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Sample Formula Sheet for CIMA® Certification[1]

Beta: $\beta_A = \frac{cov_{A,M}}{\sigma_M^2} = \frac{\rho_{A,M}\sigma_A}{\sigma_M}$

Beta of a portfolio: $\beta_P = \sum_{i=1}^{n} w_i \beta_i$

Bond price: $P = \sum_{t=1}^{n} \frac{\text{Coupon}_t}{(1+y)^t} + \frac{\text{Par Value}_n}{(1+y)^n}$

CAPM, Security market line: $E(R_A) = R_f + \beta_A(E(R_M) - R_f)$

Capital allocation line: $E(R_C) = R_f + \left(\frac{\sigma_C}{\sigma_P}\right)(E(R_P) - R_f)$

Capital market line: $E(R_P) = R_f + \left(\frac{\sigma_P}{\sigma_M}\right)(E(R_M) - R_f)$

Capture ratio, downside: $DCR = \frac{[(1+R_{p,down,1})(1+R_{p,down,2}) \dots (1+R_{p,down,n})]^{(1/n)} - 1}{[(1+R_{b,down,1})(1+R_{b,down,2}) \dots (1+R_{b,down,n})]^{(1/n)} - 1}$

Capture ratio, upside: $UCR = \frac{[(1+R_{p,up,1})(1+R_{p,up,2}) \dots (1+R_{p,up,n})]^{(1/n)} - 1}{[(1+R_{b,up,1})(1+R_{b,up,2}) \dots (1+R_{b,up,n})]^{(1/n)} - 1}$

Coefficient of determination: $R^2 = (\rho_{A,B})^2$

Convexity: $C = \frac{1}{P} \sum_{t=1}^{n} \frac{t(t+1)CF_t}{(1+y)^{t+2}}$; $\frac{\Delta P}{P} \cong -D^* * \Delta y + \frac{1}{2} C \, \Delta y^2$

Correlation coefficient: $\rho_{A,B} = \frac{cov_{A,B}}{\sigma_A \sigma_B}$

Covariance of a population: $cov_{A,B} = \frac{\sum_{t=1}^{n} [(R_{A,t} - \mu_A)(R_{B,t} - \mu_B)]}{n}$

Covariance of a sample: $cov(s)_{A,B} = \frac{\sum_{t=1}^{n} (R_{A,t} - \bar{R}_A)(R_{B,t} - \bar{R}_B)}{n-1}$

Discounted dividends model, Gordon growth model: $P_0 = \frac{D_1}{r-g}$

Downside deviation: $DD = \sqrt{\frac{\sum_{i=1}^{n} (min(R_i - MAR, 0))^2}{n-1}}$

Effective annual rate: $EAR = \left(1 + \frac{R_{nom}}{n}\right)^n - 1$

Expected return: $E(R) = \sum_{i=1}^{n} P_i R_i$

Expected return, risky asset with risk-free asset: $E(R_P) = w_A E(R_A) + w_f R_f$

Forward exchange rate: $F_0 = E_0 \left(\frac{1+R_A}{1+R_B}\right)^T$: $E_0 = \frac{Currency\ A}{Currency\ B}$

Forward one-period rate at time t: $R_{t,t+1} = \left(\frac{(1+R_{t+1})^{t+1}}{(1+R_t)^t}\right) - 1$

Future value: $FV = \sum_{t=0}^{n} CF_t (1+R)^{n-t}$

Futures price, Forward price: $FP = S_0(1 + R_f - d)^T$

Geometric mean return: $R_G = [(1+R_1)(1+R_2)(1+R_3) \dots (1+R_n)]^{1/n} - 1$

Holding period return: $HPR_t = \frac{P_t - P_{t-1} + D_t}{P_{t-1}}$

Information ratio: $IR_P = \frac{\bar{R}_P - \bar{R}_B}{Tracking\ error}$

Jensen's alpha: $\alpha_P = R_P - [R_f + \beta_P(R_M - R_f)]$

Macaulay duration: $D = \frac{\sum_{t=1}^{n} \frac{tCF_t}{(1+y)^t}}{\sum_{t=1}^{n} \frac{CF_t}{(1+y)^t}} = \frac{\sum_{t=1}^{n} (t) PVCF_t}{Price}$

