

TP 7

Measuring VaR and Expected Shortfall using Extreme Value Theory

The present TP revisits the fire insurance example seen during the lecture. The data provided consist of fire accident losses over 300 000 Danish Krone (DKK), from the years 1980 to 1990 inclusive. (For further details, see McNeil AJ (1997), Estimating the Tails of Loss Severity Distributions Using Extreme Value Theory, *ASTIN Bulletin* 27, 117–137.)

Fitting a Generalized Pareto Distribution

1. The Peaks-Over-Threshold (POT) approach assumes that the losses Y , conditionally on being above a threshold u , are distributed as $\text{GPD}(\xi, u, \sigma)$. Estimate the parameters ξ and σ that fit the data, either by maximum likelihood or by a method of moments, as explained in the lecture slides. (Use thresholds of 10 and 20 millions.)

Computing the VaR and ES

1. Assuming that the tail of the losses distribution follows a GPD, compute the VaR and Expected Shortfall at $\alpha = 1\%$.
2. Compare your results with values obtained under the assumption of Gaussian losses, and by using a kernel approach as in the previous TP.