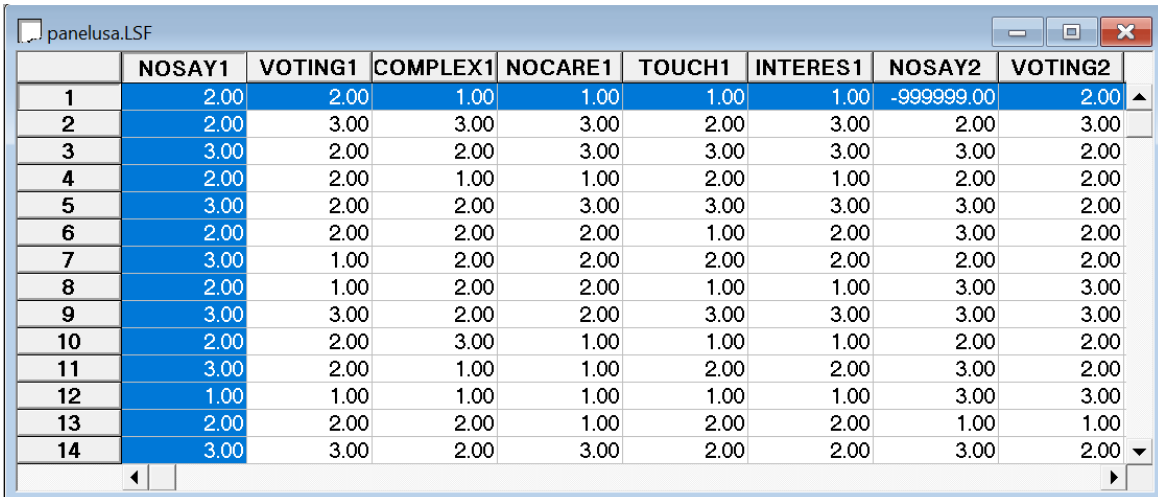


Two-stage SEM for panel data

This example is based on panel data of the six political efficacy measurements as described in Aish & Jöreskog (1990) observed in two different calendar years. The dataset **PANELUSA.LSF** consists of 933 cases obtained in a USA sample. The first few lines of this data set are shown below.



	NOSAY1	VOTING1	COMPLEX1	NOCARE1	TOUCH1	INTERES1	NOSAY2	VOTING2
1	2.00	2.00	1.00	1.00	1.00	1.00	-999999.00	2.00
2	2.00	3.00	3.00	3.00	2.00	3.00	2.00	3.00
3	3.00	2.00	2.00	3.00	3.00	3.00	3.00	2.00
4	2.00	2.00	1.00	1.00	2.00	1.00	2.00	2.00
5	3.00	2.00	2.00	3.00	3.00	3.00	3.00	2.00
6	2.00	2.00	2.00	2.00	1.00	2.00	3.00	2.00
7	3.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
8	2.00	1.00	2.00	2.00	1.00	1.00	3.00	3.00
9	3.00	3.00	2.00	2.00	3.00	3.00	3.00	3.00
10	2.00	2.00	3.00	1.00	1.00	1.00	2.00	2.00
11	3.00	2.00	1.00	1.00	2.00	2.00	3.00	2.00
12	1.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00
13	2.00	2.00	2.00	1.00	2.00	2.00	1.00	1.00
14	3.00	3.00	2.00	3.00	2.00	2.00	3.00	2.00

Note that the data values of -999999.00 are missing data values. Should a different code be used to indicate missing values, it should be assigned as the global missing code using the **Define Variables** dialog box.

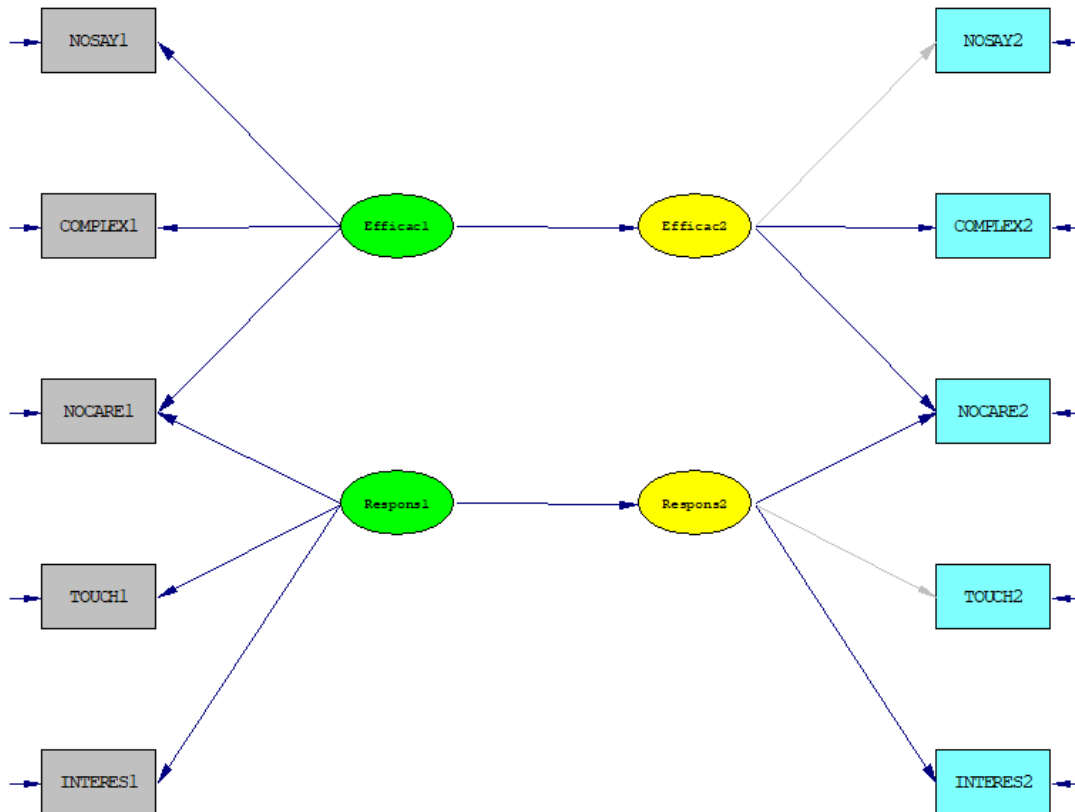
The data are the responses to the following statements:

