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The Effect of Aggregation on Extremes from Asymptotically Independent Light-Tailed Risks

Portfolio risk diversification is a well-established concept in finance and insurance. While aggregation of several risky assets generally reduces the overall investment risk, the effectiveness of diversification depends on the stochastic properties of the assets comprising the portfolio. A new approach to quantifying the effect of portfolio tail diversification is proposed under the assumption of existence of a limit set. This property is satisfied by a number of distributions commonly used in financial applications. Several analytical examples are given to illustrate the proposed asymptotic diversification index as a measure of the effect of risk aggregation on extremes as well as to quantify the impact of dimension on diversification and as a tool in optimal portfolio selection.