Permissible Covariance Structures for Simultaneous Retention of BLUEs

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Abstract

In this talk we consider the partitioned linear model

$$\mathscr{M}_{12}(\mathbf{V}_0) = \{\mathbf{y},\, \mathbf{X}_1\boldsymbol{\beta}_1 + \mathbf{X}_2\boldsymbol{\beta}_2,\, \mathbf{V}_0\}$$

and the corresponding small model

$$\mathscr{M}_1(\mathbf{V}_0) = \{\mathbf{y},\, \mathbf{X}_1\boldsymbol{\beta}_1,\, \mathbf{V}_0\}.$$

Following Rao (1971, Sec. 5.2) we can characterize the set $\mathscr{V}_{12}$ of nonnegative definite matrices $\mathbf{V}$ such that every representation of the best linear unbiased estimator, BLUE, of $\boldsymbol{\mu} = \mathbf{X}\boldsymbol{\beta}$ under $\mathscr{M}_{12}(\mathbf{V}_0)$ remains BLUE under $\mathscr{M}_{12}(\mathbf{V})$. Correspondingly, we can characterize the set $\mathscr{V}_1$ of matrices $\mathbf{V}$ such that every BLUE of $\boldsymbol{\mu}_1 = \mathbf{X}_1\boldsymbol{\beta}_1$ under $\mathscr{M}_1(\mathbf{V}_0)$ remains BLUE under $\mathscr{M}_1(\mathbf{V})$. In this talk we focus on the mutual relations between the sets $\mathscr{V}_1$ and $\mathscr{V}_{12}$.

This talk is based on co-operation with Stephen J. Haslett, Jarkko Isotalo and Augustyn Markiewicz.

Keywords

Best linear unbiased estimator, BLUE, Covariance matrix, Equality of the BLUEs, OLSE, Partitioned linear model.

References:

Rao, C.R. (1971). Unified theory of linear estimation. *Sankhyā Ser. A*, 33, 371–394. [Corrigenda (1972): 34, p. 194 and p. 477]
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