

Proposal for a Master Thesis

“Correlation Estimation in Financial Data”

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Correlation is a well established concept for measuring the relationship between random variables. In finance, correlation can be used to quantify the degree of relationship between e.g. financial products and financial institutions so that it plays an important role in many financial and economic problems. In contrast to some common quantities e.g. stock price, interest rate, correlation can not directly be observed in the financial market, it must be estimated using other observable financial data. However, the estimation of correlation is a delicate task as e.g. the Pearson estimator is not efficient for the heavy-tailed data. Especially, some recent works have indicated that correlation varies randomly in time. To estimate varying correlations we turn to e.g. rolling correlation or local Gaussian correlation which should be still further investigated.

Description of tasks:

- introduction into correlation estimation
- investigation of different estimation methods
- implementation using the real financial data
- numerical simulation and visualisation of results

Required Knowledge :

- attendance at the lecture “Computational Finance”
- basics in stochastic and statistic
- Matlab or R

Other matters:

- editing language: English or German
- starting date: by arrangement

Literature:

- A. J. McNeil, R. Frey and P. Embrechts *Quantitative Risk Management: Concepts, Techniques and Tools*, Princeton University Press, 2006.
- L. Teng, C. van Emmerich, M. Ehrhardt and M. Günther, *A Versatile Approach for Stochastic Correlation using Hyperbolic Functions*, Int. J. Comput. Math., (2015).
- D. Tjøstheim and K. O. Hufthammer, *Local Gaussian correlation: A new measure of dependence*, J. Econometrics, **172** (2013), p.33-48.