Chapter 8  Rate of Return Analysis: Multiple Alternatives

• Why incremental analysis is necessary
  ➢ Comparing ROR values of two or more alternatives will not give the best alternative.
  ➢ This is so because an alternative with high ROR may be actually generating little value.
  ➢ Therefore, to compare alternatives on the basis of ROR, an incremental analysis is necessary.

• Steps for comparing two alternatives with incremental ROR analysis using PW
  ➢ For unequal life alternatives, develop the cash flows over the LCM of lives or the study period. (See Chapter 5.)

  ➢ Designate the alternative with the highest initial investment as B, and the other as A.
  ➢ Evaluate the incremental cash flow series
    \[ \Delta F_t = FB_t - FA_t, \quad t = 1, 2, \ldots, \text{LCM}. \]
  ➢ For the series \( \Delta F_t \), find the ROR, denoted by \( \Delta_i_{B-A}^* \), assuming such a ROR is unique.
  ➢ If \( \Delta_i_{B-A}^* < \text{MARR} \) select A. Otherwise, select B.
• Justification of the incremental cash flow approach

  ➢ The $\Delta_i^{*}_{B-A}$ value is the MARR value for which the two alternatives A and B are equivalent in terms of PW.

  ➢ If $\text{MARR} \geq \Delta_i^{*}_{B-A}$ (equivalently $\Delta_i^{*}_{B-A} < \text{MARR}$), then $PW_A > PW_B$. Otherwise, if $\text{MARR} < \Delta_i^{*}_{B-A}$, $PW_B \geq PW_A$.

![Diagram showing PW(MARR) vs. MARR with PW_A and PW_B curves]

• Comparing two alternatives with incremental ROR analysis using AW

  ➢ Using AW, $\Delta_i^{*}_{B-A}$ could be found by solving the equation

    $$AW_B(i) - AW_A(i) = 0,$$

    over one life cycle of each alternative (if cash flows repeat).
• **Comparing more than two alternatives with incremental ROR analysis**
  - Rank the alternatives from smallest to largest initial investment.
  - Compare first alternative (with smallest initial investment) with the second alternative as discussed above.
  - Compare the winning alternative with the third alternative.
  - Continue with this pair-wise comparison until all alternatives are considered.

• **When you can do nothing**
  - If the do-nothing alternative could be selected, start the analysis by eliminating the alternatives with ROR < MARR.
  - If all alternatives have ROR < MARR, select the do-nothing alternative over other alternatives considered.