# An Combination Method for Averaging OLS and GLS Estimators*

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In this paper we propose a combination method based on OLS and GLS estimators to reduce the risk of misspecification between homoscedastic and heteroscedastic linear models. The proposed estimator is a weighted average of mixtures of OLS and GLS estimators. The method can also be regarded as a three-step procedure. The first two steps are to calculate two model averaging estimators based on OLS and GLS respectively. To do this, we adopt existing model averaging methods such as the Mallows model averaging (MMA) of Hansen (2007), the heteroscedasticity-robust Cp (HRCp) model averaging of Liu and Okui (2013) and the generalized least squares model averaging (GLSMA) of Liu, Okui and Yoshimura (2014). The third step is to combine these two resulting model-averaging estimators.

Most existing research on model averaging assumed that it is known whether the errors of the true data generating process are homoscedastic or heteroscedastic. This assumption is unacceptable for empirical applications. Usually, researchers do not know the structure of the error term; therefore, this assumption leads to possible misspecification. Our method provides a way to address this type of misspecification by combining OLS estimators and GLS estimators as a weighted average. We propose criteria to choose the weight vector for combining estimators. The optimality in the sense of Li (1987) of the chosen weight vector is investigated. Our method works for the situation with unknown variance-covariance matrix of the error term by using an estimate based on the nonparametric method $k$-NN. The results of simulation experiments show that our combination method is adaptive in the sence that it can achieve almost the same estimation accuracy as if the homoscedasticity or heteroscedasticity of the error term was known.

## References

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*The authors thank Okui Ryo, Mototsugu Shintani, Arihiro Yoshimura and conference participants at the 2014 European Meeting of the Econometric Society and the 2013 Kansai Keiryo Keizaigaku Kenkyukai for their helpful comments. Liu acknowledges financial support from JSPS Grant-in-Aid for Young Scientists (B) No. 25780148

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