On Recent Construction Approaches of Hierarchical Archimedean Copulas

Étienne Marceau *

etienne.marceau@act.ulaval.ca

In this talk, we present two new construction approaches of hierarchical Archimedean copulas. The first approach is based on multivariate compound distributions, while the second methodology uses multivariate gamma distributions or multivariate mixed gamma distributions. These new approaches are derived via the construction of multivariate exponential mixture distributions. The proposed approaches offer major advantages, such as a flexible range of possible combinations in the choice of distributions, the existence of explicit formulas for the distribution of the sum, and computational ease in high dimensions. After presenting the new approaches, dependence properties are investigated and simulation algorithms are provided. The new construction approaches are also compare with other construction methodologies of hierarchical Archimedean copulas. Risk aggregation under this newly proposed dependence structure is also examined. Estimation procedures are also discussed using the composite likelihood method. Finally, numerical illustrations in the context of actuarial science and quantitative risk management are presented.

*École d’actuariat, Université Laval, 2425, rue de l’Agriculture, Québec, QC G1V 0A6, CANADA