

Předpokládejme, že kapitálový trh je v rovnováze. Je dáno

$r_f = 0,04$,
 $r_M = 0,10$ a $\sigma_M = 0,09$

- a) Popište a nakreslete přímku kapitálového trhu (CML)
 b) Mějme tři CP mající následující kovariance s výnosem tržního portfolia:

$\sigma_{1,r_M} = 0,0108$
 $\sigma_{2,r_M} = -0,0027$
 $\sigma_{3,r_M} = 0,0054$

. Popište a nakreslete přímku SML. Zanešte CP na přímku SML

CML

0	0.09
0.04	0.1

kovar verze

0	0.0081
0.04	0.1

kovar výnosnosti

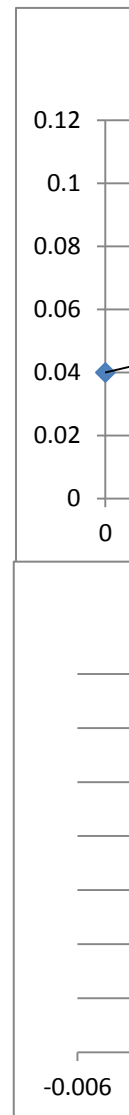
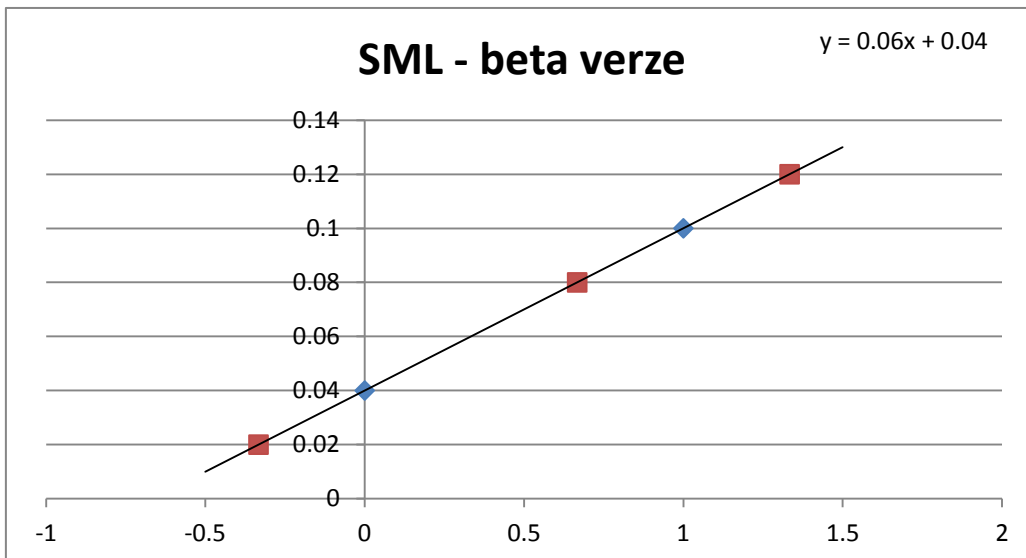
0.0108	0.12
-0.0027	0.02
0.0054	0.08

