CPWP Module 1 Formula Sheet

Disclaimer: This document serves as an aid for the exam only, and it is not an exhaustive listing of formulas that may be applied to the exam.

Macaulay duration = \[ \left[ \frac{1C_1}{(1+i)^1} + \frac{2C_2}{(1+i)^2} + \frac{3C_3}{(1+i)^3} + ... + \frac{nC_n}{(1+i)^n} + \frac{nM_n}{(1+i)^n} \right] \times \frac{1}{P} \]

Modified duration = Macaulay duration / (1 + i/n),

Put-call parity: \( C_0 + K \times e^{-rT} = P_0 + S_0 \) (without any interim cash outflow)
\( C_0 + K \times e^{-rT} = P_0 + S_0 - PV(CF_t) \) (with interim cash outflow)

Cost of carry: futures price = spot price \( \times (1+\text{interest rate}) \) + storage, insurance and transport costs – convenience yield

Roll yield = \( \frac{\text{current spot price} - \text{specified futures price}}{\text{current spot price}} \)

Earnings per share = \( \frac{\text{(profit after tax - preferred dividends)}}{\text{weighted average number of shares outstanding}} \)

Dividend discount model: \( P = D_1 / (1+r) + D_2 / (1+r)^2 + D_3 / (1+r)^3 + ... + D_\infty / (1+r)^\infty \)

Constant growth dividend discount model: \( P = D_0 (1 + g) / (r-g) \) or \( P = D_1 / (r-g) \)

Interest rate parity: \( \frac{F_{\text{Currency A/Currency B},t}}{S_{\text{Currency A/Currency B},0}} = \frac{1 + i_{\text{Currency B}} \times \frac{t}{360}}{1 + i_{\text{Currency A}} \times \frac{t}{360}} \)
Total expense ratio = \frac{\text{fund expense}}{\text{fund asset}}

Information ratio = \frac{\alpha}{\sigma_e}

Periodic TE = \sqrt{\frac{1}{T-1} \sum_{t=1}^{T} (\alpha_t - \bar{\alpha})^2}

Annualized TE = \text{periodic TE} \times \sqrt{M}

Variance of a 2-asset portfolio = \sigma_a^2 + \sigma_b^2 + 2 \times \omega_a \times \omega_b \times \rho_{ab} \times \sigma_a \times \sigma_b

Standard deviation of a portfolio = \sqrt{\sigma_p^2}

Expected utility of a portfolio = \mathbb{E}(r_p) - \frac{1}{2} \times A \times \sigma_p^2

Capital allocation line: \quad \mathbb{E}(r_p) = r_f + \frac{\mathbb{E}(r_k) - r_f}{\sigma_k} \times \sigma_p

Sharpe ratio: \quad S_p = \frac{r_p - r_f}{\sigma_p}

Treynor ratio: \quad T_p = \frac{r_p - r_f}{\beta_p}