

Copula Modelling of Dependence in Multivariate Time Series

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Almost all existing nonlinear multivariate time series models remain linear, conditional on a point in time or latent regime. Here, an alternative is proposed, where nonlinear serial and cross-sectional dependence is captured by a copula model. The copula defines a multivariate time series on the unit cube. A D-vine copula is employed, along with a factorization which allows the marginal and transitional densities of the time series to be expressed analytically. It also provides for simple conditions under which the series is stationary and/or Markov, as well as being parsimonious. A parallel algorithm for computing the likelihood is given, along with a Bayesian approach for computing inference based on model averages over parsimonious representations of the copula. The model average estimates are shown to be more accurate in a simulation study. Two five-dimensional time series from the Australian electricity market are examined. In both examples, the fitted copula captures substantial asymmetric tail dependence, both over time and across elements in the series.

There are two papers available online for this talk, which are the first two working papers listed here: http://works.bepress.com/michael_smith/