Chapter 6 Annual Worth Analysis

• Introduction
  ➢ Annual worth (AW) analysis is a variant of the present worth analysis discussed in Chapter 5.
  ➢ However, AW analysis has many advantages that make it a useful technique for comparing alternatives.

• Advantages of AW analysis
  ➢ It’s a popular analysis technique.
  ➢ It’s easy to understand. Results are reported in $/year.
  ➢ It simplifies the process of comparing alternatives
    o No need to compare two alternatives for LCM years
    o Compare for one life cycle of each alternative only

• How does it work?
  ➢ For alternative \( j \), find the uniform annual series, with value \( AW_j \), which is equivalent to all the cash flows of the alternative at the decision maker’s MARR.
  ➢ An alternative \( j \) with \( AW_j \geq 0 \) is economically viable.
  ➢ Compare annualized series (the \( AW_j \)s) of all alternatives
  ➢ The alternative with largest \( AW_j \) is selected.
• **Keep in mind**
  - PW and AW analysis are equivalent
  - An alternative has AW ≥ 0 if and only if PW ≥ 0.
  - An alternative has largest AW among a set of alternatives if and only if it has the largest PW.

• **AW analysis assumptions**
  - Same as those of PW analysis with the LCM method
    - The service provided by the alternatives will be needed for LCM years or more.
    - An alternative is repeated over each life cycle of the LCM in exactly the same manner.
    - Cash flow estimates are the same in every life cycle.

• **Capital Recovery (CR) calculation**
  - Capital Recovery (CR) is the annualized equivalent of the initial investment $P$ and the future salvage value $S$ of an alternative,
    $$ CR = -P(A/P, i, n) + S(A/F,i,n) . $$
  - Commonly, CR is added to the annual operating costs AOC to get AW,
    $$ AW = CR + AOC . $$
• **Annual worth analysis of permanent investments (n = ∞)**

  ➤ This is similar to the capitalized cost analysis in Chapter 5.

  ➤ For a recurrent cash flow $R$,

$$A_R = R\left[\frac{i}{(1+i)^n-1}\right].$$

  ➤ For a non-recurrent cash flow $C$, occurring at time $n_C$,

$$A_C = \frac{PW_C}{i} = \frac{C}{i(1+i)^C}.$$