

Compa ny	Year							
	2014				2015			
	I.	II.	III.	IV.	I.	II.	III.	IV.
<b>A</b>	1010	1055	1100	1031	988	1065	918	1060
<b>B</b>	2650	3000	3848	3228	3638	4205	3979	4731
<b>C</b>	1505	2030	2190	2325	2250	2443	1700	1796
<b>D</b>	178	300	325	396	351	370	335	327
<b>E</b>	281	372	358	494	460	539	443	468
<b>F</b>	2645	3125	3400	3330	3400	3425	3475	4100
<b>G</b>	547	800	803	1070	975	952	997	944

Covariance

A  
B  
C  
D  
E  
F  
G

Correl Matr



q-returns

								E(ri)
	0.04359	0.041769	-0.06478	-0.0426	0.075047	-0.14853	0.143827	0.006903
	0.124053	0.248941	-0.17569	0.119571	0.14484	-0.05524	0.173106	0.082797
	0.299243	0.075866	0.059818	-0.03279	0.082297	-0.3626	0.054934	0.025253
	0.521999	0.080043	0.197589	-0.12063	0.052717	-0.09937	-0.02417	0.086882
	0.280539	-0.03836	0.322003	-0.07131	0.158489	-0.19615	0.054899	0.072873
	0.166763	0.084341	-0.0208	0.020803	0.007326	0.014493	0.165392	0.062617
	0.380163	0.003743	0.287059	-0.09298	-0.02387	0.046186	-0.05462	0.077954

two-years returns

A	0.048319
B	0.579577
C	0.176769
D	0.608177
E	0.510114
F	0.438316
G	0.545677

matrice with function

A	B	C	D	E	F	G
0.009617	0.010344	0.013408	0.004913	0.006368	0.005069	-0.00303
0.010344	0.021422	0.0114	-0.00098	-0.00646	0.006738	-0.01235
0.013408	0.0114	0.03946	0.033623	0.02949	0.007957	0.016462
0.004913	-0.00098	0.033623	0.048813	0.032966	0.007341	0.03579
0.006368	-0.00646	0.02949	0.032966	0.036396	0.001804	0.024994
0.005069	0.006738	0.007957	0.007341	0.001804	0.005994	0.002183
-0.00303	-0.01235	0.016462	0.03579	0.024994	0.002183	0.033122

rice by excel function

1	0.720674	0.688288	0.226756	0.340369	0.667638	-0.16979
0.720674	1	0.392109	-0.03026	-0.23152	0.594603	-0.46366
0.688288	0.392109	1	0.766101	0.778153	0.517375	0.455353
0.226756	-0.03026	0.766101	1	0.782114	0.429199	0.890092
0.340369	-0.23152	0.778153	0.782114	1	0.122128	0.719859
0.667638	0.594603	0.517375	0.429199	0.122128	1	0.154941
-0.16979	-0.46366	0.455353	0.890092	0.719859	0.154941	1



								Var
	0.001346	0.001216	0.005139	0.002451	0.004644	0.02416	0.018748	0.009617
	0.001702	0.027604	0.066816	0.001352	0.003849	0.019055	0.008156	0.021422
	0.075071	0.002562	0.001195	0.003369	0.003254	0.150429	0.000881	0.03946
	0.189326	4.68E-05	0.012256	0.043061	0.001167	0.034691	0.012333	0.048813
	0.043125	0.012373	0.062065	0.020789	0.00733	0.072371	0.000323	0.036396
	0.010847	0.000472	0.006959	0.001748	0.003057	0.002316	0.010563	0.005994
	0.09133	0.005507	0.043725	0.029217	0.010369	0.001009	0.017577	0.033122
	0.036688	0.034867	-0.07168	-0.0495	0.068145	-0.15544	0.136924	
	0.041256	0.166145	-0.25849	0.036775	0.062044	-0.13804	0.090309	
	0.27399	0.050613	0.034566	-0.05804	0.057044	-0.38785	0.029681	
	0.435117	-0.00684	0.110707	-0.20751	-0.03417	-0.18625	-0.11105	
	0.207666	-0.11123	0.249129	-0.14418	0.085616	-0.26902	-0.01797	
	0.104147	0.021725	-0.08342	-0.04181	-0.05529	-0.04812	0.102776	
	0.302209	-0.07421	0.209105	-0.17093	-0.10183	-0.03177	-0.13258	
A-A	0.001346	0.001216	0.005139	0.002451	0.004644	0.02416	0.018748	0.009617
A-B	0.001514	0.005793	0.018529	-0.00182	0.004228	0.021456	0.012366	0.010344
A-C	0.010052	0.001765	-0.00248	0.002873	0.003887	0.060286	0.004064	0.013408
A-D	0.015963	-0.00024	-0.00794	0.010273	-0.00233	0.028951	-0.01521	0.004913
A-E	0.007619	-0.00388	-0.01786	0.007138	0.005834	0.041815	-0.00246	0.006368
A-F	0.003821	0.000757	0.00598	0.00207	-0.00377	0.00748	0.014073	0.005069
A-G	0.011087	-0.00259	-0.01499	0.008462	-0.00694	0.004938	-0.01815	-0.00303
B-B	0.001702	0.027604	0.066816	0.001352	0.003849	0.019055	0.008156	0.021422
B-C	0.011304	0.008409	-0.00893	-0.00213	0.003539	0.053539	0.00268	0.0114
B-D	0.017951	-0.00114	-0.02862	-0.00763	-0.00212	0.025711	-0.01003	-0.00098
B-E	0.008567	-0.01848	-0.0644	-0.0053	0.005312	0.037136	-0.00162	-0.00646
B-F	0.004297	0.003609	0.021563	-0.00154	-0.00343	0.006643	0.009282	0.006738
B-G	0.012468	-0.01233	-0.05405	-0.00629	-0.00632	0.004385	-0.01197	-0.01235
C-C	0.075071	0.002562	0.001195	0.003369	0.003254	0.150429	0.000881	0.03946
C-D	0.119218	-0.00035	0.003827	0.012044	-0.00195	0.072239	-0.0033	0.033623
C-E	0.056898	-0.00563	0.008611	0.008369	0.004884	0.104339	-0.00053	0.02949
C-F	0.028535	0.0011	-0.00288	0.002427	-0.00315	0.018665	0.00305	0.007957
C-G	0.082802	-0.00376	0.007228	0.009921	-0.00581	0.012321	-0.00394	0.016462
D-D	0.189326	4.68E-05	0.012256	0.043061	0.001167	0.034691	0.012333	0.048813
D-E	0.090359	0.000761	0.02758	0.029919	-0.00293	0.050106	0.001996	0.032966
D-F	0.045316	-0.00015	-0.00924	0.008677	0.001889	0.008963	-0.01141	0.007341
D-G	0.131496	0.000508	0.023149	0.03547	0.003479	0.005917	0.014723	0.03579

