MATRIX MEAN SQUARE ERROR COMPARISONS OF THE STOCHASTIC RESTRICTED LIU ESTIMATOR AND MIXED ESTIMATOR

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If only the sample information of the standard multiple linear regression model $(Y, X\beta, \sigma^2 I)$ is available, then the Ordinary Least Squares Estimator (OLSE) b is the best linear unbiased estimator of the parameter vector β, where the matrix X is assumed to be a full column rank matrix. However, in many estimation problems, one can often give auxiliary information or prior information in addition to the sample information, which can be either exact or stochastic, about the unknown parameter via the routes of postulation, experimentation or past sample data which improves the linear models. Therefore, in the presence of stochastic prior information in addition to the sample information, Thiel and Goldberger (*Int. Econ. Rev.*, **2**, 1961, 65-68) introduced a Mixed Estimator $\hat{\beta}_m$ for the parameter vector β. Several statisticians compared these two estimators and showed the superiority of the mixed estimator over the OLS estimator under certain conditions.

Liu Kejian (*Comm. Stat.*, **22**, 1993, 393-402) introduced an alternative ridge type biased estimator, which is called the Liu Estimator $\hat{\beta}_d$ of the parameter vector β, by augmenting the OLSE b. Selahattin Kaciranlar, G.P.H. Styan and H.J.Werner (*Ind. J. Stat.*, **61**, 1999, 443-459) introduced another biased estimator called the Restricted Liu estimator (RLE) by augmenting the Restricted Least Squares Estimator (RLSE) and showed the superiority of the Restricted Liu Estimator (RLE) over OLSE and the Liu estimator.

In this paper, we introduce a new biased estimator, called the Stochastic Restricted Liu Estimator (SRLE) $\hat{\beta}_{srd}$ for β and discuss its efficiency. In particular necessary and sufficient conditions for the matrix mean squared error of Stochastic Restricted Liu Estimator (SRLE) $\hat{\beta}_{srd}$ to exceed the matrix mean squared error of the Mixed Estimator $\hat{\beta}_m$ will be derived for the two cases in which the parametric restrictions are correct, and are not correct in the mean.