

DESCRIPTIVES

```
DESCRIPTIVES [VARIABLES=] {varlist}
              {ALL}

              [/OPTIONS=option numbers]

              [/STATISTICS={statistic numbers}]
              {ALL}
```

Options:

- | | |
|-----------------------------------|---------------------------|
| 1 Include user-missing values | 6 Serial format |
| 2 Suppress variable labels | 7 Narrow format |
| 4 Display reference index | 8 Suppress variable names |
| 5 Exclude missing values listwise | |

Statistics:

- | | |
|--------------------------|--|
| 1 Mean | 9 Range |
| 2 Standard error of mean | 10 Minimum |
| 5 Standard deviation | 11 Maximum |
| 6 Variance | 12 Sum |
| 7 Kurtosis | 13 Mean, standard deviation,
minimum, and maximum |
| 8 Skewness | |

Example:

```
DESCRIPTIVES VARIABLES=YVAR ZVAR, AVAR1 TO AVAR5,
              BETATEST, IOTATEST
/STATISTICS=6 13
/OPTIONS=5.
```

Overview

Procedure DESCRIPTIVES computes univariate statistics, including the mean, standard deviation, minimum, and maximum, for numeric variables. Because it does not sort values into a frequency table, DESCRIPTIVES is an efficient means of computing descriptive statistics for continuous variables. Other procedures that display descriptive statistics include FREQUENCIES and MEANS.

Defaults

The default table displays the variable name, variable label, mean, standard deviation, minimum, maximum, and number of cases with valid values on a single line for each variable. All cases with valid values for a variable are included in the calculation of statistics for that variable. The display uses the width set on the SET command.

Tailoring

Display Format. You can display statistics in serial format and restrict the width to narrow format regardless of the width defined on SET. DESCRIPTIVES also offers control over the display of variable labels, variable names, and optional reference indexes.

Statistical Display. Optional statistics include the standard error of the mean, variance, kurtosis, skewness, range, and sum. DESCRIPTIVES does not compute the median or mode (see FREQUENCIES).

Missing Values. You can include cases with user-missing values in the calculation of statistics. Optionally, you can exclude cases with missing values listwise.

Syntax

- The minimum specification is the VARIABLES subcommand with a list of variables. The actual keyword VARIABLES may be omitted.
- Subcommands are separated by slashes.

Operations

- DESCRIPTIVES is a procedure and causes the data to be read.
- If the STATISTICS subcommand is used, only those statistics explicitly requested are displayed.
- If a string variable is specified on the variable list, a warning is issued and no statistics are displayed for that variable.

- The available width and the statistics and options requested determine whether the statistics are displayed in tabular or serial form.
- If there is insufficient width to display the statistics requested, DESCRIPTIVES first truncates the variable label and then adopts serial format.
- Statistics that will fit within the allotted columns are displayed with two decimal places.

Limitations

- There is no fixed limit on the number of variables named or implied on DESCRIPTIVES.
- If the memory available is insufficient to calculate statistics for all the variables requested, DESCRIPTIVES truncates the variable list.
- Maximum 1 each of the VARIABLES, OPTIONS, and STATISTICS subcommands.

Example

```
DESCRIPTIVES VARIABLES=YVAR ZVAR, AVAR1 TO AVAR5,
      BETATEST, IOTATEST
/STATISTICS=6 13
/OPTIONS=5.
```

- This example requests statistics for all the variables named or implied by the TO keyword.
- The STATISTICS subcommand requests the variance (Statistic 6) and the defaults: mean, standard deviation, minimum, and maximum (Statistic 13).
- Option 5 specifies that cases with missing values for any variable on the variable list will be omitted from the calculation of statistics for all variables.

Example

```
DESCRIBE VAR=RAGE RINC81.
```

- Because no STATISTICS subcommand is included, only the mean, standard deviation, minimum, and maximum for RAGE and RINC81 will be displayed.
- This example takes advantage of spelling permitted by three-character truncation of keywords.

VARIABLES Subcommand

The VARIABLES subcommand names the variables to be included in the table. The actual keyword VARIABLES may be omitted.

- You can use keyword ALL to refer to all user-defined variables on the active file.
- Variables named more than once appear in the display more than once.

Display Format

By default, DESCRIPTIVES displays the statistics and a 40-character variable label for each variable on one line. If the statistics requested do not fit within the available width, DESCRIPTIVES first truncates the variable label and then uses serial format. Serial format provides larger field widths and permits more decimal places for very large or very small numbers than does the default format.

Optionally, you can request the following on the OPTIONS subcommand:

- Option 2** *Suppress variable labels.*
- Option 6** *Serial format.* The requested statistics are displayed below each variable name. This option is forced if the number of statistics requested does not fit within the available width.
- Option 7** *Narrow format.* The display width is restricted to 79 columns regardless of the width defined on SET.
- Option 8** *Suppress variable names.* The variable name will be displayed only if there is no variable label.

Statistical Display

DESCRIPTIVES automatically calculates the mean, standard deviation, minimum, and maximum for all variables in the variable list. The valid count on which statistics are based is always displayed. You can obtain additional statistics by specifying the following on the STATISTICS subcommand. If the STATISTICS subcommand is included, only statistics specifically requested are displayed.

- Statistic 1** *Mean.*
- Statistic 2** *Standard error of mean.*
- Statistic 5** *Standard deviation.*
- Statistic 6** *Variance.*
- Statistic 7** *Kurtosis.* The standard error of the kurtosis is also displayed.
- Statistic 8** *Skewness.* The standard error of the skewness is also displayed.
- Statistic 9** *Range.*
- Statistic 10** *Minimum.*
- Statistic 11** *Maximum.*
- Statistic 12** *Sum.*
- Statistic 13** *Mean, standard deviation, minimum, and maximum.* This is the same as the default.
- ALL** *Display all statistics.*

Missing Values

By default, all cases with valid values for a variable are included in the calculation of statistics for that variable. You can alter the handling of cases with missing values by specifying the following on the OPTIONS subcommand:

- Option 1** *Include cases with user-missing values.* Cases that have user-missing values will be included in the calculation of statistics for all variables named on the command.
- Option 5** *Exclude cases with missing values listwise.* Cases missing on any variable named on the DESCRIPTIVES command are excluded from the calculation of statistics for all variables. The space reserved to display the valid counts for each variable is suppressed and the valid count is reported for the table as a whole.

