

Computer Lab for EFA in SAS and CFA in AMOS

Goals for today's lab

1. To run an EFA of the 20 genetic testing variables and compare results with those in the notes pp35-44.
2. To use AMOS to perform a CFA using the variables C9, C11, C14, C8, C18, C19 from the genetic testing concerns data


EFA

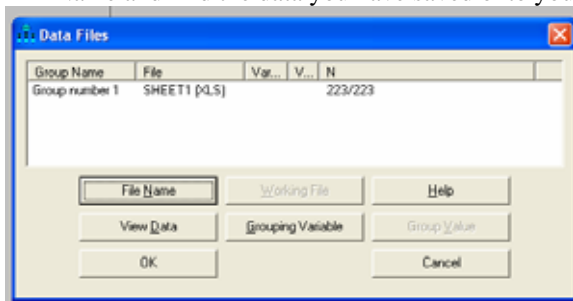
1. Open SAS and import the genectestingrawdata.xls.
2. Run the following code which performs an EFA using the maximum likelihood estimation method. Changing the nfact= value will produce results for the specified number of factors, e.g. below will fit 4 factors. This code (and its variant by changing nfact) produces output found on pp35-44 of notes. Find the results in the output that are the same as those in the notes.

```
proc factor data = a scree method = ml rotate = promax nfact=4 flag = .3;  
var c1-c20;  
run;
```

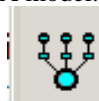
3. Change the "method = ml" to "method = prinit" which performs iterated principal factor analysis and then to "method = principal" which performs principal component analysis. Compare the results for the eigenvalues and for the 4 factor model.


CFA in AMOS...

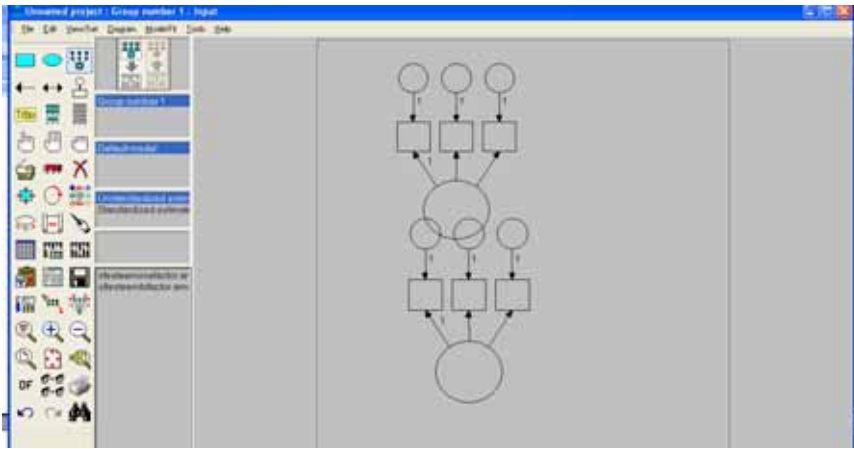
1. Open AMOS
2. Read in the genectestingrawdata.xls. To do this Select File → Data Files or click  then click on File Name and find the data you have saved onto your PC. If you read it in correctly it will say 223/223.




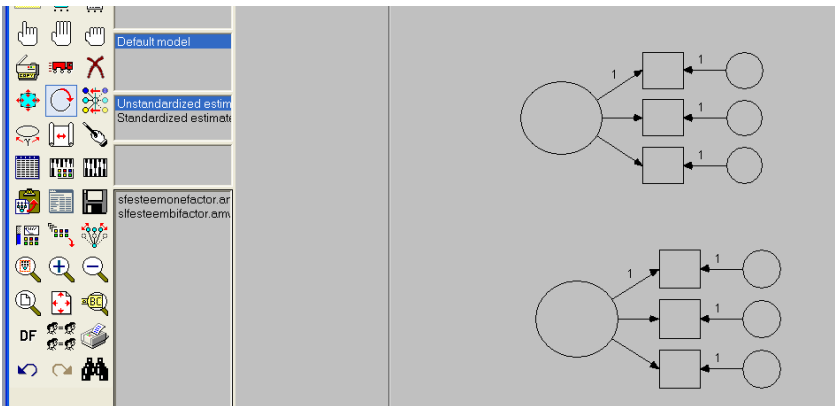
3. Now draw the following CFA model.




