HW 5
Portfolio Efficient Frontier

Qian Lou **elaine.lou90727@gmail.com**

In the sheet " Price", you can post your price data
In the sheet "return", you can choose your method of expected return, depending on your own preference
In the sheet" portfolio", you can see how the portfolio efficient frontier looks like and some important ratios.

Please input the stock price data.

Notes: Please choose ten stocks and use the monthly prices.

S&P 500 index reflects the market performance.

After inputing the price data, you can customize your preference in choosing the expected return method in the sheets " return".

Monthly Prices of 10 stocks, S&P 500

Date	MRW.L	WFM	SBRY.L	JCP	DEB.L	M	IBM	APPL	NYT	JPM	S&P 500
11-10月-07	295.75	47.91	547	49.86	106.64	29.22	106.26	189.14	18.31	42.19	1,549.38
1-11月-07	308.5	41.6	440	39.12	81.92	27.05	96.59	181.44	15.66	40.95	1,481.14
3-12月-07	322	39.46	425.25	39	75.57	23.71	99.27	197.23	16.64	39.18	1,468.36
1-1月-08	299.25	38.36	396	42.22	68.27	25.31	98.36	134.78	15.89	42.92	1,378.55
1-2月-08	297.5	34.19	355.25	41.2	64.27	22.62	104.96	124.49	17.9	36.81	1,330.63
3-3月-08	274.25	32.07	343	33.62	53.44	21.25	106.14	142.89	18.14	38.89	1,322.70
1-4月-08	286.5	31.93	383.5	38.08	60.5	23.3	111.27	173.21	18.74	43.5	1,385.59
1-5月-08	292.5	28.37	348.5	36.06	61.21	21.81	119.8	187.94	16.97	39.25	1,400.38
2-6月-08	266.25	23.18	318.25	32.52	43.87	18	109.72	166.72	14.99	31.32	1,280.00
1-7月-08	259	21.88	315.5	27.77	39.95	17.44	118.46	158.27	12.26	37.5	1,267.38
1-8月-08	282.5	18.07	347.75	35.11	48.77	19.3	113.12	168.81	12.88	35.53	1,282.83
1-9月-08	258.5	19.77	348	30.03	47.79	16.77	108.68	113.17	14.17	43.11	1,166.36
1-10月-08	263.75	10.58	282.5	21.7	37.25	11.46	86.39	107.13	9.92	38.37	968.75
3-11月-08	242.5	10.44	287	17.23	23.77	6.92	76.25	92.27	7.54	29.45	896.24
1-12月-08	280.25	9.32	328.5	17.87	24.5	9.8	78.64	84.99	7.33	29.33	903.25
2-1月-09	270.75	10.12	333	15.33	31.5	8.48	85.64	89.74	4.97	24.02	825.88
2-2月-09	258.25	11.99	315.25	14.03	38	7.45	86.46	88.93	4.13	21.51	735.09
2-3月-09	255.5	16.58	313	18.37	48	8.49	91.03	104.67	4.52	25.03	797.87
1-4月-09	246.75	20.46	330.5	28.35	91.75	13.04	96.97	125.29	5.38	31.13	872.81
1-5月-09	242	18.62	310.25	24.1	92.25	11.14	100.37	135.23	6.6	34.8	919.14
1-6月-09	236.5	18.73	313	26.52	81	11.26	98.62	141.82	5.51	32.17	919.32
1-7月-09	269.5	23.87	317.5	28.06	88.75	13.32	111.38	162.69	7.87	36.51	987.48
3-8月-09	277	28.7	325.7	27.96	79.5	14.86	112.01	167.49	7.61	41.05	1,020.62
1-9月-09	277.3	30.09	325	31.41	75.95	17.56	113.49	184.56	8.12	41.39	1,057.08
1-10月-09	280	31.64	329.9	31.01	77.9	16.87	114.44	187.69	7.97	39.5	1,036.19
2-11月-09	275.3	25.31	321.9	26.9	81.8	15.66	120.42	199.06	8.44	40.18	1,095.63
