

Day	A	B	C	D	E	Market Ind	A	B
1	570	98.4	669.1	53.9	103.5	333.4		
2	569	98.2	715	53.8	103	338.9	-0.001755927	-0.00203
3	563.8	96.6	725	53.2	101.9	346.8	-0.009180855	-0.01643
4	575.3	96.5	716	53.9	100	347.8	0.020192065	-0.00104
5	595.1	97	725	55.6	101.6	350.9	0.033837815	0.005168
6	602.8	98.4	727.5	57	101.2	348.1	0.012856008	0.01433
7	601.8	99	716.6	54.7	102	349.4	-0.001660303	0.006079
8	601.3	105.4	721.5	55.6	101.6	354.2	-0.000831186	0.062643
9	614.8	116.9	718.6	55.9	101.7	361.1	0.022203034	0.103556
10	628.1	119.6	717.8	56.5	100.5	372.7	0.021402378	0.022834
11	629	113.2	729.5	56.4	103.4	371.6	0.001431867	-0.055
12	618.6	109.5	702.6	54.9	102.3	395.9	-0.016672396	-0.03323
13	638	105	750.8	55	102.8	397.6	0.030879423	-0.04196
14	656	104.9	789.7	56.6	99.8	406.1	0.027822506	-0.00095
15	662	105.3	799.1	56.9	101.4	400.7	0.009104767	0.003806
16	669.4	105.7	805	56	100.9	396.6	0.011116233	0.003791
17	700.7	108.5	870	56.7	95.3	398.2	0.045698047	0.026145
18	709	110.3	937.6	57	65.7	400.9	0.011775691	0.016454
19	713	112.6	948.8	56.8	99.4	399.1	0.005625894	0.020638
20	708	113.9	951.5	56.5	99.2	401.1	-0.007037327	0.011479

E(ri) 0.011410933 0.007699

rf 0.03 p.a.
assumption 250
rf_p.d. 0.00012

covar_iM -7.66363E-05 -2E-05
var_i 0.000267119 0.001223
beta_i -0.246231127 -0.06446
E(ri) -0.002246253 -0.0005

Min.Variance portfolio

Covar_M
0.000267119 0.000122
0.000122378 0.001223
0.000257158 -0.00011
0.000190277 0.000168
-0.000253024 -1.4E-05

System of Matrices

0.000534238 0.000245
0.000244757 0.002447
0.000514316 -0.00021
0.000380554 0.000337
-0.000506048 -2.7E-05
1 1
3135.688208 -308.358
-308.3583546 450.2518

-723.9039686	127.2655
-2041.711841	-269.301
-61.71404383	0.141659
0.518336137	0.091635

						VRS
0.011411	7518.836	-396.182	-1270.21	-3395.35	-50.4356	0.011291
0.007699	-396.182	939.4912	285.9287	-416.959	13.18743	0.007579
0.018532	-1270.21	285.9287	1452.558	-227.887	102.2446	0.018412
0.002479	-3395.35	-416.959	-227.887	5356.944	10.71687	0.002359
-0.00223	-50.4356	13.18743	102.2446	10.71687	65.10743	-0.00235

Zi
50.61254
6.896739
13.79127
-33.0782
1.285067

sum_Zi	39.5074
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C	D	E	
0.066349	-0.00186	-0.00484	0.016362
0.013889	-0.01122	-0.01074	0.023043
-0.01249	0.013072	-0.01882	0.002879
0.012491	0.031053	0.015873	0.008874
0.003442	0.024868	-0.00394	-0.00801
-0.0151	-0.04119	0.007874	0.003728
0.006815	0.016319	-0.00393	0.013644
-0.00403	0.005381	0.000984	0.019293
-0.00111	0.010676	-0.01187	0.031619
0.016168	-0.00177	0.028447	-0.00296
-0.03757	-0.02696	-0.0107	0.063344
0.066352	0.00182	0.004876	0.004285
0.050514	0.028676	-0.02962	0.021153
0.011833	0.005286	0.015905	-0.01339
0.007356	-0.01594	-0.00494	-0.01028
0.077651	0.012423	-0.0571	0.004026
0.07483	0.005277	-0.37193	0.006758
0.011875	-0.00351	0.414053	-0.0045
0.002842	-0.0053	-0.00201	0.004999
0.018532	0.002479	-0.00223	0.00973

