

Department of Decision Sciences

Statistics Seminars

## X-Vine Models for Multivariate Extremes

**Johan Segers**  
(UCLouvain)

Thursday, January 18th 2024  
12:00 pm Room 3-E4-SR03 Via Roentgen 1 Milano

### Abstract

Regular vine sequences permit the organisation of variables in a random vector along a sequence of trees. Regular vine models have become greatly popular in dependence modelling as a way to combine arbitrary bivariate copulas into higher-dimensional ones, offering flexibility, parsimony, and tractability. In this project, we use regular vine structures to decompose and construct the exponent measure density of a multivariate extreme value distribution, or, equivalently, the tail copula density. Although these densities pose theoretical challenges due to their infinite mass, their homogeneity property offers simplifications. The theory sheds new light on existing parametric families and facilitates the construction of new ones, called X-vines. Computations proceed via recursive formulas in terms of bivariate model components. We develop simulation algorithms for X-vine multivariate Pareto distributions as well as methods for parameter estimation and model selection on the basis of threshold exceedances. The methods are illustrated by Monte Carlo experiments and a case study on US flight delay data.

Joint work with Anna Kiriliouk (UNamur) and Jeongjin Lee (UCLouvain)