

Chapter 4: Time value of Money

→ Simple Interest

1. (SI) Interest $= Pit$
2. Amount $(A) = P + I$ or $P(1 + it)$
3. (i) rate of interest $= (A - P) / Pit$
4. (t) Time $(t) = (A - P) / Pi$

→ Compound interest

1. (A) Amount $= P \left(1 + \frac{i}{N}\right)^{t \times N}$
2. (CI) Compound Interest $= P \left[\left(1 + \frac{i}{N}\right)^{t \times N} - 1 \right]$

→ Difference between CI and SI

$$P \left[\left\{ (1 + i)^t - 1 \right\} - it \right]$$

→ Effective rate of interest $E =$

$$\left(1 + \frac{i}{N}\right)^{t \times N} - 1$$

Annuity.

1. Future value of Annuity Regular

$$= A \left[\frac{\left(1 + \frac{i}{N}\right)^{t \times N} - 1}{\frac{i}{N}} \right]$$

2. Future value of annuity due

$$= A \left[\frac{\left(1 + \frac{i}{N}\right)^{t \times N} - 1}{\frac{i}{N}} \right] \times \left(1 + \frac{i}{N}\right)$$

3. Present value of annuity regular

$$= A \left[\frac{\left(1 + \frac{i}{N}\right)^{t \times N} - 1}{\frac{i}{N} \times \left(1 + \frac{i}{N}\right)^{t \times N}} \right]$$

1. Present value of annuity due

Initial Receipts + PVAR of $(n-1)$ period
or Payment

$(t \times n)$

→ Perpetuity

1. Present value of perpetuity

$$= A / (i / \text{No of ppy})$$

$$= A / (i/n)$$

2. Present value of growing perpetuity

$$A / (i - g)$$

→ Nominal rate of return
Real rate + Inflation

→ Compound annual growth rate

$$A = P \left(1 + \frac{i}{n} \right)^{t \times n}$$