E-E	0.043125	0.012373	0.062065	0.020789	0.00733	0.072371	0.000323	0.036396
E-F	0.021628	-0.00242	-0.02078	0.006029	-0.00473	0.012946	-0.00185	0.001804
E-G	0.062758	0.008255	0.052094	0.024645	-0.00872	0.008546	0.002383	0.024994
F-F	0.010847	0.000472	0.006959	0.001748	0.003057	0.002316	0.010563	0.005994
F-G	0.031474	-0.00161	-0.01744	0.007147	0.00563	0.001529	-0.01363	0.002183
G-G	0.09133	0.005507	0.043725	0.029217	0.010369	0.001009	0.017577	0.033122

sigma      function of excel

0.098067 0.009617  
 0.146364 0.021422  
 0.198645 0.03946  
 0.220938 0.048813  
 0.190778 0.036396  
 0.077418 0.005994  
 0.181996 0.033122

	0.098067	0.146364	0.198645	0.220938	0.190778	0.077418
	A	B	C	D	E	F
0.098067 A	0.009617	0.010344	0.013408	0.004913	0.006368	0.005069
0.146364 B	0.010344	0.021422	0.0114	-0.00098	-0.00646	0.006738
0.198645 C	0.013408	0.0114	0.03946	0.033623	0.02949	0.007957
0.220938 D	0.004913	-0.00098	0.033623	0.048813	0.032966	0.007341
0.190778 E	0.006368	-0.00646	0.02949	0.032966	0.036396	0.001804
0.077418 F	0.005069	0.006738	0.007957	0.007341	0.001804	0.005994
0.181996 G	-0.00303	-0.01235	0.016462	0.03579	0.024994	0.002183

	A	B	C	D	E	F	
A		1	0.720674	0.688288	0.226756	0.340369	0.667638
B	0.720674		1	0.392109	-0.03026	-0.23152	0.594603
C	0.688288	0.392109		1	0.766101	0.778153	0.517375
D	0.226756	-0.03026	0.766101		1	0.782114	0.429199
E	0.340369	-0.23152	0.778153	0.782114		1	0.122128
F	0.667638	0.594603	0.517375	0.429199	0.122128		1
G	-0.16979	-0.46366	0.455353	0.890092	0.719859	0.154941	





