

EE431/438 Economics of Financial Markets and Institutions

Problem Set 5 : CAPM

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

Deadline of submission : October 25th, 2013, 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. If the covariance of stock 1 with stock 2 is -.0065, then what is the covariance of stock 2 with stock 1?

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3. A portfolio has 50% of its funds invested in Security One and 50% of its funds invested in Security Two. Security One has a standard deviation of 6. Security Two has a standard deviation of 12. The securities have a coefficient of correlation of 0.5. What is the standard deviation of the portfolio?

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

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5. Imagine you have a portfolio of two risky stocks which turns out to have no diversification. The reason you have no diversification is .....

(Hint: the returns are too small, the returns move perfectly opposite of one another, the returns are too large to offset, the returns move perfectly with one another, or the returns are completely unrelated to one another).

6. Suppose CAPM holds. Given the following data, calculate the betas and the expected rates of returns of the two securities. Find correlation coefficient between the market portfolio and the market portfolio.

	Expected rate of returns (%)	Standard Deviation (%)	Correlation coefficient with the market portfolio
Security 1	$ER_1?$	20	0.9
Security 2	$ER_2?$	9	0.8
Market portfolio	12	12	$\sigma_{mm}?$
Risk free asset	5	0	0

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7. 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.

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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 0.0225. 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.

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- (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 J 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.

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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. Identify 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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8. The following information is provided for a stock market.

	$ER_i$	$\sigma_i$	$r_{im}$
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.  $\sigma_i$  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:  $\sigma_{xy} = r_{xy} \times \sigma_x \times \sigma_y$ ,  $r_{xy} = \frac{COV(X, Y)}{\sigma_x \sigma_y}$ )

(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, determine 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 whether 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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