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

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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

$$A^{-1} = \left(\frac{\frac{d}{ad-bc}, \frac{b}{bc-ad}}{\frac{c}{bc-ad}, \frac{a}{ad-bc}}\right)$$

- 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)