1-12月-09	277.4	27.09	323.5	24.91	77.9	16.14	124.76	209.83	12.36	39.41	1,115.10
4-1月-10	289.1	26.86	323.9	23.41	67.5	15.34	116.65	191.24	12.92	36.87	1,073.87
1-2月-10	298.5	35.02	330.4	26.01	62.75	18.45	121.74	203.75	10.94	39.74	1,104.49
1-3月-10	293.5	35.68	327.6	30.34	75.7	21.02	122.78	234	11.13	42.37	1,169.43
1-4月-10	290.4	38.51	338.3	27.67	71.8	22.4	123.5	259.97	9.92	40.36	1,186.69
4-5月-10	264.2	39.9	324	26.08	59.15	21.44	120.53	255.78	9.28	37.52	1,089.41
1-6月-10	266.1	35.55	321.5	20.38	53	17.32	118.82	250.45	8.65	34.7	1,030.71
1-7月-10	265	37.47	343.6	23.59	61.5	18.05	123.55	256.15	8.74	38.24	1,101.60
2-8月-10	290	34.33	365.2	19.14	57.75	18.78	119.07	242.06	7.18	34.51	1,049.33
1-9月-10	295.7	36.62	390.7	26.04	65.3	22.39	129.72	282.54	7.74	36.13	1,141.20
1-10月-10	293.8	39.23	389.3	30.07	76.35	22.96	138.86	299.69	7.67	35.77	1,183.26
1-11月-10	272	46.6	355.7	32.09	70.5	24.91	137.4	309.82	8.99	35.55	1,180.55
1-12月-10	267.6	49.93	376.3	31.16	70.8	24.59	142.55	321.18	9.8	40.32	1,257.64
4-1月-11	266.5	51.13	381.5	31.12	65.7	22.5	157.35	337.87	10.11	42.76	1,286.12
1-2月-11	276.8	57.91	380	33.93	62.75	23.23	157.86	351.7	10.4	44.43	1,327.22
1-3月-11	276	65.17	335.3	34.85	59.2	23.63	159.02	347.02	9.47	43.87	1,325.83
1-4月-11	294.8	62.16	348.3	37.52	68.1	23.29	166.34	348.63	8.13	43.65	1,363.61
3-5月-11	303.6	60.57	345.6	34.57	74.8	28.13	165.47	346.34	8.02	41.37	1,345.20
1-6月-11	297.7	62.95	329.4	33.7	69	28.59	168.04	334.23	8.72	39.17	1,320.64
1-7月-11	290.9	66.17	304.1	30.19	66.75	28.23	178.13	388.81	8.58	38.94	1,292.28
1-8月-11	289	65.52	299.9	26.14	53.5	25.37	169.12	383.18	8.18	36.16	1,218.89
1-9月-11	290.5	64.89	274.8	26.28	56.35	25.83	172.04	379.69	5.81	28.99	1,131.42
3-10月-11	302.2	71.65	299.1	31.71	65	29.96	181.64	403.05	7.62	33.75	1,253.30
1-11月-11	322	67.66	304	31.67	63.65	31.73	185.7	380.57	7.28	30.07	1,246.96
1-12月-11	326.2	69.13	302.9	34.75	58.55	31.68	181.63	403.27	7.73	32.29	1,257.60
3-1月-12	286	73.69	288.4	41.32	67.27	33.17	190.24	454.53	7.45	36.48	1,312.41
1-2月-12	290	80.37	298.3	39.38	73.8	37.38	195.08	540.12	6.59	38.38	1,365.68
1-3月-12	298	82.82	311.3	35.23	80.8	39.31	206.9	596.99	6.79	44.97	1,408.47
2-4月-12	280.6	82.83	307.9	36.06	82.6	40.59	205.34	581.48	6.31	42.31	1,397.91
1-5月-12	276.2	88.36	288.1	26.23	77.45	37.65	192.08	575.26	6.65	32.63	1,310.33
1-6月-12	266.1	95.18	301.4	23.31	86.5	34.18	194.75	581.5	7.8	35.17	1,362.16
2-7月-12	277.3	91.65	323.3	22.51	91.95	35.66	195.15	608.15	7.75	35.74	1,379.32
1-8月-12	280	96.61	327.6	26.08	96.5	40.1	194.85	665.24	9.19	36.87	1,406.58
3-9月-12	285.2	97.4	347.5	24.29	102.4	37.62	207.45	667.1	9.76	40.18	1,440.67
1-10月-12	283.9	97.41	356	24.15	107.3	39	205.82	640.91	9.98	41.77	1,432.56