0.181996

G

-0.00303

-0.01235

0.016462

0.03579

0.024994

0.002183

0.033122

G

-0.16979

-0.46366

0.455353

0.890092

0.719859

0.154941

1

Date	Exxon	Appl	Goldman			
2/25/2019	78.5	174.23	198.65			
2/26/2019	78.66	174.33	198.9	0.002036193	0.000574	0.001258
2/27/2019	79.47	174.87	198.1	0.010244787	0.003093	-0.00403
2/28/2019	79.03	173.15	196.7	-0.00555209	-0.00988	-0.00709
3/1/2019	80	174.97	198.2	0.01219912	0.010456	0.007597
3/4/2019	80.31	175.85	195.98	0.003867487	0.005017	-0.01126
3/5/2019	80.19	175.53	196	-0.00149528	-0.00182	0.000102
3/6/2019	79.28	174.52	194.74	-0.01141297	-0.00577	-0.00645
3/7/2019	80.16	172.5	192.77	0.01103881	-0.01164	-0.01017
3/8/2019	79.01	172.91	195.24	-0.01445024	0.002374	0.012732
3/11/2019	79.78	178.9	195.97	0.009698382	0.034056	0.003732
3/12/2019	80	180.91	196.63	0.002753801	0.011173	0.003362
3/13/2019	80.71	181.71	197.25	0.008835836	0.004412	0.003148
3/14/2019	80.44	183.73	197.47	-0.00335088	0.011055	0.001115
3/15/2019	80.15	186.12	198.26	-0.00361169	0.012924	0.003993
3/18/2019	81.08	188.02	202.47	0.011536442	0.010157	0.021012
3/19/2019	80.87	186.53	201.12	-0.00259338	-0.00796	-0.00669
3/20/2019	81.32	188.16	194.32	0.005549025	0.008701	-0.0344
3/21/2019	81.79	195.09	194.58	0.00576301	0.036168	0.001337
3/22/2019	80.48	191.05	188.96	-0.01614626	-0.02093	-0.02931
3/25/2019	79.92	188.74	188.51	-0.00698263	-0.01216	-0.00238
3/26/2019	80.96	186.79	190.69	0.012929084	-0.01039	0.011498
3/27/2019	80.34	188.47	190.03	-0.00768761	0.008954	-0.00347
3/28/2019	80.74	188.72	191.18	0.004966512	0.001326	0.006033
3/29/2019	80.8	189.95	191.99	0.000742912	0.006496	0.004228
4/1/2019	81.73	191.24	196.74	0.011444166	0.006768	0.02444
4/2/2019	81.38	194.02	197.5	-0.00429166	0.014432	0.003855
4/3/2019	80.9	195.35	200.86	-0.00591566	0.006832	0.01687
4/4/2019	82.05	195.69	202.23	0.014115005	0.001739	0.006797
4/5/2019	82.49	197	202.38	0.005348196	0.006672	0.000741
4/8/2019	83	200.1	202.54	0.006163558	0.015614	0.00079
4/9/2019	81.93	199.5	200.62	-0.01297538	-0.003	-0.00952
4/10/2019	81.56	200.62	202.98	-0.0045263	0.005598	0.011695
4/11/2019	81.95	198.95	202.83	0.004770347	-0.00836	-0.00074
4/12/2019	80.92	198.87	207.84	-0.01264828	-0.0004	0.0244
4/15/2019	80.65	199.23	199.91	-0.00334216	0.001809	-0.0389
4/16/2019	81.2	199.25	201.84	0.006796381	0.0001	0.009608
4/17/2019	81.43	203.13	207.9	0.002828545	0.019286	0.029582
4/18/2019	81.13	203.86	205.91	-0.00369099	0.003587	-0.00962
4/22/2019	82.9	204.53	204.6	0.021582317	0.003281	-0.00638
4/23/2019	83.38	207.48	204.14	0.00577335	0.01432	-0.00225
4/24/2019	81.76	207.16	200.54	-0.01962029	-0.00154	-0.01779
4/25/2019	82.22	205.28	201.4	0.005610443	-0.00912	0.004279
4/26/2019	80.49	204.3	203.08	-0.02126567	-0.00479	0.008307
4/29/2019	79.97	204.61	206.92	-0.00648135	0.001516	0.018732
4/30/2019	80.28	200.67	205.92	0.003868935	-0.01944	-0.00484
5/1/2019	78.67	210.52	204.73	-0.02025865	0.047919	-0.0058
5/2/2019	77.29	209.15	204.99	-0.01769727	-0.00653	0.001269
5/3/2019	77.47	211.75	207.52	0.002326183	0.012355	0.012267

5/6/2019	77.13	208.48	206.43	-0.00439851	-0.01556	-0.00527
5/7/2019	76.72	202.86	202.63	-0.00532983	-0.02733	-0.01858
5/8/2019	76.84	202.9	200.95	0.001562842	0.000197	-0.00833
5/9/2019	76.77	200.72	201.63	-0.00091139	-0.0108	0.003378
5/10/2019	76.56	197.18	202.05	-0.00273918	-0.01779	0.002081
5/13/2019	75.71	185.72	194.97	-0.01116448	-0.05988	-0.03567
5/14/2019	75.81	188.66	196.28	0.001319945	0.015706	0.006697
5/15/2019	76.37	190.92	196.4	0.007359804	0.011908	0.000611
5/16/2019	76.36	190.08	199.14	-0.00013098	-0.00441	0.013855
5/17/2019	75.91	189	197.43	-0.00591053	-0.0057	-0.00862
5/20/2019	75.9	183.09	197.24	-0.00013177	-0.03177	-0.00096
5/21/2019	76.25	186.6	199.11	0.004600705	0.01899	0.009436
5/22/2019	75.56	182.78	195.52	-0.0090904	-0.02068	-0.01819
5/23/2019	73.79	179.66	191.97	-0.02370378	-0.01722	-0.01832
5/24/2019	74.1	178.97	193	0.004192271	-0.00385	0.005351
5/28/2019	72.61	178.23	189.44	-0.02031284	-0.00414	-0.01862
5/29/2019	72.16	177.38	188.05	-0.00621674	-0.00478	-0.00736
5/30/2019	71.97	178.3	187.37	-0.00263655	0.005173	-0.00362
5/31/2019	70.77	175.07	182.49	-0.01681424	-0.01828	-0.02639
6/3/2019	71.88	173.3	183.19	0.01556288	-0.01016	0.003828
6/4/2019	73.59	179.64	189.88	0.023511072	0.035931	0.035868
6/5/2019	72.98	182.54	188.44	-0.00832362	0.016014	-0.00761
6/6/2019	74.31	185.22	189.81	0.018060033	0.014575	0.007244
6/7/2019	74.58	190.15	189.81	0.003626896	0.026269	0
6/10/2019	74.91	192.58	194.12	0.004415045	0.012698	0.022453
6/11/2019	74.84	194.81	194.73	-0.000935	0.011513	0.003137
6/12/2019	74.03	194.19	190.22	-0.01088205	-0.00319	-0.02343
6/13/2019	74.68	194.15	191.45	0.008741916	-0.00021	0.006445
6/14/2019	74.35	192.74	191.66	-0.00442867	-0.00729	0.001096
6/17/2019	75.09	193.89	190.83	0.009903695	0.005949	-0.00434
6/18/2019	75.74	198.45	194.98	0.008619055	0.023246	0.021514
6/19/2019	75.32	197.87	195.64	-0.00556069	-0.00293	0.003379
6/20/2019	76.61	199.46	195.7	0.016981926	0.008004	0.000307
6/21/2019	77.69	198.78	195.94	0.013998945	-0.00342	0.001226
6/24/2019	76.95	198.58	197.49	-0.00957075	-0.00101	0.007879
6/25/2019	76.27	195.57	196.06	-0.00887618	-0.01527	-0.00727
6/26/2019	76.6	199.8	197.01	0.004317414	0.021398	0.004834
6/27/2019	75.82	199.74	199.32	-0.01023494	-0.0003	0.011657
6/28/2019	76.63	197.92	204.6	0.010626496	-0.00915	0.026145
7/1/2019	76.56	201.55	206.86	-0.00091388	0.018175	0.010985
7/2/2019	75.72	202.73	205.98	-0.01103238	0.005838	-0.00426
7/3/2019	76.44	204.41	206.04	0.009463806	0.008253	0.000291
7/5/2019	76.13	204.23	207.9	-0.00406378	-0.00088	0.008987
7/8/2019	76.48	200.02	205.75	0.004586942	-0.02083	-0.0104
7/9/2019	76.43	201.24	207.77	-0.00065402	0.006081	0.00977
7/10/2019	77.51	203.23	205.97	0.014031697	0.00984	-0.0087
7/11/2019	77.57	201.75	211.35	0.000773768	-0.00731	0.025785
7/12/2019	77.63	203.3	213.94	0.000773157	0.007653	0.01218
7/15/2019	77.08	205.21	211.58	-0.00711004	0.009351	-0.01109
7/16/2019	75.93	204.5	215.52	-0.01503201	-0.00347	0.018451

