Title

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example 11 — estat framework

Description Remarks and examples Also see

Description

To demonstrate `estat framework`, which displays results in Bentler–Weeks form, we continue where [SEM] **example 10** left off:

```
. use http://www.stata-press.com/data/r13/sem_mimic1
. ssd describe
. notes
. sem (SubjSES -> s_income s_occpres s_socstat)   ///
      (SubjSES <- income occpres)
. estat residuals, normalized
. estimates store mimic1
. sem (SubjSES -> s_income s_occpres s_socstat)   ///
      (SubjSES <- income occpres)                 ///
      (s_income <- income)                        ///
      (s_occpres <- occpres)
. lrtest mimic1 .
```

See *Structural models 9: MIMIC models* in [SEM] **intro 5** for background.

Remarks and examples

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If you prefer to see SEM results reported in Bentler–Weeks form, type `estat framework` after estimating with `sem`. Many people find Bentler–Weeks form helpful in understanding how the model is fit.

[SEM] **example 10** ended by fitting

```
. sem (SubjSES   -> s_income s_occpres s_socstat)   ///
      (SubjSES   <- income occpres)                 ///
      (s_income  <- income)                         ///
      (s_occpres <- occpres)
```

In Bentler–Weeks form, the output appears as

```
. estat framework, fitted
Endogenous variables on endogenous variables
```

Beta	observed s_income	s_occpres	s_socstat	latent SubjSES
observed				
s_income	0	0	0	1
s_occpres	0	0	0	.783781
s_socstat	0	0	0	1.195539
latent				
SubjSES	0	0	0	0

Exogenous variables on endogenous variables

Gamma	observed income	observed occpres
observed		
s_income	.0532425	0
s_occpres	0	.0045201
s_socstat	0	0
latent		
SubjSES	.0538025	.0034324

Covariances of error variables

Psi	observed e.s_inc~e	observed e.s_occ~s	observed e.s_soc~t	latent e.SubjSES
observed				
e.s_income	.2292697			
e.s_occpres	0	.2773786		
e.s_socstat	0	0	.1459009	
latent				
e.SubjSES	0	0	0	.1480275

Intercepts of endogenous variables

alpha	observed s_income	observed s_occpres	observed s_socstat	latent SubjSES
_cons	.8825314	1.06586	1.07922	0

Covariances of exogenous variables

Phi	observed income	observed occpres
observed		
income	4.820021	
occpres	13.62431	451.6628

Means of exogenous variables

kappa	observed income	observed occpres
mean	5.04	36.698

```
Fitted covariances of observed and latent variables
```

Sigma	observed s_income	s_occpres	s_socstat	latent SubjSES	observed income
observed					
s_income	.4478609				
s_occpres	.1614446	.4086519			
s_socstat	.225515	.1738222	.392219		
latent					
SubjSES	.1886304	.1453924	.2060311	.1723333	
observed					
income	.5627232	.3014937	.3659463	.3060932	4.820021
occpres	3.008694	3.831184	2.729776	2.283302	13.62431

Sigma	observed occpres
observed	
occpres	451.6628

```
Fitted means of observed and latent variables
```

mu	observed s_income	s_occpres	s_socstat	latent SubjSES	observed income
mu	1.548	1.543	1.554	.3971264	5.04

mu	observed occpres
mu	36.698

Notes:

1. Bentler–Weeks form is a vector and matrix notation for the estimated parameters of the model. The matrices are known as $\boldsymbol{\beta}$, $\boldsymbol{\Gamma}$, $\boldsymbol{\Psi}$, $\boldsymbol{\alpha}$, $\boldsymbol{\Phi}$, and $\boldsymbol{\kappa}$. Those Greek names are spelled out in the labels, along with a header stating what each contains.
2. We specified `estat framework` option `fitted`. That caused `estat framework` to list one more matrix and one more vector at the end: $\boldsymbol{\Sigma}$ and $\boldsymbol{\mu}$. These two results are especially interesting to those wishing to see the ingredients of the residuals reported by `estat residuals`.
3. One of the more useful results reported by `estat framework, fitted` is the $\boldsymbol{\Sigma}$ matrix, which reports all estimated covariances in a readable format and includes the model-implied covariances that do not appear in `sem`'s ordinary output.
4. `estat framework` also allows the `standardized` option if you want standardized output.

Also see

[SEM] **example 10** — MIMIC model

[SEM] **estat framework** — Display estimation results in modeling framework