CS-1: An Alternative Approach to Blending Experience and Exposure Rating Analyses

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Agenda

- Acknowledgements

- Brief Credibility Review

- A "Traditional" Blending Approach

- The Problem with "Traditional" Blending

- Alternative Blending Solution

Brief Credibility Review

- We use Credibility Theory to combine different estimates to produce a better estimate.

- We all know the formula:

Credibility Weighted Rate =

(Experience Rate) x (Z) + (Exposure Rate) x (1-Z)

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- Experience rating analyses uses the past, with appropriate adjustments, to predict the future. It requires:

  - Historical subject base or exposures

  - Rate & price on-level factors

  - Loss & exposure trends

  - Losses – either aggregate or individual

  - Loss development factors appropriate for the loss data

- Exposure rating analysis estimates expected loss based upon the prospective exposures

  - For primary business, this is the loss cost underlying the manual rates.

  - For reinsurance (excess of loss), this is based upon the account's risk characteristics and the relevant industry severity curves.

- Some typical account risk characteristics needed for an XOL exposure rating analysis are:

  - Policy limits & attachments

  - Line of business

  - Subline / hazard / class

  - State

- The last thing needed for an XOL exposure rating analysis is an expected loss, or ELR, pick.

- Source of the ELR pick

    - Typically, an account will be evaluated from an experience standpoint, and its ELR will be used.

    - If there is no credible account experience available, then an "industry" ELR may be the only option.

- However, if the account's experience is used for the ELR, then clearly the exposure and experience ratings are NOT independent.

- Some considerations regarding credibility & credibility-weighting

    - Start by trying to reconcile & understand the differences among the various indications / analyses

    - How is credibility determined – counts, losses, exposures, actual, expected? What makes sense?

    - Does it possess consistent & desirable properties?

    - To what do I assign the complementary weight?

- A few reasons why experience rating and exposure rating analyses could give different indications

  - The ELR underlying an exposure rating analysis was not based on the account's experience

  - Historical periods' exposures were very different than the prospective period's exposure (limits profile, business mix, etc.)

  - The observed account severity or ALE is different than the exposure model's assumptions

  - Inappropriate pricing parameters

  - Lack of experience credibility

- Ideally, one would like to use all available information and analyses in making their loss pick.

- The obvious solution is to somehow combine the experience rating analysis with the exposure rating analysis.

- We do this by credibility weighting in a "traditional" fashion.

- To summarize, then

  - Experience rate = E [Loss | Account Loss Experience]

  - Exposure rate = E [Loss | Industry Curves, Account Risk Characteristics]

- Therefore

  - Final selected rate = E [Loss | Industry Curves, Account Experience & Risk Characteristics]

A "Traditional" Blending Approach

Limit		Retention	(1) Exposure Rate	(2) Experience Rate	(3) = (2) / (1) Experience to Exposure	(4) Credibility	(5) Cred-Wtd Rate	(6) = (5) / (1) Selected to Exposure
125,000	xs	0	51.64%	62.00%	1.20	75%	59.41%	1.15
125,000	xs	125,000	14.53%	16.00%	1.10	55%	15.34%	1.06
250,000	xs	250,000	14.27%	12.00%	0.84	40%	13.36%	0.94
500,000	xs	500,000	13.07%	9.50%	0.73	30%	12.00%	0.92

Note: Data is fictional – for illustration only

- The problem is that the indications provided by experience and exposure ratings are not two independent estimates.

  - In most cases, the exposure rating analysis relied upon an ELR from the companion experience rating analysis.

- Determine the selected loss costs by credibility-weighting the experience rate <u>relativity</u> with the exposure rate <u>relativity</u>.

- Procedure:

  - Experience and exposure rate a highly credible base layer, such as a limited ground-up layer, or a low excess layer.

  - Apply credibility-weighting in a traditional fashion to determine an indicated loss cost for this base layer.

  - Then, experience rate and exposure rate all successive/higher layers.

- Procedure (con't):

  - Calculate a relativity for each layer by comparing its loss cost to the layer below, similar to a decay rate.

  - Repeat this for both experience and exposure methods.

  - Credibility-weight the experience and exposure rate relativities for each layer to get an indicated layer relativity.

  - Apply the selected subject layer relativity to the selected loss cost for the layer below, to get the indicated loss cost for the subject layer.

Alternative Blending Solution
Relativity Methodology (ground-up base layer)

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		(1)	(2)	(3)	(4)	(5) = (3) / (1)	(6)	(7)	(8) = (7) / (1)	(9)	(10)	(11) = (10) / (1)
Limit	Retention	Expos Rate	Expos Relativity to Prior	Exper Rate	Exper Relativity to Prior	Exper/ Expos Relativity	Cred (Z)	Trad'l Z-Wtd Rate	Trad'l/ Expos Relativity	Z-Wtd Relativity	Alt Indic Rate	Indic/ Expos Relativity
125,000	0	51.64%		62.00%		1.20	75%	59.41%	1.15		59.41%	1.15
125,000	125,000	14.53%	0.281	16.00%	0.258	1.10	55%	15.34%	1.06	0.269	15.95%	1.10
250,000	250,000	14.27%	0.982	12.00%	0.750	0.84	40%	13.36%	0.94	0.889	14.19%	0.99
500,000	500,000	13.07%	0.916	9.50%	0.792	0.73	30%	12.00%	0.92	0.879	12.47%	0.95

Note: Data is fictional – for illustration only

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Alternative Blending Solution
Relativity Methodology (excess base layer)

		(1)	(2)	(3)	(4)	(5) = (3) / (1)	(6)	(7)	(8) = (7) / (1)	(9)	(10)	(11)
Limit	Retention	Expos Rate	Expos Relativity to Prior	Exper Rate	Exper Relativity to Prior	Exper/ Expos Relativity	Z	Trad'l Z-Wtd Rate	Trad'l/ Expos Relativity	Z-Wtd Relativity	Indicated Rate	Prior Indicated
125,000	125,000	14.53%		16.00%		1.10	55%	15.34%	1.06		15.34%	15.95%
250,000	250,000	14.27%	0.982	12.00%	0.750	0.84	40%	13.36%	0.94	0.889	13.64%	14.19%
500,000	500,000	13.07%	0.916	9.50%	0.792	0.73	30%	12.00%	0.92	0.879	11.98%	12.47%

Note: Data is fictional – for illustration only

- Relativities of experience and exposure ratings are <u>truly independent</u>, since the exposure relativities are independent of the ELR.

- Less dependence on the ground-up ELR, since it only factors into the base layer's exposure rating. So good to use when you have low confidence in the client's ELR.

- Uses all available indications

  - Experience rate

  - Exposure rate

  - Layer relativities

- Assumes the implied relativity of the industry severity curve is appropriate for all accounts

  - However, this assumption is NOT unique to this method.

- Can be difficult to explain to underwriters (think umbrella rating, decay rates, reference layers)

  - Can get answers outside the range of experience and exposure rating indications

- If credibilities are based upon expected claim counts, will still need a ground-up ELR to get the expected layer claim counts.

Thank you for your attention

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