

## Weighted least-squares estimators of parametric functions of the regression coefficients under a general linear model

Yongge Tian

Received: 9 January 2008 / Revised: 9 June 2008 / Published online: 9 September 2008  
© The Institute of Statistical Mathematics, Tokyo 2008

**Abstract** The weighted least-squares estimator of parametric functions  $\mathbf{K}\boldsymbol{\beta}$  under a general linear regression model  $\{\mathbf{y}, \mathbf{X}\boldsymbol{\beta}, \sigma^2\boldsymbol{\Sigma}\}$  is defined to be  $\mathbf{K}\hat{\boldsymbol{\beta}}$ , where  $\hat{\boldsymbol{\beta}}$  is a vector that minimizes  $(\mathbf{y} - \mathbf{X}\boldsymbol{\beta})'\mathbf{V}(\mathbf{y} - \mathbf{X}\boldsymbol{\beta})$  for a given nonnegative definite weight matrix  $\mathbf{V}$ . In this paper, we study some algebraic and statistical properties of  $\mathbf{K}\hat{\boldsymbol{\beta}}$  and the projection matrix associated with the estimator, such as, their ranks, unbiasedness, uniqueness, as well as equalities satisfied by the projection matrices.

**Keywords** General linear regression model · Parametric functions · WLSE · Projection matrix · Unbiasedness of estimator · Uniqueness of estimator