

Assignment 4

No submission required.

1. Suppose that each of two investments has a 0.9% chance of a loss of \$10 million and a 99.1% chance of a loss of \$1 million. The investments are independent of each other.
 - (a) What is the VaR for one of the investments when the confidence level is 99%?
 - (b) What is the expected shortfall for one of the investments when the confidence level is 99%?
 - (c) What is the VaR for a portfolio consisting of the two investments when the confidence level is 99%?
 - (d) What is the expected shortfall for a portfolio consisting of the two investments when the confidence level is 99%?
 - (e) Show that in this example VaR does not satisfy the subadditivity condition whereas expected shortfall does.
2. The file *ps4_data.csv* contains values for the NASDAQ Composite index during the 1,500 days preceding March 10, 2006. Calculate the one-day 99% VaR and one-day 99% ES on March 10, 2006, for a \$10 million portfolio invested in the index using:
 - (a) The basic historical simulation approach;
 - (b) The exponential weighting scheme with $\lambda = 0.995$;
 - (c) A model where daily net returns are assumed to be normally distributed with mean zero (the standard deviation is directly estimated from the sample);

Discuss the reasons for the differences between the results you get.