beta verze

0	1
0.04	0.1

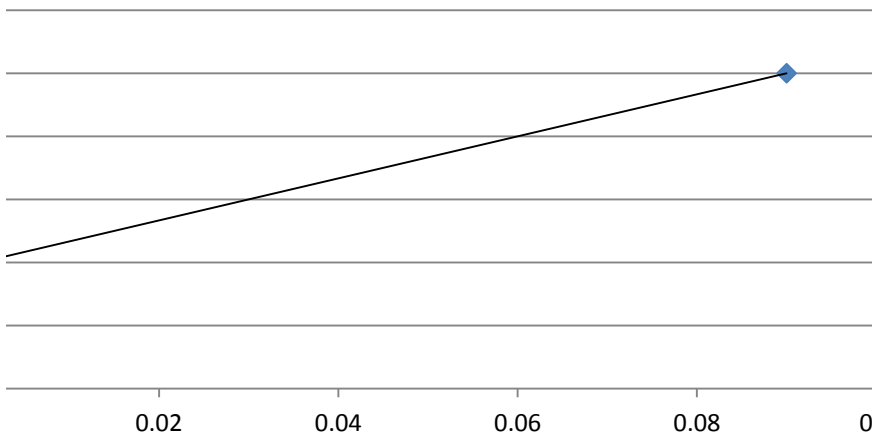
beta

1.333333	0.12
-0.333333	0.02
0.666667	0.08



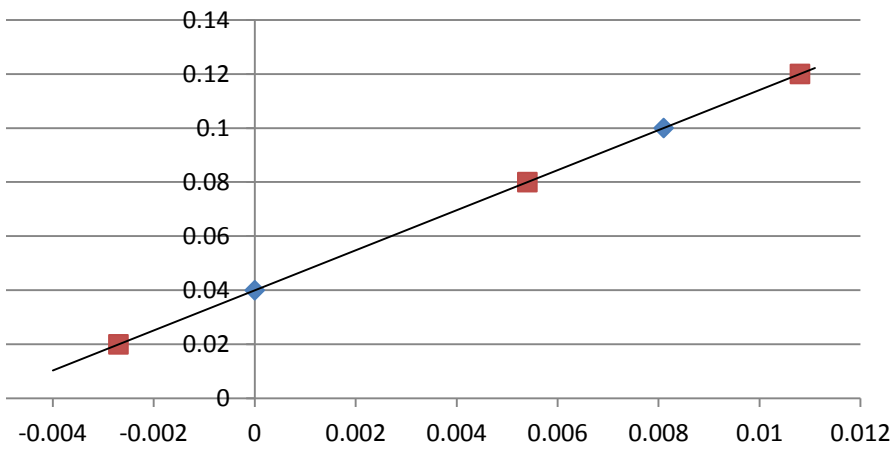
CML

$$y = 0.6667x + 0.04$$



SML - kovar verze

$$y = 7.4074x + 0.04$$



Mějme tři cenné papíry, tržní portfolio a bezrizikovou investici.

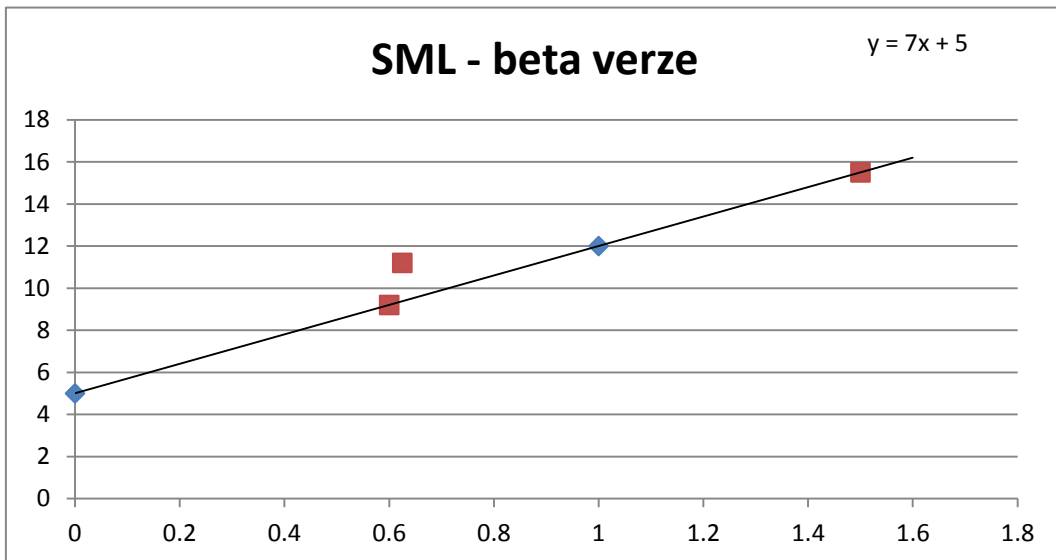
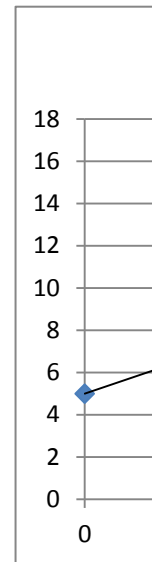
	r_i	korelace ρ_{iM}	sigma σ_i
C1	15.5	0.9	20
C2	9.2	0.8	9
C3	11.2	0.5	15
TP	12	1	12
r_f	5	0	0