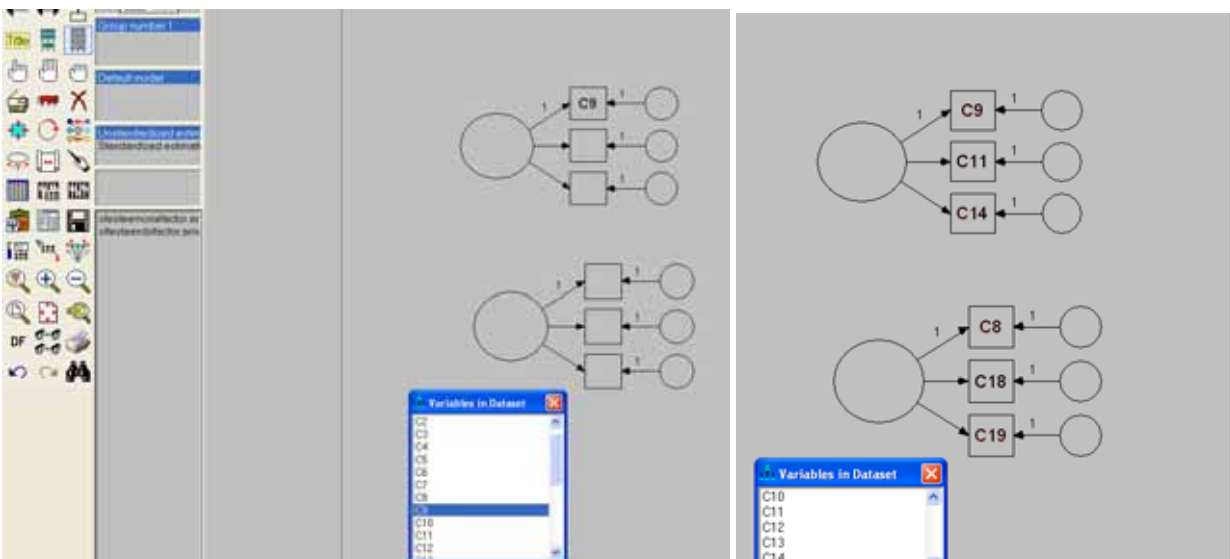
- a. Start by clicking on the tool , then in the drawing screen, clicking and drag the mouse to make an oval. Then place the cursor on the oval and click the left button which will add on one arrow to a variable box and the associated measurement error. Keep clicking the left mouse while the cursor is on the original oval to add more variables. If you add too many you can click Undo under Edit. After you have drawn one factor with 3 observed variables, repeat to draw the second factor. (Note: DO NOT DRAW the factor models by separately drawing and dragging boxes and arrows and circles, while it is possible to do it this way, it is very difficult then to get all the parameters correct since you would have to go in and add 1's to all the appropriate arrows.) It should look like this...



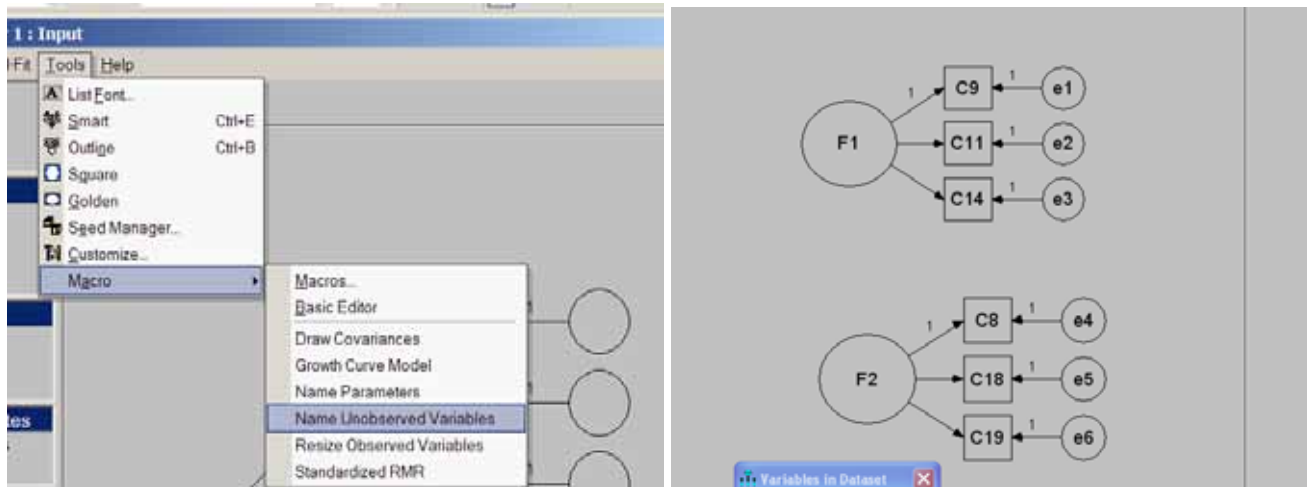
b. Use the  button to orientate the observed indicators to the right or to the left (rather than up). Click on the rotate button, then place the cursor on one of the latent factors, then by left clicking, the indicators will rotate around, keep clicking until they are in the place you want them. It should look like this...