7/17/2019	75.48	203.35	213.3	-0.0059441	-0.00564	-0.01035
7/18/2019	74.84	205.66	214.52	-0.00851531	0.011296	0.005703
7/19/2019	74.99	202.59	213.52	0.002002297	-0.01504	-0.00467
7/22/2019	75.07	207.22	214	0.001066267	0.022597	0.002245
7/23/2019	75.37	208.84	219.43	0.003988346	0.007787	0.025057
7/24/2019	75.36	208.67	222.03	-0.00013271	-0.00081	0.011779
7/25/2019	74.93	207.02	219.98	-0.0057223	-0.00794	-0.00928
7/26/2019	74.81	207.74	222.14	-0.00160281	0.003472	0.009771
7/29/2019	75.34	209.68	220.32	0.00705961	0.009295	-0.00823
7/30/2019	75.35	208.78	221.4	0.000132749	-0.0043	0.00489
7/31/2019	74.36	213.04	220.13	-0.01322572	0.020199	-0.00575
8/1/2019	72.46	208.43	211.6	-0.0258835	-0.02188	-0.03952
8/2/2019	71.75	204.02	209.37	-0.00984682	-0.02139	-0.01059
8/5/2019	70.28	193.34	201.68	-0.02070061	-0.05377	-0.03742
8/6/2019	70.96	197	206.01	0.009629075	0.018753	0.021242
8/7/2019	70.5	199.04	205.74	-0.00650361	0.010302	-0.00131
8/8/2019	72.38	203.43	207	0.026317267	0.021816	0.006106
8/9/2019	70.84	200.99	206.9	-0.02150622	-0.01207	-0.00048
8/12/2019	69.63	200.48	201.52	-0.01722829	-0.00254	-0.02635
8/13/2019	70.49	208.97	204.11	0.012275362	0.041476	0.01277
8/14/2019	67.65	202.75	195.56	-0.04112344	-0.03022	-0.04279
8/15/2019	67.25	201.74	196.18	-0.00593037	-0.00499	0.003165
8/16/2019	68.3	206.5	199.42	0.015492792	0.023321	0.016381
8/19/2019	69.45	210.35	202.2	0.016697216	0.018472	0.013844
8/20/2019	69.03	210.36	199.98	-0.00606585	4.75E-05	-0.01104
8/21/2019	69.72	212.64	200.68	0.009946057	0.01078	0.003494
8/22/2019	69.57	212.46	202.42	-0.0021538	-0.00085	0.008633
8/23/2019	67.49	202.64	196.2	-0.03035403	-0.04732	-0.03121
8/26/2019	67.85	206.49	199.65	0.005319948	0.018821	0.017431
8/27/2019	67.19	204.16	198.07	-0.0097749	-0.01135	-0.00795
8/28/2019	67.68	205.53	200.42	0.007266259	0.006688	0.011795
8/29/2019	68.43	209.01	203.44	0.01102061	0.01679	0.014956
8/30/2019	68.48	208.74	203.91	0.000730451	-0.00129	0.002308
9/3/2019	68.56	205.7	198.97	0.001167469	-0.01467	-0.02452
9/4/2019	69.29	209.19	201.73	0.010591365	0.016824	0.013776
9/5/2019	70.27	213.28	207.05	0.014044312	0.019363	0.02603
9/6/2019	70.93	213.26	207.21	0.009348553	-9.4E-05	0.000772
9/9/2019	71.49	214.17	211.98	0.007864077	0.004258	0.022759
9/10/2019	72.07	216.7	215.63	0.008080317	0.011744	0.017072
9/11/2019	71.93	223.59	216.8	-0.00194445	0.0313	0.005411
9/12/2019	71.98	223.09	218.74	0.00069492	-0.00224	0.008909
9/13/2019	72.64	218.75	219.9	0.009127376	-0.01965	0.005289
9/16/2019	73.73	219.9	217.22	0.014894092	0.005243	-0.01226
9/17/2019	73.17	220.7	215.91	-0.00762434	0.003631	-0.00605
9/18/2019	72.82	222.77	217.08	-0.00479483	0.009336	0.005404
9/19/2019	72.33	220.96	215.23	-0.00675163	-0.00816	-0.00856
9/20/2019	72.08	217.73	213.74	-0.00346237	-0.01473	-0.00695
9/23/2019	72.13	218.72	213.46	0.000693364	0.004537	-0.00131
9/24/2019	71.14	217.68	207.75	-0.01382025	-0.00477	-0.02711
9/25/2019	71.35	221.03	210.03	0.002947563	0.015272	0.010915