	kovariance	beta	
C1	216	1.5	15.5
C2	86.4	0.6	9.2
C3	90	0.625	9.375
TP	144	1	

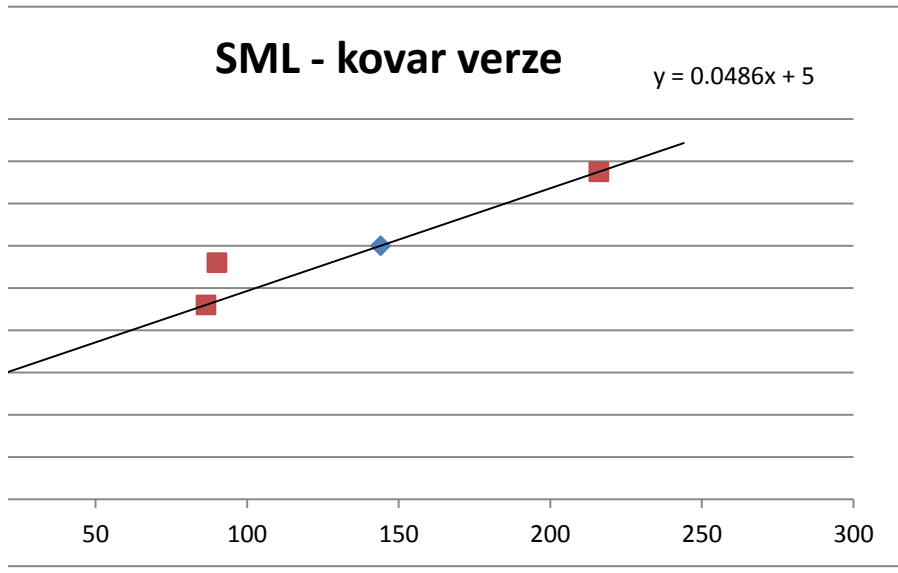
Nakreslete SML, zobrazte cenné papíry na této přímce a určete beta cenných papírů.

0 144
5 12

0 1
5 12



	delta	
15.5		0
9.2		0
9.375		1.825



den	Český Tele	ČEZ	Komerční b	UNIPETROL	IPB	PX50
1	570	98.4	669.1	53.9	103.5	333.4
2	569	98.2	715	53.8	103	338.9
3	563.8	96.6	725	53.2	101.9	346.8
4	575.3	96.5	716	53.9	100	347.8
5	595.1	97	725	55.6	101.6	350.9
6	602.8	98.4	727.5	57	101.2	348.1
7	601.8	99	716.6	54.7	102	349.4
8	601.3	105.4	721.5	55.6	101.6	354.2
9	614.8	116.9	718.6	55.9	101.7	361.1
10	628.1	119.6	717.8	56.5	100.5	372.7
11	629	113.2	729.5	56.4	103.4	371.6
12	618.6	109.5	702.6	54.9	102.3	395.9
13	638	105	750.8	55	102.8	397.6
14	656	104.9	789.7	56.6	99.8	406.1
15	662	105.3	799.1	56.9	101.4	400.7
16	669.4	105.7	805	56	100.9	396.6
17	700.7	108.5	870	56.7	95.3	398.2
18	709	110.3	937.6	57	65.7	400.9
19	713	112.6	948.8	56.8	99.4	399.1
20	708	113.9	951.5	56.5	99.2	401.1

výnosnost

Odhadněte beta a výnosnosti jednotlivých akcií. Vypočítejte výnosnost a riziko optimální

Bezriziková investice má výnosnost 3% p.a.

