Economic Formulae Decision Tree

Present or Future Value?

- Single Sum
  - Future Value $V_n = V_0(1+i)^n$ (#1) Future value of a single sum
  - Pesent Value $V_0 = V_n\left(\frac{1}{(1+i)^n}\right)$ (#2) Present value of a single sum
- Series
  - Terminating
    - Annual
      - Future Value $V_n = a\left(\frac{(1+i)^n - 1}{i}\right)$ (#3) Future value of a terminating annual series
      - Pesent Value $V_0 = a\left(\frac{(1+i)^n - 1}{i(1+i)^n}\right)$ (#4) Present value of a terminating annual series
    - Periodic
      - Future Value $V_n = \left(\frac{a*(1+i)^{pt} - 1}{(1+i)^t - 1}\right)$ (#5) Future value of a terminating periodic series
      - Pesent Value $V_0 = a\left[\frac{(1+i)^{pt} - 1}{\left[(1+i)^t - 1\right]*\left[(1+i)^{pt}\right]}\right]$ (#6) Present value of a terminating periodic series
        - $V_0 = a\left[\frac{(1+i)^k * (1+i)^{pt} - 1}{\left[(1+i)^t - 1\right]*\left[(1+i)^{pt}\right]}\right]$ (#6a) Use when stand is at "k" years
  - Perpetual
    - Annual
      - Present Value $V_o = \left(\frac{a}{i}\right)$ (#7) Present value of a perpetual annual series
    - Periodic
      - Pesent Value $V_o = a\left(\frac{1}{(1+i)^t - 1}\right)$ (#8) Present value of a perpetual periodic series
        - $V_0 = a\left[\frac{(1+i)^k}{(1+i)^t - 1}\right]$ (#8a) Use when stand is at age "k"
- Annual Payment
  - To accumulate a future amount $a = V_n\left(\frac{i}{(1+i)^n - 1}\right)$ (#9) Sinking fund formulae
  - To pay off an original investment $a = V_o\left(\frac{i(1+i)^n}{(1+i)^n - 1}\right)$ (#10) Installment Payments (Capital Recovery Formulae)

Where:

- a = equal amount or periodic payment
- i = interest rate
- n = number of years or interest bearing periods
- t = interval between periodic payments
- p= number of periods or rotations related to t
- k = stand age if not "0" or "n" years
- V_O= present (initial) value
- V_n= future (end) value

- i_p= interest rate per period
- m= number of interest bearing periods

$$i_{er} = \left[\left(1 + \frac{i_p}{Period}\right)^m - 1\right]$$

Effective Annual Interest Rate

$$i_{nr} = \left(\frac{i_p}{Period} * \frac{Periods}{yr}\right)$$

Nominal Annual Interest Rate

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