

## **APPLICATION ON A NEW STOCHASTIC RESTRICTED LIU ESTIMATOR IN LINEAR REGRESSION MODEL**

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Often a researcher may find auxiliary information or prior information in addition to the sample, which can be either exact or stochastic about the unknown parameter. Therefore in the presence of stochastic prior information, in addition to the sample, Theil and Goldberger (1961) introduced a mixed estimation procedure for estimating the parameter vector in the linear regression model. However, in the presence of multicollinearity among regressor variables it was noted that Mixed Regression Estimators (MRE) are unstable and give misleading information.

To overcome the problems related to multicollinearity Hoerl and Kennard (1970) introduced the use of ridge type biased estimator, and several other statisticians were developed it further. However a major improvement of this method was done by Liu Kejian (1993), and he suggested the Liu estimation procedure for least squares estimation. Recently Hubert and Wijekoon (2004) extended Liu estimation procedure for mixed regression estimation by defining a new estimator called Stochastic Restricted Liu Estimator (SRLE), and shown that SRLE outperforms the other alternative estimators under certain conditions with respect to the mean squared error matrix criterion.

In this study estimators were compared using scalar mean squared error, and validity of the theoretical findings was shown by using a well known numerical example named "Portland cement", which was widely analyzed to make comparisons of estimators in the literature.

This data set of "Portland cement" comes from an experimental investigation of the heat evolved during the setting and hardening of Portland cements of varied composition and the dependence of this heat on the percentages of four compounds in the clinkers from which the cement was produced. The four compounds considered are tricalcium aluminate, tricalcium silicate, tetracalcium aluminoferrite and  $\beta$ -dicalcium silicate which are denoted by  $X_1, X_2, X_3$  and  $X_4$  respectively. The heat evolved after 180 days of curing is denoted by  $Y$ , is measured in calories per gram of cement. Using these variables the stochastic properties of Stochastic Restricted Liu Estimator are analyzed and the superiority condition over the other alternative estimators are examined.

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