



KUANT Guides

Bootstrapping:

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KUANT 007.2

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Bootstrapping in PRELIS

Bootstrapping data is made easy in PRELIS, and is performed by the following steps:

1. Open your data in PRELIS.
2. Click Statistics>Bootstrapping

| | VAR1 | | VAR4 |
|----|-------|-------|-------|
| 1 | 2.500 | | |
| 2 | 2.050 | | |
| 3 | 2.000 | | |
| 4 | 2.333 | | |
| 5 | 1.833 | | |
| 6 | 2.333 | | |
| 7 | 2.566 | | |
| 8 | 2.000 | | |
| 9 | 2.500 | | |
| 10 | 2.833 | | |
| 11 | 2.000 | | |
| 12 | 2.500 | | |
| 13 | 2.333 | 2.000 | 2.167 |
| 14 | 2.667 | 2.667 | 2.333 |
| 15 | 2.000 | 2.167 | 2.556 |

Number of bootstrap samples: 5000
Sample fraction: 100

Save: All the MA-matrices
 All the mean vectors
 All the standard deviations

Output Options Cancel Syntax Run

4. To save your bootstrapped data, click on the “Output Options” box

5. In the Output window, click the “Save the transformed data to file” option, then provide a filename for your output data. Note that this file must have a .dat extension as the .psf extension is not compatible with the RP option (discussed below). To save disk space, you can alternatively bootstrap covariance matrices using the “Moment Matrix” pull down.

6. Next click the “Set seed to” radio button, and select a seed for the random number generator. This seed should be at least six digits long, end in an odd number, and be something that you can remember. Remembering this seed will allow you to replicate your bootstrapped data in the future.

7. Click “OK”

8. In the Bootstrapping window, click “Run” and your bootstrapped data will be created.

9. The bootstrapped data can be used in LISREL using the RP option (see KUant Guide # 9)

Moment Matrix: Save to file: LISREL system data

Means: Save to file:

Standard Deviations: Save to file:

Asymptotic Covariance Matrix: Save to file: Print in output

Asymptotic Variances: Save to file: Print in output

Data: Save the transformed data to file: boot5000.dat
Width of fields: 15
Number of decimals: 6
Number of repetitions: 1
 Rewind data after each repetition
 Print bivariate frequency tables
 Print tests of underlying bivariate normality
 Perform tests of multivariate normality
 Wide print
 Random seed
 Set seed to: 273315

OK Cancel

Using Bootstrapped Data in LISREL

Bootstrapped data can be estimated in LISREL using the RP option. The information below is largely redundant to our guide on that feature (see KUant Guide # 9).

LISREL is capable of running a single syntax file across multiple data sets by adding the RP option to the DA line. To make use of this function, use a single data set that contains the information for all repetitions. Specify the number of groups and indicators as normal, and type RP= x, where x is the number of times the syntax should be repeated.

In the below example, the file "boot5000.dat" contains 19 indicators (NI=19) and five thousand repetitions (RP = 5000) of 380 observations (NO = 380), with 1 group per repetition (NG = 1). The data file therefore contains 1900000 (= 380 * 5000) observations in total.

```
DA NG=1 NI=19 MA=CM ME=ML NO=380 RP=5000
RA=boot5000.DAT
```

When the RP option is used, it is necessary to combine the parameter estimates across groups. For instance, when combining estimates across several bootstrapped samples, 90% or 95% confidence intervals should be created for each parameter estimate. LISREL is unable to combine parameter estimates in this way, but it can output estimates into an external file that can be imported into your (other) favorite statistics package and manipulated.

All output options can be placed on the OU line, and follow the same format as outputting a regular matrix. Adding "PV=output.pv" to the OU line will create an external file called 'output.pv' that contains all of the freely estimate parameters. These parameters appear in the order they were assigned in the parameter specifications section of the LISREL output file. Similarly, adding "SV =<filename>" will create a file of standard errors in the same order as the parameter specifications and adding "GF= <filename>" will create an external file containing all goodness of fit statistics (and, where applicable, their respective *p*-values) in the order that they appear in the LISREL output.

Caveats:

1. The RP option is not compatible with the .psf file type. You must therefore provide the data as a .dat file or provide an appropriate set of matrices
2. LISREL version 8.80 has a bug that prevents the RP option from working. The patch for this bug is not downloadable but it is available from us upon request.
3. Using the RP option with a large number of imputations or resamples can result in a very large output file. To limit this, use the XO=<number> option on the OU line, where <number> represents the number of repetitions that you want displayed in the output file.
4. The GF file will contain several 'extra' statistics, always estimated to be zero.