0.03 250
0.00012

kovar

	Český Tele	ČEZ	Komerční b	UNIPETROL	IPB
ri	0.011604	0.008318	0.019225	0.002639	0.006364
rie	-0.00227	-0.00048	-0.00436	-0.00169	-0.01324
delta	0.013877	0.008798	0.023581	0.00433	0.019609

beta

odhad alfa
odhad beta

tangenciální portfolio - s využitím bezrizikové investice

matice soustavy

0.000275	0.000125	0.000268	0.000192	-0.00029
0.000125	0.00128	-0.00012	0.000169	8.75E-05
0.000268	-0.00012	0.001134	0.000203	-0.0014
0.000192	0.000169	0.000203	0.000328	-0.00028
-0.00029	8.75E-05	-0.0014	-0.00028	0.020276

vektor prav si

0.01148447
0.00819821
0.01910502
0.00251853
0.00624449

inverzni matice

7319.438	-376.502	-1195.3	-3379.36	-24.8669
-376.502	894.0102	257.5269	-396.589	3.044601
-1195.3	257.5269	1309.897	-181.478	69.84593
-3379.36	-396.589	-181.478	5361.055	16.54284
-24.8669	3.044601	69.84593	16.54284	54.005

Zi

49.4705961
6.94560839
13.3885426
-31.923351
1.4526823

suma Zi

39.334078

Český Telecom	ČEZ	Komerční b	UNIPETROI	IPB	PX50	
-0.001754386	-0.00203	0.0686	-0.00186	-0.00483	0.016497	
-0.00913884	-0.01629	0.013986	-0.01115	-0.01068	0.023311	Český Telec
0.020397304	-0.00104	-0.01241	0.013158	-0.01865	0.002884	ČEZ
0.034416826	0.005181	0.01257	0.03154	0.016	0.008913	Komerční b
0.012939002	0.014433	0.003448	0.02518	-0.00394	-0.00798	UNIPETROI
-0.001658925	0.006098	-0.01498	-0.04035	0.007905	0.003735	IPB
-0.000830841	0.064646	0.006838	0.016453	-0.00392	0.013738	PX50
0.022451355	0.109108	-0.00402	0.005396	0.000984	0.019481	
0.021633051	0.023097	-0.00111	0.010733	-0.0118	0.032124	
0.001432893	-0.05351	0.0163	-0.00177	0.028856	-0.00295	Český Telec
-0.016534181	-0.03269	-0.03687	-0.0266	-0.01064	0.065393	ČEZ
0.031361138	-0.0411	0.068602	0.001821	0.004888	0.004294	Komerční b
0.028213166	-0.00095	0.051811	0.029091	-0.02918	0.021378	UNIPETROI
0.009146341	0.003813	0.011903	0.0053	0.016032	-0.0133	IPB
0.011178248	0.003799	0.007383	-0.01582	-0.00493	-0.01023	
0.046758291	0.02649	0.080745	0.0125	-0.0555	0.004034	
0.011845298	0.01659	0.077701	0.005291	-0.3106	0.006781	
0.005641749	0.020852	0.011945	-0.00351	0.512938	-0.00449	
-0.007012623	0.011545	0.002846	-0.00528	-0.00201	0.005011	
0.011604467	0.008318	0.019225	0.002639	0.006364	0.009927	

ního portfolia složeného z těchto akcií (sell short povolen), systematické a nesystematické:

