

Certainty Equivalent:*Cashflow:*

$$PV = \frac{C_1 - \lambda \text{Cov}(C_1, r_m)}{(1+r_f)}$$

$$\lambda = \frac{(r_m - r_f)}{\sigma_m^2}$$

$$\beta = \frac{(1+r_f)\text{Cov}(C_1, r_m)}{\sigma_m^2 [C_1 - \lambda \text{Cov}(C_1, r_m)]}$$

Return:

$$PV = \frac{C_1}{1+r}$$

$$\beta = \frac{\text{Cov}(r_f, r_m)}{\text{Var}(r_m)}$$

$$r = r_f + \beta(r_m - r_f)$$

Option Pricing:*Put-Call Parity:*

$$C = S + P - K/(1+r)$$

Binomial Pricing:

$$\Delta = \frac{C_U - C_D}{(u-d)S}$$

$$B = \frac{uC_D - dC_U}{(u-d)(1+r)}$$

$$C = \Delta S + B$$

Leverage:*Financial:*

$$\beta_A = \beta_D \left(\frac{D}{D+E} \right) + \beta_E \left(\frac{E}{D+E} \right)$$

Operating:

$$A = R - V - F$$

$$\beta_R = \left(\frac{A}{R} \right) \beta_A + \left(\frac{V}{R} \right) \beta_V + \left(\frac{F}{R} \right)$$

Modigliani-Miller Theorem:

$$E_U = V_U = V_L = E_L + D_L$$

With Taxes:*WACC:*

$$V_L = \text{All equity cash flows} / (1 + r_{WACC})$$

$$PV_{\text{taxshld}} = \frac{T_C D r_D}{(1+r_D)}$$

$$r_{WACC} = \left(\frac{D}{D+E} \right) (1 - T_C) (r_D) + \left(\frac{E}{D+E} \right) (r_E)$$

$$r_E = r_A \left[1 + \left(\frac{D}{E_L} \right) (1 - \frac{T_C * r_D}{1 + r_D}) \right] - r_D \left(\frac{D}{E_L} \right) (1 - \frac{T_C * r_D}{1 + r_D})$$

APV:

$$APV = V_L = E_U + PV_{\text{tax shields}}$$

$$\beta_{EL} = \beta_A [(E_L + D_L - PV_{\text{tax shields}}) / E_L] - \beta_D (D_L / E_L) + \beta_{\text{tax}} (PV_{\text{taxshld}} / E_L)$$