Which expected return would you like to choose? Mean

If you choose the Black Litterman model, please input the following : *1) Views Data ,* *Relation Matrix* *3) Scalar T:*

Notes: Please input no more than 10 views

	Views	Relation Matrix (P)										Scalar
	Vector (Q)	1	2	3	4	5	6	7	8	9	10	T
1	0.03%	1.00	1.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.5
2	0.03%	0.00	2.00	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	
3	0.10%	0.00	0.00	0.00	2.00	-1.00	1.00	2.00	0.00	0.00	0.00	
4	0.20%	0.00	1.00	0.00	2.00	1.00	-1.00	-2.00	0.00	0.00	0.00	
5	0.30%	0.00	0.00	0.00	0.00	0.00	1.00	-1.00	0.00	0.00	0.00	
6	0.50%	1.00	0.00	0.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	
7												
8												
9												
10												

Omiga

0.0569	0	0	0	0	0
0	0.0907	0	0	0	0
0	0	0.0737	0	0	0
0	0	0	0.0719	0	0
0	0	0	0	0.0088	0
0	0	0	0	0	0.0163

Outputs	1	2	3	4	5	6	7	8	9	10	S&P 500	risk free rate
Std	5.25%	13.02%	6.53%	15.60%	17.83%	14.75%	5.63%	10.34%	15.22%	11.09%	5.53%	Year Yeild
beta	0.25	1.06	0.63	1.85	1.67	1.66	0.67	1.20	1.59	1.33	1.00	0.09%
Er Mean	0.07%	2.07%	-0.50%	-0.07%	1.37%	1.53%	1.27%	2.62%	0.11%	0.60%	0.02%	Monthly Yeild
Er CAPM	0.01%	0.02%	0.02%	0.04%	0.03%	0.03%	0.02%	0.03%	0.03%	0.03%	0.02%	0.01%
Er BL	0.04%	-0.01%	0.01%	0.03%	-0.12%	0.08%	-0.03%	-0.01%	0.02%	-0.00%		

	Covariance (in CAPM and MEAN method)									
1	0.28%	-0.06%	0.13%	0.09%	0.10%	0.29%	0.05%	0.10%	0.11%	0.01%
2	-0.06%	1.69%	0.23%	0.94%	0.92%	0.89%	0.35%	0.43%	0.66%	0.60%
3	0.13%	0.23%	0.43%	0.41%	0.48%	0.46%	0.14%	0.16%	0.25%	0.27%
4	0.09%	0.94%	0.41%	2.43%	1.84%	1.67%	0.37%	0.69%	0.79%	0.78%
5	0.10%	0.92%	0.48%	1.84%	3.18%	1.62%	0.52%	0.86%	0.71%	0.85%
6	0.29%	0.89%	0.46%	1.67%	1.62%	2.17%	0.36%	0.61%	0.78%	0.78%
7	0.05%	0.35%	0.14%	0.37%	0.52%	0.36%	0.32%	0.28%	0.31%	0.29%
8	0.10%	0.43%	0.16%	0.69%	0.86%	0.61%	0.28%	1.07%	0.40%	0.32%
9	0.11%	0.66%	0.25%	0.79%	0.71%	0.78%	0.31%	0.40%	2.32%	0.82%
10	0.01%	0.60%	0.27%	0.78%	0.85%	0.78%	0.29%	0.32%	0.82%	1.23%

