APPENDIX

Correlation

Pearson's correlation coefficient is defined to be

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}},$$

where

$$S_{xx} = \sum_{i=1}^{n}(x_i - \overline{x})^2 = \sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2 / n$$

$$S_{yy} = \sum_{i=1}^{n}(y_i - \overline{y})^2 = \sum_{i=1}^{n} y_i^2 - \left(\sum_{i=1}^{n} y_i\right)^2 / n$$

and

$$S_{xy} = \sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y}) = \sum_{i=1}^{n} x_i y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right) / n.$$

If all the x_i's are unique and all the y_i's are separately unique, then Spearman's correlation coefficient is given by

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)}$$

where

$$d_i = \text{rank}(x_i) - \text{rank}(y_i),$$

The Kendall coefficient τ is defined to be

$$\tau = \frac{n_c - n_d}{n(n-1)/2}.$$

EBCT1

The credibility estimate of the amount / number of claims for the coming year for Risk Number 1 is:

$$(1-Z)E[m(\theta)] + Z\bar{X}_1$$

where:

$$\bar{X}_1 = \sum_{j=1}^{n} \frac{X_{1j}}{n}$$

and:

$$Z = \frac{n}{n + \frac{E[s^2(\theta)]}{var[m(\theta)]}}.$$

$\bar{X}$ to estimate $E[m(\theta)]$

$$\frac{1}{N}\sum_{i=1}^{N}\frac{1}{(n-1)}\sum_{j=1}^{n}(X_{ij} - \bar{X}_i)^2 \text{ to estimate } E[s^2(\theta)]$$

and

$$\frac{1}{(N-1)}\sum_{i=1}^{N}(\bar{X}_i - \bar{X})^2 - \frac{1}{Nn}\sum_{i=1}^{N}\frac{1}{(n-1)}\sum_{j=1}^{n}(X_{ij} - \bar{X}_i)^2 \text{ to estimate } \text{var}[m(\theta)].$$

Generalised Linear Models
Here are some canonical link functions:

Distribution	Canonical Link Function	Name
Normal	$g(\mu) = \mu$	identity
Poisson	$g(\mu) = \log(\mu)$	log
Binomial	$g(\mu) = \log\left(\frac{\mu}{1-\mu}\right)$	logit
Gamma	$g(\mu) = \frac{1}{\mu}$	inverse

End of Appendix.