Alternative Investment Rules in Capital Budgeting

NPV vs.

Payback Period (PP), Accounting ROR, and Internal Rate of Return (IRR)

How Important is CB to a firm?

- Why is Capital Budgeting (CB) so critical to a firm's long-term survival?
  - Magnitude of $s involved:
    - Amplifies both, the positive impact of "good" decisions, and negative impact of "poor" decisions
  - Repercussions of CB decisions extend over long periods of time

Evaluation of Investment Rules

- Criterion to be used to judge investment rules:
  - Uses *Cash Flows* and NOT earnings
  - Uses *ALL* Cash flows
  - Does NOT ignore Time Value of $
  - Makes Accept/Reject decisions that are *consistent with S/H wealth Max.*

NPV-- A benchmark for other Investment Rules!

- NPV: PV of future CFs - Initial Investment
- Accept if NPV > 0 (Independent Projects)
  - In case of mutually exclusive (M.E.) projects, choose the highest NPV
- Accepting +NPV projects will ***Always*** increase S/H wealth and *vice versa*.
  - Why look at other rules??

Payback Period (PP) Rule

- Length of time it takes for a firm to recover its investment
  - if PP < a cutoff time: **Accept**
- **Disadvantages**
  - Ignores Time Value of money
  - Ignores CFs beyond Payback Period.
  - Biased against Long-term projects
  - Cutoff time is arbitrarily decided

PP Rule (continued)

- **Advantages**
  - Easy to understand/use
  - Favors liquidity
  - might be appropriate for quick decisions for repetitive or low budget projects
- Read: discounted PP (sec. 6.3) & Average Accounting Return (sec. 6.4)

Internal Rate of Return (%) (IRR)

- The discount rate for which:
  - PV of future CFs = Initial Investment ***OR***
  - NPV of the project = 0
- Accept if IRR > Required return
  - M.E.: select alternative with the highest IRR.
- IRR is independent of discount rate
- NPV profile: Discount rate, NPV graph
  - downward sloping

Potential Problems with IRR (Independent OR M.E.)

- CF_0 =\$100, CF_1 =-\$130; r = 10%

  NPV = -\$18.20, IRR = 30%; Accept????

  - NO; This is a **Financing** project
    - for **Financing**, accept if IRR < r
- CF_0 = -\$60, CF_1 =\$155 CF_2 = -\$100; Multiple IRRs
  - Neither has any economic meaning
  - Possible if >1 reversal of sign of CFs
- NPV does not have these 2 problems

Potential Problems with IRR (M.E. projects only)

- *Scale Problem*: Comparing small and large projects:
- A: CF_0 = -$100, CF_1 = $150; r = 0%

  NPV = $50, IRR = 50%
- B: CF_0 = -$1,000, CF_1 = $1,250;

  NPV = $250, IRR = 25%
- 'A' or 'B'???

IRR problems (continued)

- *Timing Problem:* CFs occur at differing times:
- CF_0= -$1,000, CF_1= $500 CF_2= $400, CF_3= $300 CF_4= $100
  - IRR_S = 14.5%
- CF_0= -$1,000, CF_1= $100 CF_2= $300, CF_3= $400 CF_4= $600
  - IRR_L = 11.8%
- If ‘r’= 10%, ‘S’ or ‘L’??? if r = 5%?

Reinvestment Assumption

- NPV: NPV rule assumes that all future CFs can be reinvested at the discount rate
- IRR: IRR calculation assumes that all future CFs can be reinvested at the IRR
- Which is more Realistic?
- IRR is easy to understand and communicate

Profitability Index (PI)& Capital Rationing

- PI: PV of future CFs/Initial Investment
  - Accept if >1 (independent projects)
  - Can lead to incorrect decision for M.E. (choosing highest PI)
  - Similar to NPV
- Capital Rationing: Limited funds
  - PI useful for making optimal decisions
- H.W. 1, 3, 7, 8, 10 (a-c, f), 12, 13, 19