Other Options

- Option 4** *Display reference index.* Displays alphabetical and positional reference indexes that give the page number of each variable in the display file.

DISPLAY

```
DISPLAY [{varlist}]  
        {ALL }
```

Example:

```
DISPLAY AVAR TO FVAR.
```

Overview The DISPLAY command exhibits information about variables in the active file.

- Syntax**
- The minimum specification is simply the command keyword.
 - When you specify a variable list, variable names can be separated by a comma or a space.
 - You can specify keyword ALL to obtain detailed information on all variables in the active file.

- Operations**
- DISPLAY information is directed to output destinations (see SET). If you have specified SET SCREEN OFF, DISPLAY information is sent to disk files or to your printer.
 - DISPLAY with no specifications provides a list of all variables in the active file and their variable labels.
 - When a list of variables or keyword ALL is specified, additional information is provided, including the variable name and label, value labels, missing-value flags, and variable type and width.

Example GET 'WEATHER.SYS'.
DISPLAY.

- DISPLAY displays a list of variables and variable labels defined in the system file WEATHER.SYS.

Example DISPLAY AVAR TO FVAR.

- DISPLAY exhibits detailed information on the variables between and including AVAR and FVAR in the active file.

EXPORT

```
EXPORT OUTFILE='filename' {/KEEP={ALL  
varlist}} [/DROP=varlist]  
  
[/RENAME=(old varlist=new varlist)...] [/MAP]  
[/DIGITS=number]
```

Example:

```
EXPORT OUTFILE='NEWDATA.POR' /RENAME=(V1 TO V3=ID, SEX, AGE)  
/MAP.
```

Overview

EXPORT produces a portable ASCII data file and dictionary that can be read with the IMPORT command in SPSS/PC or SPSS⁺. You can upload EXPORT files to a mainframe using KERMIT, provided that KERMIT is installed on both the IBM PC and the receiving mainframe computer (see Communications, Part F).

Defaults

EXPORT writes your active file, including all data and the data dictionary, to an external file. The dictionary contains variable and value labels, missing-value flags, and print formats for each variable. The portable file also contains the originating computer (IBM PC), the name and release number of SPSS/PC, and the date and time the portable file was created.

Tailoring

You can save a subset of variables from your active file on the portable file and rename variables. You can also produce a record of all variables and their names on the exported file and specify the number of decimal digits of precision for the values of all numeric variables.

Syntax

- The minimum specification is the OUTFILE subcommand with a file specification enclosed in apostrophes.
- Subcommands can be named in any order and must be separated by a slash.

Operations

- EXPORT is a transformation and causes the data to be read.
- Portable files are written with 80-character record lengths.
- Portable files may contain some unprintable characters.
- The active file is still available for SPSS/PC transformations and procedures after the portable file is created.
- The system variables \$CASENUM and \$DATE are assigned when the file is read by IMPORT. EXPORT specifies the weighting variable on the portable file.

Limitations

- Maximum 200 variables on a portable file. Each eight-character portion of a long string variable counts as one variable.
- You may not have enough available memory on your PC to write a large portable file. Use the DROP or KEEP subcommand to exclude extraneous variables from the portable file.

Example

```
EXPORT OUTFILE='NEWDATA.POR' /RENAME=(V1 TO V3=ID, SEX, AGE) /MAP.
```

- The portable file is written to NEWDATA.POR in the current directory.
- Variables V1, V2, and V3 are renamed ID, SEX, and AGE for the portable file. Their names remain V1, V2, and V3 in the active SPSS/PC file. None of the other variables written to the portable file are renamed.
- The MAP subcommand requests a listing of the variables in the portable file.

OUTFILE Subcommand

The OUTFILE subcommand specifies the filename of the portable file.

- The filename must be enclosed in apostrophes.
- The file must be in the current directory. You cannot direct portable files to other directories.

Example `EXP OUT='SALDATA.POR'.`

- The complete active file is written to file SALDATA.POR.
- This example takes advantage of spelling permitted by three-character truncation of keywords.

DROP and KEEP Subcommands

Use the DROP and KEEP subcommands to save a subset of variables on the portable file.

- DROP excludes a variable or list of variables from the portable file. All variables not named are included in the portable file.
- KEEP includes a variable or list of variables on the portable file. All variables not named are excluded.
- Variables can be specified on DROP and KEEP in any order.
- With the DROP subcommand, the order of variables in the portable file is the same as their order on the active file.
- With the KEEP subcommand, the order of variables in the portable file is the order they are named on KEEP. Thus, you can also use KEEP to reorder variables in the portable file.
- You can use both DROP and KEEP on the same EXPORT command, provided they do not name any of the same variables.
- You can use the TO keyword to specify a group of consecutive variables on the active file.
- The active file is not affected by DROP or KEEP.

Example `EXPORT OUTFILE='NEWSUM.POR' /DROP=DEPT79 TO DEPT81.`

- The portable file is written to NEWSUM.POR in the current directory.
- Variables between and including DEPT79 and DEPT81 on the active file are excluded from the portable file.
- All other variables are saved on the portable file.

RENAME Subcommand

Use the RENAME subcommand to rename variables being written to the portable file. The renamed variables retain their variable and value labels, missing-value flags, and print formats assigned in the SPSS/PC job.

- To rename a variable, specify the name of the variable in the active file, an equals sign, and the new name.
- The equals sign is required.
- You can specify lists of variables on both sides of the equals sign. The number of variables on both sides must be the same, and the entire specification must be enclosed in parentheses.
- You can use the TO convention for both variable lists (see Universals: Variable-Naming Conventions).

