

ESTIMATING COMMON PARAMETERS OF GROWTH CURVE MODELS*

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Abstract. Suppose that we have two independent random matrices X_1 and X_2 having multivariate normal distributions with common unknown matrix of parameters $\zeta (q \times m)$ and different unknown covariance matrices Σ_1 and Σ_2 , given by $N_{p_1, N_1}(B_1 \zeta A_1; \Sigma_1, I)$ and $N_{p_2, N_2}(B_2 \zeta A_2; \Sigma_2, I)$ respectively. Let $\hat{\xi}_1$ ($\hat{\xi}_2$) be the MLE of ζ based on X_1 (X_2) only. When $q=1$, necessary and sufficient conditions that a combined estimator of $\hat{\xi}_1$ and $\hat{\xi}_2$ has uniformly smaller covariance matrix than those of $\hat{\xi}_1$ and $\hat{\xi}_2$ are given. The k -sample problem as well as one-sample problem is also discussed. These results are extensions of those of Graybill and Deal (1959, *Biometrics*, **15**, 543-550), Bhattacharya (1980, *Ann. Statist.*, **8**, 205-211; 1984, *Ann. Inst. Statist. Math.*, **36**, 129-134) to multivariate case.

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