

Day	O2	ČEZ	Erste Bank	CETV	Fortuna	PX	O2
20	570	98.4	669.1	53.9	103.5	333.4	0.001755927
19	569	98.2	715	53.8	103	338.9	0.009180855
18	563.8	96.6	725	53.2	101.9	346.8	-0.020192065
17	575.3	96.5	716	53.9	100	347.8	-0.033837815
16	595.1	97	725	55.6	101.6	350.9	-0.012856008
15	602.8	98.4	727.5	57	101.2	348.1	0.001660303
14	601.8	99	716.6	54.7	102	349.4	0.000831186
13	601.3	105.4	721.5	55.6	101.6	354.2	-0.022203034
12	614.8	116.9	718.6	55.9	101.7	361.1	-0.021402378
11	628.1	119.6	717.8	56.5	100.5	372.7	-0.001431867
10	629	113.2	729.5	56.4	103.4	371.6	0.016672396
9	618.6	109.5	702.6	54.9	102.3	395.9	-0.030879423
8	638	105	750.8	55	102.8	397.6	-0.027822506
7	656	104.9	789.7	56.6	99.8	406.1	-0.009104767
6	662	105.3	799.1	56.9	101.4	400.7	-0.011116233
5	669.4	105.7	805	56	100.9	396.6	-0.045698047
4	700.7	108.5	870	56.7	95.3	398.2	-0.011775691
3	709	110.3	937.6	57	65.7	400.9	-0.005625894
2	713	112.6	948.8	56.8	99.4	399.1	0.007037327
1	708	113.9	951.5	56.5	99.2	401.1	

E(ri) -0.011410933

rf p.a. p.d.(250 trading days) 19 -0.184867802  
0.005 0.00002 -0.184867802 0.007401015

Inv.Matrice

0.06953 1.736774 0.069530193 1.736774451  
1.736774 178.499 1.736774451 178.4989822

Cov\_M O2  
O2 0.000267119  
ČEZ 2.61634E-05  
Erste Bank 0.000257158  
CETV 0.000190277  
Fortuna -0.000253024  
PX -7.66363E-05

Global Minimum

0.000534238  
5.23268E-05  
0.000514316  
0.000380554  
-0.000506048  
1

Inv\_matrice

2960.046611  
-51.89394209  
-651.4132678  
-2195.106047  
-61.63335442  
0.570531637

ČEZ	Erste Bank	CETV	Fortuna	PX	Fce	
0.002034589	-0.066349017	0.001857	0.004843	-0.01636	Fortuna	
0.016427474	-0.013889112	0.011215	0.010737	-0.02304	beta	alfa
0.001035733	0.012491488	-0.01307	0.018822	-0.00288	-1.12845	-0.00875
-0.00516797	-0.012491488	-0.03105	-0.01587	-0.00887	1.800924	0.035544
-0.014329826	-0.003442344	-0.02487	0.003945	0.008011	0.022574	0.134796
-0.006079046	0.015096194	0.041188	-0.00787	-0.00373	0.392624	17
-0.062642786	-0.006814573	-0.01632	0.003929	-0.01364	0.007134	0.30889
-0.103556232	0.004027504	-0.00538	-0.00098	-0.01929		
-0.022833973	0.001113896	-0.01068	0.01187	-0.03162		
0.054996676	-0.016168389	0.001771	-0.02845	0.002956		
0.033231617	0.037571628	0.026956	0.010695	-0.06334		
0.041964199	-0.066351565	-0.00182	-0.00488	-0.00428		
0.000952835	-0.050513822	-0.02868	0.029617	-0.02115		
-0.003805904	-0.011832968	-0.00529	-0.0159	0.013386		
-0.003791474	-0.007356183	0.015944	0.004943	0.010285		
-0.02614528	-0.077650934	-0.01242	0.0571	-0.00403		
-0.016453753	-0.074830207	-0.00528	0.371931	-0.00676		
-0.020637789	-0.011874609	0.003515	-0.41405	0.0045		
-0.011479155	-0.002841658	0.005296	0.002014	-0.005		

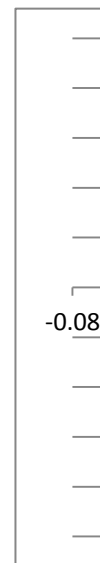
-0.007698951	-0.018531903	-0.00248	0.002233	-0.00973		
	O2	ČEZ	Erste Bank	CETV	Fortuna	
	-0.216807733	-0.14628	-0.35211	-0.04711	0.042434	
	0.00073006	0.001062	0.000847	-0.00058	-0.00673	
	O2	ČEZ	Erste Bank	CETV	Fortuna	-0.01381
alfa	-0.013806734	-0.00833	-0.02301	-0.00429	-0.00875	-0.24623
beta	-0.246231127	-0.06446	-0.46036	-0.18606	-1.12845	