Example `EXPORT OUTFILE='NEWSUM.POR' /DROP=DEPT79 TO DEPT81
 /RENAME=(DEPT82, SALARY82=DEPT, SALARY).`

- The RENAME subcommand renames DEPT82 and SALARY82 to DEPT and SALARY.
- DEPT and SALARY retain the variable and value labels, missing-value flags, and print formats assigned to DEPT82 and SALARY82.

MAP Subcommand

If you use the RENAME, DROP, or KEEP subcommands to tailor your file, you may find it helpful to produce a listing of your changes with the MAP subcommand.

- The MAP subcommand can be specified as often as you wish.
- The MAP subcommand produces a listing of all actions taken up to that point.

- When the MAP subcommand is specified last, it produces a listing of the contents of the portable file.

Example

```
EXPORT OUTFILE='NEWSUM.POR' /DROP=DEPT79 TO DEPT81 /MAP
/RENAME DEPT82=DEPT SALARY82=SALARY /MAP.
```

- The first MAP subcommand produces a listing of the variables in the file after the DROP subcommand has dropped the specified variables.
- The RENAME subcommand renames DEPT82 and SALARY82.
- The second MAP subcommand shows the variables on the file after renaming. Since this is the last subcommand, the listing will show the variables as they are written on the portable file.

DIGITS Subcommand

The DIGITS subcommand lets you specify the degree of precision for all values of noninteger numeric variables written to the portable file.

- The DIGITS subcommand has the general form DIGITS=*n*, where *n* is the number of digits of precision you want. The default is 10 digits.
- The DIGITS subcommand applies to all numbers for which rounding is required.
- You cannot specify different degrees of precision for different variables. Thus, DIGITS should be set according to the requirements of the variable that needs the most precision.

Example

```
EXPORT OUTFILE='NEWSUM.POR' /DROP=DEPT79 TO DEPT81
/RENAME=(DEPT82,SALARY82=DEPT.SALARY) /MAP /DIGITS=4.
```

- The DIGITS subcommand guarantees the accuracy of values to four significant digits.
- For example, 12.34567890876 will be rounded to 12.35.

FACTOR

```
FACTOR VARIABLES={varlist} [/MISSING={LISTWISE**}] [INCLUDE]]
                {ALL}                {PAIRWISE}
                                     {MEANSUB}
                                     {DEFAULT}

[/WIDTH={width on SET**}] ]
                {n}

[/ANALYSIS={varlist}...] [/ANALYSIS.?:]
                {ALL**}

[/FORMAT={SORT} [BLANK(n)] {DEFAULT**}]

[/PRINT={DEFAULT**} [INITIAL] [EXTRACTION] [ROTATION]
        {UNIVARIATE} {CORRELATION} {DET} [INV] [REPR] [AIC]
        {KMO} [FSCORE] [SIG] [ALL] ]

[/PLOT={EIGEN} [ROTATION (n1,n2) (n3,n4)...] ]

[/DIAGONAL={DEFAULT**} ]
           {value list}

[/CRITERIA={FACTORS(n)} [MINEIGEN({1.0})] {ITERATE({25})}
           {eig}                {ni}

           [RCONVERGE({0.0001})] [DELTA({0})]
           {r1}                {d}

           [ECONVERGE({0.001})] [{KAISER }][DEFAULT**]
           {e1}                {NOKAISER}

[/EXTRACTION={PC**} ] [/ROTATION={VARIMAX**}]
           {DEFAULT**}                {DEFAULT**}
           {PA1**}                    {EQUAMAX}
           {PAF}                      {QUARTIMAX}
           {ALPHA}                    {OBLIMIN}
           {IMAGE}                    {NOROTATE}
           {ULS}
           {GLS}
           {ML}
           {PA2}

[/EXTRACTION...] [/ROTATION...]
```

**Default if subcommand is omitted.

Example:

```
FACTOR VARIABLES=ABCVAR1 TO ABCVAR12.
```

Overview

Procedure FACTOR performs factor analysis using one of seven extraction methods. For information on writing and reading matrices, see FACTOR: Matrix Materials.

Defaults

By default, FACTOR performs principal components analysis with a varimax rotation on all the variables in the analysis using default criteria. A case that has a missing value for any variable on the FACTOR command is omitted from all analyses.

The default display includes the initial communalities, eigenvalues of the correlation matrix, and percent of variance associated with each; communalities, eigenvalues, and unrotated factor loadings; the rotated factor pattern matrix; and the factor transformation matrix. If you specify an oblique rotation (oblimin), the display also includes the factor structure matrix and the factor correlation matrix.

Tailoring

Analysis Block Display. You can tailor the statistical display for an analysis block to include correlation matrices, reproduced correlation matrices, and other statistics. You can control the order of entries in the factor pattern and structure matrices. You can also request scree plots and plots of the variables in factor space for all analyses within an analysis block.

Extraction Phase Options. You can choose among six extraction methods in addition to the default principal components extraction: principal axis factoring, alpha factoring, image factoring, unweighted least squares, generalized least squares, and maximum likelihood. You can supply initial diagonal values for principal axis factoring. You can also select the statistical criteria used in the extraction, either once for the analysis block or before each extraction.

Rotation Phase Options. You can control rotation criteria either once for the analysis block or before each rotation. You can also choose among three rotation methods (equamax, quartimax, and oblimin) in addition to the default varimax rotation or specify no rotation.

Display Format. You can control the width of the display within FACTOR.

Writing and Reading Matrices. The optional subcommands used to write and read matrices are discussed in FACTOR: Matrix Materials.

Missing Values. You can request pairwise deletion of cases with missing values or assign the variable mean to cases with missing values. You can also include cases with user-missing values.

