

## GENERALIZED SKEW-ELLIPTICAL DISTRIBUTIONS AND THEIR QUADRATIC FORMS

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**Abstract.** This paper introduces generalized skew-elliptical distributions (GSE), which include the multivariate skew-normal, skew- $t$ , skew-Cauchy, and skew-elliptical distributions as special cases. GSE are weighted elliptical distributions but the distribution of any even function in GSE random vectors does not depend on the weight function. In particular, this holds for quadratic forms in GSE random vectors. This property is beneficial for inference from non-random samples. We illustrate the latter point on a data set of Australian athletes.

*Key words and phrases:* Elliptical distribution, invariance, kurtosis, selection model, skewness, weighted distribution.