E(ri) 0.002420725 0.000649 0.004508 0.001834 0.011022

ČEZ	Erste Bank	CETV	Fortuna	PX	
0.000122378	0.000257158	0.00019	-0.00025	-7.7E-05	
0.001223278	-0.000106427	0.000168	-1.4E-05	-2E-05	
-0.000106427	0.001071405	0.000203	-0.0015	-0.00014	
0.00016828	0.000203278	0.00033	-0.00026	-5.8E-05	
-1.35394E-05	-0.001495229	-0.00026	0.017557	-0.00035	
-2.00636E-05	-0.000143282	-5.8E-05	-0.00035	0.000311	sigma_M^2

	O2	ČEZ	Erste Bank	CETV	Fortuna
beta_i	-0.246231127	-0.06446	-0.46036	-0.18606	-1.12845

	beta_i
O2	-0.246231127
ČEZ	-0.064463954
Erste Bank	-0.460363256
CETV	-0.186055958
Fortuna	-1.128453695

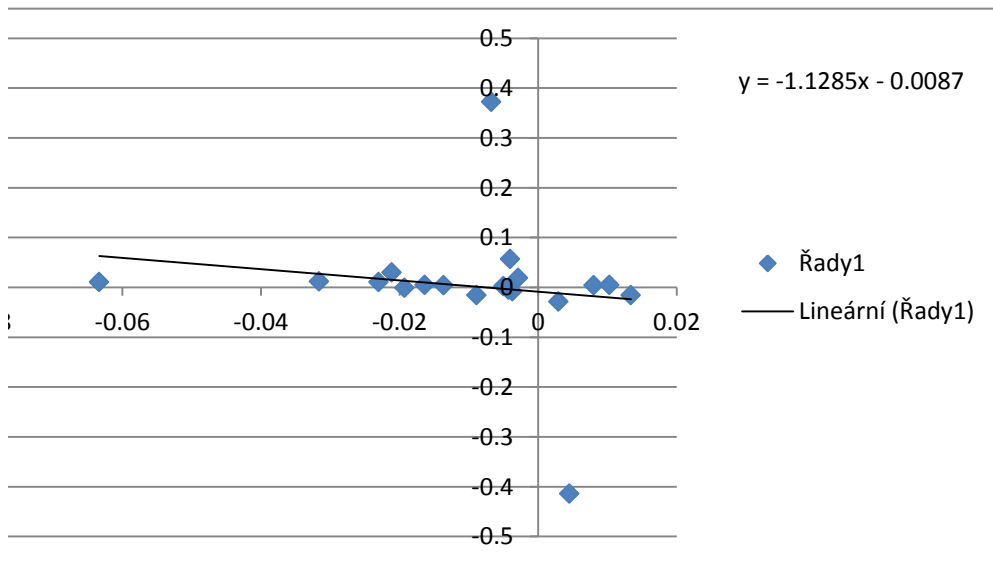


						VRS	
0.000244757	0.000514316	0.000381	-0.00051	1			0
0.002446556	-0.000212854	0.000337	-2.7E-05	1			0
-0.000212854	0.002142809	0.000407	-0.00299	1			0
0.00033656	0.000406556	0.000659	-0.00052	1			0
-2.70788E-05	-0.002990457	-0.00052	0.035114	1			0
1	1	1	1	0			1

						wi	
-291.0860525	-683.3554062	-1927.35	-58.2572	0.489302	w1		0.489302
425.0315112	68.05819449	-436.29	-4.90586	0.134029	w2		0.134029
120.1368713	696.9011147	-210.124	44.49962	0.085779	w3		0.085779
-254.2160544	-127.5115946	2588.587	-11.7532	0.260547	w4		0.260547
0.13372437	45.90769153	-14.8247	30.41662	0.030343	w5		0.030343
0.086502186	0.061746138	0.251918	0.029302	-0.00042	lambda1		-0.00042

