

Lecture 4

1. In the following table there are three markets with only two securities. Calculate the weights for minimal risk portfolio on each market. What will be the expected return and risk of every portfolio? Which of this three markets will be the best investment?

Market	Security	r_i	risk	Correlation_{A,B}
I	A	0,22	0,30	0,15
	B	0,31	0,32	
II	A	0,26	0,29	-0,06
	B	0,34	0,33	
III	A	0,18	0,20	0,09
	B	0,41	0,38	

2. For investment opportunities in three companies calculate the minimum variance portfolio. In the next step calculate the optimal portfolio with return of 15 %. For every portfolio calculate the return and risk.

	Company 1	Company 2	Company 3	Correlation	
μ	0,8	0,3	0,6	$\sigma_{1,2}$	-0,1
σ	1,2	0,8	1,1	$\sigma_{1,3}$	-0,5
				$\sigma_{2,3}$	0,3

3. In the following table you find covariance matrix and the vector of returns. What will be the optimum portfolio (weights) with minimum risk and then calculate the weights with return of 5 %. For all versions calculate return and risk.

	Sec ₁	Sec ₂	Sec ₃	Sec ₄	Sec ₅	Sec ₆	Sec ₇	r_i (%)
Sec ₁	80,5	82,7	85,3	85,1	123,9	22	3,5	1,9
Sec ₂	82,7	184,7	131,5	69,4	49,5	58	-9,9	6,1
Sec ₃	85,3	131,5	374,2	384,5	366,5	103,8	343,5	2,9
Sec ₄	85,1	69,4	384,5	684,8	599,1	51,6	502,7	4
Sec ₅	123,9	49,5	366,5	599,1	871,4	-21,2	520,4	5,7
Sec ₆	22	58	103,8	51,6	-21,2	89,7	74,4	3,4
Sec ₇	3,5	-9,9	343,5	502,7	520,4	74,4	574,6	4,9

4. Consider an investment opportunity with risky asset and risk free asset. The return of risk free asset will be 3,5 %.

Risky portfolio	A	B	C	D
\bar{r}_p	6,2%	4%	7,5%	8,4%
σ_p	14,5%	9,7%	17%	20%

Weights by different portfolios:

	1.	2.	3.	4.	5.
r_f	0,20	0,40	0,50	0,60	0,80
Portfolio	0,80	0,60	0,50	0,40	0,20