-7.93865E-05	-2E-05	-0.00015	-6E-05	-0.00044	0.000325	
						0.517979
-0.243933092	-0.06116	-0.45643	-0.18473	-1.36268	1	0.084324
						0.057578
matice soustavy						0.313911
19	0.188622					0.026209
0.188622199	0.007731					

inverzní
0.069455615 -1.69469
-1.694692808 170.7072

vektory pravých stran

Český Telecom	ČEZ	Komerční b	UNIPETROI	IPB
0.220484867	0.158046	0.365275	0.050132	0.120925
0.000759904	0.001211	0.000953	-0.00058	-0.00678

výsledek

0.014026109	0.008925	0.023756	0.004472	0.019893
-0.243933092	-0.06116	-0.45643	-0.18473	-1.36268

tran

vektor výnosností

0.011604
0.008318
0.019225
0.002639
0.006364

	váhy	výnosnost	riziko	bety
Český Telecom	1.257703	0.020701	0.022874	-0.24393
ČEZ	0.17658			-0.06116
Komerční banka	0.34038	beta portfolia		-0.45643
UNIPETROL	-0.8116	-0.37336		-0.18473
IPB	0.036932			-1.36268
		systematické riziko (rozptyl)		
		0.00005	0.00048	

Český Telecom	ČEZ	Komerční b	UNIPETROL	IPB	PX50	portfolio s i
0.000274593	0.000124726	0.000268	0.000192	-0.00029	-7.9E-05	Český Telec
0.000124726	0.001280067	-0.00012	0.000169	8.75E-05	-2E-05	ČEZ
0.000267938	-0.0001191	0.001134	0.000203	-0.0014	-0.00015	Komerční b
0.00019227	0.000169014	0.000203	0.000328	-0.00028	-6E-05	UNIPETROL
-0.000286021	8.75264E-05	-0.0014	-0.00028	0.020276	-0.00044	IPB
-7.93865E-05	-1.9904E-05	-0.00015	-6E-05	-0.00044	0.000325	
0.000549185	0.000249452	0.000536	0.000385	-0.00057	1	0
0.000249452	0.002560135	-0.00024	0.000338	0.000175	1	0
0.000535876	-0.0002382	0.002268	0.000406	-0.0028	1	0
0.00038454	0.000338028	0.000406	0.000656	-0.00057	1	0
-0.000572041	0.000175053	-0.0028	-0.00057	0.040552	1	0
1	1	1	1	1	0	1

riziko tohoto portfolia.

0.517979494	0.084324	0.057578	0.313911	0.026209
7.3674E-05	5.45E-06	7.99E-06	3.13E-05	-3.9E-06
5.44777E-06	9.1E-06	-5.8E-07	4.47E-06	1.93E-07
7.991E-06	-5.8E-07	3.76E-06	3.67E-06	-2.1E-06
3.12629E-05	4.47E-06	3.67E-06	3.23E-05	-2.3E-06
-3.8829E-06	1.93E-07	-2.1E-06	-2.3E-06	1.39E-05

0.000221

1.257703	0.17658	0.34038	-0.8116	0.036932
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0.000434	2.77E-05	0.000115	-0.0002	-1.3E-05
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2.77E-05	3.99E-05	-7.2E-06	-2.4E-05	5.71E-07
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0.000115	-7.2E-06	0.000131	-5.6E-05	-1.8E-05
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-0.0002	-2.4E-05	-5.6E-05	0.000216	8.5E-06
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-1.3E-05	5.71E-07	-1.8E-05	8.5E-06	2.77E-05
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rozptyl

zrychlená variace 0.000523

ještě rychlejší 0.000523

minimálním rizikem

váhy výnosnost riziko

0.517979	0.008814295	0.014867	-0.24393
0.084324			-0.06116
0.057578	beta portfolia		-0.45643
0.313911	-0.251491502		-0.18473
0.026209			-1.36268
-0.00044	systematické riz	nesystematické riziko (rozptyl)	
	0.00002	0.00020	

3052.801274	-287.053	-665.116	-2057.49	-43.1422	0.517979
-287.0530503	430.9208	117.7808	-258.172	-3.47689	0.084324
-665.1159821	117.7808	647.4496	-131.624	31.50943	0.057578
-2057.489995	-258.172	-131.624	2457.624	-10.339	0.313911
-43.14224628	-3.47689	31.50943	-10.339	25.4487	0.026209
0.517979494	0.084324	0.057578	0.313911	0.026209	-0.00044