Macaulay duration of portfolio: $D_P = \sum_{i=1}^{n} w_i D_i$

Modified duration: $D^* = \frac{D}{(1+y)}$; $\frac{\Delta P}{P} \cong -D^* \Delta y$

Modigliani squared: $M^2 = \left[\left[1 - \frac{\sigma_M}{\sigma_P}\right] R_f + \left[\frac{\sigma_M}{\sigma_P}\right] R_P\right]$

Multi-factor model: $\tilde{r}_i = \alpha_i + \beta_{i1}\tilde{F}_1 + \beta_{i2}\tilde{F}_2 + \cdots + \beta_{iK}\tilde{F}_K + \tilde{e}_i$

Net present value: $NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - CF_0$ Internal rate of return: IRR= rate at which NPV = 0

Performace attribution:
Where B=Benchmark and A=Active manager

$$R_A - R_B = \sum_{i=1}^{N} w_{A,i} R_{A,i} - \sum_{i=1}^{N} w_{B,i} R_{B,i}$$

Asset allocation: $\sum_{i=1}^{N} (w_{A,i} - w_{B,i}) R_{B,i}$

Asset selection: $\sum_{i=1}^{N} (R_{A,i} - R_{B,i})\, w_{A,i}$

Present value: $PV = \sum_{t=0}^{n} \frac{CF_t}{(1+R)^t}$

Put-call parity: Price of underlying equity + Price of put = Price of call + Present value of exercise price

Real rate of return: $R_{real} = \left[\frac{(1 + R_{nominal})}{(1 + R_{inflation})}\right] - 1$

Sharpe ratio: $S_P = \frac{\bar{R}_P - \bar{R}_f}{\sigma_P}$

Sortino ratio: $SR_P = \frac{\bar{R}_P - \bar{R}_f}{downside\ deviation}$

Spot - futures parity: $F_0 = S_0\,(1 + R_f - y_s)^T$

Standard deviation annualized: $\sigma_{ann} = \sigma\sqrt{t}$

Standard deviation, expected: $\sigma = \sqrt{\sum_{i=1}^{n} P_i (R_i - E(R))^2}$

Standard deviation of a multiple asset portfolio: $\sigma_P = \sqrt{\sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j cov_{ij}}$

Standard deviation of a population: $\sigma = \sqrt{\frac{\sum_{t=1}^{n} (R_t - \mu)^2}{n}}$

Standard deviation of a sample: $s = \sqrt{\frac{\sum_{t=1}^{n} (R_t - \bar{R})^2}{n-1}}$

Standard deviation, risky asset A with risk-free asset: $\sigma_P = |w_A|\sigma_A$

Standard deviation of two risky assets: $\sigma_P = \sqrt{w_A^2\sigma_A^2 + w_B^2\sigma_B^2 + 2w_A w_B \rho_{A,B}\sigma_A\sigma_B}$

Tobin's Q, Q ratio: $\text{Assets}_{MV} / \text{Assets}_{RC}$

Tracking error: Tracking error $= \sqrt{\text{Variance}(R_P - R_B)} = \sqrt{\frac{\sum_{t=1}^{n}\left[(R_{Pt} - R_{Bt}) - (\bar{R}_P - \bar{R}_B)\right]^2}{n-1}}$

Treynor ratio: $T_P = \frac{\bar{R}_P - \bar{R}_f}{\beta_P}$

Value at risk: $V_p * \left(E(R) - z\sigma_p\sqrt{\frac{V_d}{D_y}}\right)$

Variance of a population: $\sigma^2 = \frac{\sum_{t=1}^{n} (R_t - \mu)^2}{n}$

Variance of a sample: $s^2 = \frac{\sum_{t=1}^{n} (R_t - \bar{R})^2}{n-1}$

[1]This formula sheet, which is provided during CIMA® certification exams, is intended only as a resource and not as a substitute for understanding the formulae and studying the topics in the Candidate Handbook's detailed content outline. The formula list, which may be updated periodically, is not inclusive of all formulae that may be needed for an exam form. Conversely, all formulae on the list are not necessary for any one exam form. These formulae may be expressed differently in some textbooks. Likewise, the format or nomenclature used by academic publishers and providers of study/review materials may vary. Candidates are encouraged to learn to read formulae and recognize them in different formats, selecting the ones they find most useful to perform the necessary calculations.