

Trh	CP	r_i	riziko	korelace _{A,B}
I	A	0.22	0.3	0.15
	B	0.31	0.32	
II	A	0.26	0.29	-0.06
	B	0.34	0.33	
III	A	0.18	0.2	0.09
	B	0.41	0.38	

Trh I CovMatice

	0.09	0.0144	
	0.0144	0.1024	
	0.18	0.0288	1
	0.0288	0.2048	1
	1	1	0

VPS

0
0
1

3.056235	-3.05623	0.537897
-3.05623	3.056235	0.462103
0.537897	0.462103	-0.11013

wi

w_a	0.537897
w_b	0.462103
	-0.11013

Zkouska

1

Zk:

1.00	0.00	0.00
0.00	1.00	0.00
0.00	0.00	1.00

Trh II CovMatice

	0.0841	-0.00574	
	-0.00574	0.1089	
	0.1682	-0.01148	1
	-0.01148	0.2178	1
	1	1	0

VPS

0
0
1

2.445179	-2.44518	0.56064
-2.44518	2.445179	0.43936
0.56064	0.43936	-0.08925

wi

w_a	0.56064
w_b	0.43936
	-0.08925

Zkouska

1

Zk:

1.00	0.00	0.00
0.00	1.00	0.00
0.00	0.00	1.00

Trh III **CovMatice**

0.04	0.00684	
0.00684	0.1444	

0.08	0.01368	1
0.01368	0.2888	1
1	1	0

2.928772	-2.92877	0.805764
-2.92877	2.928772	0.194236
0.805764	0.194236	-0.06712

Zk:

1.00	0.00	0.00
0.00	1.00	0.00
0.00	0.00	1.00

VPS

0
0
1

wi

w_a	0.805764
w_b	0.194236
	-0.06712

Zkouska 1

Trh	Rp	SigmaP	Rp/SigmaP
I	0.261589	0.234659	1.114761
II	0.295149	0.211251	1.397146
III	0.224674	0.183192	1.226445

Požadujeme na každém trhu portfolio s $E(R_p)=25\%$

Matice soustavy				VPS
0.18	0.0288	1	0.22	0
0.0288	0.2048	1	0.31	0
1	1	0	0	1
0.22	0.31	0	0	0.25

Inv.Matice				wi
0	2.52E-15	3.444444	-11.1111	0.666667
0	-2.5E-15	-2.444444	11.1111	0.333333
3.444444	-2.444444	-2.87432	10.56691	lambda1
-11.1111	11.1111	10.56691	-40.3951	lambda2

Rp	VarP	SigmaP
0.261589242	0.055065	0.234659

				Zk
0	2.52E-15	3.444444	-11.1111	1
0	-2.5E-15	-2.444444	11.1111	
3.444444	-2.444444	-2.87432	10.56691	
-11.1111	11.1111	10.56691	-40.3951	

Rp	VarP	SigmaP
0.295148765	0.044627	0.211251

Rp	VarP	SigmaP
0.224674321	0.033559	0.183192

Rp	VarP	SigmaP		
0.25	0.057778	0.24037	1.040063	

	Firma 1	Firma 2	Firma 3		Kovariance	
μ	0.04	0.015	0.03		$\sigma_{1,2}$	2.3
σ	0.6	0.04	0.055		$\sigma_{1,3}$	-1.8
					$\sigma_{2,3}$	0.3

Covar Matice

	0.36	2.3	-1.8
	2.3	0.0016	0.3
	-1.8	0.3	0.003025

Matice soustavy

0.72	4.6	-3.6	1	vps	0
4.6	0.0032	0.6	1		0
-3.6	0.6	0.00605	1		0
1	1	1	0		1

Inver.M

0.017696	0.113034	-0.13073	-0.00332	wi	-0.00332
0.113034	-0.11779	0.004756	0.477567		0.477567
-0.13073	0.004756	0.125974	0.525757		0.525757
-0.00332	0.477567	0.525757	-0.30169		-0.30169

zk 1

Pozadovana vynosnost portfolia: 3,5%

Matice soustavy

0.72	4.6	-3.6	1	0.04	vps	0
4.6	0.0032	0.6	1	0.015		0
-3.6	0.6	0.00605	1	0.03		0
1	1	1	0	0		1
0.04	0.015	0.03	0	0		0.025

