

# Midterm report

## Yifan Shao 1004534435

### 1. Q1 Part 1

Historical 1-day VaR 95.0% = \$1986.00, Historical 1-day CVaR 95.0% = \$2864.69

Normal 1-day VaR 95.0% = \$2084.36, Normal 1-day CVaR 95.0% = \$2619.01

Historical 10-day VaR 95.0% = \$5278.00, Historical 10-day CVaR 95.0% = \$6482.56

Normal 10-day VaR 95.0% = \$5361.23, Normal 10-day CVaR 95.0% = \$6776.78

From the result,

$$\begin{aligned} VaR(10 \text{ day}) &\neq 10 * VaR(1 \text{ day}) \\ CVaR(10 \text{ day}) &\neq 10 * CVaR(1 \text{ day}) \end{aligned}$$

During the 10day horizon, some day's profit will cancel out some day's loss, slow down the variability increase rate. Furthermore, VaR is determined by standard deviation, however, standard deviation cannot be linearly multiplied. Since CVaR is calculated from VaR, therefore 10day CVaR does not equal to 10 \* 1day CVaR.

### 2. Q1 Part 2

Historical 1-day MSFT VaR 95.0% = \$114.00

Historical 1-day AAPL VaR 95.0% = \$572.00

Historical 1-day IBM VaR 95.0% = \$1470.00

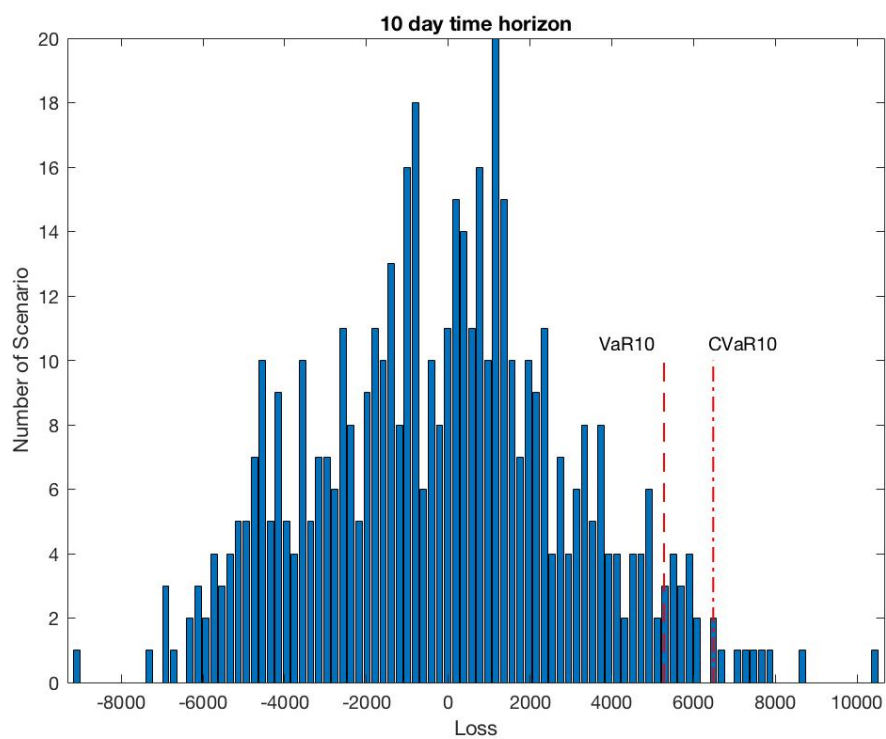
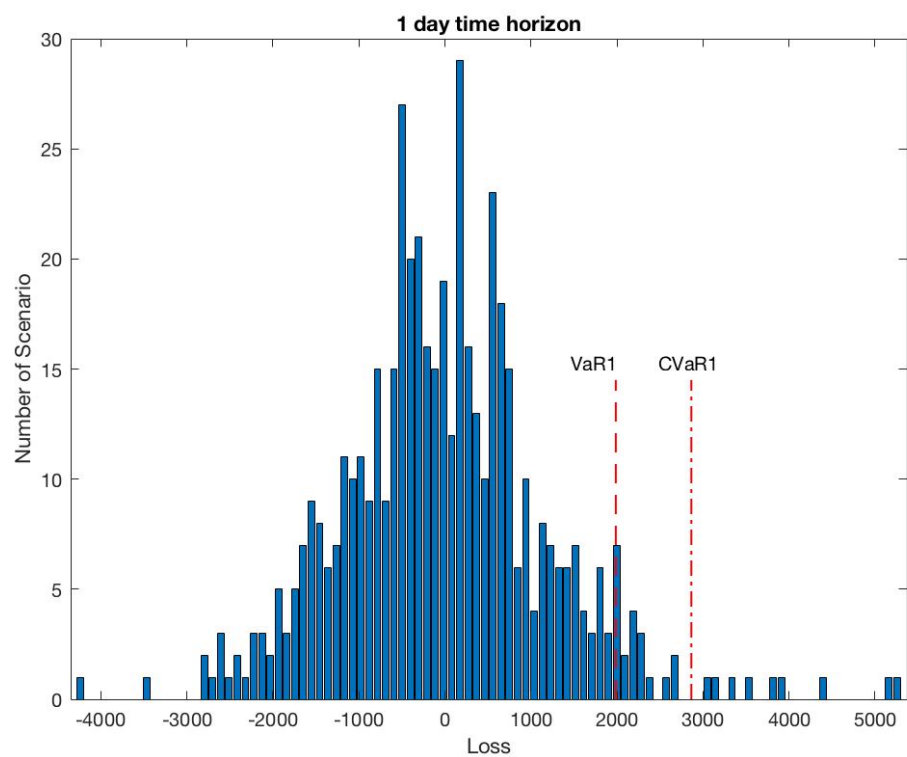
From the result,

