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EE431/438 Economics of Financial Markets and Institutions

Exercise 4: Capital Asset Pricing Model (CAPM)

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

Deadline of submission : November 10, 2014, before 15.00 hrs.

1. The percentage of a portfolio's total value invested in a particular asset is called that asset's ..... (portfolio return, portfolio weight, portfolio risk, rate of return or investment value).

2. Imagine you have a portfolio of two risky stocks which turns out to have no diversification. The reason you have no diversification is ..... ((a) the returns move perfectly in the same direction with one another, (b) the returns move (perfectly or imperfectly) in the same direction with one another, (c) the returns move perfectly in the opposite direction with one another, (d) the returns move imperfectly either in the same or in the opposite direction with one another.)

3. Company X has a beta of 1.45. The expected risk-free rate of interest is 2.5% amd the expected return on the market as a whole is 10%. Using the CAPM, what is ABC's expected return?

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4. Suppose CAPM holds. Given the following data, calculate the betas and the expected rates of reuturns of the two securities.

	Expected rate of returns (%)	Standard deviation (%)	Correlation with the market portfolio
Security 1	ER_1?	20	0.9
Security 2	ER_2?	9	0.8
Market portfolio	12	12	r_{mm} = ρ_{mm}=? *
Risk free asset	5	0	0

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5. Consider an economy with just two assets. The details of these are given below.

Stock	Number of shares	Price ($)	Expected return (%)	Standard deviation (%)
A	100	1.5	15	15
B	150	2	12	9

The correlation coefficient between the returns on the two assets is $\frac{1}{3}$ and there is also a risk free asset. Assume the CAPM model is satisfied.

(a) What is the expected rate of return on the market portfolio?

(b) What is the standard deviation of the market portfolio?

(c) What is the beta of stock A?

(d) What is the risk free rate of return?

(e) Construct the capital market line (CML) and the security market line (SML).

6. Let the expected rate of return on the market portfolio M be equal to 0.10. The standard deviation of the market portfolio M is equal to 0.20. The risk-free interest rate is equal to 0.02.

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

(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 M is equal to 0.0225. 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.

(c) Let J be a portfolio. The expected rate of return on the portfolio J is equal to 0.08 and the variance of portfolio M is equal to 0.04. 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.

(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.

(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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7. The following information is provided for a stock market.

	ER_i	σ_i	r_{im}
Asset 1	0.07	0.30	0.2
Asset 2	0.08	0.20	0.4
Asset 3	0.10	0.15	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.

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(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).

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(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 17%. 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).

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(e) A portfolio K consists of 0.10 of asset 1 and 0.90 of asset 2. What is the beta-coefficient for the portfolio K? In the context of CAPM, what is the equilibrium market required rate of return on the portfolio K?

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