HANKEN Svenska handelshögskolan
Institutionen för finansiell ekonomi
och ekonomisk statistik

INTRODUCTORY EXAM

12.9.2012

Tools allowed: Basic calculator

Time: 1h 45min.

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EMPIRICAL METHODS IN FINANCE (1725)

Ad: There will be a Datastream instruction session on Tuesday, 25 September at 11:15 in aud. 407. The administration is handled by Hanken's library, and the teacher is a representative for Datastream. The information we have obtained so far says:

> "Datastream: Finding codes in Navigator, How to download data into Excel, How to create Datastream Charts".

For the term paper in this course as well as for the bachelor's and master's thesis seminars you need to be able to collect data.

We strongly recommend you to participate in this lecture.

All answers must be justified and motivated and **all calculations must be shown in detail**. If you fail on this, you will get no points for the question. A clear, readable writing style is warranted. Highlight the most important parts of your answer.

1. (1 point.) Two gangsta students, Mrs. Snipf and Mr. Snopf are participants in the *Empirical Methods in Finance* course at Hanken. In the introductory exam, Mr. Snopf knows nothing, but Mrs. Snipf reveals her correct answers to Mr. Snopf. The heroic and alert examiner detects the attempt. Based on Hanken's *Action plan against Academic Dishonesty*,
   a) what actions should the examiner take;
   b) what are the repercussions for the students?

2. (4.5 points.) The variance-covariance matrix and return vector in decimal format for three securities are given by

$$\mathbf{V}=\begin{bmatrix} 0.090 & 0.015 & -0.003 \\ 0.015 & 0.040 & 0.008 \\ -0.003 & 0.008 & 0.010 \end{bmatrix} \text{ and } \overline{\mathbf{R}}=\begin{bmatrix} 10 \\ 6 \\ 3 \end{bmatrix}$$

   Conveniently, it is also known that

$$\mathbf{V}^{-1}=\begin{bmatrix} 12.48606 & -6.46600 & 8.91862 \\ -6.46600 & 33.11037 & -28.42809 \\ 8.91862 & -28.42809 & 125.41806 \end{bmatrix}$$

   a) Verify that $\mathbf{V}^{-1}$ is the inverse matrix of $\mathbf{V}$.

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b) Mrs. Hjördis Orvarsson is a stinking rich but technically less skilful investor. You have evaluated that her risk aversion coefficient is $\gamma = 4$. Compute the weights in the portfolio that maximizes her utility. No risk-free asset is available. The formulas are:

$$\begin{aligned} A &= \mathbf{R}^T\mathbf{V}^{-1}\mathbf{1} \\ C &= \mathbf{1}^T\mathbf{V}^{-1}\mathbf{1} \quad = 119.06354515 \\ \mathbf{a} &= \mathbf{V}^{-1}\overline{\mathbf{R}} \\ \mathbf{b} &= \mathbf{V}^{-1}\mathbf{1} \end{aligned}$$

The weight vector is given by

$$\mathbf{w}_{p,\max U} = \frac{1}{\gamma}\left(\mathbf{a} - \frac{\mathbf{b}(A-\gamma)}{C}\right).$$

c) Compute the portfolio return and volatility given the weights you calculated in the previous part. Matrix formulas must be used.

d) Shortly comment on your results, both with respect to matrix algebra and finance theory.

3. (4.5 p.) We have 100 observations for the actual price of apartments sold in postal code area 00100 to 00180 in Helsingfors during the period July 2011 to June 2012. We also have the corresponding sizes of the apartments, measured in square meters (m²). We estimate a simple regression model of the form $Y = \alpha + \beta X + \varepsilon$. The result table is given below the questions.

a) State the model given the estimates shown in the table.

b) Given the model, what is the expected price for a 112 square meter apartment?

c) State the statistical hypotheses for α and β, report the test statistics, and draw conclusions about the hypotheses.

d) Consider one additional issue shown in the table and comment on it.

gretl: model 1

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Model 1: OLS, using observations 1-100
Dependent variable: Price

              coefficient   std. error   t-ratio    p-value
  ------------------------------------------------------------
  const        45506.1       17109.4      2.660    0.0091    ***
  m2            4823.95        206.386    23.37     7.32e-042 ***

Mean dependent var   396714.1   S.D. dependent var   208741.1
Sum squared resid    6.56e+11   S.E. of regression   81823.13
R-squared            0.847901   Adjusted R-squared   0.846349
F(1, 98)             546.3158   P-value(F)           7.32e-42
Log-likelihood      -1272.115   Akaike criterion     2548.230
Schwarz criterion    2553.441   Hannan-Quinn         2550.339
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