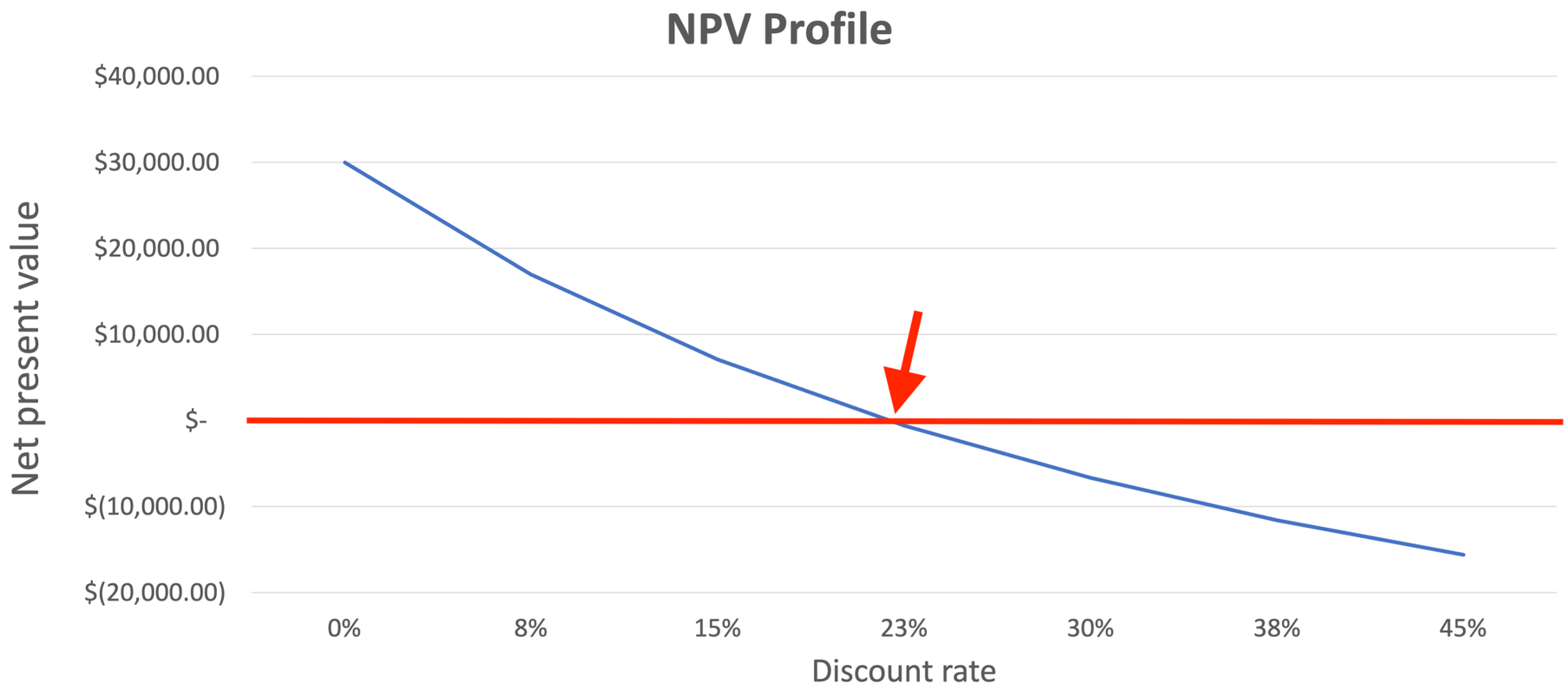
Internal rate of return (IRR)

The **internal rate of return** is the discount rate that makes NPV zero.



Internal rate of return (IRR)

The **internal rate of return** is the discount rate that makes NPV zero.

- It is an iterative function
  - "guess-and-check"
  - Not easy to find by hand
- `XIRR()` is used in Power BI
  - Cash flows
  - Dates of cash flows

$$0 = NPV = \sum_{t=0}^{n} \frac{CF_t}{(1+i)^t}$$

where:

$CF = net\ cash\ flow$

$t = time\ period$

$IRR = internal\ rate\ of\ return$

$NPV = net\ present\ value$

[1] https://www.investopedia.com/terms/i/irr

Testing the IRR

Let's say `XIRR` gives us 21.86% for this cash flow...