- Syntax**
- The minimum specification is the VARIABLES subcommand with a variables list.
 - The global subcommands VARIABLES, MISSING, and WIDTH are specified once and are in effect for the entire FACTOR procedure.
 - Other FACTOR subcommands, ANALYSIS, PRINT, PLOT, FORMAT, DIAGONAL, CRITERIA, EXTRACTION, and ROTATION, are analysis block subcommands and can be specified for each analysis block.
 - VARIABLES and MISSING must be specified before an analysis block is initiated. Either subcommand may be specified first.
 - WIDTH can be specified anywhere.
 - An analysis block is initiated explicitly by an ANALYSIS subcommand. The analysis requested in an explicit analysis block includes only variables named on the ANALYSIS subcommand.
 - An analysis block is initiated implicitly if there is no ANALYSIS subcommand or if any of the analysis block subcommands (PRINT, PLOT, FORMAT, DIAGONAL, CRITERIA, EXTRACTION, or ROTATION) precede an ANALYSIS subcommand. All variables named on the VARIABLES subcommand are included in an analysis requested by an implicit analysis block.
 - An implicit analysis block is initiated in addition to any that are explicitly initiated with the ANALYSIS subcommand.
 - Multiple analysis blocks can be specified. All but the first must be initiated with the ANALYSIS subcommand.
 - Once an analysis block has been initiated, the order of the CRITERIA, EXTRACTION, and ROTATION subcommands is governed by the analysis desired. CRITERIA affects extractions and rotations that follow it. Rotations are performed on the matrix from the preceding extraction. Other analysis block subcommands can be given in any order.
 - Multiple EXTRACTION subcommands can be specified in each analysis block.
 - A CRITERIA subcommand can be specified before each extraction.
 - Multiple ROTATION subcommands can be specified after an extraction.
 - A CRITERIA subcommand can be specified before each rotation.

- The PRINT, PLOT, and DIAGONAL subcommands are in effect only for the analysis block where they are specified. If more than one of these subcommands is included in an analysis block, only the last of each type is in effect.
- One FORMAT subcommand can be specified for each analysis block. If more than one is included, the last is in effect. Once specified, FORMAT is in effect for subsequent analysis blocks until it is overridden.
- A specification on a CRITERIA subcommand affects all FACTOR extractions and rotations in all analysis blocks that follow it until the specification is explicitly overridden. If more than one of any CRITERIA specification is given for an extraction or rotation phase, the last encountered is in effect.
- Subcommands are separated by slashes.

Operations

- FACTOR is a procedure and causes the data to be read.
- FACTOR builds a correlation matrix of variables named on the VARIABLES subcommand before it produces any factor results.
- The width specified on the WIDTH subcommand overrides the width defined on SET.
- The display uses the width on SET if no WIDTH subcommand is included.

Limitations

- The number of variables allowed on the VARIABLES subcommand is the same as the system limit.
- Maximum 1 VARIABLES subcommand.
- Maximum 1 MISSING subcommand.
- Maximum 1 WIDTH subcommand.
- Maximum 10 ANALYSIS subcommands.
- Maximum 1 DIAGONAL subcommand within an analysis block.
- There is no fixed limit on other subcommands.

Example

FACTOR VARIABLES=ABCVAR1 TO ABCVAR12.

- This example produces the default principal components analysis of twelve variables with VARIMAX rotation.

VARIABLES Subcommand

The required VARIABLES subcommand names all the variables to be used in the FACTOR procedure. FACTOR computes a correlation matrix that includes all the variables named. This matrix is used by all analysis blocks that follow.

- VARIABLES is the only required subcommand. The minimum specification on VARIABLES is a variable list.
- The VARIABLES subcommand initiates an analysis block if there is no ANALYSIS subcommand or if any of the subcommands PRINT, PLOT, FORMAT, DIAGONAL, CRITERIA, EXTRACTION, or ROTATION is specified before the first ANALYSIS subcommand.
- There can be only one VARIABLES subcommand and only the MISSING and WIDTH subcommands can precede it.
- Variables must be numeric.
- Keyword ALL on VARIABLES refers to all variables on the active file.
- All variables named on subsequent subcommands must be named on the VARIABLES subcommand.

MISSING Subcommand

Use the MISSING subcommand to control the treatment of cases with missing values.

- The MISSING subcommand can be specified only once.
- If the MISSING subcommand is omitted or included without specifications, listwise deletion is in effect.

- The MISSING subcommand must precede any analysis block subcommands.
- The MISSING specification in effect controls all analyses requested on that FACTOR command.
- The LISTWISE, PAIRWISE, and MEANS keywords on MISSING are alternatives. Any of these may be requested in combination with INCLUDE.

The following keywords may be specified on MISSING:

- LISTWISE** *Delete cases with missing values listwise.* Only cases with nonmissing values for all variables named on the VARIABLES subcommand are used. Listwise deletion may also be requested with keyword DEFAULT.
- PAIRWISE** *Delete cases with missing values pairwise.* Only cases with nonmissing values for each pair of variables correlated are used, regardless of whether the cases have missing values on any other variable.
- MEANSUB** *Replace missing values with the variable mean.* All cases are used with the substituted values. If INCLUDE is also specified, user-missing values are included in the computation of the means.
- INCLUDE** *Include user-missing values.* Cases with user-missing values are treated as valid when LISTWISE, PAIRWISE, or MEANSUB is performed.

WIDTH Subcommand

Use the WIDTH subcommand to control the width of the display.

- WIDTH can be specified anywhere and affects all FACTOR displays. If more than one is specified, the last is in effect.
- The only specification on WIDTH is an integer ranging from 72 to 132.
- If the WIDTH subcommand is omitted, the width specified on the SET command is used.
- If the WIDTH subcommand is included without specifications, the default width of 132 is used.
- WIDTH overrides the width specified on SET.

ANALYSIS Subcommand

The ANALYSIS subcommand requests an analysis on a subset of variables named on VARIABLES. It can also be used to perform different analyses on the same set of variables.

