

# Guidelines for CFA Model Improvement

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1. What you get: a CFA model specification which is a pattern of zeros in loading matrix  $\mathbf{L}$  and factor correlation matrix  $\mathbf{P}$  of the common CFA Model

$$\mathbf{S} \simeq \mathbf{LPL}^T + \text{diag}(\mathbf{U}),$$

and its multiple sample extension, which will correspond to a relatively high  $p$  value of the normal or robust  $\chi^2$  goodness of fit criterion. This may save you weeks or months you would have to spend with the traditional trial-and-error approach.

2. What we need from you to do the job:
  - (a) The data, which are either raw data, one or more (multiple sample) correlation or covariance matrices.
  - (b) The data should come either in ASCII, MS Excel, Matlab, or SAS transport form.
  - (c) If the raw data are ordinal scaled the CFA function will be analyzing polychoric correlations.
  - (d) If the data contain missing values, we need to know how they are coded. CMAT will then use an own imputation algorithm, and the results may differ, more or less, from those obtained with other software. (FIML is not yet implemented.)
  - (e) We need a rough estimate of the number of factors which you prefer, maybe an interval  $[nfa, nfe]$ .
  - (f) What type of estimation method should be used? Implemented are ULS, GLS, ML, WLS and DWLS.
  - (g) Note, that ML cannot be used for polychoric correlations when (one of) the correlation matrix(es) is indefinite (has negative eigenvalues).
  - (h) Note, that GLS cannot be used for genuine correlation analysis, where the diagonal is considered fixed and is not fitted.
  - (i) Also note, that WLS and DWLS estimation usually needs raw data for computing the weight matrix. But CFA is able to compute the asymptotic covariance matrix also for polychoric correlations, i.e. for ordinal data.

- (j) Our algorithm is trying to  $p$ -maximize CFA patterns starting from two different situations:
  - i. Improving from an EFA starting solution (most common)
  - ii. Improving from an available CFA starting solution

If you are interested in the latter you can mail us a CFA trial pattern.

3. Confidentiality:

- (a) We will keep all our work and your information and even your name confidential and will normally delete all your data after a few weeks after mailing you the results of our analysis. (We do not have the storage capacity for keeping data.)
- (b) If the data set is already published or interesting for others, we may ask you for the inclusion in our example library. But will not include it without your agreement in written form.