Formulas for SwedSec's licensing exam for specialists

Section 2: Economic analysis

Equity valuation

Gordon growth model:

$$V_0 = \frac{Div_1}{(r - g)}$$

V_0 = Fundamental value of equity

Div_1 = Next year's dividend

r = Required rate of return on equity

g = Dividend growth rate

Derivative pricing

Put call parity:

$$p_t = c_t + \frac{X}{(1 + r)^{T-t}} - S_t$$

p_t = Price of put option at time t (put premium)

c_t = Price of call option at time t (call premium)

X = Strike price

r = Risk free interest rate

$T - t$ = Time to expiration

S_t = Stock price

Portfolio theory

Standard deviation of a portfolio P with two assets A and B:

$$\sigma_P = \sqrt{w_A^2 \times \sigma_A^2 + w_B^2 \times \sigma_B^2 + 2 \times w_A \times w_B \times \rho_{A,B} \times \sigma_A \times \sigma_B}$$

σ_P = Standard deviation of portfolio P

w_A = Portfolio weight in asset A

σ_A = Standard deviation of asset A

w_B = Portfolio weight in asset B

σ_B = Standard deviation of asset B

$\rho_{A,B}$ = Correlation between assets A and B

Expected return of a portfolio P:

$$E(R_P) = \sum_{i=1}^{N} w_i \times E(R_i)$$

$E(R_P)$ = Expected return of portfolio P

w_i = Portfolio weight in asset i

$E(R_i)$ = Expected return of asset i

CAPM:

$$E(R_i) = R_f + \beta_i \times \left[E(R_M) - R_f\right]$$

$E(R_i)$ = Expected return of asset i

R_f = Return on risk free asset

β_i = Beta of asset i versus the market portfolio

$E(R_M)$ = Expected return of the market portfolio

Multi factor model:

$$R_i = \alpha_i + \beta_{i,1} \times F_1 + \beta_{i,2} \times F_2 + \cdots + \beta_{i,K} \times F_K + \varepsilon_i$$

R_i = Return of asset i

α_i = Factor independent mean return of asset i

$\beta_{i,K}$ = Factor exposure ("factor beta") for asset i versus factor K

F_K = Factor return of factor K

ε_i = Residual ("error term")

Risk (variance) decomposition:

$$\sigma_i^2 = \beta_i^2 \times \sigma_M^2 + \sigma_{\varepsilon,i}^2$$

σ_i^2 = Total variance of asset i

β_i = Beta of asset i versus the market portfolio

σ_M^2 = Variance of the market portfolio

$\sigma_{\varepsilon,i}^2$ = Non-systematic variance of asset i

Statistics

Covariance between two assets A and B:

$$Cov_{A,B} = \rho_{A,B} \times \sigma_A \times \sigma_B$$

$Cov_{A,B}$ = Covariance between assets A and B

$\rho_{A,B}$ = Correlation between assets A and B

σ_A = Standard deviation of asset A

σ_B = Standard deviation of asset B

Regression equation for alpha (α) and beta (β):

$$R_{A,t} = \alpha_A + \beta_A \times R_{B,t} + \varepsilon_{A,t}$$

$R_{A,t}$ = Return of asset A during period t

α_A = Alpha (intercept) of asset A

β_A = Beta (slope) of asset A

$R_{B,t}$ = Return of asset B (i.e. market index) during period t

$\varepsilon_{A,t}$ = Regression residual during period t

Risk adjusted return of portfolios and funds

Sharpe ratio:

$$S_P = \frac{\overline{R_P} - \overline{R_f}}{\sigma_P}$$

S_P = Sharpe ratio of portfolio P

$\overline{R_P}$ = Mean return of portfolio P

$\overline{R_f}$ = Mean return on risk free asset

σ_P = Standard deviation of portfolio P

Tracking error:

$$TE_P = Std(R_P - R_B)$$

TE_P = Tracking error of portfolio P versus portfolio B (i.e. market index)

$Std(x)$ = Standard deviation of x

R_P = Return of portfolio P

R_B = Return of portfolio B (i.e. market index)

Information ratio:

$$IR_P = \frac{\overline{R_P} - \overline{R_B}}{TE_P}$$

IR_P = Information ratio of portfolio P

$\overline{R_P}$ = Mean return of portfolio P

$\overline{R_B}$ = Mean return of portfolio B (i.e. market index)

TE_P = Tracking error of portfolio P versus portfolio B (i.e. market index)

Jensen's Alpha:

$$\alpha_P = \overline{R_P - R_f} - \beta_P \times \overline{R_M - R_f}$$

α_P = Jensen's Alpha of portfolio P

$\overline{R_P - R_f}$ = Mean excess return (versus risk free asset) of portfolio P

β_P = Beta of portfolio P versus the market index

$\overline{R_M - R_f}$ = Mean excess return (versus risk free asset) of the market index