Enhanced indexation example question 1

The table below shows the stock prices and index values over a number of time periods, together with the current portfolio.

Period	A	B	C	D	E	Index
0	39.7	3.1	38.2	72.9	3.6	2655.8
1	73.5	0.5	96.3	60.4	77	5039.7
2	17.3	42.3	62.2	49.7	91.5	4717.7
3	31.6	70.8	57.2	5.2	54.7	4946.7
T=4	64.4	86.9	76.1	27.1	14.3	6506.6
Current portfolio	5	67	8	6	10	

For example in period 3 the stock/share price for stock A is 31.6 and the index value is 4946.7. The current portfolio contains 5 units (shares) of stock A, 67 of B, etc.

Use this data to construct (enhanced indexation) tracking portfolios containing K=3 stocks with:

- values of λ of 0.99, 0.95, 0.90 and 0.80
- an aim of achieving 0.5% and 1% excess per time period. Here use just the specified and semispecified objectives.

Which of your constructed portfolios do you prefer and why?

Enhanced indexation example question 1 solution

Recall here that because Solver utilises a heuristic solution technique you will probably get different solutions from those shown below.

However if you put the portfolios given below into your own spreadsheet you should get the values for average portfolio return and difference from index return that I give below.

Utilising the enhanced indexation Solver model I get the portfolios shown below for values of λ of 0.99, 0.95, 0.90 and 0.80.

We also show below the average portfolio return as well as the difference between that and the average index return, which for the example dealt with here is 22.40178%

	A	B	C	D	E	Average portfolio return	Difference from index return
λ = 0.99	0	35.01	48.49	12.06	0	22.76286	0.36108
λ = 0.95	0	35.04	48.46	12.02	0	22.79549	0.393715
λ = 0.90	9.20	38.45	41.07	0	0	30.87252	8.470738
λ = 0.80	0	39.00	48.22	0	0	31.99487	9.593094

Here the lower values of λ (less emphasis on tracking, more emphasis on excess return) give a better performance, as we would have expected.

With an aim of achieving 0.5% and 1% excess per time period and utilising the specified or semispecified objectives we get the results shown below.

Objective	Aim	A	B	C	D	E	Average portfolio return	Difference from index return
Specified	0.5%	0	35.29	48.28	11.72	0	23.04374	0.641963
Semispecified	0.5%	0	35.99	47.79	10.85	0	23.76365	1.361875
Specified	1%	0	35.59	48.07	11.37	0	23.33498	0.933199
Semispecified	1%	13.11	40.71	35.18	0	0	31.64756	9.245784

Note here that the fundamental difference between specified and semispecified is that the specified objective tries to achieve precisely the excess percentage given (and above you can see how well it does). The semispecified objective tries to avoid falling below the excess percentage given.

Here the choice of portfolio comes down to your brain and personal objectives. Recall that all we have done here is to choose portfolios that, on past history, would have achieved the returns given above. This is no guarantee of future performance.

The Excel spreadsheet used is shown below:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Stock prices and index values							Index	Artifical	New TP	New TP	Return	Max term	Max term
2	Period	A	B	C	D	E	Index	return (%)	index	value	return (%)	difference	semi	sortino
3	0	39.7	3.1	38.2	72.9	3.6	2655.8		return (%)	6271				
4	1	73.5	0.5	96.3	60.4	77	5039.7	64.06	67.06	10405	50.64	16.43	16.43	0.00
5	2	17.3	42.3	62.2	49.7	91.5	4717.7	-6.60	-3.60	12151	15.51	-19.12	0.00	9.89
6	3	31.6	70.8	57.2	5.2	54.7	4946.7	4.74	7.74	20708	53.31	-45.57	0.00	0.00
7	T=4	64.4	86.9	76.1	27.1	14.3	6506.6	27.41	30.41	29003	33.69	-3.28	0.00	0.00
8										Objectives	Specified	680.66		
9	Current TP X(i)	5	67	8	6	10					Semispecified	67.45		
10	New TP x(i)	140.00	230.00	0.00	0.00	0.00					Unspecified	13.04	here set excess to 0	
11	Choice z(i)	1	1	0	0	0					Sharpe	0.74		
12	Proportion	1.277289	2.831541	0	0	0					Sortino	2.61		
13														
14	C	7058.7									Rmean	25.40		
15	K	2												
16	Sum z(i)	2												
17														
18	Excess (%)	3												
19	Lamda	0.95												
20														
21	Average index return (%)		22.40178											
22	Achieved TP return (%)		38.28659											
23	Difference (%)		15.88481											
24														
25														
26														
27														
28														
29														
30														
31