Covariance (in Black Litterman method)

0.11%	-0.06%	0.04%	0.01%	0.05%	0.06%	0.02%	0.04%	0.03%	-0.01%
-0.06%	0.46%	-0.04%	-0.02%	-0.01%	0.03%	0.05%	0.04%	0.10%	0.07%
0.04%	-0.04%	0.14%	0.02%	0.06%	0.03%	0.02%	0.01%	0.02%	0.04%
0.01%	-0.02%	0.02%	0.37%	0.16%	0.13%	0.03%	0.07%	0.07%	0.06%
0.05%	-0.01%	0.06%	0.16%	0.62%	0.18%	0.10%	0.15%	0.06%	0.09%
0.06%	0.03%	0.03%	0.13%	0.18%	0.33%	0.05%	0.07%	0.08%	0.09%
0.02%	0.05%	0.02%	0.03%	0.10%	0.05%	0.11%	0.08%	0.08%	0.06%
0.04%	0.04%	0.01%	0.07%	0.15%	0.07%	0.08%	0.43%	0.08%	0.04%
0.03%	0.10%	0.02%	0.07%	0.06%	0.08%	0.08%	0.08%	1.00%	0.26%
-0.01%	0.07%	0.04%	0.06%	0.09%	0.09%	0.06%	0.04%	0.26%	0.47%

