Fitting Mixture Data Collected from Highly Constrained Regions: Living with Collinearity but Removing Its Influence

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Fitting equations to mixture data collected from highly constrained regions has challenged modelers for the past 35 years. Computer roundoff error, low precision of the estimates and collinearity among the terms in the models are just a few of the hurdles they face. It is well known that fitted models experiencing collinearity can contain coefficient estimates the magnitudes of which are many hundreds even a thousand times greater that the magnitude of the data values themselves. This can be very problematic to the modeler trying to convince a client the model is adequate. Fitting models in pseudocomponents with and without centering the terms has been one of the strategies used to try and reduce the effect of collinearity but often to no avail. We introduce two additional model forms where the terms are scaled and illustrate the benefits of fitting the new models using two numerical examples. The equivalence among models of four different but related component systems is shown for the first time.

Key Words: Centered and Scaled Intercept Model, Collinearity, Constrained Mixture Region, Modified $L$-Pseudocomponents.