- ANALYSIS must have a list of variables as its specification.
- Each use of ANALYSIS explicitly initiates an analysis block. The analysis block ends when another ANALYSIS subcommand or the end of the FACTOR procedure is reached.
- If the ANALYSIS subcommand is omitted there is only one analysis block, which includes all variables named on the VARIABLES subcommand in each extraction or rotation performed.
- Keyword TO in a variable list refers to the order in which variables are named on the VARIABLES subcommand, not to their order on the active file.
- Keyword ALL refers to all variables named on the VARIABLES subcommand.

Example

```
FACTOR VARIABLES=ABCVAR1 ABCVAR2 ABCVAR3 ABCVAR4 ABCVAR5 ABCVAR6
/ANALYSIS=ABCVAR1 TO ABCVAR3/ANALYSIS=ABCVAR4 TO ABCVAR6.
```

- This example specifies two analysis blocks. Variables ABCVAR1, ABCVAR2, and ABCVAR3 are included in the first analysis block. Variables ABCVAR4, ABCVAR5, and ABCVAR6 are in the second analysis blocks.
- A default principal components analysis with a varimax rotation will be performed for each analysis block.

FORMAT Subcommand

Use the FORMAT subcommand to reformat the display of factor pattern and structure matrices to increase interpretability.

- FORMAT can be specified once in each analysis block. If more than one FORMAT is encountered in an analysis block, the last is in effect.
- If the FORMAT subcommand is omitted or included with no specification, variables appear in the order in which they are named and all matrix entries are printed.
- Once specified, FORMAT stays in effect for subsequent analysis blocks until it is overridden.

The following keywords may be specified on FORMAT:

- SORT** *Order the factor loadings in descending order by magnitude.*
BLANK(n) *Suppress coefficients lower in absolute value than threshold n.*
DEFAULT *Turn off blanking and sorting.*

Example

```
FACTOR VARIABLES=ABCVAR1 TO ABCVAR12/ MISSING=MEANSUB/  
FORMAT=SORT BLANK(.3)/ EXTRACTION=ULS.
```

- This example specifies a single analysis block. All variables between and including ABCVAR1 and ABCVAR12 on the active file are included.
- The MISSING subcommand requests that variable means be substituted for missing values.
- The FORMAT subcommand requests that variables be ordered in factor pattern matrices by descending value of loadings. Factor loadings with an absolute value less than .3 will be omitted.
- Factors are extracted using unweighted least squares.
- Because there is an EXTRACTION subcommand but no ROTATION subcommand, the factor pattern matrix is not rotated.

PRINT Subcommand

Use the PRINT subcommand to control the statistical display for the entire analysis block.

- If the PRINT subcommand is omitted or included without keywords, the displays indicated by the keywords INITIAL, EXTRACTION, and ROTATION are produced for the current analysis block.
- If any keywords are specified, only those displays specifically requested are produced for the current analysis block.
- The defaults are reinstated when an ANALYSIS subcommand is encountered.
- The statistics requested include only the variables in the analysis block.
- PRINT is in effect for all extractions or rotations in the analysis block.
- PRINT can be placed anywhere within the analysis block. If more than one PRINT subcommand is specified, the last encountered is in effect.

The following keywords may be specified on PRINT:

- UNIVARIATE** *Valid n's, means, and standard deviations.*
INITIAL *Initial communalities for each variable, eigenvalues of the unreduced correlation matrix for each factor, and percent of variance for each.*
CORRELATION *Correlation matrix.*
SIG *Matrix of significance levels of correlations.*
DET *The determinant of the correlation matrix.*
INV *The inverse of the correlation matrix.*
AIC *The anti-image covariance and correlation matrices (Kaiser, 1970). The measure of sampling adequacy for the individual variable is printed on the diagonal of the anti-image correlation matrix.*

KMO	<i>The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity. Tests of significance are not computed with matrix input if an N command is not used.</i>
EXTRACTION	<i>Factor pattern matrix, revised communalities, the eigenvalue of each factor retained, and the percent of variance each eigenvalue represents.</i>
REPR	<i>Reproduced correlations and residual correlations.</i>
ROTATION	<i>Rotated factor pattern and factor transformation matrices. Displayed for all rotations except OBLIMIN. For OBLIMIN rotations, the factor pattern, factor structure, and factor correlation matrices are displayed.</i>
FSCORE	<i>The factor score coefficient matrix. Factor score coefficients are calculated using the regression method.</i>
ALL	<i>All available statistics.</i>
DEFAULT	<i>INITIAL, EXTRACTION, and ROTATION.</i>

Example

```
FACTOR VARS=ABCVAR1 TO ABCVAR12/MISS=MEANS
/PRINT=DEFAULTS AIC KMO REPR/EXT=ULS/ROT=VARIMAX.
```

- This example specifies a single analysis block that includes all variables between and including ABCVAR1 and ABCVAR12 on the active file.
- Variable means are substituted for missing values.
- In addition to the default display, the display includes the anti-image correlation and covariance matrices, the Kaiser-Meyer-Olkin measure of sampling adequacy, and the reproduced residual and correlation matrix.
- Factors are extracted using unweighted least squares.
- The factor pattern matrix is rotated using the varimax rotation.
- This example takes advantage of spelling permitted by three-character truncation of keywords.

PLOT Subcommand

Use the PLOT subcommand to request scree plots or plots of variables in rotated factor space.

- If the PLOT subcommand is omitted, no plots are produced.
- If the PLOT subcommand is used without specifications, it is ignored.
- PLOT is in effect only for analyses in the analysis block where it is specified. The default (no plots) is reinstated when the next ANALYSIS subcommand is encountered.
- PLOT can be placed anywhere within an analysis block. If more than one PLOT subcommand is specified, the last one encountered is in effect.

The following keywords may be specified on PLOT:

EIGEN	<i>Display the scree plot (Cattell, 1966). The eigenvalues from each extraction are plotted in descending order.</i>
ROTATION(n1 n2) (n3 n4) . . .	<i>Plot the variables in factor space for each rotation. Specify a pair of factor numbers in parentheses for each plot desired. This keyword is ignored if a rotation is not implicitly or explicitly requested.</i>

CRITERIA Subcommand

Use the CRITERIA subcommand to control extraction and rotation criteria.

