%MktEval Macro

The %MktEval autocall macro evaluates an experimental design for a linear model. The %MktEval macro reports on balance and orthogonality. Typically, you will call it immediately after running the %MktEx macro. You do not call it after making a choice design by using the %ChoicEff macro. The descriptive statistics that the %MktEval macro produces are appropriate for linear models not choice models. However, you can reasonably call it with the linear arrangement that will later be transformed into a choice design, for example, with the %MktRoll macro. See page 130 for an example of using this macro in the design chapter. Also see the following pages for examples of using this macro in the discrete choice chapter: 306, 308, 349, 353, 413, 423, 480, 485, 489, 491, 493, 538, 588 and 591. Additional examples appear throughout this chapter.

The output from this macro contains two default tables. The first table shows the canonical correlations between pairs of coded factors. A canonical correlation is the maximum correlation between linear combinations of the coded factors. See page 101 for more information about canonical correlations. All zeros off the diagonal show that the design is orthogonal for main effects. Off-diagonal canonical correlations greater than 0.316 ($r^2 > 0.1$) are listed in a separate table.

For nonorthogonal designs and designs with interactions, the canonical-correlation matrix is not a substitute for looking at the variance matrix with the %MktEx macro. It just provides a quick and more-compact picture of the correlations between the factors. The variance matrix is sensitive to the actual model specified and the coding. The canonical-correlation matrix just tells you if there is some correlation between the main effects. When is a canonical correlation too big? You will have to decide that for yourself. In part, the answer depends on the factors and how the design will be used. A high correlation between the client's and the main competitor's price factor is a serious problem meaning you will need to use a different design. In contrast, a moderate correlation in a choice design between one brand's minor attribute and another brand's minor attribute might be perfectly fine.

The macro also displays one-way, two-way and n-way frequencies. Equal one-way frequencies occur when the design is balanced. Equal two-way frequencies occur when the design is orthogonal. Equal n-way frequencies, all equal to one, occur when there are no duplicate runs or choice sets.

The following steps create and evaluate a design:

```
%mktex(2 2 3 ** 6,                  /* 2 two-level and 6 three-level factors*/
       n=18,                        /* 18 runs                              */
       balance=0,                   /* require perfect balance in the end   */
       mintry=5*18,                 /* but imbalance OK for first 5 passes  */
       seed=289)                    /* random number seed                   */

%mkteval(data=randomized)
```

The results are as follows:

Canonical Correlations Between the Factors
There is 1 Canonical Correlation Greater Than 0.316

	x1	x2	x3	x4	x5	x6	x7	x8
x1	1	0.33	0	0	0	0	0	0
x2	0.33	1	0	0	0	0	0	0
x3	0	0	1	0	0	0	0	0
x4	0	0	0	1	0	0	0	0
x5	0	0	0	0	1	0	0	0
x6	0	0	0	0	0	1	0	0
x7	0	0	0	0	0	0	1	0
x8	0	0	0	0	0	0	0	1

Canonical Correlations > 0.316 Between the Factors
There is 1 Canonical Correlation Greater Than 0.316

		r	r Square
x1	x2	0.33	0.11

Summary of Frequencies
There is 1 Canonical Correlation Greater Than 0.316
* - Indicates Unequal Frequencies