9/26/2019	70.97	219.89	208.22	-0.00534005	-0.00517	-0.00866
9/27/2019	71.48	218.82	208.97	0.007160466	-0.00488	0.003595
9/30/2019	70.61	223.97	207.23	-0.01224594	0.023263	-0.00836
10/1/2019	68.95	224.59	202.69	-0.02379023	0.002764	-0.02215
10/2/2019	67.15	218.96	198.25	-0.02645261	-0.02539	-0.02215
10/3/2019	67.98	220.82	197.24	0.012284636	0.008459	-0.00511
10/4/2019	68.97	227.01	200.8	0.014458054	0.027646	0.017888
10/7/2019	68.02	227.06	200.4	-0.01386991	0.00022	-0.00199
10/8/2019	66.7	224.4	197.37	-0.01959683	-0.01178	-0.01524
10/9/2019	67.44	227.03	196.85	0.011033435	0.011652	-0.00264
10/10/2019	68.25	230.09	199.87	0.011939091	0.013388	0.015225
10/11/2019	68.98	236.21	204.68	0.010639217	0.026251	0.023781
10/14/2019	69.18	235.87	205.82	0.002895153	-0.00144	0.005554
10/15/2019	69.42	235.32	206.46	0.003463178	-0.00233	0.003105
10/16/2019	68.23	234.37	207.42	-0.01729059	-0.00405	0.004639
10/17/2019	68.14	235.28	206.46	-0.00132	0.003875	-0.00464
10/18/2019	67.61	236.41	206.52	-0.00780848	0.004791	0.000291
10/21/2019	68.74	240.51	209.25	0.016575326	0.017194	0.013132
10/22/2019	69.09	239.96	209.6	0.005078702	-0.00229	0.001671
10/23/2019	69.75	243.18	211.32	0.009507476	0.01333	0.008173
10/24/2019	69.09	243.58	211.05	-0.00950748	0.001644	-0.00128
10/25/2019	69.25	246.58	214.23	0.0023132	0.012241	0.014955
10/28/2019	68.64	249.05	217.75	-0.0088477	0.009967	0.016297
10/29/2019	68.44	243.29	217.64	-0.00291796	-0.0234	-0.00051
10/30/2019	67.72	243.26	215.81	-0.01057591	-0.00012	-0.00844
10/31/2019	67.57	248.76	213.38	-0.00221747	0.022358	-0.01132
11/1/2019	69.6	255.82	217.39	0.029600441	0.027986	0.018618
11/4/2019	71.67	257.5	219.87	0.029307683	0.006546	0.011343
11/5/2019	73.09	257.13	218.64	0.019619282	-0.00144	-0.00561
11/6/2019	71.49	257.24	218.42	-0.02213395	0.000428	-0.00101
11/7/2019	73.01	259.43	223.29	0.021038894	0.008477	0.022052
11/8/2019	70.77	260.14	222.91	-0.03116131	0.002733	-0.0017
11/11/2019	70.34	262.2	219.03	-0.00609457	0.007888	-0.01756
11/12/2019	69.37	261.96	220.41	-0.01388603	-0.00092	0.006281
11/13/2019	68.8	264.47	219.32	-0.00825075	0.009536	-0.00496
11/14/2019	68.5	262.64	219.43	-0.00437004	-0.00694	0.000501
11/15/2019	69.19	265.76	220.25	0.010022627	0.011809	0.00373
11/18/2019	68.52	267.1	219.73	-0.00973074	0.005029	-0.00236
11/19/2019	67.82	266.29	220.04	-0.01026849	-0.00304	0.00141
11/20/2019	68.03	263.19	217.91	0.003091633	-0.01171	-0.00973
11/21/2019	69.67	262.01	218.23	0.023821011	-0.00449	0.001467
11/22/2019	69.37	261.78	220.28	-0.00431524	-0.00088	0.00935
11/25/2019	68.91	266.37	222.75	-0.00665318	0.017382	0.011151
11/26/2019	68.74	264.29	222.45	-0.00247012	-0.00784	-0.00135
11/27/2019	68.7	267.84	222.95	-0.00058209	0.013343	0.002245
11/29/2019	68.13	267.25	221.35	-0.00833155	-0.00221	-0.0072
12/2/2019	68.42	264.16	217.64	0.00424755	-0.01163	-0.0169
12/3/2019	67.88	259.45	212.24	-0.00792375	-0.01799	-0.02512
12/4/2019	68.65	261.74	215.94	0.011279765	0.008788	0.017283
12/5/2019	68.41	265.58	217.14	-0.00350209	0.014564	0.005542