Inv.M

0.057018	0.038012	-0.09503	-0.59381	25.89474	wi	0.05356
0.038012	0.025341	-0.06335	1.604128	-49.4035		0.36904
-0.09503	-0.06335	0.158384	-0.01032	23.50877		0.5774
-0.59381	1.604128	-0.01032	8.56528	-388.847		-1.15589
25.89474	-49.4035	23.50877	-388.847	17052.26		37.45963

Rp	VarP	SigmaP		
0.022803	0.150845	0.388387	0.058713	

Rp	VarP	SigmaP		
0.025	0.1097	0.33121	0.075481	

Emise	CP ₁	CP ₂	CP ₃	CP ₄	CP ₅	CP ₆	CP ₇	r _i (v %)
CP ₁	80.5	82.7	85.3	85.1	123.9	22	3.5	1.9
CP ₂	82.7	184.7	131.5	69.4	49.5	58	-9.9	6.1
CP ₃	85.3	131.5	374.2	384.5	366.5	103.8	343.5	2.9
CP ₄	85.1	69.4	384.5	684.8	599.1	51.6	502.7	4
CP ₅	123.9	49.5	366.5	599.1	871.4	-21.2	520.4	5.7
CP ₆	22	58	103.8	51.6	-21.2	89.7	74.4	3.4
CP ₇	3.5	-9.9	343.5	502.7	520.4	74.4	574.6	4.9

Min.Variance:

Matice soustavy

161	165.4	170.6	170.2	247.8	44	7	1
165.4	369.4	263	138.8	99	116	-19.8	1
170.6	263	748.4	769	733	207.6	687	1
170.2	138.8	769	1369.6	1198.2	103.2	1005.4	1
247.8	99	733	1198.2	1742.8	-42.4	1040.8	1
44	116	207.6	103.2	-42.4	179.4	148.8	1
7	-19.8	687	1005.4	1040.8	148.8	1149.2	1
1	1	1	1	1	1	1	0

InvM

0.077542	-0.00619	0.008788	-0.00971	-0.03769	-0.07775	0.045002	2.1372
-0.00619	0.007803	-0.00362	0.000167	0.001056	-0.00048	0.001254	0.044435
0.008788	-0.00362	0.007544	-0.00229	-0.00426	-0.00879	0.002623	-0.29067
-0.00971	0.000167	-0.00229	0.004278	0.004072	0.01066	-0.00718	-0.23027
-0.03769	0.001056	-0.00426	0.004072	0.02058	0.040175	-0.02394	-0.77333
-0.07775	-0.00048	-0.00879	0.01066	0.040175	0.086382	-0.0502	-1.1224
0.045002	0.001254	0.002623	-0.00718	-0.02394	-0.0502	0.032436	1.235036
2.1372	0.044435	-0.29067	-0.23027	-0.77333	-1.1224	1.235036	-30.2875

Pozadavek Rp=5%

Matice soustavy

161	165.4	170.6	170.2	247.8	44	7	1
165.4	369.4	263	138.8	99	116	-19.8	1
170.6	263	748.4	769	733	207.6	687	1
170.2	138.8	769	1369.6	1198.2	103.2	1005.4	1
247.8	99	733	1198.2	1742.8	-42.4	1040.8	1
44	116	207.6	103.2	-42.4	179.4	148.8	1
7	-19.8	687	1005.4	1040.8	148.8	1149.2	1
1	1	1	1	1	1	1	0
1.9	6.1	2.9	4	5.7	3.4	4.9	0

InvM 0.016039 0.007661 -0.00407 -0.00315 -0.00914 -0.02351 0.016171 2.286871

0.007661	0.004685	-0.00072	-0.00131	-0.00537	-0.01269	0.007746	0.010736
-0.00407	-0.00072	0.004856	-0.00092	0.001708	0.002544	-0.0034	-0.25938
-0.00315	-0.00131	-0.00092	0.003579	0.001028	0.004877	-0.00411	-0.24623
-0.00914	-0.00537	0.001708	0.001028	0.00733	0.015	-0.01055	-0.8428
-0.02351	-0.01269	0.002544	0.004877	0.015	0.038551	-0.02477	-1.2544
0.016171	0.007746	-0.0034	-0.00411	-0.01055	-0.02477	0.01892	1.305199
2.286871	0.010736	-0.25938	-0.24623	-0.8428	-1.2544	1.305199	-30.6517
-0.37867	0.085259	-0.07916	0.040381	0.175762	0.333946	-0.17751	0.921531