Monthly Returns

Date	MRW.L	WFM	SBRY.L	JCP	DEB.L	M	IBM	APPL	NYT	JPM	S&P 500
11-10月-07	4.31%	-13.17%	-19.56%	-21.54%	-23.18%	-7.43%	-9.10%	-4.07%	-14.47%	-2.94%	-4.40%
1-11月-07	4.38%	-5.14%	-3.35%	-0.31%	-7.75%	-12.35%	2.77%	8.70%	6.26%	-4.32%	-0.86%
3-12月-07	-7.07%	-2.79%	-6.88%	8.26%	-9.66%	6.75%	-0.92%	-31.66%	-4.51%	9.55%	-6.12%
1-1月-08	-0.58%	-10.87%	-10.29%	-2.42%	-5.86%	-10.63%	6.71%	-7.63%	12.65%	-14.24%	-3.48%
1-2月-08	-7.82%	-6.20%	-3.45%	-18.40%	-16.85%	-6.06%	1.12%	14.78%	1.34%	5.65%	-0.60%
3-3月-08	4.47%	-0.44%	11.81%	13.27%	13.21%	9.65%	4.83%	21.22%	3.31%	11.85%	4.75%
1-4月-08	2.09%	-11.15%	-9.13%	-5.30%	1.17%	-6.39%	7.67%	8.50%	-9.45%	-9.77%	1.07%
1-5月-08	-8.97%	-18.29%	-8.68%	-9.82%	-28.33%	-17.47%	-8.41%	-11.29%	-11.67%	-20.20%	-8.60%
2-6月-08	-2.72%	-5.61%	-0.86%	-14.61%	-8.94%	-3.11%	7.97%	-5.07%	-18.21%	19.73%	-0.99%
1-7月-08	9.07%	-17.41%	10.22%	26.43%	22.08%	10.67%	-4.51%	6.66%	5.06%	-5.25%	1.22%
1-8月-08	-8.50%	9.41%	0.07%	-14.47%	-2.01%	-13.11%	-3.93%	-32.96%	10.02%	21.33%	-9.08%
1-9月-08	2.03%	-46.48%	-18.82%	-27.74%	-22.05%	-31.66%	-20.51%	-5.34%	-29.99%	-11.00%	-16.94%
1-10月-08	-8.06%	-1.32%	1.59%	-20.60%	-36.19%	-39.62%	-11.74%	-13.87%	-23.99%	-23.25%	-7.48%
3-11月-08	15.57%	-10.73%	14.46%	3.71%	3.07%	41.62%	3.13%	-7.89%	-2.79%	-0.41%	0.78%
1-12月-08	-3.39%	8.58%	1.37%	-14.21%	28.57%	-13.47%	8.90%	5.59%	-32.20%	-18.10%	-8.57%
2-1月-09	-4.62%	18.48%	-5.33%	-8.48%	20.63%	-12.15%	0.96%	-0.90%	-16.90%	-10.45%	-10.99%
2-2月-09	-1.06%	38.28%	-0.71%	30.93%	26.32%	13.96%	5.29%	17.70%	9.44%	16.36%	8.54%
2-3月-09	-3.42%	23.40%	5.59%	54.33%	91.15%	53.59%	6.53%	19.70%	19.03%	24.37%	9.39%
1-4月-09	-1.93%	-8.99%	-6.13%	-14.99%	0.54%	-14.57%	3.51%	7.93%	22.68%	11.79%	5.31%
1-5月-09	-2.27%	0.59%	0.89%	10.04%	-12.20%	1.08%	-1.74%	4.87%	-16.52%	-7.56%	0.02%
1-6月-09	13.95%	27.44%	1.44%	5.81%	9.57%	18.29%	12.94%	14.72%	42.83%	13.49%	7.41%
1-7月-09	2.78%	20.23%	2.58%	-0.36%	-10.42%	11.56%	0.57%	2.95%	-3.30%	12.43%	3.36%
3-8月-09	0.11%	4.84%	-0.21%	12.34%	-4.47%	18.17%	1.32%	10.19%	6.70%	0.83%	3.57%
1-9月-09	0.97%	5.15%	1.51%	-1.27%	2.57%	-3.93%	0.84%	1.70%	-1.85%	-4.57%	-1.98%
1-10月-09	-1.68%	-20.01%	-2.42%	-13.25%	5.01%	-7.17%	5.23%	6.06%	5.90%	1.72%	5.74%
2-11月-09	0.76%	7.03%	0.50%	-7.40%	-4.77%	3.07%	3.60%	5.41%	46.45%	-1.92%	1.78%
1-12月-09	4.22%	-0.85%	0.12%	-6.02%	-13.35%	-4.96%	-6.50%	-8.86%	4.53%	-6.45%	-3.70%
4-1月-10	3.25%	30.38%	2.01%	11.11%	-7.04%	20.27%	4.36%	6.54%	-15.33%	7.78%	2.85%
1-2月-10	-1.68%	1.88%	-0.85%	16.65%	20.64%	13.93%	0.85%	14.85%	1.74%	6.62%	5.88%
