

help for **qsymm**

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**Log-Linear Model of Quasi-Symmetry (Sobel-Hout-Duncan Parameterization)****syntax****qsymm** *freqvar rowvar colvar*, [,options]

<i>options</i>	description
<b>mod</b> ( <i>model</i> )	Log-linear model to be fitted to the data
<b>se</b>	Display parameter estimates and standard errors
<b>alphatest</b>	Test the model of quasi-symmetry against the null hypothesis of pure symmetry
<b>assymrow</b> ( <i>numlist</i> )	Vector of row subscripts for asymmetric cells
<b>assymcol</b> ( <i>numlist</i> )	Vector of column subscripts for asymmetric cells

**description**

**qsymm** fits the models of symmetry, quasi-symmetry and skew-symmetry, for R x C two-way tables with equal number of row and column categories as parameterized in Sobel, Hout and Duncan (1985). The model is estimated via a maximum likelihood Poisson regression of *freqvar* against *rowvar* and *colvar*. Where *freqvar* corresponds to the observed frequencies of the contingency table *rowvar* and *colvar* are the row and column factors respectively. Breiger and Ennis (1997), Breiger and Roberts (1998), and Han and Breiger (1999) provide further substantive extensions and theoretical developments related to these class of models.

**parameterization**

The Sobel-Hout-Duncan parameterization of quasi-symmetry is:

$$F[ij]=\text{Beta}[i]*\text{Beta}[j]*\text{Alpha}[j]*\text{delta}[ij]$$

With the following parameter restrictions:

- (1)  $\text{Beta}[i]=\text{Beta}[j]$  if  $i=j$
- (2) The product of the  $\text{Alpha}[j]$  across all  $j$  is equal to 1
- (3)  $\text{delta}[ij]=\text{delta}[ji]$  for all  $i \sim j$

**options**

Model fitting
<b>mod</b> ( <i>model</i> ) Specifies the type of log-linear model to be fit. If this option is not specified the program fits the model of pure symmetry by default. Allowed models are
<b>ps</b> requests the model of pure symmetry (default).
<b>qs</b> requests the model of quasi-symmetry.
<b>ci</b> requests the model of conditional independence with the Sobel-Hout-Duncan parameterization of the marginals.
<b>qi</b> requests the model of quasi-independence (diagonals blocked) with the Sobel-Hout-Duncan parameterization of the marginals.
<b>cis</b> requests the model of conditional independence with symmetric marginals.
<b>uas</b> requests the model of uniform association ( $\text{delta}[ij]=b*ij$ ) with symmetric marginals.

**ua** requests the model of uniform association ( $\delta_{ij} = b_{ij}$ ) with asymmetric marginals.

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#### Asymmetric interactions

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**assymncol**(*numlist*) and **assymnrrow**(*numlist*) these options should only be used when the model of quasi-symmetry fails to fit the data. These options allow the user to request that specific asymmetric parameters be fit to some subset of pairs of cells in the table. The size of each of the two vectors must be the same, and both options must be specified jointly.

The *i* subscripts for each of the hypothesized asymmetric cells are given in the vector corresponding to **assymnrrow** and the *j* subscripts are given in the vector corresponding to **assymncol**. These asymmetric "gamma" parameters are subject to the restriction that they jointly multiply to unity and that  $\delta_{ij} = 1/\delta_{ji}$  for all  $i \sim j$  (Yamaguchi 1990: 185).

For instance to request a quasi-symmetry model with asymmetric interactions between the fourth and fifth and the second and third cells of the table we would write:

```
qsymm freqvar rowvar colvar,mod(qs) asymmr(4 2) asymmc(5 3)
```

This would fit the asymmetric parameters  $\gamma_{4,5}$  and  $\gamma_{2,3}$  in addition to the beta, alpha and delta parameters of the quasi-symmetry model.

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#### Other options

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**alphatest** requests a chi-square test of the null hypothesis that the alpha parameters are jointly equal to zero. If the null hypothesis cannot be rejected, it can be concluded that the data follow a symmetric structure.

**se** requests the display of beta coefficients and standard errors associated with each of the model parameters.

#### Examples

To get the program and the example data, type:

```
net from http://www.nd.edu/~olizardo/Stataprogs/qsymm/
```

Install the program and get the ancillary data file "sex-fun.dta." This is the sexual fun data discussed in Hout, Duncan and Sobel (1987: 152, table 1).

The data consist of a cross-classification of the husband's and wife's respective responses to the question "Sex is fun for me and my partner."

The categories allowed are (1) Never/occasionally, (2) fairly often, (3) very often and (4) almost always.

You can load the data by typing:

```
sysuse sex-fun.dta
```

To fit the model of independence plus symmetry:

```
qsymm freq hus wife,mod(cis) se
```

To fit the model of independence:

```
qsymm freq hus wife,mod(ci) se
```

To fit the model of symmetry (the default model):

```
qsymm freq hus wife,se
```

To fit the model of quasi-symmetry:

qsymm freq hus wife,mod(qs) se

To fit the model of Symmetry plus uniform association:

qsymm freq hus wife,mod(uas) se

To fit the model of uniform association:

qsymm freq hus wife,mod(ua) se

The fit statistics for these models should match those reported by Hout, Duncan and Sobel (1987: 152).

### **References**

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- Sobel, Michael E., Hout, Michael and Otis Dudley Duncan. 1985. "Exchange, Structure, and Symmetry in Occupational Mobility." *American Journal of Sociology* 91: 359-372.
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