wi 2.1372 0.044435 -0.29067 -0.23027 -0.77333

Vypocet VarP

		367.6936	7.853678	-52.9898	-41.881	-204.776
		7.853678	0.36468	-1.69843	-0.71011	-1.70094
		-52.9898	-1.69843	31.61554	25.73579	82.38249
		-41.881	-0.71011	25.73579	36.31192	106.6853
		-204.776	-1.70094	82.38249	106.6853	521.1259
vps		-52.7736	-2.89267	33.86451	13.33649	-18.4013
	0	9.238319	-0.5433	-123.312	-142.966	-497.027
	0					
	0					
	0					
	0					
	0					
	0					
	1					

wi		Rp	VarP	SigmaP	
	2.1372	0.39525	15.14374	3.891496	0.101568
	0.044435				
	-0.29067				
	-0.23027				
	-0.77333				
	-1.1224				
	1.235036				
lambda1	-30.2875				
zk	1				

wi 0.3935 0.43703

	vps		12.46483	14.22203
1.9	0		14.22203	35.27677
6.1	0		-21.9915	-37.6528
2.9	0		-1.48441	-1.34447
4	0		1.755887	0.779106
5.7	0		3.595548	10.52776
3.4	0		0.57518	-1.80691
4.9	0			
0	1			
0	5			

	wi		Rp	VarP
-0.37867	1	0.3935		

0.085259		2	0.43703		5	39.86213
-0.07916		3	-0.65518			
0.040381		4	-0.04433			
0.175762		5	0.036015			
0.333946		6	0.415334			
-0.17751		7	0.417629			
0.921531	lambda1		-26.0441			
-2.33151	lambda2		-10.736			

-1.1224 1.235036

-52.7736 9.238319
-2.89267 -0.5433
33.86451 -123.312
13.33649 -142.966
-18.4013 -497.027
113.0031 -103.134
-103.134 876.446

-0.65518 -0.04433 0.036015 0.415334 0.417629

-21.9915 -1.48441 1.755887 3.595548 0.57518
-37.6528 -1.34447 0.779106 10.52776 -1.80691
160.6291 11.167 -8.64797 -28.2459 -93.9892
11.167 1.345623 -0.95644 -0.95001 -9.30635
-8.64797 -0.95644 1.130259 -0.31711 7.827232
-28.2459 -0.95001 -0.31711 15.47344 12.90509
-93.9892 -9.30635 7.827232 12.90509 100.2183

6.313646 0.791935

Riziková portfolia	A	B	C	D
\bar{r}_p	6.20%	4%	7.50%	8.40%
σ_p	14.50%	9.70%	17%	20%

rf

0.035

	1.	2.	3.	4.	5.
r_f	0.2	0.4	0.5	0.6	0.8
Portfolio	0.8	0.6	0.5	0.4	0.2

<u>Rp</u>	A	0.0566	0.0512	0.0485	0.0458	0.0404
	B	0.039	0.038	0.0375	0.037	0.036
	C	0.067	0.059	0.055	0.051	0.043
	D	0.0742	0.0644	0.0595	0.0546	0.0448

Rm	0.14
rf	0.06

Beta_i	
1	1.235
2	0.268
3	1.997
4	2.45

ri	
1	0.1588
2	0.08144
3	0.21976
4	0.256

rf

ROK	r_M	r_i	r_j	β_i	β_j
1	10	9	22	0.666666667	5
2	32	24	48	0.68	1.64
3	20	14	30	0.538461538	1.769230769
4	18	-2	-20	-0.818181818	-2.454545455
5	17	16	29	0.9	2.2
6	3	4	-3	0.75	2.5
7	12	8	21	0.2	2.8
8	-5	0	-15	0.583333333	1.833333333
9	18	12	28	0.454545455	1.909090909
10	21	15	36	0.571428571	2.071428571

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E[®] 14.6 10 17.6
 covar_m,i 105.3778 61.44444 166.3778
 beta_i 1 0.583087 1.57887

 i j
 E(ri) 11.43146 18.99941

 rf i j
 Ri 7 11.43146 18.99941
 beta_i 0 0.583087 1.57887



