Finance Formula Sheet

$$PV = \frac{FV}{(1+r)^n}$$

$$FV = PV(1+r)^n$$

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

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

$$PV_p = \frac{CF}{r}$$

$$P_s = \frac{Div_0(1+g)}{r_s - g}$$

$$EAR = \left(1 + \frac{APR}{m}\right)^m - 1$$

$$FV = PV\left(1 + \frac{r}{m}\right)^{n \times m}$$

$$PV_A = CF \times \left[\frac{1 - \frac{1}{\left(1 + \frac{r}{m}\right)^{n \times m}}}{\frac{r}{m}} \right]$$

$$FV_A = CF \times \left[\frac{\left(1 + \frac{r}{m}\right)^{n \times m} - 1}{\frac{r}{m}} \right]$$

$$r = \left[\frac{FV}{PV}\right]^{1/n} - 1$$

Expected return of a portfolio: $E\left(r_p\right)=\sum_{i=1}^{n} w_i E\left(r_i\right)$

Variance of a 2-asset portfolio: $\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_{12}$

Variance of a 3-asset portfolio: $\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2 + 2\,w_1w_2\sigma_{12} + 2\,w_1w_3\sigma_{13} + 2\,w_2w_3\sigma_{23}$

Correlation coefficient between series 1 and 2: $\rho_{1,2} = \frac{\sigma_{1,2}}{\sigma_1\sigma_2}$

Covariance between time series *x* and *y*: $\sigma_{x,y} = \frac{\sum_{i=1}^{n}\left(x_i-\bar{x}\right)\left(y_i-\bar{y}\right)}{n-1}$

Variance of asset *x*: $\sigma_x^2 = \frac{\sum_{i=1}^{n}\left(x_i-\bar{x}\right)^2}{n-1}$ Beta of security *i* = $\beta_i = \rho_{i,m}\times\frac{\sigma_i}{\sigma_m}$, or

Beta of security *i* = $\beta_i = \frac{\sigma_{i,m}}{\sigma_m^2}$ = covariance between returns of *i* and the market (*m*) ÷ variance of *m*

Expected return on equity (stock) = $E\left(r_S\right) = rf + \beta\left[E\left(r_m\right) - rf\right]$, also known as the CAPM

or, alternatively:

$E\left(r_S\right) = \frac{D_1}{P_0} + g$ = dividend yield plus expected growth

Return on Assets = $\frac{\text{Net Income}}{\text{Total Assets}}$

ROE = $\frac{\text{Net Income}}{\text{Shareholders' Equity}}$

ROE = Profit Margin × Asset Turnover × Equity Multiplier

ROE = ROA × equity multiplier

ROE = $\frac{\text{Net Income}}{\text{Sales}}\times\frac{\text{Sales}}{\text{Total Assets}}\times\frac{\text{Total Assets}}{\text{Shareholders' Equity}}$

$$\text{Gross Margin} = \frac{\text{Gross Profit (EBITDA)}}{\text{Sales}}$$

$$\text{Operating Margin} = \frac{\text{Operating Income (EBIT)}}{\text{Sales}}$$

$$\text{Net Profit Margin} = \frac{\text{Net Income}}{\text{Sales}}$$

$$WACC = \left[\frac{\text{Debt}}{\text{Tot Capital}} \times r_D \times (1 - T_c)\right] + \left[\frac{\text{Preferred}}{\text{Tot Capital}} \times r_P\right] + \left[\frac{\text{Stock}}{\text{Tot Capital}} \times r_s\right]$$

$$\text{Value of Operations} = \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \cdots + \frac{FCF_N}{(1+WACC)^N} + \frac{\left[\frac{FCF_N \times (1+g)}{WACC - g}\right]}{(1+WACC)^N}$$

or:

$$\text{Value of Operations} = \sum_{t=1}^{\infty} \frac{FCF_\infty}{(1+WACC)^\infty} = \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \cdots + \frac{FCF_\infty}{(1+WACC)^\infty}$$

Total Value of the Firm = Value of Operations + Value of Non-operating Assets

Total Operating Capital = Net operating working capital (NOWC) + B.V. of Operating Long-Term Assets

NOWC = (Cash + Account Receivable + Inventory) − (Accounts Payable + Accruals)

$$\text{Return on Invested Capital} = \frac{\text{NOPAT}}{\text{Total Invested Capital}}$$

NOPAT = EBIT(1 − tax rate)

Free Cash Flow = NOPAT − Net investment in operating assets

Market Value Added (MVA) = Market Value of the Firm's Securities – Total Capital Invested

or, depending on the inputs available to you, a good approximation is:

MVA = (Market Value of Debt + Equity) – (Book Value of Debt, Equity and Preferred Stock)

Economic Value Added (EVA) = NOPAT – (WACC × Total Capital)

or, more conceptually:

EVA = NOPAT – After-Tax Dollar Cost of Capital Used to Support Operations