

**Tree Copula Mixture Distribution for Multivariate Dependence Analysis:
an Application to Energy Data**

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We propose Bayesian tree copula models for dependence analysis among the components of the energy market. The dynamic of the commodity prices is described via a set of AR(p) models, and a tree copula is used to represent the multivariate distribution of the innovations. A suitable set of bivariate copulas is associated to the edges of the underlying Markov tree structure, and the joint multivariate distribution is factorized in terms of them. In order to take into account more complex dependence structures and to increase the flexibility of the model, we apply a finite mixture of tree copulas. Working in a Bayesian framework, we perform both qualitative and quantitative learning. Posterior summaries are obtained via MCMC methods. We present an application to the analysis of Italian and German energy markets.