Formula Guide for Exam 3
FINA 4310
Spring 2018
CRN 20690, 20691, 35178

***READ THIS FIRST*: This guide is intended to supplement your study. It is not intended to be an exhaustive list of every possible question you might see on the exam or a replacement for your own study habits. Any specific formulas you might be responsible for are given. You are responsible for knowing the formulas, and you may be asked to solve the equation for other values.**

Topic 5: Performance Evaluation (*BKM* Chapter 18)

Sharpe Ratio

$$S = \frac{r - r_f}{\sigma}$$

Treynor Measure

$$T = \frac{r - r_f}{\beta}$$

Performance Attribution

Value Added via Asset Allocation

$$VA_{AA} = \sum_{i=1}^{N} \left(w_{i,P} - w_{i,B}\right) \times \left(r_{i,B} - r_B\right)$$

Value Added via Security Selection

$$VA_{SS} = \sum_{i=1}^{N} w_{i,B} \times \left(r_{i,P} - r_{i,B}\right)$$

Value Added via Interaction

$$VA_I = \sum_{i=1}^{N} \left(w_{i,P} - w_{i,B}\right) \times \left(r_{i,P} - r_{i,B}\right)$$

Value Added – Total

$$Portfolio\ Return - Benchmark\ Return = VA_{AA} + VA_{SS} + VA_I$$

Topic 6: Risk & Return (*BKM* Chapter 5)

Expected Returns

$$E(r) = \mu = \sum_{s=1}^{S} p_s r_s$$

Variance

$$Var(r) = \sigma^2 = \sum_{s=1}^{S} p_s [r_s - E(r)]^2$$

Standard Deviation

$$\sigma = \sqrt{\sigma^2}$$

Sample Average Return ("Arithmetic Average")

$$\bar{r} = \frac{1}{T} \sum_{t=1}^{T} r_t$$

Sample Variance

$$Var(r) = s^2 = \frac{1}{T-1} \sum_{t=1}^{T} [r_t - \bar{r}]^2$$

Sample Standard Deviation

$$s = \sqrt{s^2}$$

Geometric Average

$$r_G = \sqrt[T]{\prod_{t=1}^{T} (1 + r_t)} - 1 = \left[\prod_{t=1}^{T} (1 + r_t) \right]^{\frac{1}{T}} - 1$$

Topic 7: Risky Portfolios (*BKM* Chapter 6)

Weight of an Asset

$$w_i = \frac{Value\ of\ Investment\ i}{Total\ Value\ of\ Portfolio}$$

Equally-Weighted Portfolio Weights

$$w_i = \frac{Total\ Weight}{Number\ of\ Securities}$$

Return of a Portfolio

$$r_p = \sum_{i=1}^{N} w_i r_i$$

Expected Return of a Portfolio

$$r_p = \sum_{i=1}^{N} w_i E(r_i)$$

Covariance Using Probabilities

$$Cov(r_i, r_j) = \sigma_{ij} = \sum_{s=1}^{S} p_s [r_{i,s} - E(r_i)][r_{j,s} - E(r_j)]$$

Covariance Using Data

$$Cov(r_i, r_j) = s_{ij} = \frac{1}{T-1} \sum_{t=1}^{T} [r_{i,t} - \overline{r_i}][r_{j,t} - \overline{r_j}]$$

Correlation Using Probabilities

$$Corr(r_i, r_j) = \rho_{ij} = \frac{\sigma_{ij}}{\sigma_i \sigma_j}$$

Correlation Using Data

$$Corr(r_i, r_j) = r_{ij} = \frac{s_{ij}}{s_i s_j}$$

Portfolio Variance (Two Stocks)

$$\sigma_p^2 = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\sigma_{12}$$

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$$\sigma_p^2 = \begin{pmatrix} w_1 & w_2 \end{pmatrix} \begin{pmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{21} & \sigma_{22} \end{pmatrix} \begin{pmatrix} w_1 \\ w_2 \end{pmatrix}$$

Portfolio Standard Deviation

$$\sigma_p = \sqrt{\sigma_p^2}$$

Sharpe Ratio

$$S = \frac{E(r) - r_f}{\sigma}$$

Safety First Ratio

$$SFRatio = \frac{E(r) - r_L}{\sigma}$$

Topic 8: Asset Pricing (*BKM* Chapter 7)

Beta

$$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2}$$

CAPM

$$E(r_i) = r_f + \beta_i \times \left[E(r_M) - r_f\right]$$

$$E(r_i) = r_f + \beta_i \times Market\ Risk\ Premium$$

Alpha

$$\alpha_i = r_i - \left(r_f + \beta_i \times \left[E(r_M) - r_f\right]\right)$$

Regression Form of CAPM

$$r_i - r_f = \alpha_i + \beta_i \times \left[r_m - r_f\right] + \varepsilon_{i,t}$$

Fama French 3 Factor Model

$$r_i - r_f = \alpha_i + \beta_{RMRF} \times r_{RMRF} + \beta_{SMB} \times r_{SMB} + \beta_{HML} \times r_{HML}$$