Instituto Superior de Economia e Gestão
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FORMULAE

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

GESTÃO FINANCEIRA II UNDERGRADUATE PROGRAMS

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

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

$$\text{Equivalent n-period Discount rate} = (1+r)^n - 1 \qquad (5.1)$$

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

$$\text{Free Cash Flow} = EBIT(1-\tau_C) + \text{Depreciation} - \text{CapEx} - \Delta NWC \qquad (7.5)$$

$$YTM_n = \left(\frac{FV}{P}\right)^{\frac{1}{n}} - 1 \qquad (8.3)$$

$$P = CPN \times \frac{1}{y}\left(1-\frac{1}{(1+y)^N}\right) + \frac{FV}{(1+y)^N} \qquad (8.5)$$

$$P = PV(\text{Bond Cash Flows}) = \frac{CPN}{1+YTM_1} + \frac{CPN}{(1+YTM_2)^2} + \cdots + \frac{CPN+FV}{(1+YTM_n)^n} \qquad (8.6)$$

$$f_n = \frac{(1+YTM_n)^n}{(1+YTM_{n-1})^{n-1}} - 1 \qquad (8A.2)$$

$$(1+f_1)\times(1+f_2)\times\cdots\times(1+f_n) = (1+YTM_n)^n \qquad (8A.3)$$

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

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

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

$$Div_t = EPS_t \times \text{Dividend Payout Rate}_t \qquad (9.8)$$

$$g = \text{Retention Rate} \times \text{Return on New Investment} \qquad (9.12)$$

$$P_0 = \frac{PV(\text{Future Total Dividends and Repurchases})}{\text{Shares Outstanding}_0} \qquad (9.16)$$

$$\text{Expected Return} = E[R] = \sum_R p_R \times R \quad (10.1)$$

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

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

$$Var(R) = \frac{1}{T-1}\sum_{t=1}^{T}\left(R_t - \overline{R}\right)^2 \quad (10.7)$$

$$x_i = \frac{\text{Value of investment } i}{\text{Total value of portfolio}} \quad (11.1)$$

$$E[R_p] = \sum_i x_i E[R_i] \quad (11.3)$$

$$Cov(R_i, R_j) = E\left[(R_i - E[R_i])(R_j - E[R_j])\right] \quad (11.4)$$

$$Cov(R_i, R_j) = \frac{1}{T-1}\sum_t \left(R_{i,t} - \overline{R}_i\right)\left(R_{j,t} - \overline{R}_j\right) \quad (11.5)$$

$$Corr(R_i, R_j) = \frac{Cov(R_i, R_j)}{SD(R_i)SD(R_j)} \quad (11.6)$$

$$Var(R_p) = x_1^2 Var(R_1) + x_2^2 Var(R_2) + 2x_1x_2Cov(R_1, R_2) =$$
$$= x_1^2 Var(R_1) + x_2^2 Var(R_2) + 2x_1x_2Corr(R_1, R_2)SD(R_1)SD(R_2) \quad (11.8 \text{ and } 11.9)$$

$$\text{Sharpe Ratio} = \frac{\text{Portfolio Excess Return}}{\text{Portfolio Volatility}} = \frac{E(R_P) - r_f}{SD(R_P)} \quad (11.17)$$

$$\beta_i^P \equiv \frac{SD(R_i) \times Corr(R_i, R_P)}{SD(R_P)} \quad (11.19)$$

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

$$\beta_P = \frac{Cov(R_P, R_{Mkt})}{Var(R_{Mkt})} = \sum_i x_i \beta_i \quad (11.24)$$

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

$$r_U = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D = \text{Pretax WACC} \quad (12.8),(14.6),(18.6)$$

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

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1 - \tau_C) \quad (12.12),(18.1)$$

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

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

$$\tau^* = 1 - \frac{(1 - \tau_C)(1 - \tau_E)}{(1 - \tau_i)} \quad (15.7)$$

$$\tau_{ex}^* = \frac{\tau_E - \tau_i}{1 - \tau_i} \quad (15.9)$$

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

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

$$FCFE = FCF - (1 - \tau_C) \times (\text{Interest Payments}) + (\text{Net Borrowing}) \quad (18.9)$$