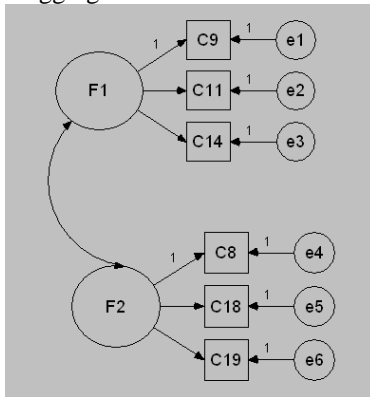
c. Put the observed variables names into the boxes by clicking on  which will make the variable name box pop-up. Click on the variable name C9 and drag it over to the first box. This will attach that variable with that box. Continue doing this for all 6 variables C9, C11, C14, C8, C18, C19. It should look like this...




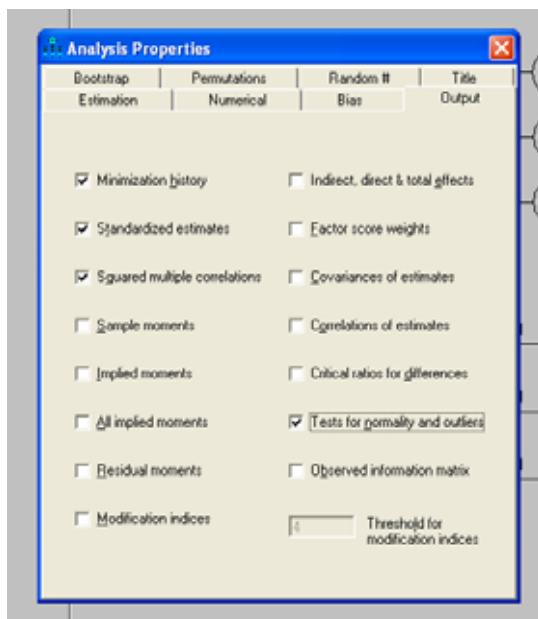
d. Name both of the factors and errors by clicking on Tools, then Macro, then Name Unobserved Variables. It should look like this.



e. Add a correlation between the factors by clicking on , then placing the cursor on one of the factor, left-clicking then dragging the arrow until it hits the other factor, then letting go. It should look like this...

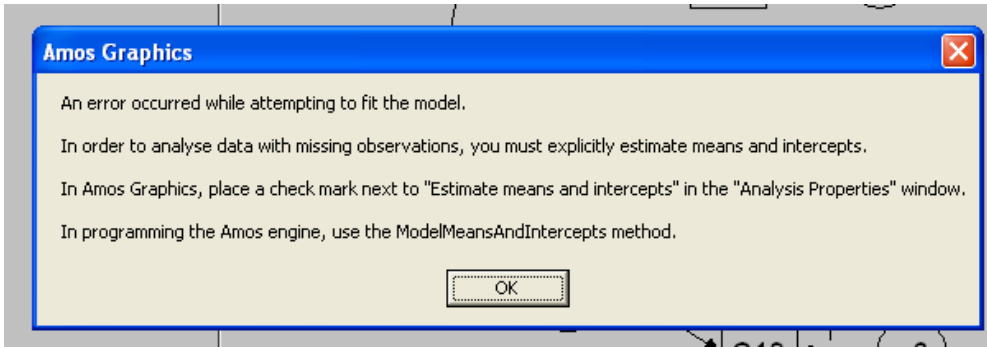


4. Set up the output we would like AMOS to produce. Click on Analysis Properties,  and hit the Output tab. then check the boxes for “Standardized estimates”, “Squared multiple correlations” and “Tests for normality and outliers”. Close the Analysis property window when you’ve check marked all the output.






5. Run the model by clicking the abacus . It should give you the following error message



Go back in to the Analysis properties (Step 4) click on Estimation, then check the box for “Estimate means and intercepts” Then rerun the model as in Step 5.

6.If all worked correctly, you should see a chi-square value of 35.5 in the left side panel (you may have to widen the panel to



see it). Click on the  button in the upper left hand corner to see the estimated parameters. You can toggle between the unstandardized and the standardized estimates. It should look like this...

The screenshot shows the Amos Graphics interface. On the left is a table of contents with the following items:


- Group number 1: Input
- Diagram
- Model Fit
- Look
- Save
- Cancel number 1
- OK: Default model
- Unstandardized estimates
- Standardized estimates
- Reading data
- 223 cases
- Default model
- Minimization
- Iteration 9
- Minimum was achieved
- Writing output
- Chi-square = 35.5, df = 8
- Finished
- genetic2facfa.amw
- s1este1monofactor.amw
- s1este1mbifactor.amw

The main window displays a path diagram with two latent variables, F1 and F2, and six observed variables, C8 through C19. The path coefficients are:

- F1 to C9: 0.70
- F1 to C11: 0.63
- F1 to C14: 0.74
- F2 to C8: 0.52
- F2 to C18: 0.61
- F2 to C19: 0.87

The error terms are e1 through e6. The chi-square value is 35.5 and the degrees of freedom are 8.



7. To look at all the results, click on the AMOS output window  and click around on the left table of contents to explore all the things it provides.