

A note on the equality of the OLSE and the BLUE of the parametric function in the general Gauss–Markov model

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Abstract In this note we consider the equality of the ordinary least squares estimator (OLSE) and the best linear unbiased estimator (BLUE) of the estimable parametric function in the general Gauss–Markov model. Especially we consider the structures of the covariance matrix \mathbf{V} for which the OLSE equals the BLUE. Our results are based on the properties of a particular reparametrized version of the original Gauss–Markov model.

Keywords Best linear unbiased estimation · Ordinary least squares estimation · Linear model · Reparametrized model

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1 Introduction

Consider the general Gauss–Markov model

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \boldsymbol{\varepsilon}, \quad (1.1)$$

where \mathbf{y} is an $n \times 1$ observable random vector, \mathbf{X} is a known $n \times p$ model matrix, $\boldsymbol{\beta}$ is a $p \times 1$ vector of unknown parameters, and $\boldsymbol{\varepsilon}$ is an $n \times 1$ random error vector. The expectation and the covariance matrix of random vector \mathbf{y} are $E(\mathbf{y}) = \mathbf{X}\boldsymbol{\beta}$

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