- CRITERIA can be specified before any implicit or explicit request for an extraction or rotation, or can be specified once for an analysis block.
- If the CRITERIA subcommand is omitted or included without specifications, the defaults are in effect.
- Only defaults specifically altered are changed.

- Any criterion that is altered remains in effect for all subsequent analysis blocks until it is explicitly overridden. CRITERIA subcommands thus have cumulative effects.

The following keywords may be specified on CRITERIA:

FACTORS(nf)	<i>Maximum number of factors extracted. The default is the number of eigenvalues greater than MINEIGEN.</i>
MINEIGEN(eg)	<i>Minimum eigenvalue used to control the number of factors extracted. The default is 1.</i>
ITERATE(ni)	<i>Number of iterations for the solutions in the extraction or rotation phases. The default is 25.</i>
ECONVERGE(e1)	<i>Convergence criterion for extraction. The default is .001.</i>
RCONVERGE(e2)	<i>Convergence criterion for rotation. The default is .0001.</i>
KAISER	<i>Kaiser normalization in the rotation phase. This is the default. The alternative is NOKAISER.</i>
NOKAISER	<i>No Kaiser normalization.</i>
DELTA(d)	<i>Delta for direct oblimin rotation. DELTA affects the ROTATION subcommand. The default is 0.</i>
DEFAULT	<i>Reestablish default values for all criteria.</i>

Example

```
FACTOR VARIABLES=ABCVAR1 TO ABCVAR12
/CRITERIA=FACTORS(6)/EXTRACTION=PC
/CRITERIA=DEFAULT/EXTRACTION=ML/ROTATION=VARIMAX
/PLOT=ROTATION(1 2) (1 3).
```

- This example initiates a single analysis block which analyzes all variables between and including ABCVAR1 and ABCVAR12 on the active file.
- A maximum of 6 factors are extracted in the first extraction. The extraction uses the default principal components method and the factor pattern matrix is not rotated.
- The default criteria are reinstated for the second extraction, which uses the maximum likelihood method. The second factor pattern matrix is rotated using the varimax rotation.
- The PLOT subcommand requests plots of the variables in the factor space defined by the first and second factors and of variables in the factor space defined by the first and third factors. The plots will be printed after the varimax rotation on the factors extracted using the maximum likelihood method.

DIAGONAL Subcommand

The DIAGONAL subcommand specifies values for the diagonal in conjunction with principal axis factoring.

- Only one DIAGONAL subcommand can be specified in each analysis block.
- If the DIAGONAL subcommand is omitted or included without specifications, FACTOR uses the default method for specifying the diagonal.
- Default communality estimates for factor methods are squared multiple correlations. If these cannot be computed, the maximum absolute correlation between the variable and any other variable in the analysis is used. For principal components analysis, 1's are on the diagonal.
- DIAGONAL is in effect for all PAF extractions within the analysis block.
- DIAGONAL is ignored with extraction methods other than PAF.

The following may be specified on DIAGONAL:

value(s) *Diagonal values.* The number of values supplied must equal the number of variables in the analysis block. Use the notation *n** before a value to indicate the value is repeated *n* times.

DEFAULT *1's on the diagonal for principal components or initial communality estimates on the diagonal for factor methods.*

Example

```
FACTOR VARIABLES=ABCVAR1 TO ABCVAR12
/DIAGNALS=56 .55 174 2*.56 .70 3*.65 .76 .64 .63
EXTRACTION=PAF/ROTATION=VARIMAX.
```

- A single analysis block that includes all variables between and including ABCVAR1 and ABCVAR12 on the active file is defined.
- DIAGONAL specifies 12 values to use as initial estimates of communalities in principal axis factoring.
- The factor pattern matrix is rotated using the varimax rotation.

EXTRACTION Subcommand

Use the EXTRACTION subcommand to specify the factor extraction technique to be used.

- Multiple EXTRACTION subcommands can be specified within an analysis block.
- If EXTRACTION is specified or if it is included without specifications, the default principal components extraction is used.

The following extraction techniques may be specified on EXTRACTION:

- PC** *Principal components analysis* (Harman, 1967). This is the default. PC can also be requested with keyword PA1 or DEFAULT.
- PAF** *Principal axis factoring*. PAF can also be requested with keyword PA2.
- ALPHA** *Alpha factoring* (Kaiser, 1963).
- IMAGE** *Image factoring* (Kaiser & Caffry, 1963).
- ULS** *Unweighted least squares* (Harman & Jones, 1966).
- GLS** *Generalized least squares*.
- ML** *Maximum likelihood* (Jöreskog & Lawley, 1968).

Example

```
FACTOR VARIABLES=ABCVAR1 TO ABCVAR12 / MISSING=MEANSUB
/EXTRACTION=ULS
/ANALYSIS=ABCVAR1 TO ABCVAR6 /EXTRACTION=ULS /EXTRACTION=ML.
```

- This example specifies two analysis blocks. Means are substituted for missing values in the analysis in both blocks.
- In the first analysis block, variables ABCVAR1 through ABCVAR12 are analyzed using unweighted least-squares extraction. The factor pattern matrix is not rotated.
- In the second analysis block, variables ABCVAR1 through ABCVAR6 are analyzed first with an unweighted least-squares extraction and then with a maximum likelihood extraction. No rotation is performed for either extraction.

ROTATION Subcommand

The ROTATION subcommand specifies the factor rotation method. It can also be used to suppress the rotation phase entirely.

- You can specify multiple ROTATION subcommands after each extraction.
- Rotations are performed on the matrix resulting from the previous extraction.
- If you omit both the EXTRACTION and ROTATION subcommands, you implicitly initiate a rotation phase with a varimax rotation.
- If you include the ROTATION subcommand without specifications, the default VARIMAX rotation is used.
- If you include an EXTRACTION subcommand but omit the ROTATION subcommand, the rotation phase is suppressed.
- Keyword NOROTATE on the ROTATION subcommand produces a plot of variables in unrotated factor space if the PLOT subcommand is also included in the analysis block.

