

# Subject index

## Symbols

`#delimit` command ..... 285

## A

alpha ..... 2  
alpha command ..... 7  
alpha formula ..... 2  
asymptotically distribution free estimator ..... 15  
auxiliary variables ..... 81–82

## B

`bmiworking.dta` ..... 158, 166

## C

case  
    change variable name case .... 269  
casewise deletion ..... 10  
`center` command ..... 187  
centering ..... 187  
CFA ... see confirmatory factor analysis  
CFI ..... see comparative fit index  
`chi2tail()` option ..... 178  
`clonevar` command ..... 14  
`codebook`, `compact` command ..... 4  
comparative fit index ..... 23  
comparisons of models ..... 225  
composite latent variables ..... 115,  
    139–148  
confirmatory factor analysis  
    advantages ..... 14  
    estimation of two-factor model ....  
        ..... 36–44  
    interpreting results ..... 17–20, 32  
    `sem` command ..... 14

constraints ..... 99–101  
    equality ..... 127–129  
    fixed error variance ..... 141, 144  
conventions ..... xxii–xxiii  
correlated errors ..... 70–81, 123  
    growth curves ..... 178  
    spurious effects ..... 123  
correlated residuals ..... 70–81  
correlation comparisons ..... 236–238  
covariance comparisons ..... 236–238  
covariates ..... 78–81  
cross-lagged panel design ..... 84–87  
cumulative disadvantage ..... 154

## D

data ..... xx–xxi  
    entering correlations, means, and  
        standard deviations .. 283–293  
    entering summary statistics ... 285  
defaults  
    restoring SEM Builder defaults ....  
        ..... 281  
degrees of freedom ... 21, 24, 33, 42–43,  
    69, 71, 73, 81, 155, 170, 241  
direct effects ..... 58–63  
    testing ..... 71–78  
`display chi2tail()` command ... 136,  
    178  
`display` command ..... 5  
do-files ..... xxii  
drawing ..... 265–281

## E

effect size ..... 231

- effects
  - direct ..... 71–78
  - indirect ..... 71–78
  - total ..... 71–78
- egen** command ..... 8
- eigenvalue ..... 5
- endogeneity ..... 58
- endogenous mediator variables... 58–59
- endogenous outcome variables ... 58–59
- equal loadings
  - multiple-group comparison ... 222
- equality constraints ... 99–101, 127–129
  - SEM Builder ..... 138
- error terms
  - changing order ..... 116
  - correlated ..... 70–81
  - equality constraints ..... 138
  - naming ..... 125
  - normally distributed ..... 12
- estat**
  - eqgof** postestimation command ..  
..... 56, 67, 111
  - framework** postestimation  
command ..... 21–22
  - ggof** postestimation command....  
..... 241
  - ginvariant** postestimation  
command ..... 221, 223, 243
  - gof** postestimation command.. 21–  
32, 55, 111
  - icc** postestimation command.. 165
  - mindices** postestimation  
command ..... 25–26
  - stable** postestimation command..  
..... 99
  - stdize:** postestimation command  
..... 76–78, 83, 87
  - teffects** postestimation  
command ..... 71–78, 126–127
- estimates** store command.. 136, 221
- estimation
  - asymptotically distribution free ...  
..... 15
  - maximum variance ..... 15
  - methods ..... 14
- exogenous variables ..... 58–59
  - covariance structure ..... 80
- explained variance ..... 67
- F**
  - factor, pcf** command ..... 4
  - factor score ..... 9
  - fixed effects ..... 151
  - fixed error variance ..... 141, 144
  - formative construct ..... 140
  - formative indicators ..... 139–148
  - formative measurement model .... 139–  
148
- G**
  - ginvariant()** option ..... 215
  - goodness of fit
    - CFI ..... 23
    - growth curves ..... 171
    - RMSEA ..... 24
    - SRMR ..... 24
  - graphs
    - individual trajectories ... 159–163
    - moderation effects ..... 91
  - greek letters
    - adding in SEM Builder ..... 280
  - group comparisons ..... 207–261
    - as an additive effect ..... 207
    - equal loadings ..... 222
    - equivalent form ..... 213
    - full SEM model ..... 210–211
    - ginvariant()** option ..... 215
    - group means ..... 231
    - invariant loadings ..... 217–222
    - means ..... 215, 228–236
    - measurement model ..... 211–238
    - model fit ..... 247
    - path analysis ..... 238–252
    - R*-squared ..... 246
    - reference group ..... 228
    - unequal *N*'s ..... 244
    - variances and covariances ... 236–  
238
  - group()** option ..... 215, 241

