Original

Examination: **Securities Analysis (1904)** **Summer Term 2005**

Examiner: **Prof. Dr. Peter Reichling**

The following aids can be used: non-programmable pocket calculator.

This examination comprises **4 problems**. All of them are to be solved.

EXAMINATION QUESTIONS:

Problem 1. (15 points)

(i) How does the present value of the cash flow series change when the hurdle rate changes? (Show it with the help of the derivative.)
(ii) How can one interpret the notion of the duration? (Provide two interpretations!)
(iii) How does the duration of a bond change if
   a. the maturity of the bond rises;
   b. the coupon rate of the bond falls;
   c. there is an upward shift in the term structure?
(iv) Find the duration of a bond which matures in three years, has a coupon rate of 8% paid semiannually, with the face value of 100€. (Assume a flat term structure at a level of 5%). How will the price of the bond change if there is a downward shift in the term structure by 50bps?

Problem 2. (25 points)

(i) What is diversification?
(ii) Assume an equally weighted portfolio consisting of two stocks which have the same standard deviation and the same expected return. In order to achieve the highest diversification effect, what correlation coefficient must these two stocks have? (Show your result both formally and graphically in $\rho - \sigma^2$ space.)
(iii) Sketch the returns of two stocks from (ii) as a function of time in one diagram.
(iv) Sketch in a $\mu - \sigma$ diagram the two stocks and the portfolio of these stocks.
(v) Show graphically the total risk of a portfolio as a function of the number of stocks in the portfolio. Derive your graphical result formally!

Problem 3. (35 points)

(i) What are the assumptions of the CAPM? (Name at least five of them!)
(ii) How does the CAPM relates β and μ of a stock. (Show it both graphically and formally.)
(iii) Sketch the CML. Show on your graph the market portfolio and some stock i. How can you both graphically and formally determine the systematic and unsystematic risk of the market portfolio and the stock i.
(iv) Show formally that the market portfolio is in a linear relationship with the risk free interest rate.
(v) Line out formally how one can determine the market portfolio.

Problem 4. (25 points)

(i) What is Jensen's alpha? (Show how it can be determined both graphically and formally). Prove that it is not possible to rank clearly alternative investments using Jensen's alpha.

(ii) Determine the terms *selectivity* and *net selectivity*. How are they related? (Show it both formally and graphically.)

(iii) Consider the following data for some portfolio P and the market portfolio M:

	μ	σ	β
P	10%	25%	0.5
M	10%	20%	1.0

Let risk free interest rate be 8%. Split the performance of P in selectivity and net selectivity. Compute the appraisal ratio for P.