

FITTING THE GENERALIZED PARETO DISTRIBUTION TO THRESHOLD EXCEEDANCES OF STOCK INDEX RETURNS IN BULL AND BEAR PERIODS

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Abstract

The investigation of phenomena of joint extreme returns on financial assets is crucial to financial risk assessment. We focussed on joint threshold exceedances of daily returns on stock indices, threshold meaning the lower, respectively upper 10% quantile of the return distribution. Exceedances in bull and bear periods were treated separately.

In a first step, we fitted the generalized Pareto distribution to the exceedances of several stock indices, applying the elemental percentile method of Castillo and Hadi. This provided the basis for the second step: Pairs of marginal distributions of threshold exceedances were coupled, assuming a logistic dependence structure for returns, in which the degree of dependency is reflected by a single correlation parameter. This led to bivariate distributions of threshold exceedances of returns.

Comparing this method to one which ignores the dependency among return exceedances, we found that financial risk would then be seriously underestimated. The degree of dependency tended to be stronger during bear periods.

All computations were carried out in the statistical computing environment *R*.

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