FIM
Nachdiplomvorlesung

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Time series models with heavy tails

September 17 - December 17, 2013
Tuesdays, 10:00 - 12:00
HG G 43, ETH Zürich, Rämistrasse 101

Abstract

(excerpt, for the full abstract see the website)

In this course, we show how the theory of non-linear regularly varying time series has developed in the last 15-20 years. We will consider the calculus of multivariate and sequential regular variation and its various applications to asymptotic theory for partial sums, maxima, order statistics, point processes, other structures. We will consider how these results can be used to derive specific extremal cluster indices, depending on the structure under consideration. We will also derive precise large deviation results and bounds for the ruin probabilities of random walks with dependent regularly varying steps. We will touch on some newer developments such as max-stable stationary processes (whose heavy-tail versions are regularly varying), following work by Taqqu, Stoev, Kabluchko, Schlather, de Haan, and others, and the conditional tail chain theory developed by Basrak and Segers (2009, SPA). The theory will be illustrated by suitable linear and non-linear time series. Among the latter ones are the GARCH and stochastic volatility models for returns. Particular attention will be given to perpetuities (or random affine mappings, stochastic recurrence equations) which have been intensively studied since Kesten (1973, Acta Math.) discovered that these processes are heavy-tailed.

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