

# Bootstrap & Jackknife Estimates for Descriptive Statistics SPSS (VERSION 13.0)

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July 2006

## 1. Overview

**BOOTJ.SPS** and **BOOTR.SPS** use both bootstrap and jackknife methods to obtain confidence intervals for a descriptive statistic specified by the user.

These programs apply three bootstrap methods for computing confidence intervals: (1) the normal method, (2) the percentile method, and (3) the bias-corrected and accelerated (BCa) method.

They also produce bootstrap and jackknife statistics such as the jackknife estimate of the bias and acceleration.

While **BOOTJ.SPS** is developed to work with a single variable, **BOOTR.SPS** is specifically developed to work with ratios (numerator variable / denominator variable).

## 2. BOOTJ Syntax Diagram

```
!BOOTJ  
[VAR= varname]  
[REPS= {1000}]  
    {value}  
[Alpha= {0.05}]  
    {value}  
[MSR= {COD}]  
    {Var or any ratio statistics}  
[SAVE= {NO}]  
    {YES}
```

**VAR=varname:** the user **MUST** specify the name of the variable on which the command is to be performed.

**REPS= #.** The user can specify the number of bootstrap replications to be performed; the default is 1000.

**Alpha= #.** The user can specify the level of significance. The default is 0.05.

**MSR**=statistic (valid keyword): The user can specify the statistic (using its valid keyword) for which the program will generate bootstrap confidence intervals and bootstrap and jackknife estimates; the default is MSR=COD. Table 1 shows the statistics for which BOOTJ.SPS could generate bootstrap confidence intervals

Table 1. Statistics and their Valid Keywords for Bootstrapping

	<b>Statistics</b>	<b>Keyword</b>
1	The average absolute deviation	AAD
2	The coefficient of dispersion	COD
3	Minimum	MIN
4	Maximum	MAX
5	Mean	MEAN
6	Median	MEDIAN
7	The median-centered coefficient of variation	MDCOV
8	The mean-centered coefficient of variation	MNCOV
9	Range	RANGE
10	Standard deviation	STDDEV
11	Variance	Var

NB: Although the program would work for any of the descriptive statistics that could be obtained via ratio statistics command, please make sure of the applicability and validity of the bootstrap methods to these statistics.

**SAVE=YES or NO.** This option gives the user the choice whether to save the results of every bootstrap replication and the jackknife values. If the user chooses SAVE=YES, the results will be saved in the following files, respectively: **C:\Temp\DRAWS.sav** & **C:\Temp\JackknifeValues.sav**. The default is SAVE=YES.

### 3. BOOTJ Installation

Here are the recommended steps for using the BOOTJ command:

- The user needs to download the BOOTJ.SPS program
- The user needs an SPSS data file which will be used as the active file for the program
- The user needs to write a syntax file which will INSERT the program, GET the SPSS data file, and execute the BOOTJ command. Here is an example:

```
INSERT FILE=' C:\Temp\BOOTJ.sps' .
GET FILE='C:\Temp\ratiostudy.sav'.
!BOOTJ REPS=1000 VAR=ratio Alpha=0.05 MSR=COD SAVE=YES.
```

#### 4. BOOTR Syntax Diagram

```
!BOOTR
[ NUM= varname ]
[ DEN= varname ]
[ REPS= { 1000 } ]
    { value }
[ Alpha= { 0.05 } ]
    { value }
[ MSR= { COD } ]
    { Var or any ratio statistics }
[ SAVE= { NO } ]
    { YES }
```

**NUM=varname:** the user **MUST** specify the numerator variable

**DEN=varname:** the user **MUST** specify the denominator variable

**REPS= #.** The user can specify the number of bootstrap replications to be performed; the default is 1000.

**Alpha= #.** The user can specify the level of significance. The default is 0.05.

**MSR=statistic (valid keyword):** The user can specify the statistic (using its valid keyword) for which the program will generate bootstrap confidence intervals and bootstrap and jackknife estimates; the default is MSR=COD. Table 2 shows the statistics for which BOOTJ.SPS could generate bootstrap confidence intervals

