FAQ June 2011

QUESTION:
I have a question on my multilevel model in Mplus. I am trying to replicate results from Applied Longitudinal Data Analysis (Singer & Willett, page 163, Model D). Dependent variable is CESD, and my two independent variables are Unemp, and monBYun. In this model the intercept, as well as the slopes for the independent variables are to have both fixed and random components. The code I used to fit this model is:

```
%within%
s1 | cesd on unemp;
s2 | cesd on monBYun;
%between%
cesd with s1 s2;
s1 with s2;
```

The model fits, but my results are slightly different from the results listed in the book (or for that matter obtained using SAS or MLWin). Results are given below.

Intercept [MPlus=11.135; Book=11.267] / Intercept var [MPlus=42.779; Book=41.52]
Unemp slope [Mplus=6.985; Book=6.8795] / Unemp Var [MPlus=33.269; Book=40.45]
monBYun slope [MPlus=-0.300; Book=-0.3254] / monBYun Var [MPlus=0.758; Book=0.71]
Res. Var [MPlus=60.379; Book=62.43]

These results are for Model D; using the same data but different variable combinations, I fit 3 other models (A, B, C) and the numbers are identical (to 3 decimal place rounding). The mean intercept and slopes for Model D are fairly close as shown above, but, difference in variance, especially Unemp seems larger. I have used the same estimator (ML) as used in prior models on the data. Is my code in error by any chance?

ANSWER:
The page 163 results don't show covariances among the random effects, but I assume they are included in their modeling. A first check is if the same number of parameters is used - Mplus shows this clearly in the output.

Next, you can check if the loglikelihoods (LL) agree. They give the Deviance which is -2 times the LL. Perhaps either their run or the Mplus run can sharpen its convergence criterion and get a better LL with agreement of estimates.

QUESTION:
The LL value for the MPlus model I ran was -2547.997. Thus -2LL=5095.994; on page 163 of the book the deviance for the same model is 5093.6. These values are very close, but not identical.

I also checked the SAS (v9.2) output for the same model on UCLA's ATS website. SAS results are identical to those reported in the book including -2LL. From the output it appears as though there are 10 parameters estimated in SAS. My MPlus output tells me "Number of Free Parameters 10", thus the number of parameters estimated is the same as well.

As a side, from the ATS website, only the results from MLWin and SAS are consistent for Model D. Remaining software packages, MPlus, Stata and SPSS give estimates that are close yet different. Stata had difficulty calculating standard errors for variance / covariance parameters.

ANSWER:
The SAS deviance translates to LL = -2546.8 so that it a little bit higher than the Mplus LL. You can try a sharper Mplus convergence criterion saying

mconvergence = 0.00001;

in the Analysis command instead of the default mconv = 0.001 and see if the LL changes.

In some cases the estimated between covariance matrix is close to singular (e.g. high correlations) and can be the cause of not getting right at the best LL.

QUESTION:
I used a convergence criteria even smaller than the one you suggested by it does not change the previous results.

ANSWER:
We haven't had a case so far where we have not been able to get perfect agreement between SAS and Mplus, so feel free to send the input, output and data to support together with the SAS output.

ANSWER:
You can decrease the logcriterion convergence criterion (add these two commands logcriterion=0.0000001; miter=10000;) and then you get the same results as in stata.

http://www.ats.ucla.edu/stat/stata/examples/alda/chapter5/aldastatach5.htm

The reason you are experiencing problems with this example is that the variance covariance matrix for the 3 random effects is singular - I computed the determinant and it came out negative. Different algorithms and packages will react differently on singular variance covariance matrix and most people would consider this an unacceptable model. You can introduce structured variance covariance matrix for the random effects to eliminate these problems.

Just a little more information about Mplus. If you add the technical option output:tech8; you will see the details of the convergence process. The default algorithm EMA quickly reaches the ML estimates but fails because the variance covariance matrix for the random effects is singular. At that point Mplus switches to the EM algorithm which slowly approaches the singularity, but Mplus will deliberately avoid the full convergence to avoid the singularity. In this part of the algorithm the solution is driven by the logcriterion convergence criterion. So essentially all software packages differ because the ML solution is inadmissible so they report their own version of "approximately" ML solution.