

CME PLOT

PURPOSE

Generates a conditional mean exceedance plot (also known as the mean residual life plot, the mean life expectancy plot, or the Yang plot).

DESCRIPTION

The conditional mean exceedance function (also referred to as the mean residual life function or the expectation of life at t) is defined for a non-negative random variable X as:

$$\text{CME}(x) = E(X-x \mid X \geq x)$$

It can be interpreted as the expected remaining life after time t given that a unit or individual is of age t .

An exact functional form for the CME function can often be obtained if the distribution function of the original variable is known. However, what DATAPLOT calculates is the empirical CME function. Given a variable, the following steps are performed:

1. the data are sorted into ascending order;
2. at each data point, subtract that value from the remaining data points;
3. calculate the mean of these remaining adjusted data points;
4. plot this series of mean points.

The paper by Guess and Proschan (see the REFERENCE section below) gives the mathematical formulas. It also includes the formulas for handling ties in the data.

DATAPLOT supports several variations of this plot. In step 3 above, the median or midmean can be substituted for the mean. In addition, steps 3 and 4 can be replaced by simply plotting the adjusted remaining data points at the given point.

SYNTAX 1

CME PLOT <x> <SUBSET/EXCEPT/FOR qualification>
 where <x> is a response variable;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

SYNTAX 2

CONDITIONAL MEDIAN EXCEEDANCE PLOT <x> <SUBSET/EXCEPT/FOR qualification>
 where <x> is a response variable;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax computes the median rather than the mean.

SYNTAX 3

CONDITIONAL MIDMEAN EXCEEDANCE PLOT <x> <SUBSET/EXCEPT/FOR qualification>
 where <x> is a response variable;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax computes the midmean rather than the mean.

SYNTAX 4

CONDITIONAL EXCEEDANCE PLOT <x> <SUBSET/EXCEPT/FOR qualification>
 where <x> is a response variable;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax plots the remaining adjusted data points.

EXAMPLES

```
CME PLOT Y1
CME PLOT Y1 SUBSET TAG > 1
CONDITIONAL MEDIAN EXCEEDANCE PLOT Y1
```

NOTE

DATAPLOT internally fits a line to the resulting plot and saves the following internal parameters:

CMECC	-	the correlation coefficient of the fitted line
CMEA0	-	the intercept term
CMEA1	-	the slope term
SDCMEA0	-	the standard deviation of the intercept term
SDCMEA1	-	the standard deviation of the slope term
CMERESSD	-	the residual standard deviation
CMERESDF	-	the residual degrees of freedom

Entering STATUS PARAMETERS is a quick way to see the values of all of these parameters. This is a linear fit, so these parameters may not be meaningful if a straight line is not a good fit to the data.

DEFAULT

None

SYNONYMS

The following are synonyms for CME PLOT:

CONDITIONAL MEAN EXCEEDANCE PLOT
 LIFE EXPECTANCY PLOT
 MEAN LIFE EXPECTANCY PLOT
 MEAN RESIDUAL LIFE PLOT
 YANG PLOT

CONDITIONAL SCATTER EXCEEDANCE PLOT is a synonym for CONDITIONAL EXCEEDANCE PLOT.

RELATED COMMANDS

LINES	=	Sets the type for plot lines.
CHARACTERS	=	Sets the type for plot characters.
TAIL AREA PLOT	=	Generates a tail area plot.
PLOT	=	Generates a data or function plot.

REFERENCE

“Handbook of Statistics, Vol. 7,” Krishnaiah and Rao, eds. Elsevier Science Publishers B. V., 1988, pp. 215-224. Specifically, the article is “Mean Residual Life: Theory and Applications,” Frank Guess and Frank Proschan.

APPLICATIONS

Reliability, Extreme Value Analysis

IMPLEMENTATION DATE

94/2

PROGRAM

```

SKIP 25
READ WASHDC.DAT Y
.
TITLE AUTOMATIC
LINES BLANK ALL
CHARACTER X ALL
MULTIPLY 2 2; MULTIPLY CORNER COORD 0 0 100 100
CONDITIONAL EXCEEDANCE PLOT Y
CME PLOT Y
CONDITIONAL MEDIAN EXCEEDANCE PLOT Y
CONDITIONAL MIDMEAN EXCEEDANCE PLOT Y
END OF MULTIPLY
    
```