The following may be specified on ROTATION:

- VARIMAX** *Varimax rotation*. This is the default if both EXTRACTION and ROTATION are omitted from the analysis block or if ROTATION is included without specifications. VARIMAX can also be specified with keyword DEFAULT.

EQUAMAX *Equamax rotation.*
QUARTIMAX *Quartimax rotation.*
OBLIMIN *Direct oblimin rotation.*
NOROTATE *No rotation.* This is the default if the **EXTRACTION** subcommand is included and **ROTATION** is omitted.

Example `FACTOR VARIABLES=ABCVAR1 TO ABCVAR12
 /FORMAT=SORT BLANK(.3)
 /EXTRACTION=ULS
 /ROTATION: ROTATION=OBLIMIN.`

- The first **ROTATION** subcommand specifies the default varimax rotation.
- The second **ROTATION** subcommand specifies an oblimin rotation based on the same maximum likelihood extraction.

References

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- Harman, H. H. *Modern Factor Analysis*. Chicago: University of Chicago Press, 1967.
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- Kaiser, H. F. A second-generation Little Jiffy. *Psychometrika*, 35, 401-415, 1970.
- Kaiser, H. F. Image analysis. In C. W. Harris (ed.), *Problems in Measuring Change*. Madison: University of Wisconsin Press, 1963.
- Kaiser, H. F., and J. Caffry. Alpha factor analysis. *Psychometrika*, 30, 1-14, 1965.

FACTOR: Matrix Materials

```
FACTOR VARIABLES=varlist

  [/READ={ {CORRELATION {TRIANGLE}}}]
          {DEFAULT
          {FACTOR(n)}

  [/WRITE={ {CORRELATION}}]
           {DEFAULT
           {FACTOR
```

Examples:

```
FACTOR VARIABLES=CONBUS TO CONARMY./ WRITE.
FACTOR READ /VARIABLES=SUICIDE1 TO SUICIDE4.
```

Overview

The FACTOR procedure can read a correlation matrix or a factor loading matrix in lieu of a case file. It can also write one of these matrices to the results file named on SET for use in subsequent SPSS/PC sessions. Matrix materials to be read can be in either fixed or freefield format but must conform to certain record and format specifications (see DATA LIST: Matrix Materials).

Syntax

- The WRITE subcommand can be specified after the VARIABLES or ANALYSIS subcommand.
- The READ subcommand must be specified before the first analysis block.
- READ and WRITE cannot be used in the same FACTOR procedure.
- Any of the subcommands described in FACTOR can also be used with READ or WRITE.
- The UNIVARIATE keyword on the PRINT subcommand cannot be specified with READ (see FACTOR).

Operations

- FACTOR writes fixed-column matrices, with each matrix entry in a 10-column field. There are thus up to 8 entries on each record. Each row of the matrix begins on a new record.
- If the results file named on SET is not empty when you specify WRITE, FACTOR will overwrite the contents of the file. Use the SET command to specify the name of the results file before you execute FACTOR.
- When FACTOR reads correlation matrices written by other procedures such as CORRELATION, it skips the record or matrix of *n*'s and prints a message for each line of the matrix of *n*'s.

Limitations

- Only one matrix can be read.

WRITE Subcommand

Use the WRITE subcommand to write a correlation or factor matrix to the results file.

- WRITE is an analysis block subcommand and can be specified within any analysis block.
- The variables in the analysis block are the only variables included in the matrix.
- When WRITE is included without keywords, FACTOR writes a correlation matrix.
- If WRITE is omitted, no matrix materials are written.
- If FACTOR writes a correlation matrix, the matrix is indexed by the number and order of variables on the VARIABLES or ANALYSIS subcommand immediately preceding WRITE.

- If FACTOR writes a factor matrix, each variable in the analysis defines a row and each factor extracted defines a column.
- The matrix is written to the results file specified on the SET command (by default, SPSS.PRC).
- Matrices are written in a fixed format of 10-column fields, 8 fields to a record. Each row of the matrix begins a new record.

The following can be specified on WRITE:

CORRELATION *Write a correlation matrix.* The correlation matrix can also be requested with keyword DEFAULT.

FACTOR *Write an unrotated factor matrix.*

Example

```
DATA LIST FREE FILE='GSS80.DAT'
/ABANY, ABDEFECT, ABHLTH, ABNOMORE, ABPCOR, ABRAPE, ABSINGLE.
SET RESULTS='GSS80.MAT'
FACTOR VAR=ABANY TO ABSINGLE WRITE FACTOR.
```

- The DATA LIST command requests that data be read from the file GSS80.DAT. DATA LIST also specifies that the data will be read in freefield format and provides names for the variables.
- The SET command identifies GSS80.MAT as the results file.
- In the first analysis block, all variables in the active file are analyzed. The default principal components extraction and varimax rotation are performed.
- The WRITE subcommand writes out a factor matrix.

READ Subcommand

Use the READ subcommand to indicate that a correlation or factor matrix is to be read.

- READ is a global subcommand and can be specified only once on the FACTOR subcommand.
- The VARIABLES subcommand must be the first subcommand specified when you use READ.
- READ must be specified before the first analysis block.
- When the READ subcommand is omitted, FACTOR assumes that it is reading cases.
- When READ is included without specifications, FACTOR assumes that it is reading a correlation matrix that is in the same format as the matrices FACTOR writes.
- When you specify READ on FACTOR, you must first specify a DATA LIST command that points to the file containing the matrix materials and names the variables that will be read.
- The number and order of variables on the VARIABLES subcommand must match the number and order of variables in the correlation or factor matrix.
- You can analyze a subset of variables when you read a correlation matrix but not when you read a factor matrix.
- Because FACTOR does not read a matrix of the number of cases, specify an N command before FACTOR to obtain significance levels for extraction techniques using a chi-square test and for PRINT KMO.