12/6/2019	69.51	270.71	224.61	0.015951585	0.019132	0.033823
12/9/2019	69.66	266.92	221.81	0.002155666	-0.0141	-0.01254
12/10/2019	69.06	268.48	221.88	-0.00865066	0.005827	0.000316
12/11/2019	68.96	270.77	221.19	-0.00144905	0.008493	-0.00311
12/12/2019	70.34	271.46	226.05	0.019813958	0.002545	0.021734
12/13/2019	69.23	275.15	225	-0.01590623	0.013502	-0.00466
12/16/2019	70	279.86	228.04	0.011060904	0.016973	0.013421
12/17/2019	69.68	280.41	231.15	-0.00458191	0.001963	0.013546
12/18/2019	69.87	279.74	230.45	0.002723083	-0.00239	-0.00303
12/19/2019	69.39	280.02	229.94	-0.00689367	0.001	-0.00222
12/20/2019	69.94	279.44	228.93	0.00789501	-0.00207	-0.0044
12/23/2019	70.29	284	229.09	0.004991795	0.016187	0.000699
12/24/2019	70.02	284.27	229.91	-0.00384868	0.00095	0.003573
12/26/2019	70.13	289.91	231.21	0.001569747	0.019646	0.005638
12/27/2019	69.89	289.8	230.66	-0.00342806	-0.00038	-0.00238
12/30/2019	69.48	291.52	229.8	-0.00588358	0.005918	-0.00374
12/31/2019	69.78	293.65	229.93	0.004308437	0.00728	0.000566
1/2/2020	70.9	300.35	234.32	0.01592304	0.02256	0.018913
1/3/2020	70.33	297.43	231.58	-0.00807198	-0.00977	-0.01176
1/6/2020	70.87	299.8	233.95	0.007648776	0.007937	0.010182
1/7/2020	70.29	298.39	235.49	-0.0082177	-0.00471	0.006561
1/8/2020	69.23	303.19	237.76	-0.01519522	0.015958	0.009593
1/9/2020	69.76	309.63	242.6	0.00762647	0.021018	0.020152
1/10/2020	69.14	310.33	242.11	-0.00892739	0.002258	-0.00202
1/13/2020	69.8	316.96	245.21	0.009500633	0.021139	0.012723
1/14/2020	69.2	312.68	245.66	-0.00863323	-0.0136	0.001833
1/15/2020	69.09	311.34	245.21	-0.00159087	-0.00429	-0.00183
1/16/2020	68.82	315.24	249.72	-0.00391554	0.012449	0.018225
1/17/2020	68.56	318.73	249.46	-0.00378516	0.01101	-0.00104
1/21/2020	67.58	316.57	245.7	-0.01439713	-0.0068	-0.01519
1/22/2020	67.19	317.7	247.05	-0.00578765	0.003563	0.005479
1/23/2020	66.77	319.23	245.58	-0.00627062	0.004804	-0.00597
1/24/2020	66.32	318.31	241.92	-0.00676232	-0.00289	-0.01502
1/27/2020	64.74	308.95	238.14	-0.02411229	-0.02985	-0.01575
1/28/2020	64.65	317.69	242.58	-0.00139108	0.027897	0.018473
1/29/2020	64.11	324.34	240.12	-0.00838776	0.020716	-0.01019
1/30/2020	64.79	323.87	244.13	0.010550912	-0.00145	0.016562
1/31/2020	62.12	309.51	237.75	-0.0420833	-0.04535	-0.02648
2/3/2020	60.73	308.66	239.01	-0.02263017	-0.00275	0.005286
2/4/2020	59.97	318.85	241.94	-0.01259336	0.03248	0.012184
2/5/2020	62.73	321.45	244.3	0.044995348	0.008121	0.009707
2/6/2020	61.88	325.21	241.82	-0.01364276	0.011629	-0.0102
2/7/2020	61.47	320.03	238	-0.00664777	-0.01606	-0.01592
2/10/2020	59.96	321.55	237.36	-0.02487161	0.004738	-0.00269
2/11/2020	60.53	319.61	236.46	0.009461437	-0.00605	-0.0038
2/12/2020	61.27	327.2	238.65	0.012151233	0.02347	0.009219
2/13/2020	60.93	324.87	238.35	-0.00556466	-0.00715	-0.00126
2/14/2020	60.65	324.95	237.08	-0.004606	0.000246	-0.00534
2/18/2020	59.88	319	233.21	-0.01277709	-0.01848	-0.01646
2/19/2020	60.34	323.62	237.33	0.007652657	0.014379	0.017512

2/20/2020	59.86	320.3	232.73	-0.00798671	-0.01031	-0.01957	
2/21/2020	59.13	313.05	230.62	-0.01227009	-0.0229	-0.00911	
2/24/2020	56.36	298.18	224.54	-0.04797872	-0.04867	-0.02672	
2/25/2020	54.82	294.79	220.02	-0.02770461	-0.01143	-0.02034	
			E (ri)	-0.00142478	0.002087	0.000405	Var

Covar M

	Exxon	Appl	Goldman
Exxon	0.000156172	8.96E-05	9.33E-05
Appl	8.96095E-05	0.000236	0.000122
Goldman	9.33047E-05	0.000122	0.000188

