

## Ceny akcií (denní):

Datum	ABC	CEZ	KOBA
1	1,856.00	1,089.00	4,266.00
2	1,913.00	1,072.00	4,108.00
3	1,905.00	1,074.00	4,008.00
4	1,868.00	1,082.00	3,921.00
5	1,860.00	1,086.00	3,987.00
6	1,865.00	1,092.00	4,035.00
7	1,859.00	1,100.00	3,986.00
8	1,832.00	1,093.00	4,032.00
9	1,871.00	1,102.00	3,953.00
10	1,853.00	1,107.00	4,052.00
11	1,854.00	1,099.00	4,047.00
12	1,862.00	1,102.00	3,994.00
13	1,870.00	1,109.00	4,030.00
14	1,864.00	1,114.00	4,133.00
15	1,834.00	1,123.00	4,271.00
16	1,808.00	1,140.00	4,257.00
17	1,814.00	1,159.00	4,261.00
18	1,836.00	1,203.00	4,318.00
19	1,807.00	1,186.00	4,239.00
20	1,812.00	1,224.00	4,216.00
21	1,843.00	1,226.00	4,274.00
22	1,834.00	1,219.00	4,266.00
23	1,831.00	1,238.00	4,142.00
24	1,860.00	1,246.00	4,208.00
25	1,878.00	1,273.00	4,175.00
26	1,872.00	1,255.00	4,228.00
27	1,938.00	1,243.00	4,300.00
28	1,975.00	1,265.00	4,273.00
29	1,954.00	1,277.00	4,316.00
30	2,010.00	1,293.00	4,294.00
31	2,054.00	1,279.00	4,239.00
32	2,063.00	1,268.00	4,242.00
33	2,053.00	1,266.00	4,280.00
34	2,047.00	1,261.00	4,295.00
35	2,010.00	1,245.00	4,236.00
36	2,015.00	1,257.00	4,230.00
37	2,072.00	1,270.00	4,292.00
38	2,036.00	1,301.00	4,326.00
39	2,064.00	1,343.00	4,293.00
40	2,161.00	1,384.00	4,396.00
41	2,213.00	1,360.00	4,465.00
42	2,175.00	1,344.00	4,509.00
43	2,213.00	1,365.00	4,459.00
44	2,201.00	1,375.00	4,495.00
45	2,183.00	1,385.00	4,498.00
46	2,059.00	1,411.00	4,441.00
47	2,046.00	1,386.00	4,369.00
48	1,996.00	1,392.00	4,319.00
49	1,909.00	1,372.00	4,458.00
50	1,945.00	1,337.00	4,478.00
51	1,928.00	1,300.00	4,496.00
52	1,992.00	1,324.00	4,401.00
53	1,966.00	1,330.00	4,382.00
54	1,929.00	1,325.00	4,344.00

## Výnosy akcií (30-denní):

ABC	CEZ	KOBA
0.1067	0.1745	-0.0063
0.0784	0.1828	0.0326
0.0777	0.1788	0.0679
0.0958	0.1654	0.0954
0.0806	0.1464	0.0625
0.0804	0.1511	0.0483
0.1146	0.1545	0.0768
0.1114	0.1903	0.0729
0.1032	0.2187	0.0860
0.1662	0.2502	0.0849
0.1936	0.2375	0.1033
0.1681	0.2196	0.1289
0.1834	0.2308	0.1065
0.1808	0.2343	0.0876
0.1903	0.2333	0.0531
0.1388	0.2377	0.0432
0.1279	0.1959	0.0253
0.0871	0.1571	0.0002
0.0564	0.1568	0.0517
0.0734	0.0923	0.0621
0.0461	0.0604	0.0519
0.0862	0.0861	0.0316
0.0737	0.0743	0.0579
0.0371	0.0634	0.0323
0.0202	0.0353	0.0271
0.0150	0.0637	0.0078
-0.0351	0.0684	-0.0121
-0.0420	0.0711	-0.0199
-0.0210	0.0807	-0.0280
-0.0493	0.0665	-0.0282
-0.0847	0.0602	-0.0130
-0.0722	0.0450	-0.0200
-0.0755	0.0506	-0.0262
-0.0669	0.0508	-0.0184
-0.0209	0.0602	0.0158
0.0094	0.0613	0.0338
-0.0193	0.0693	0.0084
0.0000	0.0792	0.0162
-0.0208	0.0558	0.0116
<b>0.0563</b>	<b>0.1285</b>	<b>0.0362</b>

Průměry:

