Estimation of Dependence using Copulas: Comparison of two approaches

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Copulas have increasingly been recognised as a critical modelling technique for investigating dependence structure in financial and insurance risk. The choice of parameters and copula is known to have a significant impact on risk measures and capital requirements. In order to implement a copula in a stochastic model it is necessary to estimate parameters of the marginal distributions and the copula. In this paper methods of estimating parameters for copulas are considered. Two approaches used to estimate the parameters of the joint distribution that are compared are the Maximum Likelihood Estimator (MLE) and the Inference Functions for Margins (IFM). The MLE approach estimates all parameters simultaneously. The IFM approach is a two step method where marginal are estimated first and then the dependence parameters in the copula fitted. We simulate data from various copulas proposed for stochastic modelling and show that the MLE approach is subject to less estimation error compared to the IFM approach whereas the IFM method is less computationally time intensive. These issues are important for practical implementation of a copula in a stochastic model.

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