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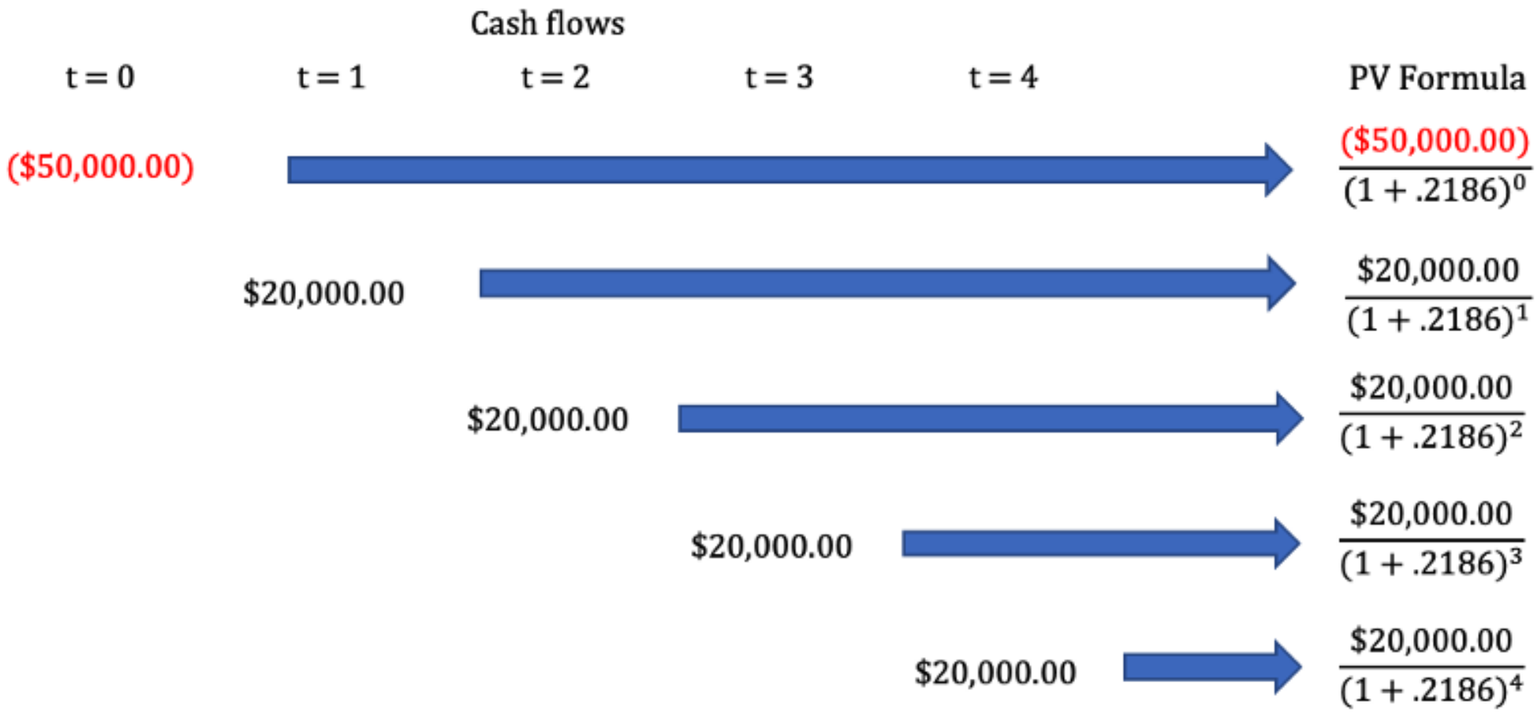

