

# Depth weighted covariances

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## Abstract

General depth weighted means and covariances are discussed with emphasis on covariances. Consistency, limiting distribution, and influence function of these covariance matrices are addressed.

A specific case of the general depth weighted covariances, the projection depth weighted covariances, which include as a special case the Stahel-Donoho covariance estimator, is investigated. Large sample behavior (including consistency and limiting distribution) and finite sample behavior (including breakdown and relative efficiency) of the projection depth weighted covariances are thoroughly examined. The asymptotic normality of the Stahel-Donoho covariance estimator follows as a special case. The influence function and the maximum bias of the projection depth weighted covariances are also discussed.

Unlike many high-breakdown competitors, the projection depth weighted covariances can integrate high breakdown point and high efficiency while enjoying a bounded-influence function and a moderate maximum bias curve. Comparisons with leading estimators on asymptotic relative efficiency and gross error sensitivity reveal that the projection depth weighted covariances behave very well overall.

## References

Y. Zuo and H. Cui (2002). Depth weighted covariances. Preprint.

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