- People like me have no say in what the government does (NOSAY)
- Voting is the only way that people like me can have any say about how the government runs things (VOTING)
- Sometimes politics and government seem so complicated that a person like me cannot really understand what is going on (COMPLEX)
- I don't think that public officials care much about what people like me think (NOCARE)
- Generally speaking, those we elect to Parliament lose touch with the people pretty quickly (TOUCH)
- Parties are only interested in people's votes but not in their opinions (INTEREST)

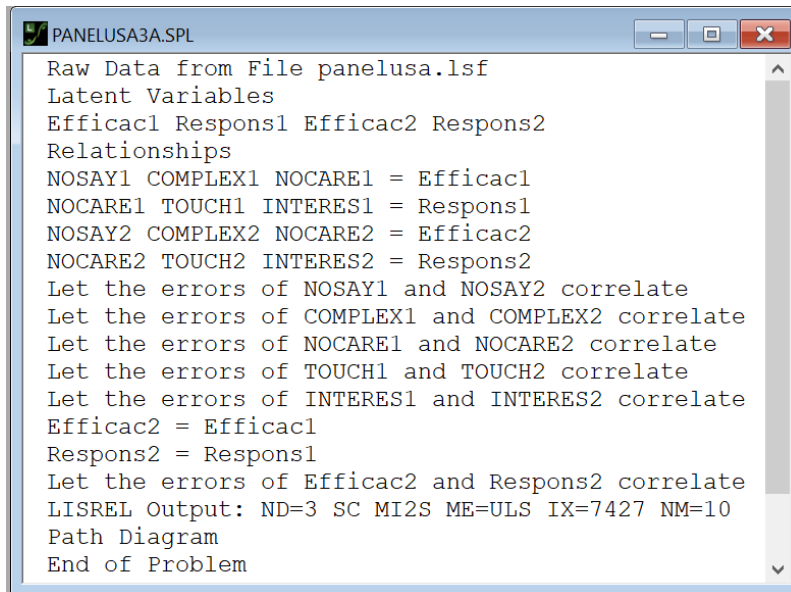
The ordered categories are:

- 1: agree strongly
- 2: agree
- 3: disagree
- 4: disagree strongly

The theoretical model is a two-wave model for political efficacy and political responsiveness. A path diagram of the theoretical model is shown in the image below.



