

Improved Estimation of Regression Parameters when the Two Regression Lines are Parallel

B. U. Khan

Department of Mathematics and Computing Science, Saint Mary's University, Halifax, NS, Canada.
Email: bkhan@smu.ca

A. K. Md. Ehsanes Saleh

School of Mathematics and Statistics, Carleton University, Ottawa, Canada.
Email: esaleh@math.carleton.ca

Abstract

In this paper we consider two simple multivariate regression models. Our interest is to estimate the intercept and slope vectors of one model when it is apriori suspected, but not sure, that the slope vectors of the two models may be equal. Five estimators namely; unrestricted, restricted, preliminary test, shrinkage, and positive-rule shrinkage are proposed for the estimation of intercept and slope vectors. Expressions for the biases, quadratic biases, and quadratic risks of the proposed estimators are derived. The statistical properties and relative performances of the estimators are investigated based on unbiasedness and quadratic risk criteria. It is observed that, under certain conditions, the risk of shrinkage estimator is less than that of the maximum likelihood estimator. It is also observed that shrinkage estimator performs better than preliminary test estimator except in a small range of the parameter space.

Keywords: Multivariate regression model, non-sample information, preliminary test estimator, shrinkage and positive-rule estimators, quadratic bias, quadratic risk.

2000 Mathematics Subject Classification: 62F30, 62J05.