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An Approximation Method for Risk Aggregations and Capital Allocation Rules Based on Additive Risk Factor Models

Ming Zhou,* Jan Dhaene†, Jing Yao‡

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Abstract

This paper proposes the use of convex lower bounds as approximation to evaluate the aggregation of risks, based on additive risk factor models in the multivariate generalized Gamma distribution context. We consider two types of additive risk factor model. In Model 1, the risk factors that contribute to the aggregation are deterministic. In Model 2, we consider contingent risk factors. We work out the explicit formulae of the convex lower bounds, by which we propose an analytical approximate capital allocation rule based on the conditional tail expectation. We conduct stress tests to show that our method is robust across various dependence structures.

Key-words: risk aggregation, convex lower bound, capital allocation, approximation, generalized Gamma distribution.

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