Table 2. Ratio Statistics and their Valid Keywords for Bootstrapping

	<b>Statistics</b>	<b>Keyword</b>
1	The average absolute deviation	AAD
2	The coefficient of dispersion	COD
3	Minimum	MIN
4	Maximum	MAX
5	Mean	MEAN
6	Median	MEDIAN
7	The median-centered coefficient of variation	MDCOV
8	The mean-centered coefficient of variation	MNCOV
9	The price-related differential	PRD
10	Range	RANGE
11	Standard deviation	STDDEV
12	Weighted mean	WGTMEAN
13	Variance	Var

NB: Although the program would work for any of the descriptive statistics that could be obtained via ratio statistics command, please make sure of the applicability and validity of the bootstrap methods to these statistics.

**SAVE=YES or NO.** This option gives the user the choice whether to save the results of every bootstrap replication and the jackknife values. If the user chooses SAVE=YES, the results will be saved in the following files, respectively: **C:\Temp\DRAWS.sav & C:\Temp\JackknifeValues.sav.** The default is SAVE=YES.

## 5. BOOTR Installation

Here are the recommended steps for using the BOOTR command:

- The user needs to download the BOOTR.SPS program
- The user needs an SPSS data file which will be used as the active file for the program
- The user needs to write a syntax file which will INSERT the program, GET the SPSS data file, and execute the BOOTJ command. Here is an example:

```
INSERT FILE=' C:\Temp\BOOTR.sps' .  
GET FILE='C:\Temp\ratiostudy.sav'.  
!BOOTR REPS=1000 NUM= AppraisedValue DEN= SalePrice  
Alpha=0.05 MSR=COD SAVE=YES.
```

You don't need to change the program. All you have to do is to create a syntax file similar to the example above. You might even copy the example into a new syntax file changing the parts given in bold type with the proper location of the BOOTJ.SPS program and the SPSS data file, the name of your SPSS data file, and your desired options for the BOOTJ command.

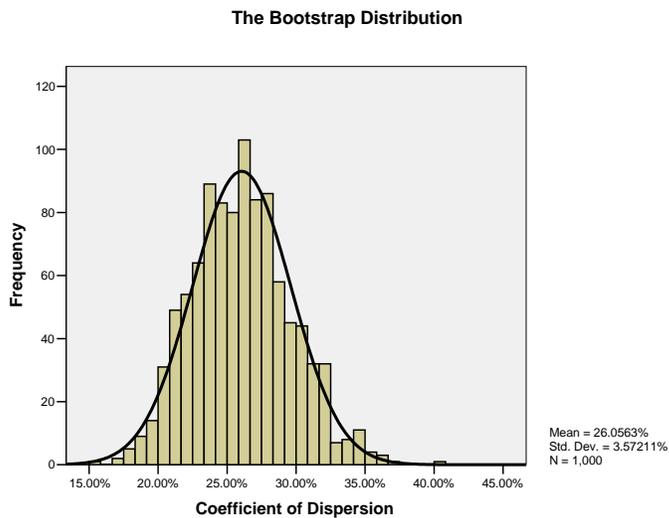
To practice, please save the package attached to this document into the directory: C:\Temp. Then copy the example above to a new syntax file and execute it as it is. You will obtain an output that looks like the following, but not exactly the same since different random sample will be drawn:

## Bootstrap Confidence Intervals

	Normal	Percentile	BCa
Lower Bound :	19.78620	20.59656	21.92515
Upper Bound :	33.78860	32.03571	34.40107

## Bootstrap & Jackknife Statistics

Observed:	26.78740
Jackknife Bias :	-.16021
Bootstrap Bias :	-.73112
Std. Err :	3.57211
Acceleration :	.00709
Median Bias (zo):	.24043
BCa_Alpha1 :	.12504
BCa_Alpha2 :	.98427



Please, email me ([vmamoun@yahoo.com](mailto:vmamoun@yahoo.com)) if you have any question, comment, or recommendation.

## 6. References

Efron, B. & Tibshirani, R. J. (1993). An Introduction to the Bootstrap. New York: Chapman & Hall.