



FORMULAE

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

GESTÃO FINANCEIRA II UNDERGRADUATE PROGRAMS 1st SEMESTER 2011-2012

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

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

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

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

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

$$\text{YTM}_n = \left(\frac{\text{FV}}{\text{P}} \right)^{\frac{1}{n}} - 1 \quad (8.3)$$

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

$$P = PV(\text{Bond Cash Flows}) = \frac{\text{CPN}}{1 + \text{YTM}_1} + \frac{\text{CPN}}{(1 + \text{YTM}_2)^2} + \dots + \frac{\text{CPN} + \text{FV}}{(1 + \text{YTM}_n)^n} \quad (8.6)$$

$$f_n = \frac{(1 + \text{YTM}_n)^n}{(1 + \text{YTM}_{n-1})^{n-1}} - 1 \quad (8A.2)$$

$$(1 + f_1) \times (1 + f_2) \times \dots \times (1 + f_n) = (1 + \text{YTM}_n)^n \quad (8A.3)$$

$$r_E = \frac{\text{Div}_1}{P_0} + \frac{P_1 - P_0}{P_0} \quad (9.2)$$

$$P_0 = \frac{\text{Div}_1}{1 + r_E} + \frac{\text{Div}_2}{(1 + r_E)^2} + \dots + \frac{\text{Div}_N}{(1 + r_E)^N} + \frac{P_N}{(1 + r_E)^N} \quad (9.4)$$

$$P_0 = \frac{\text{Div}_1}{r_E - g} \quad (9.6)$$

$$\text{Div}_t = \text{EPS}_t \times \text{Dividend Payout Rate}_t \quad (9.8)$$

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

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

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

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

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

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

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

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

$$\text{Cov}(R_i, R_j) = E[(R_i - E[R_i])(R_j - E[R_j])] \quad (11.4)$$

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

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

$$\begin{aligned} \text{Var}(R_p) &= x_1^2 \text{Var}(R_1) + x_2^2 \text{Var}(R_2) + 2x_1 x_2 \text{Cov}(R_1, R_2) = \\ &= x_1^2 \text{Var}(R_1) + x_2^2 \text{Var}(R_2) + 2x_1 x_2 \text{Corr}(R_1, R_2) \text{SD}(R_1) \text{SD}(R_2) \end{aligned} \quad (11.8 \text{ and } 11.9)$$

$$\text{SharpeRatio} = \frac{\text{Portfolio Excess Return}}{\text{Portfolio Volatility}} = \frac{E(R_p) - r_f}{\text{SD}(R_p)} \quad (11.17)$$

$$\beta_i^p \equiv \frac{\text{SD}(R_i) \times \text{Corr}(R_i, R_p)}{\text{SD}(R_p)} \quad (11.19)$$

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

$$\beta_p = \frac{\text{Cov}(R_p, R_{\text{Mkt}})}{\text{Var}(R_{\text{Mkt}})} = \sum_i x_i \beta_i \quad (11.24)$$

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

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

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

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

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

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

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

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

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

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

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