

# HOW TO SPEND MONEY (CAPITAL BUDGETING TOOLS)

Wrinkles with IRR

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# WRINKLES WITH IRR

1. Loan-type flows
2. Scale problems
3. Timing problems
4. No IRR or multiple IRRs

# IRR WITH LOAN-TYPE FLOWS

- ▶ When the cash flows are reversed
- ▶ Money in, then money out
- ▶ Any time the signs flip

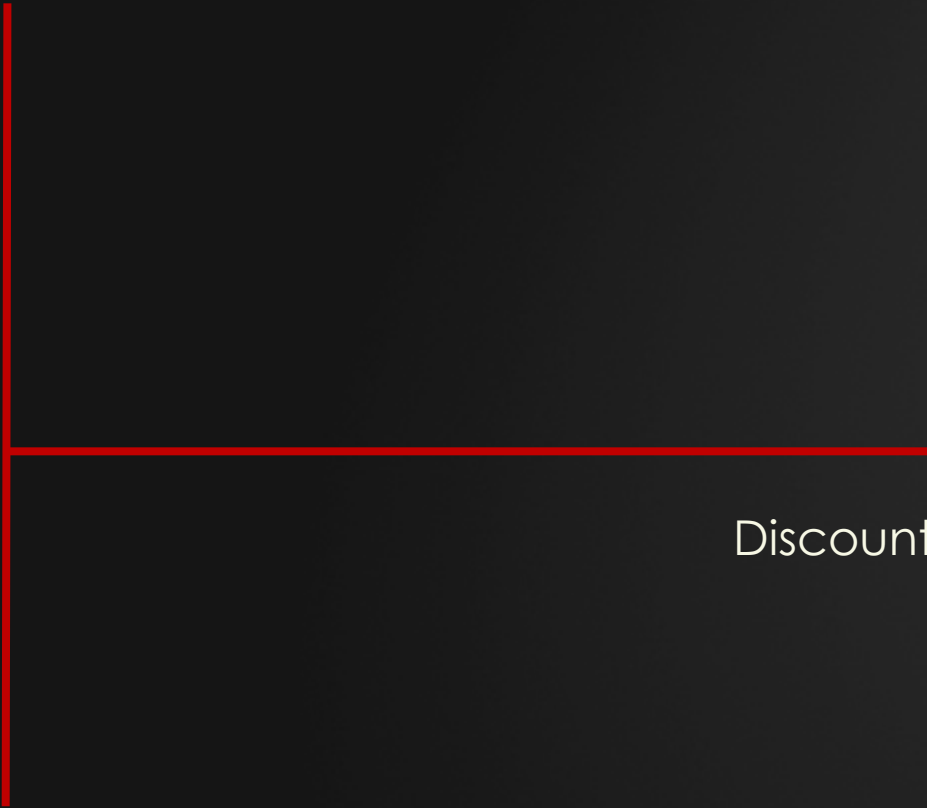
# IRR WITH LOAN-TYPE FLOWS: EXAMPLE

| Project | $CF_0$ | $CF_1$ | IRR | NPV<br>at 10% |
|---------|--------|--------|-----|---------------|
| X       | (400)  | 500    | 25% | 54.54         |
| Y       | 400    | (500)  | 25% | (54.54)       |

# IRR WITH LOAN-TYPE FLOWS

NPV

Discount rate



# COMPARING SCALE WITH IRR

- ▶ Hard to compare mutually exclusive projects
- ▶ Higher IRR might now imply higher NPV

