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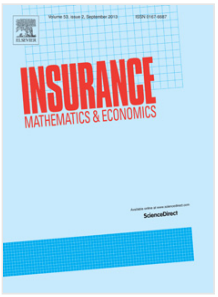

On multivariate extensions of the conditional Value-at-Risk measure

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On Multivariate Extensions of the Conditional Value-at-Risk measure

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Abstract

CoVaR is a systemic risk measure proposed by Adrian and Brunnermeier [1] able to measure a financial institution's contribution to systemic risk and its contribution to the risk of other financial institutions. CoVaR stands for conditional Value-at-Risk, i.e. it indicates the Value at Risk for a financial institution that is conditional on a certain scenario. In this paper, two alternative extensions of the classic univariate Conditional Value-at-Risk are introduced in a multivariate setting. The two proposed multivariate CoVaRs are constructed from level sets of multivariate distribution functions (*resp.* of multivariate survival distribution functions). These vector-valued measures have the same dimension as the underlying risk portfolio. Several characterizations of these new risk measures are provided in terms of the copula structure and stochastic orderings of the marginal distributions. Interestingly, these results are consistent with existing properties on univariate risk measures. Furthermore, comparisons between existent risk measures and the proposed multivariate CoVaR are developed. Illustrations are given in the class of Archimedean copulas. Estimation procedure for the multivariate proposed CoVaRs is illustrated in simulated studies and insurance real data.

Keywords: Copulas and dependence, Level sets of distribution functions, Multivariate risk measures, Stochastic orders, Value-at-Risk.

Introduction

A risk-based approach for supervision and regulation of the financial sector is gaining ground in both emerging and industrialized countries. As part of this approach, regulators need to measure, monitor, and manage market risk. Value-at-Risk (VaR) is one measure being explored

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