Generalized Least Squares Model Averaging

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Abstract

This paper proposes a method of averaging generalized least squares (GLS) estimators for linear regression models with heteroskedastic errors. We derive two kinds of Mallows' (1973, Tecnometrics) C_p criteria, calculated from the estimates of the mean of the squared errors of the fitted value based on the averaged GLS estimators, for this class of models. The averaging weights are chosen by minimizing Mallows' C_p criterion. We show that this method achieves asymptotic optimality, which is considered by Li (1987, Annals of Statistics) and the proof is also an extension of that of Li's paper. It is also shown that the asymptotic optimality holds even when the variances of the error terms are estimated and the feasible generalized least squares (FGLS) estimators are averaged. Monte Carlo simulations demonstrate that averaging FGLS estimators yields an estimate that has a remarkably lower level of risk compared with averaging least squares estimators in the presence of heteroskedasticity, and it also works when heteroskedasticity is not present, in finite samples.

Keywords: model averaging, GLS, FGLS, asymptotic optimality, Mallows' C_p.
JEL Classification: C31, C52 ,C53

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