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Diversification benefit in gaussian aggregation trees

Insurance risks are often aggregated together with the help of copulas: risks whose individual marginals are known are tied together via some function (the copula). In mathematical language, their joint distribution is defined via the copula. We focus our study on the aggregation of risks within so-called hierarchical trees: A tree of aggregation refers to applying several times such a process, linking some marginals together, then linking the resulting marginals together, and so on and so forth, until the total portfolio is modelised. We study in particular the "Gaussian Tree" where both marginals and copulas are Gaussian. This enables exact anlytical results for the r.v. of the total portfolio, and therefore the exact computation of the diversification benefit (the release in solvency capital due to diversification of risks, but taking into account their interdependencies). Such a toy model enables us to study the impact of the width and depth of the tree on the diversification benefit. We show that "tight trees" diversify better than "fat trees". We also show some numerical results that support this conclusion also outside the Gaussian world: Lognormal Trees aggregated via Gaussian or Clayton copula show the same overall behavior.

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