Week05 Project

Wenqi Cai

Problem2

Results as following:

	VaR	ES
a normal distribution with an exponentially weighted variance	-0.07811009	-0.09772969
a MLE fitted T distribution	-0.07647603	-0.11321790
a Historic Simulation	-0.00957041	-0.01206307

VaR:

For VaR, both the Normal and T-distributions have pretty similar values, meaning they show about the same level of expected max loss at the confidence level we're looking at. However, the Historic Simulation has a much smaller VaR. This suggests that the actual historical data didn't include many extreme losses during the period studied, which is why it gives us a lower risk estimate.

ES:

For ES, the T-distribution has the highest value because it accounts for "heavier tails," or higher risks of really big losses in extreme scenarios. The Normal distribution ES is a bit lower because it assumes smaller tail risks. Historic Simulation shows the lowest ES, which suggests that the historical data may not fully capture potential extreme losses. This could be a limitation if the historical data missed significant stress events.

Problem3

By fitting Generalized T model to portfolio A and B, and Normal distribution to portfolio C, the results of VaR and ES as following:

	VaR	ES
Portfolio A	4121.028831088362	5562.499090524782
Portfolio B	3679.953915356336	4948.515560115976
Portfolio C	3152.811717348543	3977.0384080174995
Portfolio ALL	10426.039085104405	14055.889134760833

Using Delta Normal, Monte Carlo, and Historical methods to calculate the VaR for portfolios in week04 project:

	A	B	C	ALL
Delta Normal	20037.39	11829.61	27219.96	54418.03
Monte Carlo	17311.31	10740.21	24870.65	49413.94
Historic	16884.39	8976.78	20198.81	46410.02

By comparing the VaR from the Copula method with what we did last week, it's clear that the VaR values are totally different, because we focused on completely different portfolios.

There is one of my guesses: the results from this simulation seem to align more with the Historic Simulation results. Copula works better for portfolios with complex correlations since it can handle non-linear relationships and extreme situations really well.