- growth curves  
 correlated errors.....173, 178  
 equal error variances.....201–204  
 estimation.....165–175  
 fixed effect.....151  
 goodness of fit.....171  
 identification.....155–157  
 individual trajectories...159–163  
 interpreting intercept and slope  
   with covariates.....191  
 interpreting mean intercept and  
   slope.....170  
 modification indices.....178  
 purpose of.....151  
 quadratic.....179  
 random effects.....185  
 random intercept.....151, 185  
 random slope.....152, 185  
 time-invariant covariates..199–201  
 time-varying covariates...192–201  
 trajectory.....151
- H**  
**help sem** command.....xxii  
**histogram** command.....8
- I**  
 ICC.....see intraclass correlation  
 identification.....22, 42–44  
   composite latent variable..141–145  
   formative indicators.....141–145  
   growth curves.....155–157  
   intercept.....154  
   structural equation model...115–  
     117  
 indirect effects.....59–63, 126–127  
   testing.....71–78  
 interaction.....87–93  
   traditional approach.....207–209  
 intercept  
   interpreting with covariates...191  
 intercept constraints.....224–225  
 internal consistency.....2
- intraclass correlation.....163–165  
 invariance  
   equal loadings.....217–222  
   measurement model.....129
- L**  
 latent variable.....11–14  
   reliability of measurement scale...  
     .....20  
   variance of.....17  
 likelihood-ratio test.....221  
 listwise deletion.....10  
 loadings.....5  
 long format.....160  
 lowercase  
   change to uppercase.....269  
**lrtest** command.....136, 221
- M**  
 MAR.....see missing at random  
 maximum likelihood estimation....14  
 MCAR.....see missing completely at  
   random  
 means  
   group comparisons.....228–236  
**means()** option.....168, 215  
 measurement invariance.....129  
 measurement models  
   and group comparisons.....210  
 mediation.....58–59, 61–63  
**method(adf)** option.....15  
**method(mlmv)** option.....15  
 methods factor.....45  
 MIMIC model..see multiple indicators,  
   multiple causes models  
 missing at random.....15, 81–82, 200  
 missing completely at random..81–82,  
   200  
 missing values.....8, 10, 35–36, 165  
   auxiliary variables.....81–82  
   missing at random.....81–82  
   missing completely at random..81–  
     82  
   **method(mlmv)** option.....15

- model comparison ..... 225
    - nested models ..... 178, 179
  - model fit
    - `estat gof` command ..... 21–32
  - models
    - constraints ..... 99–103
    - cross-lagged panel design ... 84–87
    - interaction ..... 87–93
    - MIMIC ..... 145–148
    - moderation ..... 87–93
    - nonrecursive ..... 93–103
    - reciprocal relations ..... 94
  - moderation ..... 87–93
    - traditional approach ..... 207–209
  - modification indices .... 21–32, 123, 178
  - `multgrp_cfa.dta` ..... 211
  - `multgrp_path.dta` ..... 238
  - multiple groups
    - `ginvariant(none)` option ..... 215
    - invariant loadings ..... 217–222
  - multiple indicators, multiple causes
    - models ..... 145–148, 209–210
  - multiple-group analysis ..... 207–261
    - measurement model ..... 211–238
  - multiple-group comparisons
    - equal loadings ..... 222
    - equivalent form ..... 213
    - path analysis ..... 238–252
- N**
- National Longitudinal Survey of Youth, 1997 ..... 3, 157, 211
  - `nlsy97cfa.dta` ..... 3
  - `noconstant` option ..... 168
  - `nodirect` option ..... 126
  - nonrecursive models ..... 93–103
- O**
- ordering error terms ..... 116
- P**
- parceling ..... 44
  - path analysis ..... 57–111
    - multiple-group comparisons .. 238–252
- postestimation commands
- `estat eggof` ..... 56, 67
  - `estat framework` ..... 21–22
  - `estat ggof` ..... 241
  - `estat ginvariant` .. 221, 223, 243
  - `estat gof` ..... 55
  - `estat icc` ..... 165
  - `estat mindices` ..... 25–26
  - `estat stable` ..... 99
  - `estat stdize:` ..... 83, 87
  - `estat teffects` .. 71–78, 126–127
  - `predict` ..... 10, 91
- `predict` postestimation command .. 10, 91
- principal component factor analysis .. 3–6
- Q**
- quadratic graph ..... 183
  - quadratic growth curve
    - identification ..... 156–157
- R**
- R*-squared ..... 67
  - random effects ..... 151
  - random intercept ..... 151
  - random slope ..... 152, 163
  - recursive model ..... 116
  - reference group
    - group comparisons ..... 228
  - reference indicator ..... 17
    - selection of ..... 120
  - reflective indicators ..... 114, 139
  - reliability
    - scale reliability in CFA ..... 20
    - scale reliability with correlated errors ..... 20, 28
    - scale reliability without correlated errors ..... 20
  - `rename (*)`, `lower` command ..... 269
  - reordering labels ..... 116
  - `reshape` command ..... 160
  - RMSEA .... *see* root mean squared error of approximation
  - robust estimator ..... 14

