

Chapter nine

net present value and other investment criteria

NET PRESENT VALUE

- An investment is worth undertaking if it creates value for its owners
- Capital budgeting is trying to determine whether a proposed investment or project will be worth more, once it is in place, than it costs
- **Net present value:** The difference between an investment's market value and its cost
 - The capital budgeting process can be viewed as a search for investments with positive net present values
 - Capital budgeting becomes much more difficult when we cannot observe the market price for at least roughly comparable investments
- **Discounted cash flow (DCF) valuation:** The process of valuing an investment by discounting its future cash flows
 - An investment should be accepted if the net present value is positive and rejected if it is negative
 - Accepted → $NPV > 0$
 - Rejected → $NPV < 0$
- How to solve for NPV on the financial calculator:
 - 1) CF button
 - 2) Enter the original project cost for CF_0 , but as a negative value (to represent cash outflow)
 - 3) Enter the rest of the projected future cash flows for $CF_{1,2,\dots,k}$ inputs as positive values (to represent cash inflow)
 - 4) NPV button
 - 5) Enter discount rate for I
 - 6) Compute NPV
- The NPV approach has no serious flaws; it is the preferred decision criterion

THE PAYBACK RULE

- **Payback period:** The amount of time required for an investment to generate cash flows sufficient to recover its initial cost
 - Based on the payback rule, an investment is acceptable if its calculated payback period is less than some prespecified number of years
 - Accepted → Calculated < Prespecified
 - Rejected → Calculated > Prespecified
- Advantages and disadvantages of the payback period rule
 - Advantages
 - Easy to understand
 - Adjusts for uncertainty of later cash flows
 - Biased toward liquidity
 - Disadvantages
 - Ignores the time value of money
 - Requires an arbitrary cutoff point
 - Ignores cash flows beyond the cutoff date

- Biased against long-term projects, such as research and development, and new projects

THE DISCOUNTED PAYBACK

- **Discounted payback period:** The length of time required for an investment's discounted cash flows to equal its initial cost
 - Based on the discounted payback rule, an investment is acceptable if its discounted payback is less than some prespecified number of years
 - Accepted → Calculated < Prespecified
 - Rejected → Calculated > Prespecified
- Advantages and disadvantages of the discounted payback period rule
 - Advantages
 - Includes time value of money
 - Easy to understand
 - Does not accept negative estimated NPV investments
 - Biased toward liquidity
 - Disadvantages
 - May reject positive NPV investments
 - Requires an arbitrary cutoff point
 - Ignores cash flows beyond the cutoff date
 - Biased against long-term projects, such as research and development, and new projects

THE INTERNAL RATE OF RETURN

- **Internal rate of return (IRR):** The discount rate that makes the NPV of an investment zero
 - Based on the IRR rule, an investment is acceptable if the IRR exceeds the required return; it should be rejected otherwise
 - Accepted → IRR > Discount rate
 - Rejected → IRR < Discount rate
- How to solve for IRR on the financial calculator:
 - 1) CF button
 - 2) Enter the original project cost for CF_0 but as a negative value (to represent cash outflow)
 - 3) Enter the rest of the projected future cash flows for $CF_{1,2,\dots,k}$ inputs as positive values (to represent cash inflow)
 - 4) IRR button
 - 5) Compute IRR
- The IRR on an investment is the required return that results in a zero NPV when it is used as the discount rate
- The IRR rule and NPV rule lead to identical decisions if the following conditions are met:
 - Project's cash flows must be conventional
 - The first cash flow must be negative while all the rest are positive
 - Project must be independent
- Advantages and disadvantages of the IRR rule
 - Advantages
 - Closely related to NPV, often leading to identical decisions
 - Easy to understand and communicate
 - Disadvantages
 - May result in multiple answers or not deal with nonconventional cash flows
 - ↳ **Multiple rates of return:** The possibility that more than one discount rate will make the NPV of an investment zero

- May lead to incorrect decisions in comparisons of mutually exclusive investments

↳ **Mutually exclusive investment decisions:** A situation in which taking one investment prevents the taking of another

~ Given two or more mutually exclusive investments, the best one is the one with the largest NPV

- The Modified Internal Rate of Return (MIRR) is used to avoid the multiple rate of return problem

THE PROFITABILITY INDEX

- **Profitability index (PI):** The present value of an investment's future cash flows divided by its initial cost

- Based on the PI rule, an investment is acceptable if the PI exceeds 1

- Accepted → $PI > 1$

- Rejected → $PI < 1$

- Advantages and disadvantages of the PI rule

- Advantages

- Closely related to NPV, generally leading to identical decisions
- Easy to understand and communicate
- May be useful when available investment funds are limited

- Disadvantages

- May lead to incorrect decisions in comparisons of mutually exclusive investments