NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

B. COMM (HONOURS) ACTUARIAL SCIENCE

FINANCIAL ECONOMICS : CIN 4115

JULY 2004 SUPPLEMENTARY EXAMINATION

DURATION : 2 HOURS

INSTRUCTIONS TO CANDIDATES
1.   Attempt all questions
2.   You must not start writing your answers in the booklet until instructed to do so by the invigilator.
3.   In addition to this question paper, you require an electronic calculator (non-programmable)

1(a)   Consider the power utility function given by U(x) = $\dfrac{x^{\alpha} - 1}{\alpha}$, $(x \geq 0)$, show that U

exhibits declining absolute risk aversion and constant relative risk aversion.
[6 marks]

(b)   Suppose that an investor has a quadratic utility function $U(x) = x f c x^2$, with c< 0

and $0 < x < -\dfrac{1}{2c}$, then show that the function to be maximized under the

expected utility function theorem involves a linear combination of the first two
moments of the distribution of return.   **[6 marks]**
[Total : 12 marks]

2.   An investor is faced with three independent investment portfolios A, B and C.

Each has the following rate of returns:
A: 3%, 5% and 7% with probabilities $^1/_4$, $^1/_2$, $^1/_4$ respectively
B: 4%, 5% and 6% with probabilities $^1/_3$, $^1/_3$, $^1/_3$ respectively
C: 3%, 5% and 7% with probabilities $^1/_5$, $^2/_5$, $^2/_5$ respectively

Using each of the following types of dominance which portfolio would an
investor choose first, second and third?

(a)   Absolute dominance   **[2 marks]**
(b)   First order stochastic dominance   **[3 marks]**
(c)   Second order stochastic dominance   **[4 marks]**
[Total : 9 marks]

3.   An investor can choose between two investment portfolios B and C which are
independent. The investments give the following returns:

Probability	B	C
$\frac{1}{3}$	45	30
$\frac{1}{3}$	60	60
$\frac{1}{3}$	75	90

You are advised that the investor wants to create a minimum variance portfolio P consisting of assets B and C.

(i)   Find the portfolio P. Compute its mean and variance (short-sales are allowed)   **[8 marks]**

(ii)   Sketch the opportunity set formed by these two assets. Mark on your sketch the efficient frontier (short-sales are disallowed).   **[9 marks]**

Total : 17 marks]

4.   Assets A and B have expected return of 7% and 10% respectively and betas 0.8 and 1.2 respectively. Use the security market line to calculate the risk-free rate and the expected return on the market portfolio.   **[8 marks]**

5.   Three assets 1, 2 and 3 can be modeled by a single index model using the following parameters.

	1	2	3
α	2	-1	1
β	0.5	1.5	1.2
σ_{ei}^2	5	8	4

(α has units % and σ_{ei}^2 has units %%)

(a)   Given that the market has expected return of 9% and variance of 2%%. Calculate the mean, variance and covariance of return on each asset.
                                                                                    [7 marks]

(b)   An investor can only invest in assets 1, 2 and 3. She wants to calculate the minimum variance portfolio for a given expected return Ep. She expresses this problem in matrix notation as $Ay = b$. Write down the matrices A, y and b.   **[5 marks]**

(c)   Briefly explain your understanding of the alphas and betas used in asset-liability models.   **[4 marks]**

[Total : 16 marks]

6.   Give two examples of inside information which could encourage an insider to buy a stock. Who would be the insiders be in each case? Why does the government limit the trading that insiders do?   **[8 marks]**

END OF EXAMINATION PAPER!!!