-0.00014	-5.8E-05	-0.00035	0.000311
0.001071	0.00033	0.017557	0.000311

-0.46036	-0.18606	-1.12845	1
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-0.0043	-0.00167	-0.01072	0.00973
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0.000257	0.00019	-0.00025
-0.00011	0.000168	-1.4E-05
0.001071	0.000203	-0.0015
0.000203	0.00033	-0.00026
-0.0015	-0.00026	0.017557

0.000514	0.000381	-0.00051	1
-0.00021	0.000337	-2.7E-05	1
0.002143	0.000407	-0.00299	1
0.000407	0.000659	-0.00052	1
-0.00299	-0.00052	0.035114	1
1	1	1	0

-723.904	-2041.71	-61.714	0.518336
127.2655	-269.301	0.141659	0.091635

beta	alfa	beta
-0.24623	0.013807	-0.06446
0.216607	0.004275	0.480577
0.070644	0.016213	0.001057
1.292229	17	0.017993
0.00034	0.004468	2.33E-05

vrs	
0	
0	
0	
0	
0	
1	

wi		
0.518336	0.518336137	0.091635
0.091635	7.17675E-05	5.81E-06

713.6363	-162.924	45.92632	0.073796	0.073796	5.8127E-06	1.03E-05
-162.924	2488.709	-14.7721	0.285904	0.285904	9.83657E-06	-7.2E-07
45.92632	-14.7721	30.41821	0.030329	0.030329	2.81979E-05	4.41E-06
0.073796	0.285904	0.030329	-0.00043	-0.00043	-3.9777E-06	-3.8E-08

proof	1	Rp	0.008629
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	1.28109	0.174568	0.349081	-0.83727	0.032527
wi					
1.28109	0.000438	2.74E-05	0.000115	-0.0002	-1.1E-05
0.174568	2.74E-05	3.73E-05	-6.5E-06	-2.5E-05	-7.7E-08
0.349081	0.000115	-6.5E-06	0.000131	-5.9E-05	-1.7E-05
-0.83727	-0.0002	-2.5E-05	-5.9E-05	0.000231	7.09E-06
0.032527	-1.1E-05	-7.7E-08	-1.7E-05	7.09E-06	1.86E-05

1	Rp	0.020283
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minVar	
return_p/risk	0.587975

alfa	beta	alfa	beta	alfa	beta
0.008326	-0.46036	0.023011	-0.18606	0.00429	-1.12845
0.009485	0.435922	0.008604	0.245452	0.004844	1.800924
0.03597	0.061566	0.032628	0.032694	0.018372	0.022574
17	1.115282	17	0.574584	17	0.392624
0.021996	0.001187	0.018098	0.000194	0.005738	0.007134

