

PSYC 948: Latent Trait Measurement and Structural Equation Models

Homework #2 (Total 10 Points)

Due: Wednesday, January 23, 2012 at 11:59pm

Homework Problems:

The following questions refer data from a five-item scale of general self-esteem. Each item was measured using a 9-point Likert scale. The item responses are in the file sem12ersh8750.xlsx, available on the course's website. **USING MPLUS**, answer the questions below. NOTE: the following Mplus MODEL syntax will be useful (this assumes your variables are named X1-X5):

- To constrain variance parameters to be equal, use X1-X5 (var); (the label var in the parentheses constrains all to be the same)
- To constrain covariance parameters to be zero, use X1-X5 WITH X1-X5@0; (the @ symbol fixes the parameters to the value zero, which constrains all to be zero)
- To constrain covariance parameters to be equal use X1-X5 WITH X1-X5 (cov); (the label cov in parentheses constrains all to be the same)
- To constrain the means to be equal use [X1-X5] (mean); (the brackets indicate the means, the label mean in parentheses constrains all to be the same)

Use the MLR estimator to estimate the following models:

1. Estimate a saturated means (the mean for every item estimated) and independent variables model (a common variance for all items and zero covariance for all item pairs).
2. Estimate a saturated means (the mean for every item estimated) and compound-symmetric covariance model (a common variance for all items and a common covariance for all item pairs).
3. Estimate a saturated means (the mean for every item estimated) and unstructured covariance model (i.e., a unique variance for every item and unique covariance for all item pairs).
4. Estimate a common means (the mean for every item set equal) and unstructured covariance model (i.e., a unique variance for every item and unique covariance for all item pairs).

Answer the following questions:

1. What is the estimate and standard error of the common variance from Model #1? (.5 points)
2. What is the estimate and the standard error of the common variance from Model #2? (.5 points)
3. What is the estimate and the standard error of the common covariance from Model #2? (.5 points)
4. What is the residual covariance matrix from Model #2? (.5 points)
5. Conduct a likelihood ratio test comparing Model #1 and Model #2. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (.5 points)
6. What is the estimate and the standard error for all 15 parameters in the covariance matrix from Model #3? (.5 points)
7. Compare the estimates of the means for all three models. Do they change? Why or why not? (.5 points)
8. Conduct a likelihood ratio test comparing Model #2 and Model #3. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (.5 points)
9. What is the estimate and standard error of the common mean from Model #4? (.5 points)
10. Conduct a likelihood ratio test comparing Model #3 and Model #4. What is the test statistic, degrees of freedom, and p-value? Based on this result, what model do you select from these two? (.5 points)

Spreadsheet creation:

11. Create an Excel spreadsheet that calculates the rescaled likelihood ratio test statistic under MLR. Note: You may use other resources to construct yours, but may not copy directly. (2 points)

Replication with your data:

12. Using the data set you have selected for analyses throughout class, replicate analyses #1-4 and write up your results in an APA-style formatted results section. Be sure to note which of the four models was selected and then report the various parameters from the model in a table. Note: Please use between 3-5 variables for this analysis. (3 points)

Submission Instructions:

All homework and final answers must be your own and not be copied or paraphrased from anyone else's answers. Homework must be submitted via your shared personal folder on Dropbox in the form of Microsoft Word document with the name: 948_FirstLast_HW#.docx. Late homework will have a penalty of 10% per calendar day.