root mean squared error of approximation ..... 24  
 rowmean() option ..... 8

**S**

saving estimates ..... 221  
 scale score ..... 8  
 SEM Builder ..... xx, 265–281  
   adding special characters ..... 280  
   adding text ..... 280  
   CFA model ..... 12–14, 48–51  
   copy figure to Word document ..... 277  
   custom reporting ..... 232  
   equality constraints ..... 138, 269  
   equality constraints on errors .. 138  
   fixing error variance at 0 ..... 144  
   group comparisons  
     same form of model ..... 216  
   model fitting ..... 277–279  
   postestimation commands ..... 280–281  
   restore defaults ..... 281  
   restricting results shown ..... 278  
   sembuilder command ..... 12, 48, 106, 266  
 sem command ..... 14–20, 35–36  
 SEM reference manual ..... xxi–xxii  
 sem, coeflegend command ..... 75–76, 131  
 sem, standardized command ..... 18  
 sem\_sm2.dta ..... 265  
 sembuilder command ..... 12, 48, 106, 266  
 set obs command ..... 285  
 significance  
   for chi-squared ..... 136  
   not reported for variances ..... 31  
 slope ..... 152, 154  
 Small Stata ..... xxii  
 spurious effects  
   and correlated errors ..... 123  
 SRMR ..... see standardized root mean squared residual

**ssd**

command limitations ..... 293  
 describe command ..... 266  
 list command ..... 286  
 set correlations command ..... 285  
 ssdmath.dta ..... 286  
 standardized coefficients ..... 227–228  
 standardized root mean squared residual ..... 24  
 standardized solution ..... 18  
 storing estimates ..... 221  
*Structural Equation Modeling Reference Manual* ..... xxi–xxii  
 structural model ..... 57–111  
 summarize command ..... 8  
 summary data ..... xx  
 summary statistics  
   entering ..... 283–293  
   limitations ..... 293

**T**

*t* test ..... 228  
 tables  
   comparison of models ..... 225–228  
   mean comparison ..... 234  
 testing equality of coefficients ..... 82–84  
 tests  
   equality constraints ..... 99–103, 133  
   indirect effects ..... 71–78  
   invariance ..... 138  
   nonlinear ..... 76–78  
   significance of chi-squared ..... 136  
 total effects ..... 71–78  
 total score ..... 8  
 trajectory  
   fixed effect ..... 151  
   random effect ..... 151  
 twoway command ..... 183

**U**

unequal *N*'s ..... 244  
 unidimensional ..... 1  
 unique variance ..... 11

unstandardized coefficients . . . . 227–228  
uppercase  
    change to lowercase . . . . . 269

**V**

variance comparisons . . . . . 236–238  
vce(**bootstrap**) option . . . . . 15

**W**

wide format . . . . . 166

**X**

xtmixed command . . . . . 201