Multi-sample analyses: son's and parents' reports of parental socioeconomic characteristics

In the table below (Mare & Mason (1981)) observed covariance matrices are given for six variables and three populations.

Table: Covariance matrices for white sixth, ninth and twelfth graders
Son's and parent's reports of parental socioeconomic characteristics

	1.	2.	3.	4.	5.	6.
Sixth grade						
SOFED	5.86					
SOMED	3.12	3.32				
SOFOC	35.28	23.85	622.09			
FAFED	4.02	2.14	29.42	5.33		
MOMED	2.99	2.55	19.20	3.17	4.64	
FAFOC	35.30	26.91	465.62	31.22	23.38	546.01
Ninth grade						
SOFED	8.20					
SOMED	3.47	4.36				
SOFOC	45.65	22.58	611.63			
FAFED	6.39	3.16	44.62	7.32		
MOMED	3.22	3.77	23.47	3.33	4.02	
FAFOC	45.58	22.01	548.00	40.99	21.43	585.14
Twelfth grade						
SOFED	5.74					
SOMED	1.35	2.49				
SOFOC	39.24	12.73	535.30			
FAFED	4.94	1.65	37.36	5.39		
MOMED	1.67	2.32	15.71	1.85	3.06	
FAFOC	40.11	12.94	496.86	38.09	14.91	538.76

The variables are:

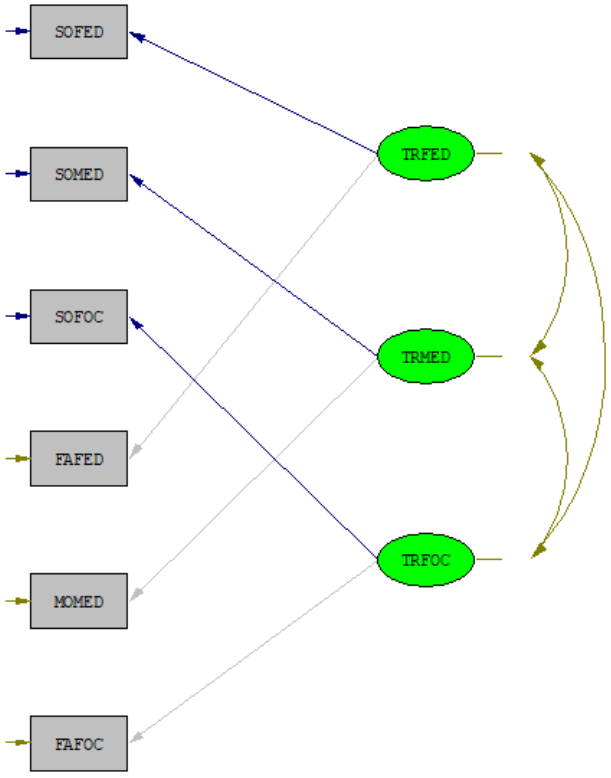
SOFED	Son's report of father's education
SOMED	Son's report of mother's education
SOFOC	Son's report of father's occupation

FAFED	Father's report of his own education
MOMED	Mother's report of her own education
FAFOC	Father's report of his own occupation

The three populations are:

Group 1:	White sixth graders
Group 2:	White ninth graders
Group 3:	White twelfth graders

The model is shown in the path diagram below, where the latent variables represent the true father's education (TRFED), mother's education (TRMED), and father's occupation (TRFOC), respectively.



This model can be specified as a LISREL Submodel 1 with:

$$\boldsymbol{\Lambda}_x = \begin{bmatrix} * & 0 & 0 \\ 0 & * & 0 \\ 0 & 0 & * \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad \boldsymbol{\Phi} = \begin{bmatrix} * & & \\ * & * & \\ * & * & * \end{bmatrix} \quad \boldsymbol{\Theta}_\delta = \begin{bmatrix} * & & & & & \\ * & * & & & & \\ 0 & 0 & * & & & \\ 0 & 0 & 0 & * & & \\ 0 & 0 & 0 & 0 & * & \\ 0 & 0 & 0 & 0 & 0 & * \end{bmatrix}$$

Mare & Mason (1981) considered many models. One of them was that $\boldsymbol{\Phi}$ and $\theta_{44}^{(\delta)}$, $\theta_{55}^{(\delta)}$, and $\theta_{66}^{(\delta)}$, are invariant over groups and that $\theta_{21}^{(\delta)}$ is zero in group 3 (but not in the other groups).

The LISREL command file (**EX93.LIS** in the **LISREL Examples** folder) for this model is:

```
SON'S AND PARENTS' REPORTS OF PARENTAL SOCIOECONOMIC CHARACTERISTICS GRADE 6
DA NI=6 NO=80 NG=3
CM
5.86 3.12 3.32 35.28 23.85 622.09 4.02 2.14 29.42 5.33 2.99 2.55 19.20 3.17
4.64 35.30 26.91 465.62 31.22 23.38 546.01
LA
'SOFED' 'SOMED' 'SOFOC' 'FAFED' 'MOMED' 'FAFOC'
MO NX=6 NK=3 TD=SY
LK
'TRFED' 'TRMED' 'TRFOC'
FR LX 1 1 LX 2 2 LX 3 3 TD 2 1
VA 1 LX 4 1 LX 5 2 LX 6 3
OU SE TV MI ND=2
SON'S AND PARENTS' REPORTS OF PARENTAL SOCIOECONOMIC CHARACTERISTICS GRADE 9
DA
CM
8.20 3.47 4.36 45.65 22.58 611.63 6.39 3.16 44.62 7.32 3.22 3.77 23.47 3.33
4.02 45.58 22.01 548.00 40.99 21.43 585.14
LA
'SOFED' 'SOMED' 'SOFOC' 'FAFED' 'MOMED' 'FAFOC'
MO LX=PS PH=IN TD=SY
LK
'TRFED' 'TRMED' 'TRFOC'
FR TD 2 1
EQ TD 1 4 4 TD 4 4
EQ TD 1 5 5 TD 5 5
EQ TD 1 6 6 TD 6 6
OU
SON'S AND PARENTS' REPORTS OF PARENTAL SOCIOECONOMIC CHARACTERISTICS GRADE 12
DA
CM
5.74 1.35 2.49 39.24 12.73 535.30 4.94 1.65 37.36 5.39 1.67 2.32 15.71 1.85
3.06 40.11 12.94 496.86 38.09 14.91 538.76
LA
'SOFED' 'SOMED' 'SOFOC' 'FAFED' 'MOMED' 'FAFOC'
MO LX=PS PH=IN TD=SY
```

```
LK
'TRFED' 'TRMED' 'TRFOC'
EQ TD 1 4 4 TD 4 4
EQ TD 1 5 5 TD 5 5
EQ TD 1 6 6 TD 6 6
OU
```

The output file reveals the reliabilities (squared multiple correlations) shown in the table below.

Table: Computed reliabilities

	SOFED	SOMED	SOFOC	FAFED	MOMED	FAFOC
Grade 6	0.62	0.38	0.71	0.87	0.93	0.90
Grade 9	0.76	0.86	0.92	0.87	0.93	0.90
Grade 12	0.91	0.81	0.95	0.87	0.93	0.90

This is a somewhat remarkable result because in grade 12, the sons' reports of their fathers' education and occupation are more reliable than the fathers' reports of their own education and occupation.