Title

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Example 22 — Testing parameter equality across groups

Description Remarks and examples Also see

Description

Below we demonstrate `estat ginvariant` to test parameters across groups.

We pick up where [SEM] **Example 20** left off:

```
. use https://www.stata-press.com/data/r18/sem_2fmmby
. sem (Peer -> peerrel1 peerrel2 peerrel3 peerrel4)   ///
      (Par  -> parrel1  parrel2  parrel3  parrel4), group(grade)
```

Remarks and examples

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We use `estat ginvariant` to test whether parameters that are constrained to be equal across groups should not be and whether parameters that are not constrained across groups could be.

```
. estat ginvariant

Tests for group invariance of parameters
```

	Wald test			Score test		
	chi2	df	P>chi2	chi2	df	P>chi2
Measurement						
peerrel1						
Peer	.	.	.	2.480	1	0.1153
_cons	.	.	.	0.098	1	0.7537
peerrel2						
Peer	.	.	.	0.371	1	0.5424
_cons	.	.	.	0.104	1	0.7473
peerrel3						
Peer	.	.	.	2.004	1	0.1568
_cons	.	.	.	0.002	1	0.9687
peerrel4						
Peer	.	.	.	0.239	1	0.6246
_cons	.	.	.	0.002	1	0.9611
parrel1						
Par	.	.	.	0.272	1	0.6019
_cons	.	.	.	0.615	1	0.4329
parrel2						
Par	.	.	.	0.476	1	0.4903
_cons	.	.	.	3.277	1	0.0703
parrel3						
Par	.	.	.	3.199	1	0.0737
_cons	.	.	.	1.446	1	0.2291
parrel4						
Par	.	.	.	2.969	1	0.0849
_cons	.	.	.	0.397	1	0.5288
var(e.peer~1)	0.024	1	0.8772	.	.	.
var(e.peer~2)	0.033	1	0.8565	.	.	.
var(e.peer~3)	0.011	1	0.9152	.	.	.
var(e.peer~4)	0.294	1	0.5879	.	.	.
var(e.parr~1)	1.981	1	0.1593	.	.	.
var(e.parr~2)	14.190	1	0.0002	.	.	.
var(e.parr~3)	0.574	1	0.4486	.	.	.
var(e.parr~4)	0.022	1	0.8813	.	.	.
var(Peer)	4.583	1	0.0323	.	.	.
var(Par)	0.609	1	0.4350	.	.	.
cov(Peer,Par)	0.780	1	0.3772	.	.	.

Notes:

1. In the output above, score tests are reported for parameters that were constrained. The null hypothesis is that the constraint is valid. None of the tests reject a valid constraint.

2. Wald tests are reported for parameters that were not constrained. The null hypothesis is that a constraint would be valid. Only in two cases does it appear that grade 4 differs from grade 5, namely, the variance of `e.parrel2` and the variance of `Peer`.

3. We remind you that these tests are marginal tests. That is, each test is intended to be interpreted separately. These are not joint tests of simultaneous imposition or relaxation of constraints. If you want simultaneous tests, you must do them yourself by using, for instance, the `test` command.

   If joint tests of parameter classes are desired, the `class` option can be used.

These results imply that none of the constraints we impose should be relaxed, and that perhaps we could constrain all the variances and covariances to be equal across groups except for the variances of `e.parrel2` and `Peer`. We do that in [SEM] **Example 23**.

Also see

[SEM] **Example 20** — Two-factor measurement model by group

[SEM] **Example 23** — Specifying parameter constraints across groups

[SEM] **estat ginvariant** — Tests for invariance of parameters across groups

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