

Problem 1

For this problem, I have created many Risk Management functions to and successfully passed all the tests.

Here is brief classification of these functions:

Covariance Estimation Part:

cov_skip_miss

corr_skip_miss,

cov_pairwise

corr_pairwise

ewCovar

ewCorr

cov_with_different_ew_var_corr

Non-PSD fixes for correlation matrices Part:

RJ_nearestPSD

getAplus

getPS

getPu

wgtNorm

higham_nearestPSD

Simulation Methods Part:

chol_psd

simulate_normal

simulate_pca

Fitted Model Functions Part:

FittedModel (Class)

fit_normal

fit_general_t

general_t_ll

fit_regression_t

VaR Calculation Methods Part:

return_calculate

VaR_cal

simple_VaR

simple_VaR_sim

ES Calculation Methods Part:

simple_ES

simple_ES_sim

VaR and ES Part:

VaR_ES

Historical_VaR_ES

Problem 2

a)

Under Normal Distribution

VaR_abs	VaR_diff_from_mean	ES_abs	ES_diff_from_mean
0.09116934	0.09028951	0.11410652	0.11322669

b)

Under T distribution

VaR_abs	VaR_diff_from_mean	ES_abs	ES_diff_from_mean
0.07647603	0.0763823	0.1132179	0.11312418

c)

Using Historical Simulation

VaR_abs	VaR_diff_from_mean	ES_abs	ES_diff_from_mean
0.07586151	0.07486562	0.11711568	0.11611979

We can find that the results under T distribution and Historical Simulation are almost identical and less than results under Normal Distribution. The reason I infer is that T distribution is closer to the Historical situation than Normal distribution and Normal distribution relatively overestimate the extreme events compared to the fitted T distribution.

Problem 3

Portfolio A result:

VaR95	ES95	VaR99	ES99
20993.782985	28123.791412	31449.637274	39748.417001

Portfolio B result:

VaR95	ES95	VaR99	ES99
12011.944870	15973.659105	18102.881556	22576.622361

Portfolio C result:

VaR95	ES95	VaR99	ES99
27525.219185	34281.352943	37859.348277	44138.596860

Portfolio Total result:

VaR95	ES95	VaR99	ES99
58333.553034	75034.435384	84230.009506	102929.930855

Compared to last week's VaR result, we can find that the result calculated by Copula method is much larger. It may be because of the distribution assumption difference (EW_Normal assumption in last week and Normal and T assumptions this week).