CHALMERS | UNIVERSITY OF GOTHENBURG

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Financial Time Series TMS087/MSA410 – LP4 2015/16

Project 1

Download a price series of an asset $(P_t, t = 0, \dots, 500)$ of your choice of consecutive observations, where you believe that seasonality is involved.

1. Create a log-return series sample $(r_t, t = 1, \dots, N)$ by computing

$$r_t := \ln \frac{P_t}{P_{t-1}}$$

and plot the sample path.

2. Implement a method from the lecture to remove seasonal and trend components from the log-returns. Plot both paths and compare them.

3. Implement a method to test the obtained series for iid. What is your result? Try to explain your result.

4. Divide your stationary log-returns from Task **2.** (if you think that you succeeded, else choose new log-returns where you believe that they are stationary) into two subsamples of 250 consecutive observations each. Use the first subsample to estimate the autocovariance function for $h = 0, \dots, 5$. Implement then an algorithm to compute all possible one-step ahead linear forecasts $(b_n^l(r_{n-1}, \dots, r_{n-5}), n = 256, \dots, 500)$ in the second subsample. Evaluate the performance of your estimators by computing

$$\frac{1}{245} \sum_{n=256}^{500} \left(b_n^l(r_{n-1}, \dots, r_{n-5}) - r_n \right)^2 .$$

Conclude if you are satisfied with your result and give reasons for your opinion.

Deadline: Monday, May 2, 2015, 23:59
Webpage:
`http://www.math.chalmers.se/Stat/Grundutb/CTH/tms087/1516/`
Requirement: To pass the course, both projects as well as the final exam have to be passed.
Formalities: You are allowed to work in groups up to two. Nevertheless, everybody should hand in his project individually to make sure that it arrives on time. Send your project report as pdf document to both annika.lang 'at' chalmers.se as well as annika.lang.chalmers 'at' analys.urkund.se. Your report should include all plots, explanations, and answers to the questions as well as your implemented code in an appendix. The code in your preferred language should include comments to be readable. Emails received after the deadline will be considered "failed".