ABC
CEZ
KOBA

55	1,916.00	1,318.00	4,288.00
56	1,900.00	1,335.00	4,261.00
57	1,870.00	1,328.00	4,248.00
58	1,892.00	1,355.00	4,188.00
59	1,913.00	1,380.00	4,195.00
60	1,911.00	1,379.00	4,173.00
61	1,880.00	1,356.00	4,184.00
62	1,914.00	1,325.00	4,157.00
63	1,898.00	1,330.00	4,168.00
64	1,910.00	1,325.00	4,216.00
65	1,968.00	1,320.00	4,303.00
66	2,034.00	1,334.00	4,373.00
67	2,032.00	1,358.00	4,328.00
68	2,036.00	1,404.00	4,396.00
69	2,021.00	1,418.00	4,343.00

**Kovariance:**

ABC	CEZ	KOBA
0.006654	0.005202	0.002879
0.005202	0.005083	0.002158
0.002879	0.002158	0.0018

### Markowitzův model

Průměrné výnosy, tj.  $R_i$ :

0.0563	0.1285	0.0362
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Kovarianční matice, tj.  $S_{ij}$ :

	ABC	CEZ	KOBA
ABC	0.0067	0.0052	0.0029
CEZ	0.0052	0.0051	0.0022
KOBA	0.0029	0.0022	0.0018

$Z_i$ :

0.0000	1.0000	0.0000	1.0000
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$Z_i * \text{Kov.mat.}$ :

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$Z_i * Z_i * \text{Kov.mat.}$ :

Rozptyl PF	
Riziko PF	0.071293

Výnos:

0.128472
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Zadaný výnos:

0.15
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$$\hat{R}_{PF} = \sum \hat{R}_i Z_i \quad \sigma_{PF} = \sqrt{\sum_{i,j=1}^M \sigma_{ij} Z_i Z_j}$$

## Sharpeho model

Průměrné výnosy, tj.  $R_i$ :

0.0563	0.1285	0.0362
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Kovarianční matice, tj.  $S_{ij}$ :

	ABC	CEZ	KOBA
ABC	0.0067	0.0052	0.0029
CEZ	0.0052	0.0051	0.0022
KOBA	0.0029	0.0022	0.0018

$Z_i$ :

0.0000	0.4011	0.5989	suma: 1.0000
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$Z_i * \text{Kov.mat.}$ :

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$Z_i * Z_i * \text{Kov.mat.}$ :

Rozptyl PF

Riziko PF **0.049999**

Zadané riziko:

**0.05**

Výnos:

**0.073212**

$$\hat{R}_{PF} = \sum \hat{R}_i Z_i \quad \sigma_{PF} = \sqrt{\sum_{i,j=1}^M \sigma_{ij} Z_i Z_j}$$

**Markowitzův model s bankovním účtem**

Průměrné výnosy, tj.  $R_i$ : 

0.0563	0.1285	0.0362	0.0020
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Kovarianční matice, tj.  $S_{ij}$ : 

	ABC	CEZ	KOBA	Účet
ABC	0.0065	0.0051	0.0028	0.0000
CEZ	0.0051	0.0050	0.0021	0.0000
KOBA	0.0028	0.0021	0.0018	0.0000
Účet	0.0000	0.0000	0.0000	0.0000

suma: **0**

$Z_i$ : 

0.0000	0.0000	0.0000	0.0000
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$Z_i * Kov.mat.:$ 

0.0000	0.0000	0.0000	0.0000
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$Z_i * Z_i * Kov.mat.:$  Rozptyl PF **0**

Riziko PF **0**

Výnos: **0**

Zadaný výnos: **0.07**

$$\hat{R}_{PF} = \sum \hat{R}_i Z_i \quad \sigma_{PF} = \sqrt{\sum_{i,j=1}^M \sigma_{ij} Z_i Z_j}$$

### Sharpeho model s bankovním účtem

Průměrné výnosy, tj.  $R_i$ : 

0.0563	0.1285	0.0362	0.0020
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Kovarianční matice, tj.  $S_{ij}$ : 

	ABC	CEZ	KOBA	Účet
ABC	0.0065	0.0051	0.0028	0.0000
CEZ	0.0051	0.0050	0.0021	0.0000
KOBA	0.0028	0.0021	0.0018	0.0000
Účet	0.0000	0.0000	0.0000	0.0000

$Z_i$ : 

0.0000	0.0000	0.0000	0.0000
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 suma: **0**

$Z_i * Kov.mat.:$ 

0.0000	0.0000	0.0000	0.0000
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$Z_i * Z_i * Kov.mat.:$  Rozptyl PF **0**  
 Riziko PF 

0
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 Zadané riziko: 

0.07
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 Výnos: 

0
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$$\hat{R}_{PF} = \sum \hat{R}_i Z_i \quad \sigma_{PF} = \sqrt{\sum_{i,j=1}^M \sigma_{ij} Z_i Z_j}$$