

The Performance of Missing Data Imputation Methods for Maximum Likelihood Estimation in Structural Equation Modeling

Hyung Ki So

Department of Mathematics, Korea Military Academy
POB No.77 Gongneung-dong, Nowon-gu, Seoul, Korea
rokaso@kma.ac.kr

Keywords: Structural Equation Modeling, Missing Observations

Abstract

Theory-based maximum likelihood approaches for treating missing data such as EM algorithm and FIML have been known in the technical literature for some time, and have recently begun to appear in statistical packages. But the extent to which the theoretical benefits associated with these methods may be realized in practice is unclear. In this paper, we examine the interaction effects of the missing data imputation methods (EM algorithm, full information maximum likelihood and listwise deletion) with maximum likelihood estimation in structural equation modelling. Other covariates employed in our experimental design based on Monte Carlo simulation are normality of variables, sample size, and missing data rate. Outcome measures used are bias, variance, MSE of parameters estimates, and model goodness-of-fit.

References

- Enders, C.K. & Bandalos, D.L. (2001), The Relative Performance of FIML Estimation, *Structural Equation Modeling*, 8, 430-457, Lawrence Erlbaum Associates, Inc.
- Finch, J.F., West, S.G., & MacKinnon, D.P. (1997), Effects of Sample Size and Nonnormality on the Estimation of Mediated Effects in Latent Variable Models, *Structural Equation Modeling*, 2, 87-105.
- Little, R.J.A. & Rubin, D.B. (1987), *Statistical Analysis with Missing Data*, New York: Wiley.
- Marsh, H.W. (1998), Pairwise Deletion for Missing Data in Structural Equation Models: Nonpositive Definite Matrices, Parameter Estimates, Goodness of Fit, and Adjusted Sample Sizes, *Structural Equation Modeling*, 5, 22-36.
- Muthén, B., Kaplan, D., & Hollis, M. (1987), On Structural Equation Modeling with Data that are not Missing Completely at Random, *Psychometrika*, 52, 431-462.
- Olsson, U.H., Foss, T., & Howell, R.D. (2000), The Performance of ML, GLS, and WLS Estimation in Structural Equation Modeling Under Conditions of Misspecification and Nonnormality, *Structural Equation Modeling*, 7(4), 557-595.