Formula Sheet

Present value of a perpetuity

$$PV = \frac{C}{r}$$

Present value of a growing perpetuity

$$PV = \frac{C_1}{r - g}$$

Present value of an annuity

$$PV = \frac{C}{r}\left(1 - \frac{1}{(1+r)^T}\right)$$

Present value of an annuity due

$$PV = C\left(1 + \frac{1}{r}\left(1 - \frac{1}{(1+r)^{T-1}}\right)\right)$$

Effective annual rate

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

Weighted Average Cost of Capital

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_c)$$

Project-based WACC

$$r_{wacc} = r_U - d\tau_c r_D$$

Project-based WACC with Annual Debt Adjustment

$$r_{wacc} = r_U - d\tau_c r_D \frac{1 + r_U}{1 + r_D}$$

Unlevered Cost of Capital

$$r_U = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D$$

Cost of Equity

$$r_E = r_U + \frac{D}{E}(r_U - r_D)$$

Debt Capacity

$$D_t = d \times V_t^L$$

Adjusted Present Value

$$V^L = APV = V^U + PV(\text{Interest Tax Shield})$$

Free Cash Flow to Equity

$$FCFE = FCF - (1 - \tau_c) \times (\text{Interest Payments}) + (\text{Net Borrowing})$$

Free Cash Flow

$$FCF = EBIT(1 - \tau_c) + Depreciation - Capex - \Delta NWC$$

Levered Value with a Constant Interest Coverage Ratio

$$V_L = (1 + \tau_c k)V_U$$

Annually Adjusted Debt

$$PV(\tau_c \times Int_t) = \frac{\tau_c \times Int_t}{(1 + r_U)^{t-1}(1 + r_D)} = \frac{\tau_c \times Int_t}{(1 + r_U)^t} \times \left(\frac{1 + r_U}{1 + r_D}\right)$$

$$r_{wacc} = r_U - d\,\tau_c\, r_D \frac{1 + r_U}{1 + r_D}$$

Personal Taxes

$$\tau^* = 1 - \frac{(1 - \tau_c)(1 - \tau_e)}{(1 - \tau_i)}$$

$$r_D^* \equiv r_D \frac{(1 - \tau_i)}{(1 - \tau_e)}$$

Unlevered Cost of Capital (CAPM)

$$r_U = r_f + \beta_U(E[R_{mkt}] - r_f)$$

Black-Scholes Formula

$$C = S^x N(d_1) - PV(K)N(d_2)$$

$$d_1 = \frac{\ln[S^x/PV(K)]}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$$

$$d_2 = d_1 - \sigma\sqrt{T}$$

Failure Cost Index

$$\text{FCI} = \frac{1 - PV(\text{success})}{PV(\text{investment})}$$

Leasing

PV(Lease payments) = Price of the Asset – PV(residual value of the asset)

$FCF(Buy)_t$ = - $CapEx_t$ + Depreciation tax $shield_t$

$FCF(Lease)_t$= - Lease $payments_t$ + Income tax $savings_t$

Incremental free cash $flow_t$ = $FCF\ (Lease - Buy)_t$ = $FCF(Lease)_t$ – $FCF(Buy)_t$

Lease equivalent loan = PV ($FCF(Lease - Buy)_1$ + …+ $FCF(Lease - Buy)_T$)

Valuation and the takeover process

Amount Paid = Target's Pre-Bid Market Cap. + Acquisition Premium

Value Acquired = Target stand alone value + PV(Synergies)

$$Exchange\ ratio = \frac{x}{N_T} < \frac{P_T}{P_A}\left(1 + \frac{S}{T}\right)$$