1

Rp	-0.00878
Rp_matrixC	-0.00878
Var_P	0.000211
Sigma_P	0.014528



0.489302196 0.134029 0.085779 0.260547 0.030343

6.39527E-05 8.03E-06 1.08E-05 2.43E-05 -3.8E-06

1.71581E-06 2.2E-05 -1.2E-06 5.88E-06 -5.5E-08

1.07934E-05 -1.2E-06 7.88E-06 4.54E-06 -3.9E-06

2.42577E-05 5.88E-06 4.54E-06 2.24E-05 -2.1E-06

-3.7566E-06 -5.5E-08 -3.9E-06 -2.1E-06 1.62E-05

Date	K	L	M	Index	K	L	M	Index
2/22/2016	176.4	82.39	15.86121	112.48	0.062515	0.107669	0.270884	0.118005
2/19/2016	182.01	82.5	25.05275	110.49	0.13522	0.074593	0.10667	0.126201
2/18/2016	186.21	82.45	9.439176	111.34	0.143051	0.106777	-0.45498	0.11223
2/17/2016	182.61	82	28.95428	108.98	0.16	0.113797	0.478851	0.115114
2/16/2016	175.49	81.22	18.83143	106.03	0.112483	0.061179	-0.50448	0.092522
2/12/2016	177.75	81.03	3.040745	107.33	0.14505	0.04351	-1.13168	0.103365
2/11/2016	180.05	79.6	8.759708	107.23	0.171659	0.006048	-0.4155	0.107508
2/10/2016	182.95	79.35	30.16247	108.61	0.153859	0.047751	0.315375	0.068493
2/9/2016	182.47	80.08	3.064378	108.03	0.188512	0.062875	-2.14723	0.082855
2/8/2016	181.62	81.16	12.43475	106.82	0.162046	0.096555	1.354608	0.066075
2/5/2016	183.53	80.08	28.47809	108.74	0.177245	0.06968	2.192254	0.151854
2/4/2016	182.01	79.83	19.2481	107.32	0.147434	0.046144	0.400789	0.131563
2/3/2016	180.23	78.48	31.10395	105.26	0.109357	0.012953	0.261566	0.078223
2/2/2016	177.14	74.59	29.55045	105.35	0.103957	-0.04624	0.328693	0.088471
2/1/2016	174.09	76.29	25.21651	102.71	0.137668	-0.01522	0.329506	0.083521
1/29/2016	169.84	77.85	29.17203	100.7	0.106513	-0.00128	0.122115	0.044158
1/28/2016	164.62	76.99	12.35519	96.45	0.050648	-0.01444	-0.42103	-0.00155
1/27/2016	163.94	75.29	2.982268	96.96	0.046636	-0.05012	-1.64203	0.030791
1/26/2016	165.73	76.7	31.57403	98.53	0.104737	-0.02625	1.432877	0.036379
1/25/2016	165.71	73.98	12.09742	99.96	0.111339	-0.06982	0.052965	0.050998
1/22/2016	158.99	76.57	22.51798	97.39	0.076845	-0.04619	1.067646	0.032561
1/21/2016	161.39	74.1	14.8775	99.52	0.137265	-0.0468	0.000356	0.06026
1/20/2016	155.61	73.18	17.93703	97.13	0.062856	-0.05425	-0.35991	0.032862
1/19/2016	156.82	76.4	31.18719	96.66	0.051018	-0.01145	0.54663	0.000207
1/15/2016	153.75	77.58	9.428935	96.79	0.018445	-0.00489	-1.39512	-0.01365
1/14/2016	151.65	79.12	13.27212	96.3	0.026189	-0.00038	-1.09071	0.000415
1/13/2016	156.86	75.65	22.00399	101.42	0.065534	-0.04876	-0.34227	0.054506
1/12/2016	151.12	75.2	26.23458	99.44	0.015538	-0.01098	1.952594	0.026081
1/11/2016	154.45	73.69	3.208768	99.99				
1/8/2016	153.72	74.69	3.180001	93.42				
1/7/2016	157.06	76.23	12.89221	94.09				
1/6/2016	161.56	77.47	23.94523	97.34				
1/5/2016	159.65	78.12	21.27231	96.43				
1/4/2016	151.7	77.46	18.1377	94.48				
12/31/2015	152.68	77.95	25.8186	96.35				
12/30/2015	156.49	78.11	18.82358	96.6				
12/29/2015	156.47	79.16	15.40536	94.02				
12/28/2015	149.25	78.74	7.53424	95.01				
12/24/2015	148.25	79.33	11.47335	94.99				
12/23/2015	147.23	80.19	7.742066	94.27				
12/22/2015	140.69	77.65	14.87221	93.7				
12/21/2015	146.13	77.26	25.70735	93.99				
12/18/2015	149.02	77.28	18.05419	96.64				
12/17/2015	150.94	77.96	38.05016	98.12				
12/16/2015	147.73	79.15	39.50302	96.26				
12/15/2015	146.91	79.43	30.98474	96.04				
12/14/2015	148.79	76.03	3.72283	96.88				
Rf	1,5 p.a.	0.00125		E(ri)	0.106558	0.014373	0.046765	0.067144