Correl M

	1	0.466777	0.544306
	0.466776586	1	0.579785
	0.544305508	0.579785	1

1.19783E-05	2.29E-06	7.26E-07
0.000136179	1.01E-06	1.97E-05
1.70347E-05	0.000143	5.62E-05
0.000185611	7E-05	5.17E-05
2.8008E-05	8.58E-06	0.000136
4.97048E-09	1.53E-05	9.2E-08
9.97639E-05	6.17E-05	4.7E-05
0.000155341	0.000188	0.000112
0.000169663	8.25E-08	0.000152
0.000123725	0.001022	1.11E-05
1.74605E-05	8.26E-05	8.74E-06
0.00010528	5.41E-06	7.52E-06
3.70988E-06	8.04E-05	5.03E-07
4.78257E-06	0.000117	1.29E-05
0.000167993	6.51E-05	0.000425
1.36564E-06	0.000101	5.03E-05
4.86339E-05	4.37E-05	0.001211
5.16643E-05	0.001162	8.68E-07
0.000216722	0.00053	0.000883
3.08898E-05	0.000203	7.78E-06
0.000206033	0.000156	0.000123
3.92231E-05	4.72E-05	1.5E-05
4.08486E-05	5.8E-07	3.17E-05
4.69887E-06	1.94E-05	1.46E-05
0.00016561	2.19E-05	0.000578
8.21904E-06	0.000152	1.19E-05
2.0168E-05	2.25E-05	0.000271
0.000241485	1.21E-07	4.09E-05
4.58731E-05	2.1E-05	1.13E-07
5.75828E-05	0.000183	1.48E-07
0.000133417	2.59E-05	9.86E-05
9.61947E-06	1.23E-05	0.000127
3.83796E-05	0.000109	1.31E-06
0.000125967	6.2E-06	0.000576
3.67635E-06	7.74E-08	0.001545
6.75874E-05	3.95E-06	8.47E-05
1.80907E-05	0.000296	0.000851
5.13571E-06	2.25E-06	0.0001
0.000529326	1.43E-06	4.61E-05
5.1813E-05	0.00015	7.06E-06
0.000331077	1.32E-05	0.000331
4.94943E-05	0.000126	1.5E-05
0.000393661	4.72E-05	6.24E-05
2.5569E-05	3.26E-07	0.000336
2.80234E-05	0.000464	2.76E-05
0.000354715	0.002101	3.85E-05
0.000264794	7.42E-05	7.46E-07
1.40697E-05	0.000105	0.000141



8.84307E-06	0.000312	3.22E-05
1.52494E-05	0.000865	0.00036
8.92586E-06	3.57E-06	7.62E-05
2.63569E-07	0.000166	8.84E-06
1.72765E-06	0.000395	2.81E-06
9.48619E-05	0.003839	0.001301
7.53349E-06	0.000185	3.96E-05
7.71689E-05	9.65E-05	4.23E-08
1.67392E-06	4.22E-05	0.000181
2.0122E-05	6.06E-05	8.15E-05
1.67186E-06	0.001146	1.87E-06
3.63064E-05	0.000286	8.16E-05
5.87618E-05	0.000519	0.000346
0.000496354	0.000373	0.000351
3.15512E-05	3.52E-05	2.45E-05
0.000356759	3.88E-05	0.000362
2.29629E-05	4.72E-05	6.04E-05
1.4684E-06	9.53E-06	1.62E-05
0.000236836	0.000415	0.000718
0.00028858	0.00015	1.17E-05
0.000621797	0.001145	0.001258
4.75941E-05	0.000194	6.43E-05
0.000379658	0.000156	4.68E-05
2.55194E-05	0.000585	1.64E-07
3.41035E-05	0.000113	0.000486
2.39882E-07	8.89E-05	7.46E-06
8.94399E-05	2.78E-05	0.000568
0.000103362	5.26E-06	3.65E-05
9.0234E-06	8.79E-05	4.77E-07
0.000128334	1.49E-05	2.25E-05
0.000100879	0.000448	0.000446
1.71058E-05	2.51E-05	8.84E-06
0.000338807	3.5E-05	9.77E-09
0.000237891	3.03E-05	6.73E-07
6.63569E-05	9.57E-06	5.59E-05
5.55235E-05	0.000301	5.89E-05
3.29727E-05	0.000373	1.96E-05
7.7619E-05	5.7E-06	0.000127
0.000145233	0.000126	0.000663
2.6101E-07	0.000259	0.000112
9.23061E-05	1.41E-05	2.18E-05
0.000118561	3.8E-05	1.3E-08
6.96434E-06	8.81E-06	7.36E-05
3.61408E-05	0.000525	0.000117
5.94067E-07	1.6E-05	8.77E-05
0.000238903	6.01E-05	8.29E-05
4.8336E-06	8.83E-05	0.000644
4.83091E-06	3.1E-05	0.000139
3.23223E-05	5.28E-05	0.000132
0.000185157	3.08E-05	0.000326

2.04243E-05	5.97E-05	0.000116
5.02757E-05	8.48E-05	2.81E-05
1.17448E-05	0.000293	2.58E-05
6.20529E-06	0.000421	3.39E-06
2.93019E-05	3.25E-05	0.000608
1.66942E-06	8.42E-06	0.000129
1.84687E-05	0.000101	9.37E-05
3.16944E-08	1.92E-06	8.77E-05
7.19848E-05	5.2E-05	7.45E-05
2.42589E-06	4.08E-05	2.01E-05
0.000139262	0.000328	3.79E-05
0.000598229	0.000574	0.001594
7.09308E-05	0.000551	0.000121
0.000371558	0.00312	0.001431
0.000122188	0.000278	0.000434
2.57946E-05	6.75E-05	2.95E-06
0.000769621	0.000389	3.25E-05
0.000403264	0.0002	7.9E-07
0.000249751	2.14E-05	0.000716
0.000187694	0.001552	0.000153
0.001575984	0.001044	0.001866
2.03003E-05	5.01E-05	7.62E-06
0.000286204	0.000451	0.000255
0.000328407	0.000268	0.000181
2.15395E-05	4.16E-06	0.000131
0.000129296	7.56E-05	9.54E-06
5.31469E-07	8.61E-06	6.77E-05
0.000836902	0.002441	0.001
4.54913E-05	0.00028	0.00029
6.97246E-05	0.00018	6.97E-05
7.55341E-05	2.12E-05	0.00013
0.000154888	0.000216	0.000212
4.645E-06	1.14E-05	3.62E-06
6.71974E-06	0.000281	0.000622
0.000144388	0.000217	0.000179
0.000239293	0.000298	0.000657
0.000116065	4.76E-06	1.35E-07
8.62828E-05	4.71E-06	0.0005
9.03468E-05	9.33E-05	0.000278
2.70056E-07	0.000853	2.51E-05
4.49311E-06	1.87E-05	7.23E-05
0.000111348	0.000472	2.38E-05
0.000266305	9.96E-06	0.00016
3.84346E-05	2.39E-06	4.17E-05
1.13573E-05	5.25E-05	2.5E-05
2.83754E-05	0.000105	8.04E-05
4.15178E-06	0.000283	5.41E-05
4.48652E-06	6E-06	2.95E-06
0.000153648	4.7E-05	0.000757
1.91174E-05	0.000174	0.00011

