

On the Worst and Least Possible Asymptotic Dependence

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Abstract. Various methods have been discussed in the literature to evaluate the range of values for a risk measure of a function of random variables. The uncertainty with the chosen dependence risk model makes these bounds worth investigating and the tighter the entire spectrum of values is, the more informative the bounds are. It is natural to believe that the individual risk distributions are known; any additional piece of information on dependence would help to reduce the spread of our bounds. The main purpose of the paper is to discuss bounds for a risk measure of extreme events via the Extreme Value Theory. The worst and least asymptotic bivariate dependence are found in the presence of asymptotic dependence where the tail dependence value is known. Numerical examples are provided for the extreme VaR and CVaR risk measures of a sum of dependent random variables and we show that our approach provides a great improvement of the existing methods. Finally, a simple solution to test the classical problem of distinguishing between asymptotic dependence and asymptotic independence is provided. The pure essence of considering this test as a viable alternative lays in the fact that our estimator is based on a large extreme region rather than focusing on linear extreme paths.

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