E(Rp)

10%

OLS

VRS

K

28	1.880019		2.98362
1.880019	0.180148		0.247332

Inv\_M

0.11933	-1.24532	alfa	0.048027
-1.24532	18.54718	beta	0.871735

0.048027

0.871735

CAPM - SML

	K	L	M
Ri	0.058692	0.053889	0.286475

Cov\_M

	K	L	M
K	0.002598	0.001444	0.005268
L	0.001444	0.003136	0.004452
M	0.005268	0.004452	1.020101
Index	0.001741	0.001595	0.008644

beta_i	0.871735	0.798856	4.328575
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**Min.Var.Port**

Sys_Eq	0.005196	0.002889	0.010536
	0.002889	0.006273	0.008904
	0.010536	0.008904	2.040203
	1	1	1

Inv_M	176.1026	-175.667	-0.4354
	-175.667	175.7258	-0.05861
	-0.4354	-0.05861	0.494011
	0.597078	0.405696	-0.00277

	MinVarP	TgP	Given10%
Ratio(Rp/si	1.504775	2.291897	2.025579



## Tg\_portfolio

Sys_Eq(CM)	0.002598	0.001444
	0.001444	0.003136
	0.005268	0.004452

Inv_M	520.1733	-237.205
	-237.205	428.9988
	-1.65097	-0.64733

## Given return of 10 % in Rp

Sys_Eq	0.005196	0.002889
	0.002889	0.006273
	0.010536	0.008904
	1	1
	0.106558	0.014373

Inv_M	0.060946	0.112502
	0.112502	0.207672
	-0.17345	-0.32017
	-0.15534	1.156992
	10.85348	-10.8373



L	M				
0.402454	1.309418		2.98362	0.402454	1.309418
0.070094	0.321301		0.247332	0.070094	0.321301

-0.03926	-0.24387
0.798856	4.328575

Function		K		L	
		beta	alfa	beta	alfa
-0.03926	-0.24387	0.871735	0.048027	0.798856	-0.03926
0.798856	4.328575	0.144247	0.01157	0.189374	0.01519
		0.584147	0.033494	0.406324	0.043973
		36.52216	26	17.79494	26
		0.040972	0.029168	0.034408	0.050273

Index

0.001741	
0.001595	
0.008644	
0.001997	Market_var

VRS			wi		
1		0	0.597078	0.405696	-0.00277
1		0			
1		0			
0		1			
0.597078	w1	0.597078	0.000926	0.00035	-8.7E-06
0.405696	w2	0.405696	0.00035	0.000516	-5E-06
-0.00277	w3	-0.00277	-8.7E-06	-5E-06	7.85E-06
-0.00424	lambda1	-0.00424			

Proof 1

Rp\_matrice 0.069325 0.069325  
 Rp\_sumproc 0.069325

VarP 0.002122  
 Sigma\_p 0.04607

	VRS
0.005268	0.105308
0.004452	0.013123
1.020101	0.045515

	Zi	wi	1.608481	-0.6042	-0.00428
-1.65097	Z1	51.59027 w1	1.608481		
-0.64733	Z2	-19.3791 w2	-0.6042	0.006721	-0.0014
0.991646	Z3	-0.13722 w3	-0.00428	-0.0014	0.001145
				-3.6E-05	1.15E-05
				1.15E-05	1.87E-05
sum_Zi	32.07391	Proof	1		

Rp\_matrice 0.162512  
Rp\_sumprc 0.162512

VarP 0.005028  
Sigma\_p 0.070907

			VRS	
0.010536	1	0.106558		0
0.008904	1	0.014373		0
2.040203	1	0.046765		0
1	0	0		1
0.046765	0	0		0.1

			wi	0.93001	0.073259	-0.00327
-0.17345	-0.15534	10.85348 w1	0.93001			
-0.32017	1.156992	-10.8373 w2	0.073259	0.002247	9.84E-05	-1.6E-05
0.493621	-0.00165	-0.01615 w3	-0.00327	9.84E-05	1.68E-05	-1.1E-06
-0.00165	-0.00746	0.046389 lambda1	-0.00282	-1.6E-05	-1.1E-06	1.09E-05
-0.01615	0.046389	-0.66915 lambda2	-0.02053			

Proof 1

Rp\_matrice 0.1  
Rp\_sumprc 0.1

VarP 0.002437  
Sigma\_p 0.049369



M

beta	alfa
4.328575	-0.24387
4.350524	0.348961
0.036678	1.010189
0.989935	26
1.010211	26.53252