

FAMILIES OF m -VARIATE DISTRIBUTIONS
WITH GIVEN MARGINS AND
 $m(m - 1)/2$ BIVARIATE DEPENDENCE PARAMETERS

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A class of m -variate distributions with given margins and $m(m - 1)/2$ dependence parameters, which is based on iteratively mixing conditional distributions, is derived. The family of multivariate normal distributions is a special case. The motivation for the class is to get parametric families that have $m(m - 1)/2$ dependence parameters and properties that the family of multivariate normal distributions does not have. Properties of the class are studied, with details for (i) conditions for bivariate tail dependence and non-trivial limiting multivariate extreme value distributions and (ii) range of dependence for a bivariate measure of association such as Kendall's tau.

1. Introduction. The main purpose of this paper is to derive and study a class of m -variate distributions with given margins and $m(m - 1)/2$ dependence parameters, one parameter corresponding to each bivariate margin. Of the parameters, $m - 1$ can be interpreted as dependence parameters and the remainder can be interpreted as conditional dependence parameters. The multivariate normal family is a special case with the parametrization in terms on $m - 1$ correlations and $(m - 1)(m - 2)/2$ partial correlations, each (independently) being in the range $(-1, 1)$. The class considered here includes multivariate families with different amounts of bivariate tail dependence for different bivariate margins; the multivariate normal family does not have tail dependence, a property which is important for extreme value behavior.

The class of multivariate distributions is defined in Section 2. Properties studied there include: (a) partial closure under taking of margins, (b) simulation from the class, (c) bivariate tail dependence, (d) ordering by concordance, and (e) range of dependence.

Because tail dependence properties are one reason for studying non-multivariate normal families, conditions for bivariate tail dependence are stud-

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