Fitting Report Lag Distributions Revisited

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Abstract: Weissner first reported on fitting distributions to report lags in the 1978 PCAS and updated this study with Accomando in 1988. Newer calculation methodology makes it easier to fit and evaluate distributions. The 1988 report is revisited using some of this methodology.

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Weissner (1978) and Accamando and Weissner (1988) projected claim count IBNR for a book of medical malpractice claims by fitting a Weibull distribution to the observed history of claim reports. This approach is somewhat unique in actuarial practice because report lags are one of those rare variables that are truncated from above. That is, unlike claims that are censored by policy limits, for which you know how many are at the limit or higher, report lags are truncated by the time elapsed since occurrence, so there is no data on how many claims exceed the latest observed lag.

Fitting truncated data by MLE is straightforward. You assemble the likelihood function by using the conditional probabilities given that all observations are less than the latest lag. This just involves dividing each probability in the likelihood function by the probability of being less than that lag. Then you are estimating the parameters of the untruncated distribution when you do the MLE on the truncated data.

The choice of the Weibull was practical. First of all, it is a flexible distribution. It can be quite highly skewed, or have zero or even negative skewness. Second, it has a closed form distribution function, so is easy to calculate for grouped data (which is what was available). However now these considerations are less critical. Quite a few distributions can be readily estimated within spreadsheets. The definition of what is closed form is somewhat squishy when you can write down beta, gamma and normal distributions as explicit functions in your software.

Data and Fits

Report Lag Range		Count
0	6	4
6	12	6
12	18	8
18	24	38
24	30	45
30	36	36
36	42	62
42	48	33
48	54	29
54	60	24
60	66	22
66	72	24
72	78	21
78	84	17
84	90	11
90	96	9
96	102	7
102	108	13
108	114	5
114	120	2
120	126	7
126	132	17
132	138	5
138	144	8
144	150	2
150	156	6
156	162	2
162	168	0

The data as of 1988 was fit by a Weibull distribution $F(x) = 1 - \exp[(x/\theta)^{\tau}]$ with $\theta = 67.3$ and $\tau = 1.71$, with loglikelihood value -1419.3.