

## FINM 2401 Final Revision

### Lecture 5 Investment Decision Rules: NPV vs. IRR

#### 1. Net present value (NPV)

$$NPV = PV(\text{benefit}) - PV(\text{cost})$$

- ✓ NPV Decision Rule: if  $NPV > 0 \rightarrow$  accept the project
- ✓ For mutually exclusive project  $\rightarrow$  choose the one with highest NPV

#### 2. Internal Rate of Return (IRR)

$$IRR = r, \text{ when } NPV = 0$$

- ✓ IRR Decision Rule: if  $IRR > r_e \rightarrow$  accept the project
- ✓ IRR is a project's expected rate of return on its investment

#### 3. Applying the IRR Rule

General situation

Cash flow Pattern	No. of IRR	Decision Rule
$(-) CF_0 \rightarrow (+) CF_n$	One IRR	$NPV > 0,$ $IRR > r_e$

Three Pitfalls

<u>Delayed Investments:</u> $(+) CF_0 \rightarrow (-) CF_n$	One IRR	If $NPV > 0,$ $IRR < r_e$
<u>Multiple IRRs:</u> $(-) CF_0 \rightarrow (+) CF_n \rightarrow (-) CF_0$ (change sign more than once)	Multiple (no. of IRR = no. of CF sign changed)	Use NPV rule
<u>Nonexistent IRR:</u> No investment at all time and CF sign never change	No IRR	Use NPV rule
<i>When NPV rule conflicts with IRR rule, always go with NPV decision rule</i>		

- ✓ Differences in Scale:
  - If a project's size is doubled, its NPV will double

Year	A	B
0	-\$ 100	-\$ 200
1	\$ 45	\$ 90
2	\$ 50	\$ 100
3	\$ 55	\$ 110
NPV @ 10%	\$23.55	\$47.11
IRR	22.48%	22.48%

- ✓ Timing of Cash Flows

Year	A	B
0	-\$ 100	-\$ 100
1	\$ 45	\$ 70
2	\$ 50	\$ 65
3	\$ 55	\$ 5
NPV @ 10%	\$23.55	\$21.11
IRR	22.48%	25.14%