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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 https://www.stata-press.com/data/r18/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)
                                                    111
      (s_income <- income)
                                                    111
      (s_occpres <- occpres)
. lrtest mimic1 .
```

See Structural models 10: 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

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

#### Endogenous variables on exogenous variables

Gamma	Observed income	occpres
Observed s_income s_occpres s_socstat	.0532425 0 0	0 .0045201 0
Latent SubjSES	.0538025	.0034324

#### Covariances of error variables

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

### Intercepts of endogenous variables

alpha	Observed s_income s_occpres s_socsta			Latent SubjSES
_cons	.8825314	1.06586	1.07922	0

#### Covariances of exogenous variables

Phi	Observed income	occpres
Observed income occpres	4.820021 13.62431	451.6628

#### Means of exogenous variables

kappa	Observed income	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 s_occpres s_socstat	.4478609 .1614446 .225515	.4086519 .1738222	.392219		
Latent SubjSES	.1886304	.1453924	.2060311	.1723333	
Observed income occpres	.5627232 3.008694	.3014937 3.831184	.3659463 2.729776	.3060932 2.283302	4.820021 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  $\beta$ ,  $\Gamma$ ,  $\Psi$ ,  $\alpha$ ,  $\Phi$ , and  $\kappa$ . 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:  $\Sigma$  and  $\mu$ . 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 Σ 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

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