Construction Accounting and Financial Management

Chapter 15
Time Value of Money

Equivalence

- Cash flows have the same perceived value
- Cash flows are not equal unless they occur at the same period of time
- For example, $100 today may be equivalent to $105 a year from now
- Basis of banking equations in Chapter 16

Equivalence Based Upon

- Size of the cash flows
- Timing of the cash flows
- Interest rate

Variables

- *P* = Present value
  - Value at beginning of period 1 (end of period 0)
- *F* = Future value
  - Value at end of period *n*
- *A* = Uniform series
  - Cash flows are the same for the end of periods 1 through *n*
  - Occurs each and every period

Variables

- *i* = Periodic interest rate
  - Interest rate for one period
  - Period may be month or year
- *n* = Number of interest compounding periods
  - Must be the same length

Single-Payment Compound-Amount Factor

- Converts a present value into a future value
- $F = P(1 + i)^n$
- What will be the value of *P* dollars in *n* years at an annual interest rate of *i*?

Single-Payment Present-Worth Factor

- Converts a future value into a present value
- $P = F/(1 + i)^n$
- How much (P) must I set aside today to have F dollars in n years at an annual interest rate of i?

Uniform-Series Compound-Amount Factor

- Converts a uniform series into a future value
- $F = A[(1 + i)^n - 1]/I$
- If I set aside A dollars every year for n years, how much will I have at the end of n years at an annual interest rate of i?
  - Saving for retirement

Uniform-Series Sinking-Fund Factor

- Converts a future value into a uniform series
- $A = Fi/[(1 + i)^n - 1]$
- How much (A) must I set aside each year for n years to have F dollars at the end of n years at an annual interest rate of i?
  - Saving for retirement

Uniform-Series Present-Worth Factor

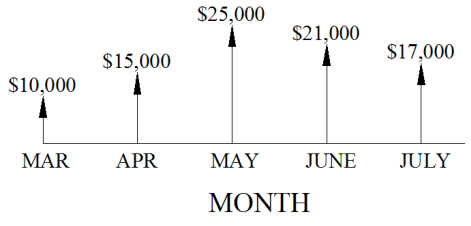
- Converts a uniform series into a present value
- $P = A[(1 + i)^n - 1]/[i(1 + i)^n]$
- How much can I pay for a home if I can afford a monthly payment of A dollars for n months at a monthly interest rate of i?

Uniform-series capital-recovery factor

- Converts a present value in to a uniform series
- $A = P[i(1 + i)^n]/[(1 + i)^n - 1]$
- How much would my monthly payment be on a P dollar loan with a term of n months at a monthly interest rate of i?

Cash-flow diagrams

- Shows direction, size, and timing of cash flow



Complex cash flows

- Cash flows occurring at the same period of time may be added or subtracted
- Use time value of money to moved all of the cash flows to the same point in time and add or subtract them

Finding Unknown Periodic Interest Rates

- Solving by trial-and-error
- Set up equations in Excel and use the Goal Seek function to find the solution
- Cash flows that change directions more than once may have multiple solutions