$$VaR(\text{Portfolio}) \neq VaR(\text{MSFT}) + VaR(\text{AAPL}) + VaR(\text{IBM})$$

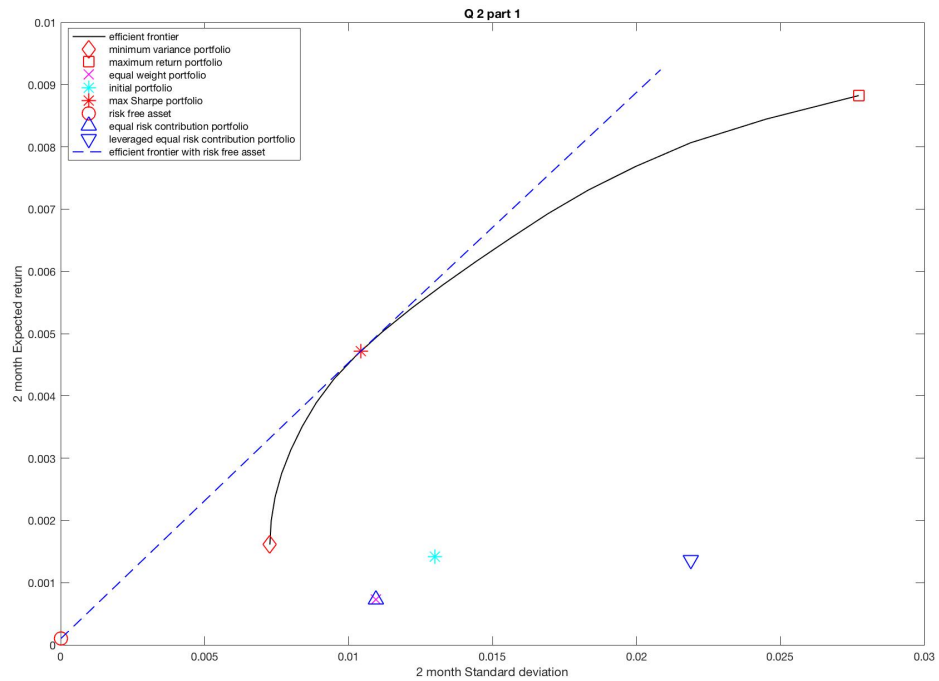
Because each of the three assets is not independent of each other, each one has correlation with another, therefore you cannot linearly add them together to get the portfolio VaR. Also VaR is decided by standard deviation, standard deviation cannot be linearly added. standard deviation of the sum does not equal to the sum of the standard deviation

$$VaRn(\text{Portfolio}) \neq VaRn(\text{MSFT}) + VaRn(\text{AAPL}) + VaRn(\text{IBM})$$

It would be the same for the normally distributed because each of the variable is correlated. They are not independent variables. Also, standard deviation of the sum does not equal to the sum of the standard deviation.



### 3. Q2 Part 1



### 4. Q2 Part 2