0.073796 0.285903523 0.030329

9.84E-06 2.81979E-05 -4E-06

-7.2E-07	4.40873E-06	-3.8E-08
5.83E-06	4.28886E-06	-3.3E-06
4.29E-06	2.6937E-05	-2.3E-06
-3.3E-06	-2.25589E-06	1.62E-05

Var_p 0.000215376 Sigma_p 0.014676

total risk = syst. Risk+unsyst. Risk

sym risk is $\beta_p^2 \cdot \text{var}_m$

$\beta_p = \sum w_i \cdot \beta_i$

beta_p -0.254929935

VarP_syst- β 2.02271E-05 0.004497

Unsys_par 0.000195149 0.01397

Var_p 0.000510358 Sigma_p 0.022591

faster way 0.000510358 0.022591

TangPort

0.897828

alfa

0.008746

0.035544

0.134796

17

0.30889

Date	KO	MCD	Goog	Amzn	Close		
4/9/2018	44.509998	161.729996	1029.27002	1430.790039	93.080002		
4/16/2018	43.740002	158.770004	1072.959961	1527.48999	95	-0.01745	-0.01847
4/23/2018	43.310001	158.300003	1030.050049	1572.619995	95.82	-0.00988	-0.00296
4/30/2018	42.360001	165.029999	1048.209961	1580.949951	95.160004	-0.02218	0.041635
5/7/2018	42.139999	165.389999	1098.26001	1602.910034	97.699997	-0.00521	0.002179
5/14/2018	42.18	160.979996	1066.359985	1574.369995	96.360001	0.000949	-0.02703
5/21/2018	42.400002	163.210007	1075.660034	1610.150024	98.360001	0.005202	0.013758
5/28/2018	43.119999	159.160004	1119.5	1641.540039	100.790001	0.016838	-0.02513
6/4/2018	43.950001	168.910004	1120.869995	1683.98999	101.629997	0.019066	0.059456
6/11/2018	44.119999	166.460007	1152.26001	1715.969971	100.129997	0.003861	-0.01461
6/18/2018	43.25	164.550003	1155.47998	1715.670044	100.410004	-0.01992	-0.01154
6/25/2018	43.860001	156.690002	1115.650024	1699.800049	98.610001	0.014006	-0.04895
7/2/2018	44.639999	159.419998	1140.170044	1710.630005	101.160004	0.017628	0.017273
7/9/2018	44.740002	158.509995	1188.819946	1813.030029	105.43	0.002238	-0.00572
7/16/2018	45.279999	157.970001	1184.910034	1813.699951	106.269997	0.011997	-0.00341
7/23/2018	46.209999	157.479996	1238.5	1817.27002	107.68	0.020331	-0.00311
7/30/2018	46.619999	156.210007	1223.709961	1823.290039	108.040001	0.008833	-0.0081
8/6/2018	46.080002	158.679993	1237.609985	1886.300049	109	-0.01165	0.015688
8/13/2018	46.599998	161.149994	1200.959961	1882.219971	107.580002	0.011221	0.015446
8/20/2018	45.630001	159.380005	1220.650024	1905.390015	108.400002	-0.02104	-0.01104
8/27/2018	44.57	162.229996	1218.189941	2012.709961	112.330002	-0.0235	0.017724
9/3/2018	45.720001	163.899994	1164.829956	1952.069946	108.209999	0.025475	0.010241
9/10/2018	45.990002	160.839996	1172.530029	1970.189941	113.370003	0.005888	-0.01885
9/17/2018	46.580002	165.300003	1166.089966	1915.01001	114.260002	0.012747	0.027352
9/24/2018	46.189999	167.289993	1193.469971	2003	114.370003	-0.00841	0.011967
10/1/2018	45.880001	166.570007	1157.349976	1889.650024	112.129997	-0.00673	-0.00431
10/8/2018	44.68	163.820007	1110.079956	1788.609985	109.57	-0.0265	-0.01665
10/15/2018	46.330002	167.490005	1096.459961	1764.030029	108.660004	0.036264	0.022155
10/22/2018	45.919998	173.339996	1071.469971	1642.810059	106.959999	-0.00889	0.034331
10/29/2018	48	176.75	1057.790039	1665.530029	106.160004	0.0443	0.019481
11/5/2018	49.68	185.940002	1066.150024	1712.430054	109.57	0.034401	0.050688
11/12/2018	50.169998	187.589996	1061.48999	1593.410034	108.290001	0.009815	0.008835
11/19/2018	49.02	181.929993	1023.880005	1502.060059	103.07	-0.02319	-0.03064
11/26/2018	50.400002	188.509995	1094.430054	1690.170044	110.889999	0.027763	0.035529
12/3/2018	49.09	182.960007	1036.579956	1629.130005	104.82	-0.02634	-0.02988
12/10/2018	49.34	183.289993	1042.099976	1591.910034	106.029999	0.00508	0.001802
12/17/2018	47.57	174.149994	979.539978	1377.449951	98.230003	-0.03653	-0.05115
12/24/2018	47.200001	175.559998	1037.079956	1478.02002	100.389999	-0.00781	0.008064
12/31/2018	47.57	178.279999	1070.709961	1575.390015	101.93	0.007808	0.015374
1/7/2019	47.34	182.369995	1057.189941	1640.560059	102.800003	-0.00485	0.022682
1/14/2019	47.610001	182.570007	1098.26001	1696.199951	107.709999	0.005687	0.001096
1/21/2019	47.369999	184	1090.98999	1670.569946	107.169998	-0.00505	0.007802
1/28/2019	48.700001	176.720001	1110.75	1626.22998	102.779999	0.02769	-0.04037
2/4/2019	49.5	174.75	1095.060059	1588.219971	105.669998	0.016294	-0.01121
2/11/2019	45.240002	179.970001	1113.650024	1607.949951	108.220001	-0.08999	0.029434
2/18/2019	45.279999	183.169998	1110.369995	1631.560059	110.970001	0.000884	0.017624
2/25/2019	45.380001	185.050003	1140.98999	1671.72998	112.529999	0.002206	0.010211
3/4/2019	44.84	179.5	1142.319946	1620.800049	110.510002	-0.01197	-0.03045
3/11/2019	45.299999	185.330002	1184.459961	1712.359985	115.910004	0.010206	0.031963

