Technical project 1 Financial Risk MVE220/MSA400 Fall 2014

Instructions: Results from computations/calculations along with graphs should be included in your pdf-format report (see the document "How to write a statistical report" on the course web page) where the file name should contain the names of the group members.

Software codes (Matlab, R or whatever, if any, you are using) should be pasted as an appendix pasted into the report.

Make sure that formulas and graphs in your word or latex (or whatever you are using) format report are still there when converted to pdf.

Excel files and software codes should be sent as attachments when sending the report to mattib@chalmers.se

Note: Software codes should be pasted into the report AND sent as attachments.

The report should also be sent to mattib.chalmers@analys.urkund.se. Reports not sent to urkund are considered to be not handed in.

Deadline: December 19th 23:59 (11:59pm) CET

Tasks:

For grades 3,4,5,G and VG;

1) Download a set of two years of daily stock prices, from e.g. yahoo finance, where latest date is as recent as possible.
2) Using some software of your choice convert prices into log-returns and plot log-returns vs. dates or observation numbers.
3) Compute and plot volatility estimates of log-returns (as presented in the slides of lecture 1)
4) Compute and plot standardized negated returns (as presented in the slides of lecture 1)
5) Fit a dynamic 95% VaR-series under i.i.d. normal assumption (as presented in the slides of lecture 1)
6) Plot VaR and log-returns (as presented in the slides of lecture 1)
7) Compute the percentage of returns exceeding VaR.

For grades 4,5 and VG;

8) Using the same standardized negated returns as above, fit a dynamic 95% VaR using the Gumbel distribution under i.i.d. assumption on the standardized negated returns.
9) Give QQ-plots for your fit of the Gumbel distribution (as presented in the slides of lecture 2). Note that you may need to iterate 8 and 9 in order to get a good fit, but you only have to present your final QQ-plot in the report.
10) Plot VaR and log-returns (as presented in the slides)
11) Compute the percentage of returns exceeding VaR
12) Using the same standardized negated returns as above fit a dynamic 95% VaR using the GP distribution (with shape parameter zero as presented in the slides for lecture 3) under i.i.d. assumption on the standardized negated returns.
13) Give QQ-plots for your fit of the GP distribution (as presented in the slides of lecture 3). Note that you may need to iterate 12 and 13 in order to get a good fit, but you only have to present your final QQ-plot in the report.
14) Plot VaR and log-returns (as presented in the slides)
15) Compute the percentage of returns exceeding VaR
16) Prove the expected shortfall formula (found in the slides for lecture one) under assumption of a normally distributed loss variable

For grades 5 and VG;

17) Using the same standardized negated returns as above, estimate the extremal index (using techniques presented in the slides of lecture 4) and us it to improve the Gumbel VaR from task 8.
18) Plot VaR and log-returns (as presented in the slides)
19) Compute the percentage of returns exceeding VaR
20) Using the same standardized negated returns as above, use the cluster maxima given in the declustering procedure in task 17 to fit a dynamic VaR series using GPD without assuming that the shape is zero. Note that this is probably not possible in Excel but rather has to be done in Matlab or R or some other software.
21) Give QQ-plots for your fit of the GP distribution (as presented in the slides of lecture 3). Note that you may need to iterate 20 and 21 in order to get a good fit and that these iterations may need another declustering scheme than the one used to give the extremal index in 17. You have to present your final QQ-plot in the report.
22) Plot VaR and log-returns (as presented in the slides)
23) Compute the percentage of returns exceeding VaR
24) Prove the mean excess function and expected shortfall formulas (see slides for lecture 3) for the PoT model. You may take $\psi(\eta) = \psi(\eta_0) + \xi(\eta - \eta_0)$ for $\eta > \eta_0$ as a proven result (we will prove or have proven this during the lectures). Hint; for a positive random variable X it holds that $E(X) = \int_0^\infty P(X > x)dx$