Student ID.....

EE431/438 Economics of Financial Markets and Institutions

Exercise 3: Capital Asset Pricing Model (CAPM)

Please submit at the BE office, 5th floor department of Economics building.

Deadline of submission : Tuesday, March 26th, 2013, before 15.00 hrs.

Late submission will not be accepted.

1. Let the expected rate of return on the market portfolio M be equal to 0.09. The standard deviation of the market portfolio M is equal to 0.16. The risk-free interest rate is equal to 0.01.

   (a) Find the equation for the CML and interpret its meaning regarding the relationship between return and risk.

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   (b) Let G be a portfolio. The expected rate of return on the portfolio G is equal to 0.08 and the variance of portfolio G is equal to 0.0196. Does the portfolio G lie on CML? Graphically illustrate and explain. If the portfolio G lie on the CML, derive the weight of the risk-free asset and the weight of the market portfolio in the portfolio G.

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   (c) Let J be a portfolio. The expected rate of return on the portfolio J is equal to 0.07 and the variance of portfolio J is equal to 0.0256. Does the portfolio J lie on CML? Graphically illustrate and explain. If the portfolio J lie on the CML, derive the weight of the risk-free asset and the weight of the market portfolio in the portfolio J.

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(d) According to James Tobin's investment decision process, which portfolio(s) investors might choose to hold? Describe James Tobin's investment decision process. Indentify the portfolio(s) investors might choose to hold. Explain the reason.

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(e) According to James Tobin's investment decision process and the CML in (a), what are the market required rates of return on the portfolio M, G and J? Is the given information sufficient to determine the market required rate of returns of the three portfolios?

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2. The following information is provided for a stock market.

	ER_i	σ_i	r_{im}
Asset 1	0.04	0.02	0.8
Asset 2	0.06	0.04	0.4
Asset 3	0.08	0.08	0.8
Market Portfolio (M)	0.09	0.10	1

ER_i is the expected rate of return on asset i. σ_i is the standard deviation of the rate of return on asset i. r_{im} is **the correlation coefficient** between the rate of return on asset i and the rate of return on the market portfolio M. At equilibrium, the expected rate of return on the market portfolio is equal to 0.09 and the standard deviation of the market portfolio is equal to 0.10. The risk free interest rate is 4%. (Hint: $\sigma_{xy} = r_{xy} \times \sigma_x \times \sigma_y$, $r_{xy} = \dfrac{COV(X,Y)}{\sigma_x \sigma_y}$)

(a) In the context of CAPM, find the beta-coefficient for each asset.

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(b) Construct SML from the given information and interpret its meaning. Graphically illustrate SML and show the points where each asset lie in the graph.

(c) In the context of CAPM, detemine whether each asset is overpriced, underpriced.or correctly priced. Explain the price adjustment process that might happen (if any).

(d) You are informed that the fourth asset, with the beta-coefficient is equal to 2 is available. Empirical evidence reveals that its expected rate of return is 11%. Determine whehter this asset is overpriced, underpriced or correctly priced. In the context of CAPM, explain the price adjustment process that might happen(if any).

3. Given that

$$CML : E(R_p) = R_f + \left(\frac{E(R_m) - R_f}{\sigma_m} \right) \sigma_p,$$

show how to derive CAPM. (Imagine you hold the market portfolio. You add a risky asset, i.)