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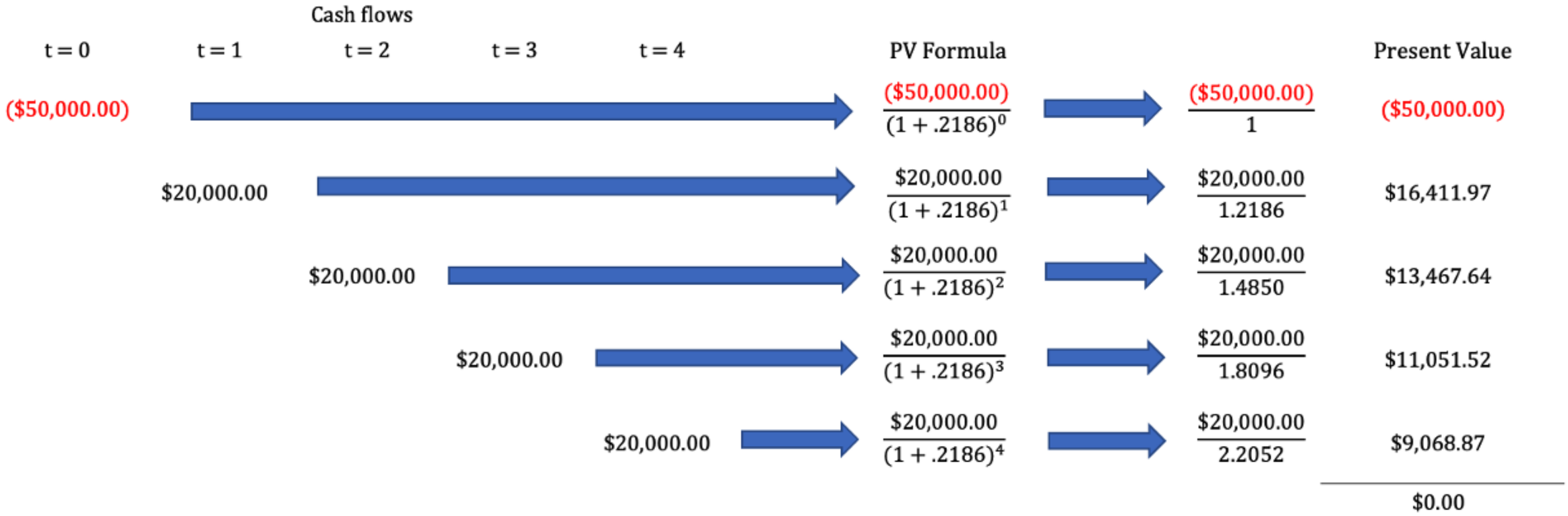

Making decisions with IRR

- A **hurdle rate** is the target return for an investment

IRR investment criteria:

- If **IRR > the hurdle rate** then invest
- If **IRR < the hurdle rate** then don't invest
- Mutually exclusive projects:
  - Choose the project with **the highest net present value**
  - NPV represents a real dollar amount

Example: Your company has a hurdle rate of 10%. If the IRR is 7%, should they invest in the project?

Answer: No! IRR < the hurdle rate.

Payback period

- The **break-even point** is the point where `initial investment + cash flows = 0`.
- **Payback period** is the time it takes to break even
  - Simple to understand, making it a popular metric
  - Does not consider the time value of money; no discounting of cash flows
  - Does not analyze profitability

[1] https://www.investopedia.com/terms/p/paybackperiod.asp

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Discounted payback period

- Uses *discount cash flows* to find the length of time it takes break-even
  - Uses time value of money
  - More conservative since cash flows are discounted, it will take longer

[1] https://www.investopedia.com/terms/p/paybackperiod.asp

Payback period

Period	0	1	2	3	4	Payback Period
CF	(5,000.00)	2,500.00	2,500.00	2,500.00	2,500.00	2
Discounted CF (10%)	(5,000.00)	2,272.73	2,066.12	1,878.29	1,707.53	3

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Discounted CF (10%)	(5,000.00)	2,272.73	2,066.12	1,878.29	1,707.53	3

Decision criteria

- **Investment horizon** is the length of time an investor wants to be invested in an asset.
  - If the payback period =< the investment horizon, invest
  - If the payback period > the investment horizon, don't invest

Let's practice!

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IRR and payback period in Power BI

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Let's practice!

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Congratulations!

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Chapter 1: Financial dashboards

- Reviewed the basics about dashboards and learned financial concepts
- Applied **Objective and Key Results (ORK)** frame work goal setting
- Used **artificial intelligence** to create impactful dashboard visuals
- Created a **forecast** using the *analytics pane*.

Chapter 2: Scenarios and sensitivity analysis

- Used **what-if** parameters to run **scenario analysis**
- **Stress-tested** sales data and created **forecasts** with DAX
- Created a **scenario analysis** matrix to show the impact of various **input variables**

Chapter 3: Time value of money

- Learned about the **time value of money** and **compounding**
- Performed **future value** and **present value** calculations by hand and with DAX
- Used `FV()` to create a **straight-line forecast**

Chapter 4: Capital budgeting

- Learned about the importance of **capital budgeting** in financial analysis.
- Used **net present value**, **profitability index**, **internal rate of return**, and **payback period** to make sound investment decisions.
- Explored the impact of **discount rates** on **net present value**.
- Used **intermediate DAX** skills to create a **payback period** measure.
- Focused on creating an informative dashboard that could be shared.

Best of luck!

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