1.53294E-05	5.27E-05	8.21E-05
7.37064E-05	4.85E-05	1.02E-05
0.000117098	0.000448	7.69E-05
0.000500214	4.59E-07	0.000509
0.000626392	0.000755	0.000509
0.000187948	4.06E-05	3.04E-05
0.000252264	0.000653	0.000306
0.000154881	3.48E-06	5.76E-06
0.000330223	0.000192	0.000245
0.000155207	9.15E-05	9.26E-06
0.000178593	0.000128	0.00022
0.00014554	0.000584	0.000546
1.86618E-05	1.24E-05	2.65E-05
2.38921E-05	1.95E-05	7.29E-06
0.000251724	3.76E-05	1.79E-05
1.09786E-08	3.2E-06	2.54E-05
4.07517E-05	7.31E-06	1.32E-08
0.000324004	0.000228	0.000162
4.22952E-05	1.92E-05	1.6E-06
0.000119514	0.000126	6.03E-05
6.533E-05	1.97E-07	2.84E-06
1.39725E-05	0.000103	0.000212
5.50999E-05	6.21E-05	0.000253
2.22961E-06	0.00065	8.29E-07
8.37432E-05	4.88E-06	7.83E-05
6.28371E-07	0.000411	0.000138
0.000962564	0.000671	0.000332
0.000944484	1.99E-05	0.00012
0.000442852	1.24E-05	3.62E-05
0.00042887	2.75E-06	1.99E-06
0.000504616	4.08E-05	0.000469
0.000884261	4.18E-07	4.45E-06
2.1807E-05	3.36E-05	0.000323
0.000155283	9.02E-06	3.45E-05
4.6594E-05	5.55E-05	2.88E-05
8.6746E-06	8.15E-05	9.2E-09
0.000131043	9.45E-05	1.11E-05
6.89891E-05	8.66E-06	7.67E-06
7.82113E-05	2.63E-05	1.01E-06
2.03979E-05	0.00019	0.000103
0.00063735	4.33E-05	1.13E-06
8.35478E-06	8.79E-06	8E-05
2.73362E-05	0.000234	0.000115
1.09275E-06	9.85E-05	3.07E-06
7.10125E-07	0.000127	3.38E-06
4.77036E-05	1.84E-05	5.79E-05
3.21753E-05	0.000188	0.0003
4.22367E-05	0.000403	0.000652
0.000161405	4.49E-05	0.000285
4.31523E-06	0.000156	2.64E-05

0.000301938	0.000291	0.001117
1.28196E-05	0.000262	0.000168
5.22134E-05	1.4E-05	8.08E-09
5.89286E-10	4.1E-05	1.24E-05
0.000451084	2.1E-07	0.000455
0.000209713	0.00013	2.56E-05
0.000155892	0.000222	0.000169
9.96749E-06	1.52E-08	0.000173
1.72047E-05	2.01E-05	1.18E-05
2.99087E-05	1.18E-06	6.87E-06
8.68584E-05	1.73E-05	2.31E-05
4.11724E-05	0.000199	8.6E-08
5.87532E-06	1.29E-06	1E-05
8.96717E-06	0.000308	2.74E-05
4.01313E-06	6.08E-06	7.77E-06
1.98809E-05	1.47E-05	1.71E-05
3.28697E-05	2.7E-05	2.56E-08
0.000300947	0.000419	0.000343
4.41854E-05	0.000141	0.000148
8.23294E-05	3.42E-05	9.56E-05
4.61438E-05	4.63E-05	3.79E-05
0.000189625	0.000192	8.44E-05
8.19251E-05	0.000358	0.00039
5.62892E-05	2.93E-08	5.89E-06
0.000119365	0.000363	0.000152
5.19619E-05	0.000246	2.04E-06
2.75888E-08	4.07E-05	5.01E-06
6.20393E-06	0.000107	0.000318
5.57139E-06	7.96E-05	2.09E-06
0.000168282	7.9E-05	0.000243
1.90347E-05	2.18E-06	2.57E-05
2.34822E-05	7.38E-06	4.06E-05
2.84894E-05	2.47E-05	0.000238
0.000514723	0.00102	0.000261
1.13532E-09	0.000666	0.000326
4.84832E-05	0.000347	0.000112
0.000143417	1.25E-05	0.000261
0.001653116	0.00225	0.000723
0.000449669	2.34E-05	2.38E-05
0.000124737	0.000924	0.000139
0.002154828	3.64E-05	8.65E-05
0.000149279	9.11E-05	0.000113
2.72797E-05	0.000329	0.000267
0.000549754	7.03E-06	9.6E-06
0.00011851	6.62E-05	1.77E-05
0.000184308	0.000457	7.77E-05
1.71387E-05	8.53E-05	2.77E-06
1.01202E-05	3.39E-06	3.3E-05
0.000128875	0.000423	0.000284
8.23998E-05	0.000151	0.000293

4.3059E-05	0.000154	0.000399
0.000117621	0.000624	9.05E-05
0.00216727	0.002576	0.000736
0.00069063	0.000183	0.00043
0.000156172	0.000236	0.000188