BMAN 70381: Foundations of Finance Theory
Exam
Answer all 4 questions

January 2009

Answer all questions. All questions carry equal marks (25 marks per question).

1. Assume the following data for stocks 1 and 2:

   (a) Expected cash flow: $E(x_1) = 15$, Standard deviation: $\sigma_1 = 3.0$, Stock value: $S_1 = 12$.

   (b) Expected cash flow: $E(x_2) = 4$, Standard deviation: $\sigma_2 = 0.4$, Stock value: $S_2 = 3.6$. Covariance between the cash flows: $\sigma_{1,2} = 0.72$.

   Assume that the risk-free rate of interest is $r_f = 0.04$.

   Assume a mean-variance utility function. Also, assume the following for investors 1 and 2: wealth, $w_1 = 5$, $w_2 = 12$. Risk parameter, $\lambda_1 = 1.5$, $\lambda_2 = 0.7$.

   (a) State the first order conditions for a maximum of the utility of investor 2. (5 marks)

   (b) Compute the optimal stock portfolios for investors 1 and 2 and the amount of borrowing/lending. (15 marks)

   (c) Explain which investor is the more risk averse (5 marks)

   Note, given a matrix:

$$A = \begin{pmatrix} a, b \\ c, d \end{pmatrix}$$

   the inverse matrix is

$$A^{-1} = \begin{pmatrix} \frac{d}{ad-bc}, \frac{b}{bc-ad} \\ \frac{c}{bc-ad}, \frac{a}{ad-bc} \end{pmatrix}$$

2. (a) Detail one set of assumptions that imply that the CAPM holds and show how the CAPM result follows from these assumptions. (15 marks)

   (b) Assume that the CAPM holds and a company is considering three investment projects with the following characteristics:-

project	1	2	3
beta	1.4	0	-0.6

Suppose that the risk-free rate of interest is 4% and that the expected return on the market portfolio is 9%. What is the required rate of return for each of the projects (10 marks)

3. (a) Show the Black-Scholes formula for the price of a call option on a non-dividend paying stock. Explain what each symbol in the formula means and how the variable that it represents affects the option price. (15 marks)

   (b) 'Explain how the formula can be modified to give the value of an option on a stock paying a continuous dividend. (5 marks)

   (c) Give some examples of how option pricing can be applied in corporate finance. (5 marks)

4. (a) Explain the difference between a forward contract and a futures contract. (10 marks)

   (b) Use the Rational Expectations approach to derive an expression for the futures price of a cash flow with payoff x_{t+T} at time $t+T$. (15 marks)