

FINTECH 545 Week05 Project Report

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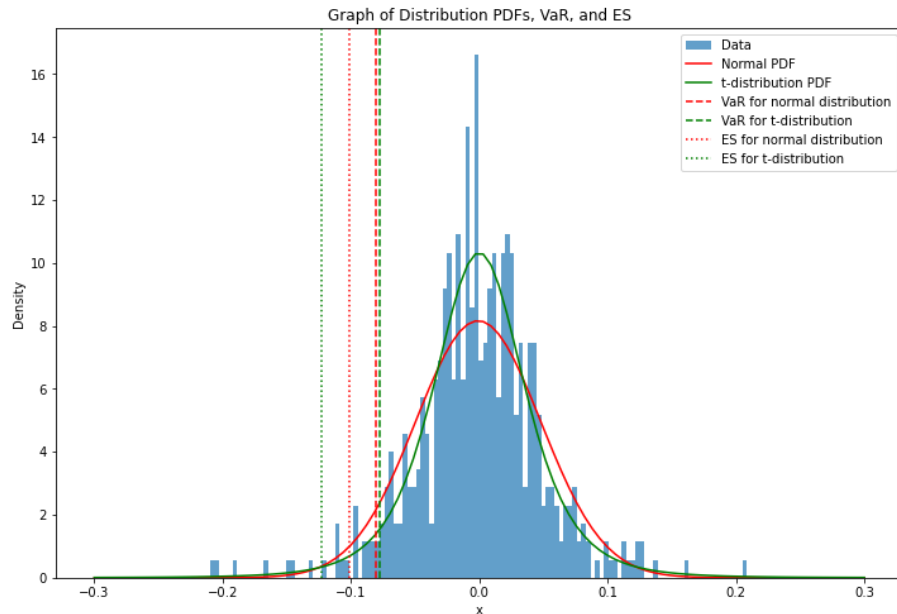
Problem 1:

The table here exhibits the VaR and ES for Normal Distribution and Generalized t-distribution:

	VaR	ES
Normal Distribution	0.0807	0.1016
T-distribution	0.0777	0.1229

The computation details are in the Problem 1 Section of code file (code.ipynb).

The graph of the distribution pdfs, VaR, and ES values for both fitted normal distribution and t-distribution are shown below:



From the plot above we can figure out that **a generalized t-distribution (colored in green) is a better fitted distribution** for the data in problem1.csv. Firstly, we can visually figure out that the generalized t-distribution fits better to the data than the normal distribution does. Additionally, the t-distribution has a similar Value at Risk (VaR) yet significantly smaller expected shortfall (ES) comparing to normal distribution, and this is possibly because the normal distribution is more centralized, yet the generalized t-distribution intends to have a “fatter tail” that includes more extreme cases.

Problem 2:

The library for risk management function is in the riskmgmt.py file under the lib folder, and the test suites are shown in the Problem 2 Section of code file (code.ipynb). Every function performs as expected based on the test results.

Problem 3:

The computation of VaR and ES of each portfolio are in the Problem 3 Section of code file (code.ipynb).

The VaR for each portfolio is:

Portfolio A: \$20342.54

Portfolio B: \$11601.29

Portfolio C: \$25202.35

And the total VaR for this portfolio is \$55485.3

The ES for each portfolio is:

Portfolio A: \$28612.41

Portfolio B: \$16214.01

Portfolio C: \$37015.47

And the total VaR for this portfolio is \$80157.82

According to the results above and the VaR results computed from Problem 3 from Week 4 project, we can figure out that the VaR for each portfolio and for all portfolios are higher when using the generalized t-distribution. This is primarily because the generalized t-distribution intends to have a “fatter tail” that includes more extreme cases, which will result in a higher VaR and ES.