The effect of rounding and Sheppard's correction

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Continuous data will always be measured in a more or less coarsened way. They will be rounded. When one uses such data to estimate moments and regression coefficients, the results will typically be biased. There is a widely dispersed and often half forgotten literature on the bias-inducing effects of rounding, which will be reviewed. Under appropriate conditions, this effect can be approximately rectified by versions of Sheppard’s correction formula. We discuss the conditions under which this approximation is valid. We also investigate the efficiency loss caused by rounding. Furthermore, we study the distribution of the rounding error, which is not a measurement error as in a measurement error model. In order to take account of the often observed phenomenon of rounding preferences (heaping), we generalize the concept of simple rounding to that of asymmetric rounding and consider its effect on the mean and variance of a distribution. We derive a generalization of Sheppard’s correction for this case. When Sheppard’s correction cannot be applied, other estimating methods must take over.