

Title: Bayesian inference for two nonstandard flexible families of bivariate Kumaraswamy models: theory and applications

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Abstract: Arnold and Ghosh (2017a, 2017b) have proposed a broad spectrum of bivariate Kumaraswamy (henceforth, KW, in short) distributions involving conditional specification, conditional survival specification, and starting from the Arnold-Ng (2011) eight parameter bivariate beta model. In addition, copula-based construction of bivariate KW models was considered. Included among the models that they discussed were the Olkin-Trikalinos (henceforth, in short, OT-BK) and the Ghosh-BK (henceforth, in short, G-BK) model. These two models can accommodate both positive and negative correlation under certain parametric restrictions. However, this comes at the expense of dealing with a density that is mathematically intractable. We focus our attention on estimation in the 4 and 5 parameter OT-BK and the G-BK models respectively using a Bayesian approach. A general framework based on approximate Bayesian computation methodology is proposed and studied in this article. In particular, the choice of priors must be such that they satisfy the parameter constraints for these models. We conduct simulation studies for both the models under a wide selection of priors. For illustrative purposes, a real data set has been re-analyzed.