FINM331/STAT339 Financial Data Analysis – Hanson – Winter 2009

Lecture 3 Homework: More Exploratory Data Analysis

(Due by beginning of Lecture 4 in Chalk FINM331 Digital Dropbox.)
You must show your work, code and/or worksheet for full credit.

1. Using the S&P500 Index data collected in log-return form from Homework 2 Problem 4, compute the following **quantiles** for the data and the corresponding normal distribution with the same statistics (mean, variance):

(a) Risk Probabilities P = [0.001,0.01.02,0.025,0.050];

(b) Quartile Probabilities P = [0.00,0.25,0.50,0.75,1.00];

(c) finally compute the relative difference of the normal results in each case relative to the data results. Discuss the differences.

{*Note: a better way would be to do an maximum likelihood fitting to find the reference normal, but we have not covered MLE as yet.*}

2. Compute the **quantile-quantile plot** for the S&P 500 Index data log-returns and the simple reference normal in Problem 1. Discuss the results.

3. For the discretized jump-diffusion model with compound Poisson process, allowing for extra jumps beyond one (L3 p. 24), simulate the process using same mean and variance for the normal (Gaussian) part as for the S&P data log-returns of Problem 1. For the compound Poisson part use the same uniform distribution in (a,b) found from the range of the data, but take $\lambda = 300$ per year. Then compute the **quantile-quantile plot** with the log-return processed data. Discuss the results.

4. Compute the relative value at risk **relVaR** for the data and reference normal in Problem 1 for risk probabilities, $\boldsymbol{\alpha} = \mathbf{[0.001, 0.01.02, 0.025, 0.050]}$**;** and again compute the relative differences (errors of the normal?). Discuss the normal bias.

5. Compute the relative value at risk **relVaR** for the data and reference normal in Problem 3 for risk probabilities, $\boldsymbol{\alpha} = \mathbf{[0.001, 0.01.02, 0.025, 0.050]}$**;** and again compute the relative differences (errors of the normal?). Discuss the normal bias, contrasting it to the results of Problem 4.