LISBON SCHOOL OF ECONOMICS & MANAGEMENT
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FORMULAE

(following Berk and DeMarzo's "Corporate Finance" sequence)

GESTÃO FINANCEIRA II / CORPORATE FINANCE II

$$PV(growing\ perpetuity) = \frac{C}{r-g} \qquad (4.10)$$

$$PV(annuity\ of\ C\ for\ N\ periods\ with\ interest\ rate\ r,growing\ at\ rate\ g) = C\times\frac{1}{r-g}\left(1-\left(\frac{1+g}{1+r}\right)^N\right) \qquad (4.11)$$

$$Equivalent\ n-period\ discount\ rate = (1+r)^n - 1 \qquad (5.1)$$

$$1+EAR = \left(1+\frac{APR}{k}\right)^k \qquad (5.3)$$

$$Free\ Cash\ Flow = EBIT(1-T_C) + Depreciation - CapEx - \Delta NWC \qquad (8.5)$$

$$YTM_n = \left(\frac{FV}{P}\right)^{\frac{1}{n}} - 1 \qquad (6.3)$$

$$P = CPN\times\frac{1}{y}\left(1-\frac{1}{(1+y)^n}\right) + \frac{FV}{(1+y)^n} \qquad (6.5)$$

$$P = PV(Bond\ cash\ Flows) = \frac{CPN}{1+YTM_1} + \frac{CPN}{(1+YTM_2)^2} + \cdots + \frac{CPN+FV}{(1+YTM_N)^N} \qquad (6.6)$$

$$f_n = \frac{(1+YTM_N)^N}{(1+YTM_{N-1})^{N-1}} - 1 \qquad (6A.2)$$

$$(1+f_1)\times(1+f_{12})\times \ldots\times(1+f_n) = (1+YTM_n)^n \qquad (6A.3)$$

$$r_E = \frac{Div_1}{P_0} + \frac{P_1 - P_0}{P_0} \qquad (9.2)$$

$$P_0 = \frac{Div_1}{1+r_E} + \frac{Div_2}{(1+r_E)^2} + \cdots + \frac{Div_N}{(1+r_E)^N} + \frac{P_N}{(1+r_E)^N} \qquad (9.4)$$

$$P_0 = \frac{Div_1}{r_E - g} \qquad (9.6)$$

$$Div_t = EPS_t\times Dividend\ Payout\ Rate_t \qquad (9.8)$$

$$g = Retention\ rate\ \times Return\ on\ New\ Investment \qquad (9.12)$$

$$P_0 = \frac{PV(Future\ Total\ Dividends\ and\ Repurchases)}{Shares\ Outstanding_0} \qquad (9.16)$$

$$Expected\ Return = E(R) = \sum_R p_R\times R \qquad (10.1)$$

$$Var(R) = E\left[(R-E(R))^2\right] = \sum_R p_R\times(R-E(R))^2 \quad ; \quad SD(R) = \sqrt{Var(R)} \qquad (10.2)$$

$$\bar{R} = \frac{1}{T}(R_1 + R_2 + \cdots + R_T) = \frac{1}{T}\sum_{t=1}^{T} R_t \qquad (10.6)$$

$$Var(R) = \frac{1}{T-1}\sum_{t=1}^{T}(R_t - \bar{R})^2 \qquad (10.7)$$

$$x_i = \frac{value\ of\ investment\ i}{total\ value\ of\ portfolio} \qquad (11.1)$$

$$E(R_p) = \sum_i x_i\, E(R_i) \qquad (11.3)$$

$$cov(R_i, R_j) = E\left[\left(R_i - E(R_i)\right)\left(R_j - E(R_j)\right)\right] \qquad (11.4)$$

$$cov(R_i, R_j) = \frac{1}{T-1}\sum_t (R_{i,t} - \bar{R}_i)(R_{j,t} - \bar{R}_j) \qquad (11.5)$$

$$corr(R_i, R_j) = \frac{cov(R_i, R_j)}{SD(R_i)SD(R_j)} \qquad (11.6)$$

$$Var(R_p) = x_1^2 Var(R_1) + x_2^2 Var(R_2) + 2x_1x_2cov(R_1, R_2) =$$

$$= x_1^2 Var(R_1) + x_2^2 Var(R_2) + 2x_1x_2corr(R_1, R_2)SD(R_1)SD(R_2) \qquad (11.8\ and\ 11.9)$$

$$Sharpe\ Ratio = \frac{Portfolio\ Excess\ Return}{Portfolio\ Volatility} = \frac{E(R_p) - r_f}{SD(R_p)} \qquad (11.17)$$

$$\beta_i^p = \frac{SD(R_i)corr(R_i,R_p)}{SD(R_p)} \qquad (11.19)$$

$$E(R_i) = r_i = r_f + \beta_i \times \left(E[R_{Mkt}] - r_f\right) \qquad (11.22)$$

$$\beta_p = \frac{cov(R_p, R_{Mkt})}{Var(R_{Mkt})} = \sum_i x_i\beta_i \qquad (11.24)$$

$$r_d = y - pL \qquad (12.7)$$

$$r_U = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D = Pre-tax\ WACC \qquad (12.8), (14.6), (18.6)$$

$$\beta_U = \frac{E}{E+D}\beta_E + \frac{D}{E+D}\beta_D \qquad (12.9), (14.8)$$

$$r_{WACC} = \frac{E}{E+D}r_E + \frac{D}{E+D}r_D(1-T_C) \qquad (12.12), (18.1)$$

$$r_E = r_U + \frac{D}{E}(r_U - r_D) \qquad (14.5), (18.10)$$

$$\beta_E = \beta_U + \frac{D}{E}(\beta_U - \beta_D) \qquad (14.9)$$

$$\tau^* = 1 - \frac{(1-T_C)(1-T_E)}{(1-T_i)} \qquad (15.7)$$

$$\tau_{ex}^* = \frac{T_E - T_i}{1 - T_i} \qquad (15.9)$$

$$V^L = V^U + PV(Interest\ Tax\ Shield) - PV(Financial\ Distress\ Costs) - PV(Agency\ Costs\ of\ Debt) + PV(Agency\ Benefits\ of\ Debt) \qquad (16.3)$$

$$Net\ Borrowing\ Date\ t = D_t - D_{t-1} \qquad (18.8)$$

$$FCFE = FCF - (1-T_C) \times InterestPayments + Net\ Borrowing \qquad (18.9)$$