1-3月-10	-1.06%	7.93%	3.27%	-8.80%	-5.15%	6.57%	0.59%	11.10%	-10.87%	-4.74%	1.48%
1-4月-10	-9.02%	3.61%	-4.23%	-5.75%	-17.62%	-4.29%	-2.40%	-1.61%	-6.45%	-7.04%	-8.20%
4-5月-10	0.72%	-10.90%	-0.77%	-21.86%	-10.40%	-19.22%	-1.42%	-2.08%	-6.79%	-7.52%	-5.39%
1-6月-10	-0.41%	5.40%	6.87%	15.75%	16.04%	4.21%	3.98%	2.28%	1.04%	10.20%	6.88%
1-7月-10	9.43%	-8.38%	6.29%	-18.86%	-6.10%	4.04%	-3.63%	-5.50%	-17.85%	-9.75%	-4.74%
2-8月-10	1.97%	6.67%	6.98%	36.05%	13.07%	19.22%	8.94%	16.72%	7.80%	4.69%	8.76%
1-9月-10	-0.64%	7.13%	-0.36%	15.48%	16.92%	2.55%	7.05%	6.07%	-0.90%	-1.00%	3.69%
1-10月-10	-7.42%	18.79%	-8.63%	6.72%	-7.66%	8.49%	-1.05%	3.38%	17.21%	-0.62%	-0.23%
1-11月-10	-1.62%	7.15%	5.79%	-2.90%	0.43%	-1.28%	3.75%	3.67%	9.01%	13.42%	6.53%
1-12月-10	-0.41%	2.40%	1.38%	-0.13%	-7.20%	-8.50%	10.38%	5.20%	3.16%	6.05%	2.26%
4-1月-11	3.86%	13.26%	-0.39%	9.03%	-4.49%	3.24%	0.32%	4.09%	2.87%	3.91%	3.20%
1-2月-11	-0.29%	12.54%	-11.76%	2.71%	-5.66%	1.72%	0.73%	-1.33%	-8.94%	-1.26%	-0.10%
1-3月-11	6.81%	-4.62%	3.88%	7.66%	15.03%	-1.44%	4.60%	0.46%	-14.15%	-0.50%	2.85%
1-4月-11	2.99%	-2.56%	-0.78%	-7.86%	9.84%	20.78%	-0.52%	-0.66%	-1.35%	-5.22%	-1.35%
3-5月-11	-1.94%	3.93%	-4.69%	-2.52%	-7.75%	1.64%	1.55%	-3.50%	8.73%	-5.32%	-1.83%
1-6月-11	-2.28%	5.12%	-7.68%	-10.42%	-3.26%	-1.26%	6.00%	16.33%	-1.61%	-0.59%	-2.15%
1-7月-11	-0.65%	-0.98%	-1.38%	-13.42%	-19.85%	-10.13%	-5.06%	-1.45%	-4.66%	-7.14%	-5.68%
1-8月-11	0.52%	-0.96%	-8.37%	0.54%	5.33%	1.81%	1.73%	-0.91%	-28.97%	-19.83%	-7.18%
1-9月-11	4.03%	10.42%	8.84%	20.66%	15.35%	15.99%	5.58%	6.15%	31.15%	16.42%	10.77%
3-10月-11	6.55%	-5.57%	1.64%	-0.13%	-2.08%	5.91%	2.24%	-5.58%	-4.46%	-10.90%	-0.51%
1-11月-11	1.30%	2.17%	-0.36%	9.73%	-8.01%	-0.16%	-2.19%	5.96%	6.18%	7.38%	0.85%
1-12月-11	-12.32%	6.60%	-4.79%	18.91%	14.89%	4.70%	4.74%	12.71%	-3.62%	12.98%	4.36%
3-1月-12	1.40%	9.07%	3.43%	-4.70%	9.71%	12.69%	2.54%	18.83%	-11.54%	5.21%	4.06%
1-2月-12	2.76%	3.05%	4.36%	-10.54%	9.49%	5.16%	6.06%	10.53%	3.03%	17.17%	3.13%
1-3月-12	-5.84%	0.01%	-1.09%	2.36%	2.23%	3.26%	-0.75%	-2.60%	-7.07%	-5.92%	-0.75%
2-4月-12	-1.57%	6.68%	-6.43%	-27.26%	-6.23%	-7.24%	-6.46%	-1.07%	5.39%	-22.88%	-6.27%
1-5月-12	-3.66%	7.72%	4.62%	-11.13%	11.68%	-9.22%	1.39%	1.08%	17.29%	7.78%	3.96%
1-6月-12	4.21%	-3.71%	7.27%	-3.43%	6.30%	4.33%	0.21%	4.58%	-0.64%	1.62%	1.26%
2-7月-12	0.97%	5.41%	1.33%	15.86%	4.95%	12.45%	-0.15%	9.39%	18.58%	3.16%	1.98%
1-8月-12	1.86%	0.82%	6.07%	-6.86%	6.11%	-6.18%	6.47%	0.28%	6.20%	8.98%	2.42%
3-9月-12	-0.46%	0.01%	2.45%	-0.58%	4.79%	3.67%	-0.79%	-3.93%	2.25%	3.96%	-0.56%

