# Investment Criteria

## Example

- Consider a firm with two projects, A and B, each with the following cash flows and a 10 percent cost of capital:

| Year | Project A Cash Flows | Project B Cash Flows |
|---|---|---|
| 0 | -$100 | -$150 |
| 1 | $70 | $100 |
| 2 | $70 | $100 |

# Net Present Value (NPV)

- **What is it?**
  - Measure of _____ from project
- **How do I do it?**
  - PV of future CFs – Initial Cost
- **The Investment Rule:**
  - Accept projects with _____ NPV and accept highest NPV first

# Net Present Value (NPV)

- **Pros:**
  - Uses _____ _____
  - Incorporates time value of money
- **Cons:**
  - Need appropriate discount rate
  - Relatively more difficult to explain

# Internal Rate of Return (IRR)

- **What is it?**
  - Discount rate that makes the NPV = _____
- **How do I do it?**
  - Set NPV = 0 and solve for discount rate
- **The Investment Rule:**
  - Accept if IRR is _____ than required rate of return and accept highest IRR first

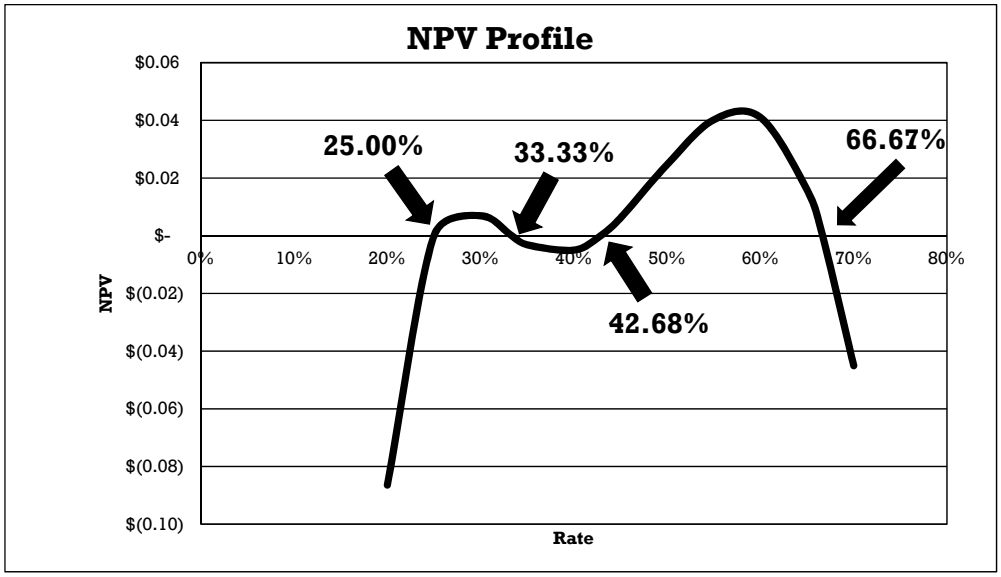
# Internal Rate of Return (IRR)

- **Pros:**
  - Closely related to NPV, leads to same decision MOST of the time
  - Relatively more easy to explain
- **Cons:**
  - May result in _____
  - May result in _____

# NPV Profiles

- What is an NPV profile?
- Nonnormal Cash Flows

| Year | Cash Flow |
|---|---|
| 0 | -$252 |
| 1 | $1,431 |
| 2 | -$3,035 |
| 3 | $2,850 |
| 4 | -$1,000 |



# NPV Profiles

- What about mutually exclusive projects?

## Modified Internal Rate of Return (MIRR)

- **What is it?**
  - Discount rate that makes present value of outflows equal to future value of inflows
- **How do I do it?**
  - Take present value of outflows and future value of inflows and solve for breakeven rate
- **The Investment Rule:**
  - Accept if the MIRR is _____ than the required rate of return and accept highest MIRR first.

| Year | Cash Flow |
|---|---|
| 0 | -$252 |
| 1 | $1,431 |
| 2 | -$3,035 |
| 3 | $2,850 |
| 4 | -$1,000 |

## Modified Internal Rate of Return (MIRR)

- **Pros:**
  - Assumes all cash flows are reinvested at the _____ _____
  - Closely related to NPV, leading to the same decision more than the IRR
  - No longer possible to get _____
- **Cons:**
  - Can still lead to incorrect decisions when size/scale differences and mutually exclusive projects

## Profitability Index

- **What is it?**
  - Benefit-cost ratio
- **How do I do it?**
  - Present value of future cash inflows divided by initial cost
- **The Investment Rule:**
  - Accept if PI _____ than 1 and accept highest PI first.

# Profitability Index

- **Pros:**
  - Closely related to NPV, leading to same decision MOST of the time
  - May be useful when available funds are limited
- **Cons:**
  - May result in _____

# Payback Period

- **What is it?**
  - Time to recover initial investment
- **How do I do it?**
  - Add up cash flows to determine time
- **The Investment Rule:**
  - Accept if payback period is _____ than cutoff and accept shortest payback first

# Payback Period

- **Pros:**
  - Simple, no need for discount rate
  - Biased toward projects with higher liquidity
- **Cons:**
  - Ignores _____
  - Can accept _____ projects
  - Ignores cash flows beyond cutoff
  - Can reject _____ projects
  - Arbitrary cutoff
  - Biased against long-term projects (e.g., R&D)

# Discounted Payback Period

- **What is it?**
  - Time for present value of cash flows to recover initial investment
- **How do I do it?**
  - Add up present value of cash flows to determine time
- **The Investment Rule:**
  - Accept if discounted payback period is _____ than cutoff and accept shortest discounted payback first

# Discounted Payback Period

- **Pros:**
  - Incorporates the time value of money
  - Does not accept _____ projects
  - Biased toward liquidity
- **Cons:**
  - Ignores cash flows beyond the cutoff
  - Can reject _____ projects
  - Arbitrary cutoff
  - Biased against long-term projects (e.g., R&D)

# Projects with Unequal Lives

- Replacement Chain or Common Life Approach
- Equivalent Annual Annuity (EAA) or Equivalent Annual Cost
  - Calculate the annuity payment based on the NPV

## Projects with Unequal Lives: An Example

Your firm is considering which pollution reduction system to purchase and implement to meet required EPA standards. Option 1 involves an initial $30,000 investment and subsequent annual costs of $10,000, and must be replaced again after 3 years. Option 2 requires an initial investment of $55,000 and has a 6 year life, requiring subsequent annual costs of $4,000, $6,000, $8,000, $12,000, $14,000, and $16,000, respectively. The appropriate discount rate for this project is 12 percent. Which option do you recommend?

## Projects with Unequal Lives: An Example

| NPV | EAA | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| | | $(30,000) | $(10,000) | $(10,000) | $(10,000) | | | |
| | | | | | | | | |
| | | $(55,000) | $ (4,000) | $ (6,000) | $ (8,000) | $(12,000) | $(14,000) | $(16,000) |

## Chapters 5 and 6 Suggested Problems

- Concept Questions
  - Chapter 5: 2, 9, and 11
  - Chapter 6: 7
- Questions and Problems
  - Chapter 5: 1, 3, 6, 8, 11, 12, 14, 15, and 17
  - Chapter 6: 12 and 23