Chapter 8

Net Present Value and Other Investment Criteria

Capital Budgeting Techniques

- Net Present Value
- The Payback Rule
- The Average Accounting Return
- The Internal Rate of Return
- The Profitability Index

Net Present Value

- The difference between the market value of a project and its cost
- How much value is created from undertaking an investment?
  - The first step is to estimate the expected future cash flows.
  - The second step is to estimate the required return for projects of this risk level.
  - The third step is to find the present value of the cash flows and subtract the initial investment.

NPV Decision Rule

- ***If the NPV is positive, accept the project***
- A positive NPV means that the project is expected to add value to the firm and will therefore increase the wealth of the owners.
- Since our goal is to increase owner wealth, NPV is a direct measure of how well this project will meet our goal.

Payback Period

- How long does it take to get the initial cost back in a nominal sense?
- Computation
  - Estimate the cash flows
  - Subtract the future cash flows from the initial cost until the initial investment has been recovered
- Decision Rule – ***Accept if the payback period is less than some preset limit***

Decision Criteria Test - Payback

- Does the payback rule account for the time value of money?
- Does the payback rule account for the risk of the cash flows?
- Does the payback rule provide an indication about the increase in value?
- Should we consider the payback rule for our primary decision criteria?

Advantages and Disadvantages of Payback

- Advantages
  - Easy to understand
  - Adjusts for uncertainty of later cash flows
  - Biased towards 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

Average Accounting Return

- There are many different definitions for average accounting return
- The one used in the book is:
  - Average net income / average book value
  - Note that the average book value depends on how the asset is depreciated.
- Need to have a target cutoff rate
- Decision Rule: ***Accept the project if the AAR is greater than a preset rate.***

Decision Criteria Test - AAR

- Does the AAR rule account for the time value of money?
- Does the AAR rule account for the risk of the cash flows?
- Does the AAR rule provide an indication about the increase in value?
- Should we consider the AAR rule for our primary decision criteria?

Advantages and Disadvantages of AAR

- Advantages
  - Easy to calculate
  - Needed information will usually be available
- Disadvantages
  - Not a true rate of return; time value of money is ignored
  - Uses an arbitrary benchmark cutoff rate
  - Based on accounting net income and book values, not cash flows and market values

Internal Rate of Return

- This is the most important alternative to NPV
- It is often used in practice and is intuitively appealing
- It is based entirely on the estimated cash flows and is independent of interest rates found elsewhere

IRR – Definition and Decision Rule

- Definition: IRR is the return that makes the NPV = 0
- Decision Rule: ***Accept the project if the IRR is greater than the required return***

Decision Criteria Test - IRR

- Does the IRR rule account for the time value of money?
- Does the IRR rule account for the risk of the cash flows?
- Does the IRR rule provide an indication about the increase in value?
- Should we consider the IRR rule for our primary decision criteria?

Advantages of IRR

- Knowing a return is intuitively appealing
- It is a simple way to communicate the value of a project to someone who doesn't know all the estimation details
- If the IRR is high enough, you may not need to estimate a required return, which is often a difficult task

NPV vs. IRR

- NPV and IRR will generally give us the same decision
- Exceptions
  - Non-conventional cash flows – cash flow signs change more than once
  - Mutually exclusive projects
    - Initial investments are substantially different
    - Timing of cash flows is substantially different

IRR and Nonconventional Cash Flows

- When the cash flows change signs more than once, there is more than one IRR
- When you solve for IRR, you are solving for the root of an equation and when you cross the x-axis more than once, there will be more than one return that solves the equation
- If you have more than one IRR, which one do you use to make your decision?

IRR and Mutually Exclusive Projects

- Mutually exclusive projects
  - If you choose one, you can't choose the other
  - Example: You can choose to attend graduate school next year at either Ole Miss or Mississippi State, but not both
- Intuitively, you would use the following decision rules:
  - NPV – choose the project with the higher NPV
  - IRR – choose the project with the higher IRR

Conflicts Between NPV and IRR

- NPV directly measures the increase in value to the firm
- Whenever there is a conflict between NPV and another decision rule, you should ***always*** use NPV
- IRR is unreliable in the following situations
  - Non-conventional cash flows
  - Mutually exclusive projects

Profitability Index

- Measures the benefit per unit cost, based on the time value of money
- A profitability index of 1.1 implies that for every $1 of investment, we create an additional $0.10 in value
- This measure can be very useful in situations in which there is limited capital

Advantages and Disadvantages of Profitability Index

- 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

Capital Budgeting In Practice

- We should consider several investment criteria when making decisions
- NPV and IRR are the most commonly used primary investment criteria
- Payback is a commonly used secondary investment criteria