

List of Equations (Chapters 5 to 8)

5.1. Future value = present value $\times (1 + r)^t$

5.2. Present value = $\frac{\text{future value after } t \text{ periods}}{(1 + r)^t}$

5.2a. $r = \left(\frac{FV}{PV} \right)^{\frac{1}{t}} - 1$

5.3. PV of perpetuity = $\frac{C}{r} = \frac{\text{cash payment}}{\text{interest rate}}$

5.4. Present value of t year annuity = $C \left[\frac{1}{r} - \frac{1}{r(1 + r)^t} \right] = C \left[\frac{1 - \frac{1}{(1 + r)^t}}{r} \right]$

5.4a. $C = \frac{PV \cdot r}{1 - (1 + r)^{-t}}$

5.5. Future value (FV) of annuity of \$1 a year = present value of annuity of \$1 a year $\times (1 + r)^t$

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

$$= \frac{(1 + r)^t - 1}{r}$$

5.6. Present value of annuity due = $(1 + r) \times$ Present value of annuity

5.7. Future value of annuity due = Future value of ordinary annuity $\times (1 + r)$

5.8. $1 + \text{real interest rate} = \frac{1 + \text{nominal interest rate}}{1 + \text{inflation rate}}$

5.9. Real interest rate \approx nominal interest rate – inflation rate

6.1. Bond price = PV (coupons) + PV (face value)
 $= (\text{coupon} \times \text{annuity factor}) + (\text{face value} \times \text{discount factor})$

6.2. Bond rate of return = $\frac{\text{coupon income} + \text{price change}}{\text{investment}}$

6.3a. $YTM = \frac{\text{coupon} + \frac{\text{Face} - PV}{t}}{\frac{\text{Face} + PV}{2}}$

$$7.1. \quad V_0 = \frac{\text{DIV}_1 + P_1}{1+r}$$

$$7.2. \quad P_0 = \frac{\text{DIV}_1}{1+r} + \frac{\text{DIV}_2}{(1+r)^2} + \dots + \frac{\text{DIV}_H + P_H}{(1+r)^H}$$

$$7.3. \quad P_0 = \frac{\text{DIV}_1}{r-g}$$

$$7.4. \quad g = \text{sustainable growth rate} = \text{return on equity} \times \text{plowback ratio}$$

$$7.5. \quad r = \frac{\text{DIV}_1}{P_0} + g = \text{dividend yield} + \text{growth rate}$$

$$8.1. \quad \text{NPV} = \text{PV} - \text{required investment}$$

$$8.2. \quad \text{Profitability index} = \frac{\text{net present value}}{\text{initial investment}}$$

$$8.3. \quad \text{Equivalent annual annuity} = \frac{\text{present value of costs}}{\text{annuity factor}}$$

$$8.3a. \quad \text{annuity factor} : \left[\frac{1}{r} - \frac{1}{r(1+r)^Y} \right]$$