Exam Financieel Modelleren / Financiering 2.2,
December 20, 2011, 08:45-10:45.

The format of the exam is MULTIPLE CHOICE. If you do not see the exact answer (which you obtained by your calculations) between the choices, choose the closest answer.
During the exam you can use the attached list with formulas and a graphical calculator.
Hint regarding all the exercises:
EVERYWHERE, PAY EXTRA ATTENTION TO THE TIME SCALE, I.E. YEARLY RETURNS OR VOLATILITIES OR VaR'S VS. MONTHLY VS DAILY, **and distinguish between** *VARIANCE and VOLATILITY*!
Results will be announced on January 3.

The next table shows monthly returns for two stocks over last twelve months.

Date		
1	3.5%	0.33%
2	−3.2%	−4.5%
3	5.9%	3.5%
4	−0.5%	−1.7%
5	0.5%	0.6%
6	−1.5%	−0.5%
7	−3.1%	−1%
8	3%	4.3%
9	5.3%	2.1%
10	4.5%	1%
11	−2.4%	−0.6%
12	0.7%	2%

1. It is known that $\sum_{i=1}^{12}(r_i - \bar{r})^2$ equals to 119,81 for the first stock and 62,82 for the second stock. The variances of the monthly returns of the first and the second stocks are

   a) 10,9% and 5,7%   b) 10 and 5,2   c) 10,9 and 5,7   d) 3,3 and 2,4.

2. The yearly volatilities of the first and the second stocks are

   a) 10,9% and 5,7%   b) 11,4% and 8,3%   c) 3,3% and 2,4%   d) 37,7% and 19,8%.

3. Furthermore, it is known that $\sum_{i=1}^{12}(r_i^1 - \bar{r}^1)(r_i^2 - \bar{r}^2) = 66,72$. The covariance between the first and second stock's returns is

   a) 0,77   b) 6,06%   c) 5,6   d) 6,06.

4. The correlation between the first and second stock's returns is

   a) 7,7%   b) 6,4%   c) 77%   d) 9,8%.

5. Your portfolio consists for 50% of stock 1 and for 50% of stock 2. The yearly volatility of your portfolio is

   a) 2,7%   b) 9,3%   c) 7,2%   d) 7,4%.

6. The portfolio consists of three stocks (with weights 0,5, 0,25 and 0,25), whose returns satisfy the following Variance-Covariance matrix (all numbers are yearly):

$$\begin{pmatrix} 0.2 & 0.06 & 0.06 \\ 0.06 & 0.16 & 0.08 \\ 0.06 & 0.08 & 0.12 \end{pmatrix}$$

The yearly volatility of this three-stocks portfolio is

   a) 23%   b) 11%   c) 45%   d) 33%.

7. The same three stocks as in 6. The correlation between 2nd and 3d stock returns is

   a) 58%   b) 8%   c) 4%   d) 28%.

8. You invest 10 000 Euros in the same portfolio of three stocks as in 6. Assuming that the daily return on this portfolio is approximately zero, the portfolio Value-at-Risk at 95% and 1 day is

   a) 500 Euros   b) 54 Euros   c) 340 Euros   d) 5395 Euros.

(Recall: z-value at 95% for Normal (0,1) distribution is 1,645.)

9. Consider Microsoft and WalMart stocks, who have yearly volatilities of respectively 24% and 14% and the returns' correlation of 0,7. You borrow and short-sell 2000 USD worth of Microsoft stock and invest the proceeds plus additional 8000 USD (so the total of 10 000 USD) into WalMart stock. The yearly volatility of your portfolio is

   a) 9%   b) 14%   c) 11%   d) 12%.

10. The same Microsoft and WalMart stocks as above. You have 10 000 USD and you borrow additional 10 000 USD against the risk-free rate of 6% to invest the entire amount of 20 000 USD into a portfolio that consists for 30% of Microsoft and for 70% of WalMart stocks. The average yearly returns on Microsoft and WalMart are respectively 45% and 25%. The expected return on your investment is

   a) 50%   b) 62%   c) 64%   d) 56%.

11. The same investment strategy as in 10. The volatility of your investment is:

   a) 31,4%   b) 15,7%   c) 4,9%   d) 25,4%.

Hint: Compute first the volatility of the unleveraged portfolio consisting for 30% of Microsoft and for 70% of WalMart.

12. The same investment strategy as in 10. Assuming that the daily return on this portfolio is approximately zero, the 95%, 1 day Value-at-Risk of your investment is

   a) 652 UDS   b) 326 USD   c) 258 USD   d) 516 USD.

13. The same investment strategy as in 10. Do NOT assume now that the daily return on your investment is approximately zero but use the actual expected return calculated in 10. The 99%, 1 month VaR of your investment is:

   a) 5150 UDS   b) 1175 USD   c) 3283 USD   d) 13 674 USD.

(Hint: expected loss = - expected return. Also, recall: z-value at 99% for Normal (0,1) distribution is 2,326.)

14. A portfolio consists of stocks all with the same volatility of 30% and the same correlation of 0,4 between each pair of stock returns. The lowest possible portfolio volatility you can achieve with these stocks is

   a) 0%   b) 12%   c) 4%   d) 19%.

15. Calculate the 97.5% Value at Risk for one day for the following portfolio: 100 000 Euros invested in AEX index. Lately the volatility of AEX was 15% per annum. Assume the average yearly return of 8% and use Normal distribution z-value at 97,5%: 1,96. Your answer is:

   a) 1855 Euros   b) 6144 Euros   c) 29370 Euros   d) 1824 Euros.

16. The same portfolio as in 15. The 95%, 10 days VaR of this portfolio is

   a) 4890 Euros   b) 4600 Euros   c) 4925 Euros   d) 5550 Euros.

17. The same portfolio as in 15. In the Appendix, you can find 100 sorted historical changes in such a portfolio after one day (in Euros). The 97,5%, 1 day Value-at-Risk for this portfolio is estimated at

   a) 1700 Euros   b) 1605 Euros   c) 1510 Euros   d) 1580 Euros.

18. The same portfolio as in 15. Using the Appendix, the 97,5%, 1 day Expected Shortfall for this portfolio is estimated at

    a) 1742 Euros   b) 1810 Euros   c) 1710 Euros   d) 2330 Euros.

19. The beta's of Unilever and Mittal are respectively 0,8 and 1,8 and the volatilities are respectively 20% and 30% p/a. The average return on the AEX index is 8% p/a, the volatility of the AEX is 15% p/a and the risk free rate on Dutch Treasury Certificates is 3%. The correlations of Unilever and Mittal returns with the AEX returns are

    a) 1 and 3,6   b) 0,5 and 0,75   c) 0,6 and 0,9   d) 0,75 and 0,5.

20. The expected return on the portfolio equally spread between Unilever and Mittal is

    a) 9,5%   b) 6,5%   c) 10,2%   d) 4,3%.

21. Suppose we have 100K Euros to invest. To achieve the same expected return as that of the equally weighted portfolio of Unilever and Mittel (so the same return as in ex. 20) but with lower volatility, we can invest (or borrow) a proportion of our wealth x against the risk-free rate of DTC and put the rest into AEX. Such an investment strategy is

    a) invest 30K into DTC and 70K into AEX.
      b) such a strategy is not possible
      c) borrow 15K at risk free rate and invest all 115K in AEX
      d) borrow 30K at risk free rate and invest all 130K in AEX.