Frequencies

	x1	9 9
	x2	9 9
	x3	6 6 6
	x4	6 6 6
	x5	6 6 6
	x6	6 6 6
	x7	6 6 6
	x8	6 6 6
*	x1 x2	3 6 6 3
	x1 x3	3 3 3 3 3 3
	x1 x4	3 3 3 3 3 3
	x1 x5	3 3 3 3 3 3
	x1 x6	3 3 3 3 3 3
	x1 x7	3 3 3 3 3 3
	x1 x8	3 3 3 3 3 3
	x2 x3	3 3 3 3 3 3
	x2 x4	3 3 3 3 3 3
	x2 x5	3 3 3 3 3 3
	x2 x6	3 3 3 3 3 3
	x2 x7	3 3 3 3 3 3
	x2 x8	3 3 3 3 3 3

```
x3 x4    2 2 2 2 2 2 2 2 2
x3 x5    2 2 2 2 2 2 2 2 2
x3 x6    2 2 2 2 2 2 2 2 2
x3 x7    2 2 2 2 2 2 2 2 2
x3 x8    2 2 2 2 2 2 2 2 2
x4 x5    2 2 2 2 2 2 2 2 2
x4 x6    2 2 2 2 2 2 2 2 2
x4 x7    2 2 2 2 2 2 2 2 2
x4 x8    2 2 2 2 2 2 2 2 2
x5 x6    2 2 2 2 2 2 2 2 2
x5 x7    2 2 2 2 2 2 2 2 2
x5 x8    2 2 2 2 2 2 2 2 2
x6 x7    2 2 2 2 2 2 2 2 2
x6 x8    2 2 2 2 2 2 2 2 2
x7 x8    2 2 2 2 2 2 2 2 2
N-Way    1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```

All factors in this design are perfectly balanced, and almost all are orthogonal, but `x1` and `x2` are correlated with each other.

%MktEval Macro Options

The following options can be used with the `%MktEval` macro:

Option	Description
`help`	(positional) "help" or "?" displays syntax summary
`blocks=`*variable*	blocking variable
`data=`*SAS-data-set*	input data set with design
`factors=`*variable-list*	factors in the design
`format=`*format*	format for canonical correlations
`freqs=`*frequency-list*	frequencies to display
`list=`*n*	minimum canonical correlation to list
`outcb=`*SAS-data-set*	within-block canonical correlations
`outcorr=`*SAS-data-set*	canonical correlation matrix
`outfreq=`*SAS-data-set*	frequencies
`outfsum=`*SAS-data-set*	frequency summaries
`outlist=`*SAS-data-set*	list of largest canonical correlations
`print=`*print-options*	controls the display of the results
`vars=`*variable-list*	factors in the design

You can specify either of the following to display the option names and simple examples of the macro syntax:

```
%mkteval(help)
%mkteval(?)
```

blocks= *variable*
specifies a blocking variable. This option displays separate canonical correlations within each block. By default, there is one block.

data= *SAS-data-set*
specifies the input SAS data set with the experimental design. By default, the macro uses the last data set created.

factors= *variable-list*
vars= *variable-list*
specifies a list of the factors in the experimental design. The default is all of the numeric variables in the data set.

freqs= *frequency-list*
specifies the frequencies to display. By default, `freqs=1 2 n`, and 1-way, 2-way, and n-way frequencies are displayed. Do not specify the exact number of ways instead of `n`. For ways other than `n`, the macro checks for and displays zero cell frequencies. For n-ways, the macro does not output or display zero frequencies. Only the full-factorial design will have nonzero cells, so specifying something like `freqs=1 2 20` will make the macro take a *long* time, and it will try to create *huge* data sets and will probably run out of memory or disk space before it is done. However, `freqs=1 2 n` runs very reasonably.

format= *format*
specifies the format for displaying the canonical correlations. The default format is `4.2`.

list= n
specifies the minimum canonical correlation to list. The default is 0.316, the square root of $r^2 = 0.1$.

outcorr= *SAS-data-set*
specifies the output SAS data set for the canonical correlation matrix. The default data set name is CORR.

outcb= *SAS-data-set*
specifies the output SAS data set for the within-block canonical correlation matrices. The default data set name is CB.

outlist= *SAS-data-set*
specifies the output data set for the list of largest canonical correlations. The default data set name is LIST.

outfreq= *SAS-data-set*
specifies the output data set for the frequencies. The default data set name is FREQ.

outfsum= *SAS-data-set*
specifies the output data set for the frequency summaries. The default data set name is FSUM.

print= *print-options*
controls the display of the results. The default is `print=short`. Specify one or more values from the following list.

`all`	all output is displayed
`corr`	displays the canonical correlations matrix
`block`	displays the canonical correlations within block
`freqs`	displays the frequencies, specified by the `freqs=` option
`list`	displays the list of canonical correlations greater than the `list=` value
`nonzero`	like `ordered` but sets `list=1e-6`
`ordered`	like `list` but ordered by variable names
`short`	is the default and is equivalent to: `corr list summ block`
`summ`	displays the frequency summaries
`noprint`	no output is displayed

By default, the frequency list, which contains the factor names, levels, and frequencies is not displayed, but the more compact frequency summary list, which contains the factors and frequencies but not the levels is displayed.

%MktEval Macro Notes

This macro specifies `options nonotes` throughout most of its execution. If you want to see all of the notes, submit the statement `%let mktopts = notes;` before running the macro. To see the macro version, submit the statement `%let mktopts = version;` before running the macro.