Taloustieteiden tiedekunta

Tentin päivämäärä / Date of exam: 04.12.2014
Opintojakson koodi, nimi ja tentin numero / The code and the name of the course and number of the exam: **724208A Portfolio Theory**
Tentaattori(t)/ Examiner(s): Andrew Conlin
Sallitut apuvälineet / The devices allowed in the exam: X Laskin (ei graafinen/ohjelmoitava)/Calculator (not graphic, programmable) ☐ Sanakirja/Dictionary   ☐ Muu materiaali, tarkennettu alla/Other material, specified below
Tenttiin vastaaminen / Please answer the questions X suomeksi/ in Finnish X englanniksi/ in English
Kysymyspaperi on palautettava / Paper with exam questions must be returned: ☐ Kyllä/Yes X Ei/No

The exam consists of 10 quantitative questions (2 points each) and 5 short-answer essay questions (4 points each). There is a formula sheet attached. You may answer in English or Finnish. If you answer in Finnish, use yleiskieli. **WRITE CLEARLY and SHOW YOUR WORK** (no credit for answers if you do not show your work!)

I wish to use my midterm bonus points for this exam: YES NO
(only for those who did NOT use bonus points on the first exam)

Part 1

Questions 1 and 2 use the following information: P_t = price at time t; Q_t = shares outstanding at time t

Stock	P_0	Q_0	P_1	Q_1
A	100.00	10000	101.50	10000
B	5.00	3000000	5.15	3000000

1. What is the return on a price-weighted index composed of stocks A and B?
2. What is the return on market-value-weighted index composed of stocks A and B?

Questions 3 and 4 are related.

You sold short 1000 shares of Nokia at a price of 5.25. The initial margin is 50%. You earn no interest on the funds in your account and the cost of borrowing the shares is 0.25%.

3. If the maintenance margin is 35%, how high can the stock go before you get a margin call?
4. Nokia paid a dividend of 0.25€ per share while you held the short position. You covered the short position at a price of 5.80. What was your return on the short position?
5. Assume the utility function $U = E(r) - ½ A σ^2$ with risk aversion = 4. The equity fund has $E(r_E)$= 12% and $σ_E$=.30 The debt fund has $E(r_D)$ = 6%. If an investor is indifferent between the debt and equity funds, then what is $σ_D$?

Questions 6-8 are related.

6. Assume a world with one risky portfolio and one risk-free asset. Use the utility function $U = E(r) - ½ A \sigma^2$. The risk free rate is 4%, and the risky portfolio has $E(r_p)$ = 14% and σ_p=24%. If your risk aversion is 2, how much of your money should you put into the risky portfolio?

7. What is the expected return of your optimal complete portfolio?

8. What is the standard deviation of your optimal complete portfolio?

9. Assume the CAPM is true. The risk-free rate is 3%, the $E(r_A)$ = 11%, and $\beta_A = 1.4$. If Stock B has $\beta_B = 2.5$, what is the $E(r_B)$?

10. Assume the index model. The risk-free rate is 2%. The market portfolio has $E(r_M)$ = 8% and σ_M= 25%. The active portfolio has α_A = 3.5% and $\sigma_{e_A} = 28\%$. What is the Sharpe ratio of the optimal risky portfolio?

Part 2 Write maximum 2 paragraphs (tekstikappale) per question. Write complete ideas; do NOT just list vocabulary words.

1. What is the disposition effect, and why is it bad behavior for investors?
2. You just bought 100 shares of Apple at $118. The current inside market (inside quote) for the stock is 117.90 to 118.10. You want to be sure that do not lose more than 10% on this investment. What type of order do you enter with your broker? And what are the advantages and disadvantages of entering this type of order?
3. Define the efficient frontier and explain its role in optimal portfolio construction.
4. In the index model of portfolio formation, we assume that market risk (m_i) and firm-specific risk (e_i) are uncorrelated. Explain how this assumption makes the index model easier than Markowitz's method.
5. What is Roll's critique?

Formula Sheet - *Kaavakokoelma*

$$(1+R)=(1+r)(1+i)$$

$$APR=\frac{(1+EAR)^{T}-1}{T}$$

$$\sigma^2 = \sum_s p(s)\left[r(s) - E(r)\right]^2, \quad \sigma = \sqrt{\sigma^2}$$

$$Cov(r_i, r_j) = \sum_s p(s)\left[r_i(s) - E(r_i)\right]\left[r_j(s) - E(r_j)\right]$$

$$S = \frac{E(r_P) - r_f}{\sigma_P}$$

$$y^* = \frac{E(r_P) - r_f}{A\sigma_P^2}$$

$$E(r_p) = \sum_{i=1}^{n} w_i E(r_i)$$

$$\sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j Cov(r_i, r_j)$$

$$Cov(r_i, r_j) = \rho_{ij}\sigma_i\sigma_j$$

$$w_{A_{Min}} = \frac{\sigma_B^2 - Cov(r_A, r_B)}{\sigma_A^2 + \sigma_B^2 - 2Cov(r_A, r_B)}; w_{B_{Min}} = 1 - w_{A_{Min}}$$

$$w_A = \frac{[E(r_A)-r_f]\sigma_B^2 - [E(r_B)-r_f]Cov(r_A,r_B)}{[E(r_A)-r_f]\sigma_B^2 + [E(r_B)-r_f]\sigma_A^2 - [E(r_A)-r_f + E(r_B)-r_f]Cov(r_A,r_B)}; w_B = 1 - w_A$$

$$E(R_i) = \alpha_i + \beta_i E(R_M)$$

$$\sigma_{i_{or}P}^2 = \beta_{i_{or}P}^2\sigma_M^2 + \sigma^2(e_{i_{or}P})$$

$$Cov(r_i, r_j) = \beta_i\beta_j\sigma_M^2$$

$$\alpha_P = \sum_{i=1}^{n} w_i \alpha_i; \quad \beta_P = \sum_{i=1}^{n} w_i \beta_i; \quad \sigma^2(e_P) = \sum w_i^2 \sigma^2(e_i)$$

$$w_i^0 = \frac{\alpha_i}{\sigma^2(e_i)} \quad \rightarrow \quad w_i = \frac{w_i^0}{\sum_{i=1}^{n} w_i^0}$$

$$w_A^0 = \frac{\alpha_A / \sigma^2(e_A)}{E(R_M) / \sigma_M^2} \quad \rightarrow \quad w_A^* = \frac{w_A^0}{1 + (1 - \beta_A) w_A^0}$$

$$S_P^2 = S_M^2 + \left[\frac{\alpha_A}{\sigma(e_A)} \right]^2$$

$$E(r_i) = r_f + \beta_i \left[E(r_M) - r_f \right]$$

$$\beta_i = \frac{Cov(r_i, r_M)}{\sigma_M^2}$$

$$E(r_P) = r_f + \beta_{P1} \left[E(r_1) - r_f \right] + \beta_{P2} \left[E(r_2) - r_f \right] + \ldots$$