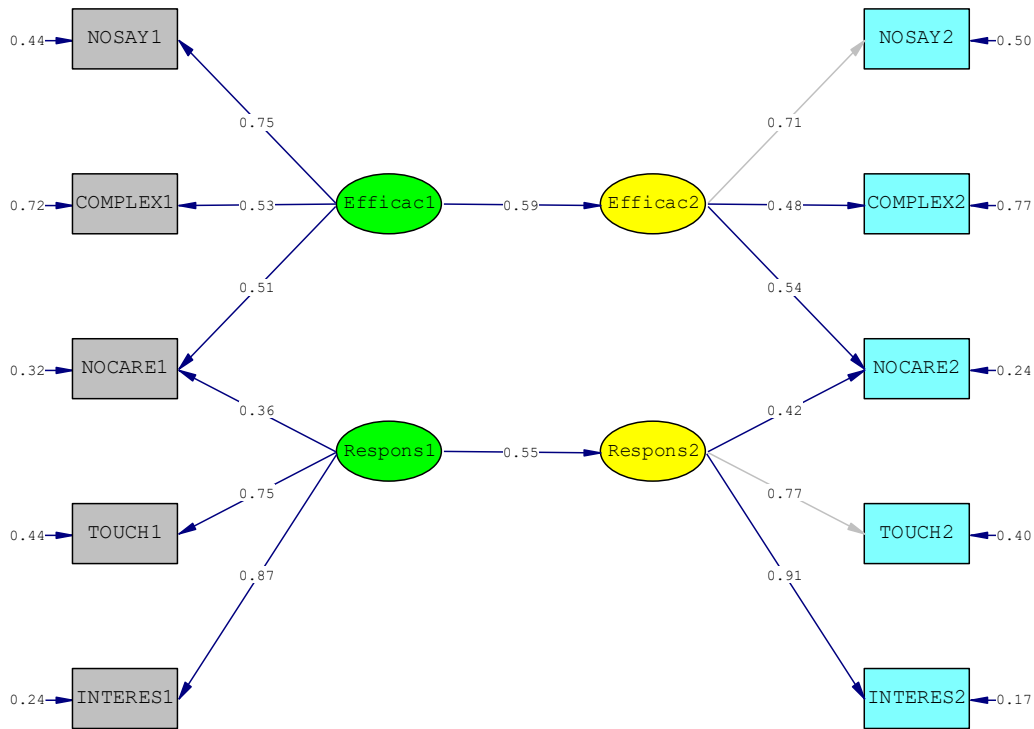
The SIMPLIS syntax file to fit the model reflected in the path diagram above to the average polychoric correlation matrix for 10 multiple MCMC imputations is depicted in the image below. The two-stage multiple imputation SEM syntax is reflected on the LISREL Output command as MI2S which requests the method, NM = 10 which requests 10 multiple imputations, and IX = 7427 which requests a starting random seed of 7427.



```
PANELUSA3A.SPL
Raw Data from File panelusa.lsf
Latent Variables
Efficac1 Respons1 Efficac2 Respons2
Relationships
NOSAY1 COMPLEX1 NOCARE1 = Efficac1
NOCARE1 TOUCH1 INTERES1 = Respons1
NOSAY2 COMPLEX2 NOCARE2 = Efficac2
NOCARE2 TOUCH2 INTERES2 = Respons2
Let the errors of NOSAY1 and NOSAY2 correlate
Let the errors of COMPLEX1 and COMPLEX2 correlate
Let the errors of NOCARE1 and NOCARE2 correlate
Let the errors of TOUCH1 and TOUCH2 correlate
Let the errors of INTERES1 and INTERES2 correlate
Efficac2 = Efficac1
Respons2 = Respons1
Let the errors of Efficac2 and Respons2 correlate
LISREL Output: ND=3 SC MI2S ME=ULS IX=7427 NM=10
Path Diagram
End of Problem
```

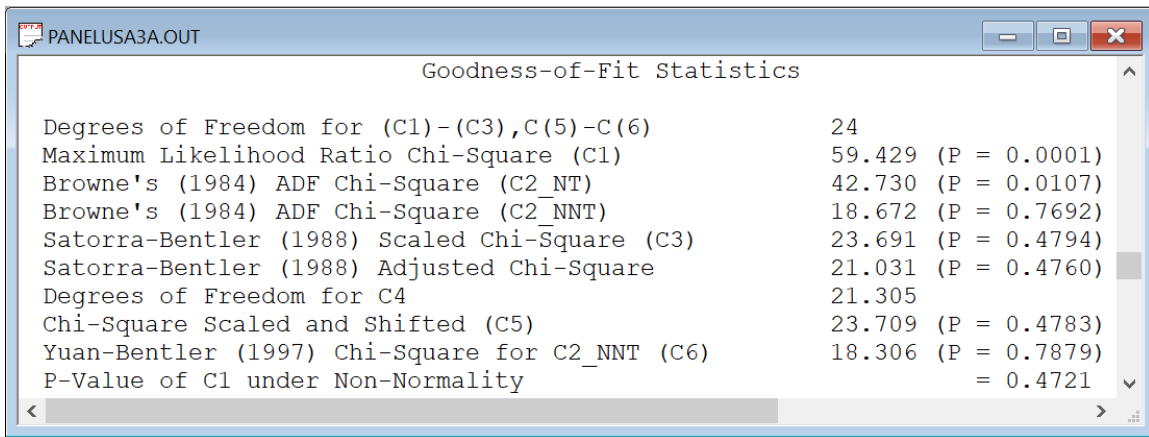
- Line 1 specifies the raw data source.
- Lines 2 and 3 specify labels for the latent variables of the model.
- Lines 4 to 16 specify the two-wave model for the latent variables political efficacy and political responsiveness.
- Line 17 requests that the results in the output file should be given in terms of the LISREL model for the structural equation model (LISREL Output). It also requests that the results should be written to three decimal places (ND = 3), that the completely standardized solution should be written to the output file (SC), and robust unweighted least squares estimation (ME = ULS).
- Line 18 requests a path diagram of the model.
- Line 19 indicates that no more SIMPLIS commands are to be processed.

If the above **SPL** file is opened with LISREL and the **Run LISREL** button is clicked, the following **PTH** file is obtained.



Chi-Square=18.67, df=24, P-value=0.47938, RMSEA=0.000

The corresponding output file, **PANELUSA3A.OUT**, is opened in a separate window. A small portion of this file is shown in the following image.



The Chi-square test statistic values for non-normality (C2_NNT, C3, C4, and C6) above indicate that the theoretical two-wave model for political efficacy and political responsiveness is supported by the data.