3/18/2019	45.93	186.809998	1205.5	1764.77002	117.050003	0.013811	0.007954
3/25/2019	46.860001	189.899994	1173.310059	1780.75	117.940002	0.020046	0.016406
4/1/2019	46.470001	190.710007	1207.150024	1837.280029	119.889999	-0.00836	0.004256
4/8/2019	46.549999	189.850006	1203.839966	1849.859985	119.93	0.00172	-0.00452
4/9/2019	46.52	189.270004	1196	1846.219971	119.364998	-0.00064	-0.00306
					E(ri)	0.000833	0.002967

0.041571	0.065399	0.020418	0.000458322	9.37E-05	7.87E-05	0.000163	0.000109
-0.04081	0.029117	0.008595	9.36801E-05	0.000549	0.00019	0.00042	0.000307
0.017477	0.005283	-0.00691	7.86634E-05	0.00019	0.000851	0.000896	0.000568
0.046643	0.013795	0.026342	0.000163308	0.00042	0.000896	0.001817	0.000907
-0.02948	-0.01797	-0.01381	0.000108569	0.000307	0.000568	0.000907	0.000736
0.008683	0.022472	0.020543					
0.039948	0.019307	0.024405					
0.001223	0.025531	0.0083	MIN VARIANCE				
0.02762	0.018813	-0.01487					
0.002791	-0.00017	0.002793	0.000916643	0.000187	0.000157	0.000327	0.000217
-0.03508	-0.00929	-0.01809	0.00018736	0.001098	0.00038	0.000841	0.000613
0.02174	0.006351	0.025531	0.000157327	0.00038	0.001702	0.001792	0.001136
0.041784	0.058138	0.041344	0.000326616	0.000841	0.001792	0.003635	0.001814
-0.00329	0.000369	0.007936	0.000217139	0.000613	0.001136	0.001814	0.001472
0.044234	0.001966	0.013181	1	1	1	1	1
-0.01201	0.003307	0.003338					
0.011295	0.033975	0.008846	740.6306883	-428.875	-223.281	130.637	-219.111
-0.03006	-0.00217	-0.01311	-428.875426	1008.73	13.35684	7.973082	-601.185
0.016262	0.012235	0.007593	-223.28102	13.35684	1281.858	-306.381	-765.552
-0.00202	0.054795	0.035613	130.6369562	7.973082	-306.381	762.7067	-594.936
-0.04479	-0.03059	-0.03737	-219.111198	-601.185	-765.552	-594.936	2180.784
0.006589	0.00924	0.046583	0.441497776	0.329965	0.266796	-0.19297	0.154709
-0.00551	-0.02841	0.00782					
0.023209	0.044923	0.000962					
-0.03073	-0.05825	-0.01978					
-0.0417	-0.05495	-0.0231					
-0.01235	-0.01384	-0.00834	0.000833368				
-0.02306	-0.07119	-0.01577	0.002966912				
-0.01285	0.013735	-0.00751	0.002832695				
0.007872	0.02777	0.031616	0.004809689				
-0.00438	-0.07204	-0.01175	0.004692956				
-0.03607	-0.05904	-0.0494					
0.066634	0.117992	0.07313	Rf	0.03 p.a.			
-0.05431	-0.03678	-0.05629		0.0006 p.w.			VRS
0.005311	-0.02311	0.011477					0.000233
-0.06191	-0.1447	-0.07641					0.002367
0.057081	0.070469	0.021751					0.002233
0.031913	0.0638	0.015224					0.00421
-0.01271	0.040535	0.008499					0.004093
0.038113	0.033353	0.046657					
-0.00664	-0.01523	-0.00503					
0.01795	-0.0269	-0.04183	2295.023851	-249.564	45.19246	-94.4015	-153.065
-0.01423	-0.02365	0.02773	-249.564353	2472.004	394.2392	-249.877	-989.249
0.016834	0.012346	0.023845	45.19245541	394.2392	2860.881	-827.696	-1358.78
-0.00295	0.014577	0.025094	-94.4015197	-249.877	-827.696	1680.87	-1314.51
0.027203	0.024322	0.01396	-153.064538	-989.249	-1358.78	-1314.51	4461.492
0.001165	-0.03094	-0.01811					
0.036226	0.054953	0.047708					

0.017607	0.030148	0.009787
-0.02707	0.009014	0.007575
0.028433	0.031252	0.016399
-0.00275	0.006824	0.000334
-0.00653	-0.00197	-0.00472
0.002833	0.00481	0.004693

Rp 0.005459 VarP 0.000894964 sigma_p 0.029916
faster way to find varP 0.000894964

globa.Min Tang_port
return/risk 0.122803 0.182492336