Portfolio Efficient Frontier

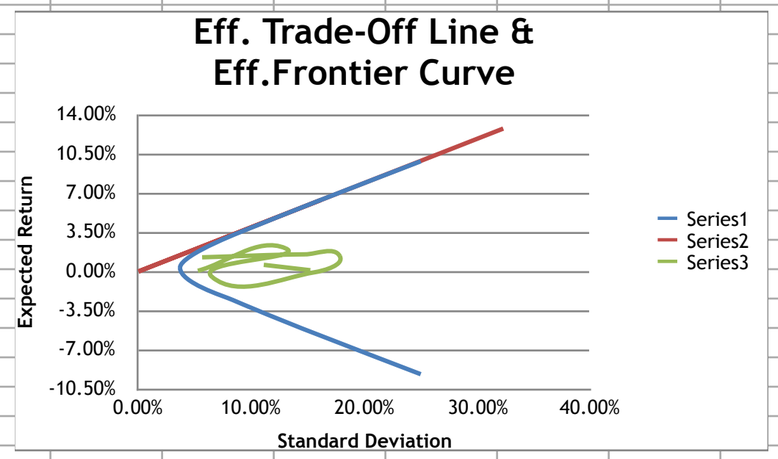
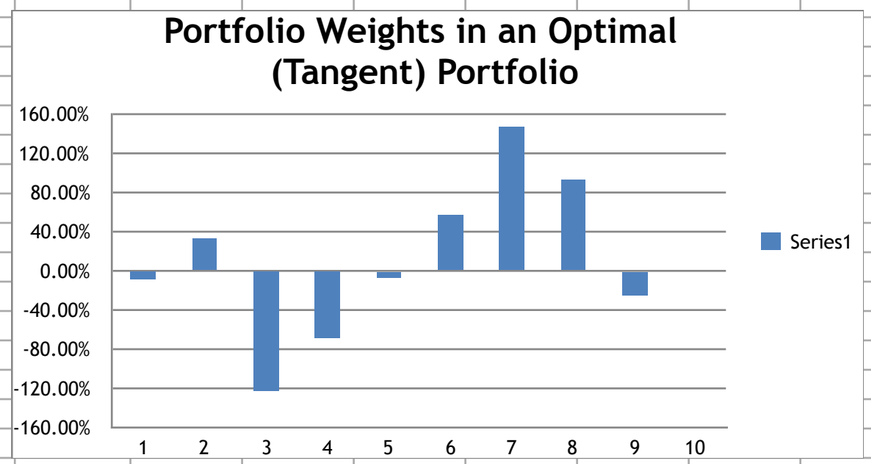
1) Expected Return, Risk and Sharp Ratio **2) Portfolio Weights**

The return and the risk of the portfolio is 6.39%, 16.16% respectively. The largest sharp ratio of the portfolio is 39.52%. In order to create this portfolio, the weight you shoud allocate in each assets is -8.17% , 33.74% , -122.46% , -68.11% , -7.04% , 57.60% , 146.39% , 92.80% , -24.09% , -0.67% respectively .

	Expected Return			Expected Return	Standard Deviation	Exp Ret+1 [1+E®]	Ones
	Mean	CAPM	BL				
riskless rate	0.01%	0.01%	0.01%	0.01%	0.00%	100.01%	1
risky asset1	0.07%	0.01%	0.04%	0.07%	5.25%	100.07%	1
risky asset2	2.07%	0.02%	-0.01%	2.07%	13.02%	102.07%	1
risky asset3	-0.50%	0.02%	0.01%	-0.50%	6.53%	99.50%	1
risky asset4	-0.07%	0.04%	0.03%	-0.07%	15.60%	99.93%	1
risky asset5	1.37%	0.03%	-0.12%	1.37%	17.83%	101.37%	1
risky asset6	1.53%	0.03%	0.08%	1.53%	14.75%	101.53%	1
risky asset7	1.27%	0.02%	-0.03%	1.27%	5.63%	101.27%	1
risky asset8	2.62%	0.03%	-0.01%	2.62%	10.34%	102.62%	1
risky asset9	0.11%	0.03%	0.02%	0.11%	15.22%	100.11%	1
risky asset10	0.60%	0.03%	-0.00%	0.60%	11.09%	100.60%	1

