# RUTGERS BUSINESS SCHOOL OPTIMIZATION MODELS IN FINANCE(26:711:564)

## Assignment 8

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### 1 Problem 1

The first part of this problem, VaR, is totally same with the previous assignment. Here we simply duplicate the result from the previous assignment.

#### 1.1 Value at Risk

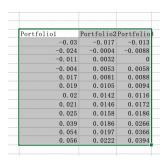
According to the requirements of the portfolio, we arrange the portion as follows,

Portfolio	Portfolio	Portfolio	3
0	0.1	0	
0	0.1	0.2	
0	0.1	0.2	
0	0.1	0	
0	0.1	0	
0	0.1	0.2	
0	0.1	0	
0	0.1	0.2	
1	0.1	0.2	
0	0.1	0	

Then the returns and the expected returns can be calculated as follows,

Returns													Expected
Portfolio 1	0.017	0.02	-0.024	-0.004	0.019	0.039	-0.03	0.025	0.021	0.054	-0.011	0.056	0.015166667
Portfolio 2	0.0142	-0.0004	0.0146	0.0032	0.0158	0.0081	-0.0017	0.0105	0.0222	0.0053	0.0197	0.0186	0.010841667
Portfolio 3	0.0172	0.0058	-0.013	-2. 2E-19	0.0094	0.0366	-0.0088	0.0088	0.0266	0.0116	0.0186	0.0394	0.012683333

Since the distribution is uniform, we can simply re-arrange the return rate (by ascending order) and find the return rate accordingly. and find the value of that closest to  $\alpha = 0.1, 0.2, 0.3$ .



The uniform distribution quantile indicates that we should use the return rate at column 2,3 and 4, because the cumulative probability of the uniform distribution is 2/12, 3/12 and 4/12, which are the closest to a=0.1,0.2,0.3 Then we just simply multiply the return rate with the capital we have, and obtain the final result,



which are  $\alpha = 0.1, 0.2, 0.3$  accordingly.

#### 1.2 Average Value at Risk

We use the formula

$$AVAR_{\alpha}^{+}(Z) = \min_{\eta \in R} \eta + \frac{1}{\alpha} \sum_{k=1}^{K} p_k (z_k - \eta)_{+}$$

and carry out the linear programming problem. My results are,

	alpha=0.1	alpha=0.2	alpha=0.3
avar1	0. 151666667	0.0758333	0.05055556
avar2	0. 108416667	0.0542083	0. 036138889
avar3	0. 126833333	0.0634167	0.042277778

The v and  $\eta$  I have obtained are as follows, with the sequence portfolio1  $\alpha=0.1,0.2,0.3$ , portfolio2  $\alpha=0.1,0.2,0.3$ , portfolio3  $\alpha=0.1,0.2,0.3$ .

	-4
v	eta
0.017	0
0.02	
-0.024	
-0.004	
0.019	
0.039	
-0.03	
0.025	
0.021	
0.054	
-0.011	
0.056	
alpha	0.1

v	eta
0.0142	0
-0.0004	
0.0146	
0.0032	
0.0158	
0.0081	
-0.0017	
0.0105	
0.0222	
0.0053	
0.0197	
0.0186	

	eta		2
0.0172		0	
0.0058			
-0.013			
0			
0.0094			
0.0366			
0.0088			
0.0088			
0.0266			
0.0116			
0.0186			
0.0394			

V		eta
	0.017	(
	0.02	
	-0.024	
	-0.004	
	0.019	
	0.039	
	-0.03	
	0.025	
	0.021	
	0.054	
	-0.011	
	0.056	

v	eta	Z
0.0142	0	
-0.0004		
0.0146		
0.0032		
0.0158		
0.0081		
-0.0017		
0.0105		
0.0222		
0.0053		
0.0197		
0.0186		

v	eta
0.0172	0
0.0058	
-0.013	
0	
0.0094	
0.0366	
-0.0088	
0.0088	
0.0266	
0.0116	
0.0186	
0.0394	

v	eta
0.017	0
0.02	
-0.024	
-0.004	
0.019	
0.039	
-0.03	
0.025	
0.021	
0.054	
-0.011	
0.056	

v	eta		2
0.01	42	0	
-0.00	04		
0.01	46		
0.00	32		
0.01	58		
0.00	81		
-0.00	17		
0.01	05		
0.02	22		
0.00	53		
0.01	97		
0.01	86		

v	eta
0.0172	0
0.0058	
-0.013	
0	
0.0094	
0.0366	
-0.0088	
0.0088	
0.0266	
0.0116	
0.0186	
0.0394	