The following can be specified on the READ subcommand:

CORRELATION *Read a correlation matrix.* A correlation matrix can also be specified with keyword DEFAULT.

TRIANGLE *Read a correlation matrix in lower-triangular form.* TRIANGLE can be specified only after the CORRELATION keyword.

FACTOR(nf) *Read a factor matrix.* nf is the number of factors (columns) in the matrix.

Example DATA LIST MATRIX FREE
/ABANY, ABDEFECT, ABHLTH, ABNOMORE, ABPOOR, ABRAPE, ABSINGLE.
BEGIN DATA
 .6747329 .2183443
 .6522527 .1644450
 .3511271 .8334249
 .0181689 .8180816
 .6998996 -.0986098
 .6363841 -.1623558
 .7479211 -.4813617
END DATA.
FACTOR VAR=ABANY TO ABSINGLE/READ FAC (2)
/ROTATE EQUAMAX/ROTATE QUARTIMAX/PRINT ALL.

- This example reads a factor matrix computed on seven variables. Two factors were extracted when the matrix was computed.
- The matrix is analyzed using equamax and quartimax rotations, and all PRINT displays available with matrix input are requested.

FINISH

FINISH

Overview The FINISH command terminates an SPSS/PC session and returns control to DOS.

Syntax • The minimum specification is simply the command keyword. FINISH has no additional specifications.

Operations • FINISH causes SPSS/PC to stop reading commands.
• Any commands following FINISH in an INCLUDE file are ignored.

Example DATA LIST FILE='NEW.DAT'/NAME 1-15(A) V1 TO V15 16-30.
LIST.
FINISH.

• The DATA LIST and LIST commands are executed.
• The SPSS/PC session is ended with the FINISH command.

FORMATS

FORMATS variable (format) [variable ...]

Format	Meaning
Fw.d	Numeric of width w and d decimal places
COMMAw.d	Numeric with commas and decimal places
DOLLARw.d	Numeric with dollar sign, commas, and decimal places

Example:

```
FORMATS VARA (F4.2) VARB (DOLLAR9) VARC (COMMA7).
```

Overview

The FORMATS command allows you to change the print and write formats of numeric variables. You can change the print width, specify additional decimal digits, and add commas and dollar signs. The values used in computations by SPSS/PC are not affected by the print and write FORMAT specification.

Syntax

- The syntax for specifying formats is Fw.d, COMMAw.d, or DOLLARw.d, where w specifies the total number of columns, including decimal point, commas, and dollar sign, and d specifies the number of decimal places. For example, to display the number 6543210 as \$6,543,210, you must specify a dollar format of at least (DOLLAR10). The d specification is optional.
- ↳ Format specifications are enclosed in parentheses.
- Each format specification applies only to the variable immediately preceding it.
- You can specify format types for more than one variable on a single FORMATS command.
- You cannot use FORMATS with string variables.

Operations

- FORMATS is a transformation and is executed when the data are read for the next procedure.
- The FORMATS specification is saved on the active file dictionary.
- The FORMATS command specifies how values are printed in SPSS/PC procedures and how data values are written using the WRITE command.
- The formats specified on FORMATS are in effect for the duration of the session or until the variable is given a new FORMATS specification.
- Print and write formats are retained in system files (see SAVE) and portable files (see EXPORT).
- When a COMMA or DOLLAR format is incorrectly assigned, SPSS/PC attempts to display the value without commas or a dollar sign. If you have not allowed enough columns for printing a numeric value, SPSS/PC prints asterisks. The values in the active file are unchanged.

Limitations

- Some procedures are unable to print wide format values.

Example

```
DATA LIST / VARA 1-4 (3) VARB 6-10 VARC 12-17.  
BEGIN DATA.  
155 10500 429813  
4309 25000 389213  
6256 18750 35946  
END DATA.  
LIST.  
FORMATS VARA (F4.2) VARB (DOLLAR9) VARC (COMMA7).  
LIST VAR=ALL.
```

- The DATA LIST command indicates inline fixed-format data and defines three variables. VARA is four columns wide with three implied decimal places. VARB is five columns wide, and VARC is six columns wide.

- The first LIST command prints out all variables using the dictionary formats defined by the DATA LIST command. The results of the first LIST command are shown below:

```

VARA  VARB  VARC
.155 10500 429813
4.309 25000 389213
6.256 18750 35946

```

- The FORMATS command defines new print formats for each variable. VARA is printed in four columns (including decimal point) with two decimal digits. VARB is printed in nine columns including dollar signs and commas. VARC is printed in seven columns including commas.
- The second LIST command prints out each of the variables using the new formats. The results of this LIST procedure are shown below:

```

VARA      VARB      VARC
.15      $10,500 429.813
4.31     $25,000 389.213
6.26     $18,750 35.946

```

Example

```

DATA LIST FREE/ VARA VARB VARC.
BEGIN DATA.
155 10500 429813 4309.25000 389213 6256 18750 35946
END DATA.
LIST.
FORMATS VARA (F4.0) VARB (DOLLAR11.2) VARC (COMMA9.1).
LIST VAR=ALL.

```

- The DATA LIST command identifies inline data in freefield format. By default, variables VARA, VARB, and VARC have print and write formats of eight columns with two decimal places.
- The first LIST command shows the default formats of the three variables:

```

VARA      VARB      VARC
155.00 10500.00 429813.0
4309.00 25000.00 389213.0
6256.00 18750.00 35946.00

```

- The FORMATS command specifies a print format of four columns with no decimal digits for VARA; eleven columns, including a dollar sign, comma, and two decimal digits for VARB; and nine columns, including commas and one decimal place for VARC.
- The LIST command uses the new print formats and is shown below:

```

VARA      VARB      VARC
155      $10,500.00 429.813.0
4309     $25,000.00 389.213.0
6256     $18,750.00 35.946.0

```