Covariance Matrix

	1	2	3	4	5	6	7	8	9	10
1	0.28%	-0.06%	0.13%	0.09%	0.10%	0.29%	0.05%	0.10%	0.11%	0.01%
2	-0.06%	1.69%	0.23%	0.94%	0.92%	0.89%	0.35%	0.43%	0.66%	0.60%
3	0.13%	0.23%	0.43%	0.41%	0.48%	0.46%	0.14%	0.16%	0.25%	0.27%
4	0.09%	0.94%	0.41%	2.43%	1.84%	1.67%	0.37%	0.69%	0.79%	0.78%
5	0.10%	0.92%	0.48%	1.84%	3.18%	1.62%	0.52%	0.86%	0.71%	0.85%
6	0.29%	0.89%	0.46%	1.67%	1.62%	2.17%	0.36%	0.61%	0.78%	0.78%
7	0.05%	0.35%	0.14%	0.37%	0.52%	0.36%	0.32%	0.28%	0.31%	0.29%
8	0.10%	0.43%	0.16%	0.69%	0.86%	0.61%	0.28%	1.07%	0.40%	0.32%
9	0.11%	0.66%	0.25%	0.79%	0.71%	0.78%	0.31%	0.40%	2.32%	0.82%
10	0.01%	0.60%	0.27%	0.78%	0.85%	0.78%	0.29%	0.32%	0.82%	1.23%

Output

	A	740.59004986						
	B	743.09177595						
	C.	745.75005462		Efficient	Efficient			
	Delta	109.68265815		Frontier	Trade-off	Individual		
	Gamma	40.88%		Curve	Line	Asset	Optimal Combinatoin	
			Standard	Expected	Expected	Expected	of Risky Assets	
		Index	Deviation	Return	Return	Return	Tangent Portfolio	
Risk Asset 1			5.25%			0.07%	-8.17%	
Risk Asset 2			13.02%			2.07%	33.74%	
Risk Asset 3			6.53%			-0.50%	-122.46%	
Risk Asset 4			15.60%			-0.07%	-68.11%	
Risk Asset 5			17.83%			1.37%	-7.04%	
Risk Asset 6			14.75%			1.53%	57.60%	
Risk Asset 7			5.63%			1.27%	146.39%	
Risk Asset 8						2.62%	92.80%	
Risk Asset 9			15.22%			0.11%	-24.09%	
Risk Asset 10			11.09%			0.60%	-0.67%	
Trade-off Curve		0	25.00%	-9.18%				
Trade-off Curve		1	22.56%	-8.23%				
Trade-off Curve		2	20.12%	-7.28%				
Trade-off Curve		3	17.70%	-6.32%				
Trade-off Curve		4	15.29%	-5.37%				
Trade-off Curve		5	12.90%	-4.42%				
Trade-off Curve		6	10.55%	-3.47%				
Trade-off Curve		7	8.28%	-2.52%				
Trade-off Curve		8	6.16%	-1.57%				
Trade-off Curve		9	4.43%	-0.61%				
Trade-off Curve		10	3.67%	0.34%				
Trade-off Curve		11	4.43%	1.29%				
Trade-off Curve		12	6.16%	2.24%				
Trade-off Curve		13	8.28%	3.19%				
Trade-off Curve		14	10.55%	4.14%				
Trade-off Curve		15	12.90%	5.10%				
Trade-off Curve		16	15.29%	6.05%				
Trade-off Curve		17	17.70%	7.00%				
Trade-off Curve		18	20.12%	7.95%				
Trade-off Curve		19	22.56%	8.90%				
Trade-off Curve		20	25.00%	9.85%				
Optimal Comb.			16.16%		6.39%			
Eff Trade-off Line		0	0.00%		0.01%			
Eff Trade-off Line		1	16.16%		6.39%			
Eff Trade-off Line		2	32.31%		12.78%