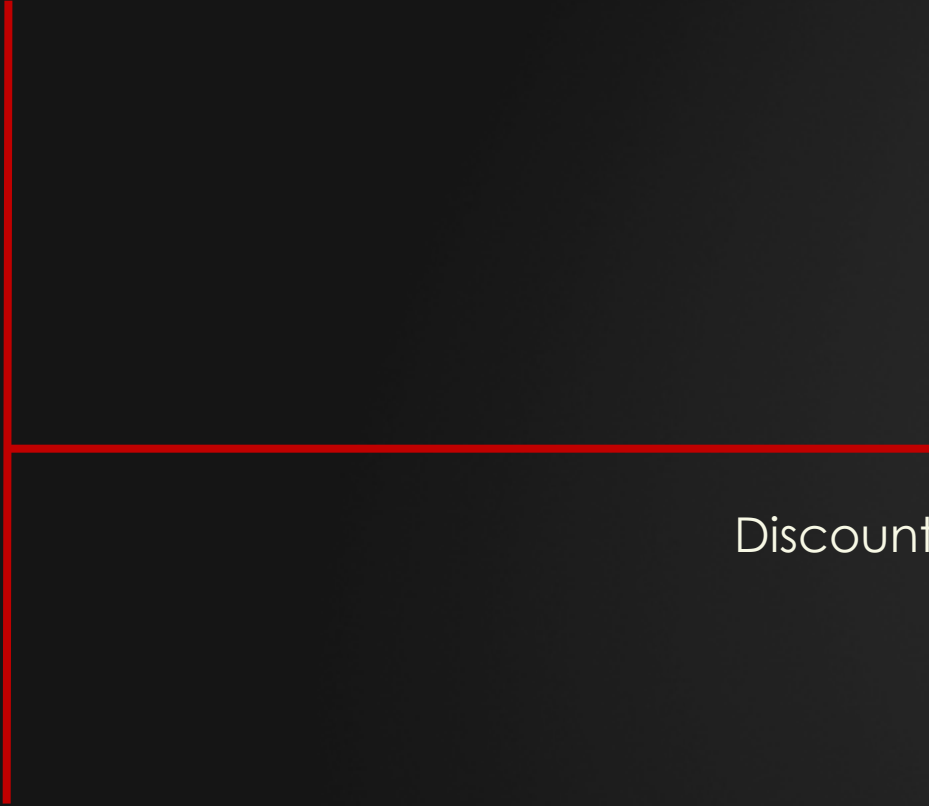
# COMPARING SCALE WITH IRR

| Project | CF <sub>0</sub> | CF <sub>1</sub> | IRR  | NPV<br>at<br>10% |
|---------|-----------------|-----------------|------|------------------|
| X       | -1              | 2               | 100% | 0.82             |
| Y       | -100            | 120             | 20%  | 9.1              |

# COMPARING SCALE WITH IRR

NPV

Discount rate





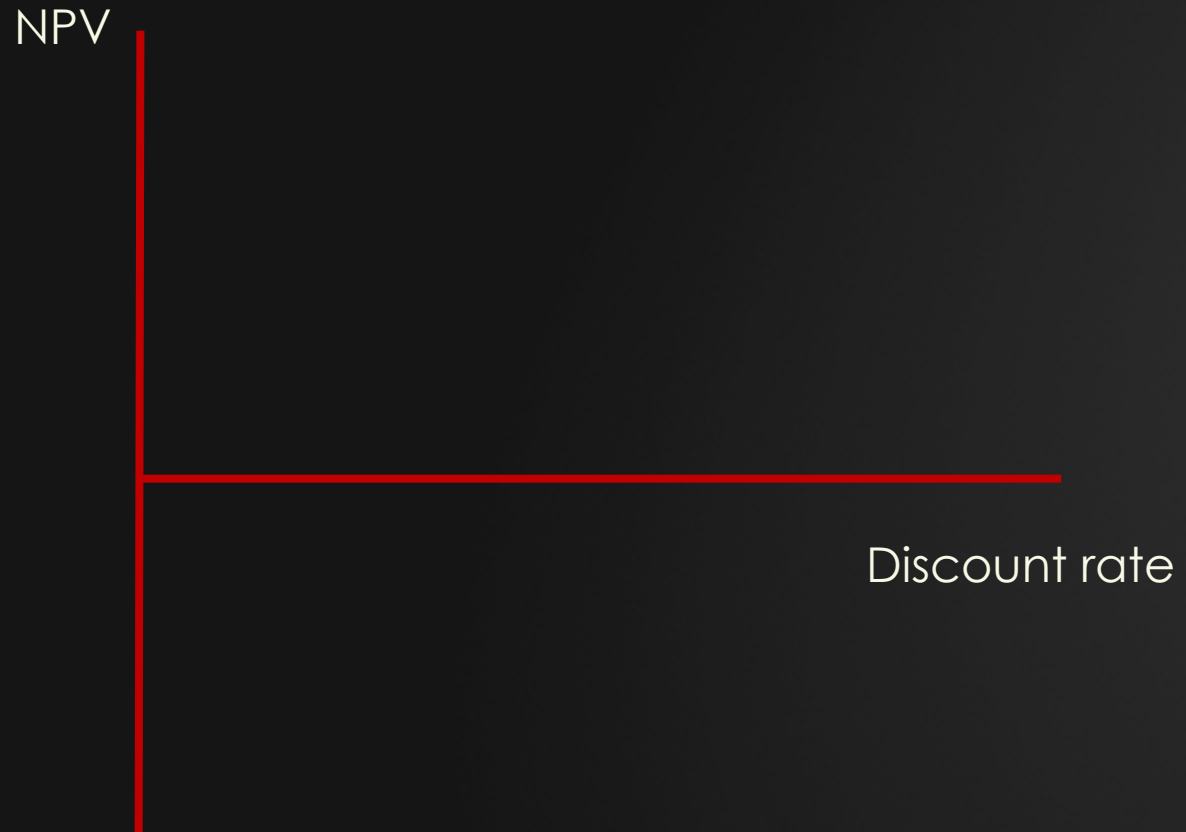
# MULTIPLE OR NO IRR

- ▶ There could be no rate that sets  $NPV = 0$
- ▶ Different rates might set  $NPV = 0$

# COMPARING SCALE WITH IRR

| Project | CF <sub>0</sub> | CF <sub>1</sub> | CF <sub>3</sub> | IRR       |
|---------|-----------------|-----------------|-----------------|-----------|
| X       | -100            | 235             | 136.5           | [5%, 30%] |
| Y       | -100            | 120             | -50             | --        |

# MULTIPLE OR NO IRR



# WRINKLES WITH IRR: WRAP-UP

- ▶ Be careful!
- ▶ Always check for sign changes
- ▶ Always check for multiples
- ▶ Always compare with NPV!