Complete the Loop: Reinsurance Reserving to Pricing

Casualty Actuaries in Reinsurance
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Reserving-To-Pricing: Feedback Loop

1	Critical pricing parameters
2	What do reserving people know better
3	Joint effort: Step-by-Step
4	Conclusions

Pricing Parameters – What Can Be Tested? Actual Versus Expected Framework

- Business mix
- Contract terms
- Loss and premium data
- Data you exclude
- Frequency/severity trend
- Exposure trend
- Rate changes
- Emergence/payout patterns
- Premium flows
- Appropriate benchmarks/defaults
- CAT loads
- Loss distributions

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What Do Reserving People Know Better? But Later…

	Yes	No
Cedant loss and premium data	☺	
Mix of business	☺	
Emergence/payout pattern	☺	
Premium flows	☺	
Large losses	☺	
Everything else?	☺	

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Hindsight is 20/20

- **Cedant's Data.** Always a good idea to make sure you are looking at the same thing
  - How does the renewal submission compare to what is on the books?
    - How much credibility should be given to an "as if" presentation? Particularly the one that excludes certain "unusual" claims?
    - Could the remaining difference be explained by reporting lag?
    - Be prepared to deal with accident year vs. underwriting year presentations.
- **Emergence patterns**
  - As expected?
  - For high excess – high loss cost/ultimate loss sensitivity.
- **Payout** – faster or slower? **Premium collection** – faster or slower? Could make or break the ROE.

Unfortunately, some of the profound revelations take time to make themselves known. Even to the reserving actuaries.

The Fact Is

- When the ultimate outcomes are known, it's often too late and not very useful.
- However, having some facts could be better than running on pure assumptions.
- But one should be careful in not confusing the two.
- For example, a real life loss development factor triangle

Accident Year	1	2	3	4	5
1992					1.031
1993				1.108	1.113
1994			1.124	1.112	1.050
1995		1.397	1.198	1.115	0.974
1996	2.224	1.299	1.193	1.072	1.122
1997	2.345	1.090	1.145	1.176	1.162
1998	2.451	1.192	1.468	1.248	1.168
1999	2.129	1.526	1.334	1.202	
2000	2.471	1.385	1.370		
2001	2.192	1.331			
2002	2.342				

A trend or an anomaly?

Actual Versus Expected: Loss Development

Question to answer is "Is there appreciable difference?"

- If yes, then why?
  - Got the mix of business wrong
  - Got the reporting assumptions wrong
  - Anything else?
- Is it a trend or an anomaly?
- Higher LDF's at earlier ages mean
  a) Speed up – all of the development happens upfront, and the tail is shorter?
  b) Lengthening – LDF's at later ages will be higher as well?

You May Recall

Expected Emergence - Pricing Assumptions

PremOps-1 100x100	12	24	36	48	60	72	84	96	108	120	120+	1,100,000
Selected ATU	6.192	2.506	1.704	1.396	1.249	1.174	1.129	1.101	1.082	1.070		
Selected Cum'l % Reptd	16.1%	39.9%	58.7%	71.6%	80.1%	85.2%	88.6%	90.8%	92.4%	93.5%	100.0%	
Selected ATU	16.1%	23.8%	18.8%	12.9%	8.4%	5.1%	3.4%	2.3%	1.6%	1.0%	6.5%	
Incremental Reported	177,649	261,298	206,593	142,426	92,739	56,263	37,346	24,778	17,544	11,402	71,963	
Cumulative Reported	177,649	438,947	645,540	787,966	880,705	936,968	974,314	999,092	1,016,636	1,028,037	1,100,000	

Actual Emergence - Longer Tailed Business Actually Written

Prods 100x100	12	24	36	48	60	72	84	96	108	120	120+	1,500,000
Selected ATU	9.674	3.513	2.330	1.849	1.686	1.489	1.395	1.331	1.292	1.261		
Selected Cuml % Rptd	10.3%	28.5%	42.9%	54.1%	61.9%	67.1%	71.7%	75.1%	77.4%	79.3%	100.0%	
Selected Incr % Rptd	10.3%	18.1%	14.5%	11.1%	7.8%	5.2%	4.5%	3.4%	2.3%	1.9%	20.7%	
Incremental Reported	155,053	271,907	216,903	167,167	117,403	78,695	68,076	51,734	33,852	29,209	310,001	
Cumulative Reported	155,053	426,960	643,863	811,031	928,434	1,007,129	1,075,204	1,126,939	1,160,790	1,189,999	1,500,000	

Actual / Expected Emergence	87.3%		99.7%		105.4%						136.4%
	Favorable		As Expected		Somewhat Worse						Much Worse

John Buchanan, FCAS, MAAA. ISO
As presented in IT1

You May Also Recall

Motor XOL – A case study
Pricing vs. Reserving

Pricing - Assumptions

- Proportion of LS vs. PPOs
  - Payment and incurred patterns
- Future wage index and ASHE (constant)
- Constant index factor
- Discounted vs. undiscounted loss pick
- Capital charge
  - LS – reserve risk
  - PPO – mortality risk

Reserving - Actuals
Actuarial or Claims?

- Actual cases of LS vs. PPOs
- Claim by claim indexation
- Discounted PPOs reserves: annual review present value of O/S
  - Actual and forecasted indices and interest rates
  - Remaining life expectancy

Ana Mata, PhD, ACAS,
As presented in IT2
Matβlas

Portfolio vs. Individual Account

- Arguably, impossible to see trends on an individual account basis. Solution: Use Portfolios.
  - Ensure consistent definitions between pricing and reserving:
    - Does the liability section of homeowners treaties go into property or casualty class in your reserving system?
- Reserving classes could be heterogeneous. Hard to identify appropriate patterns for in-force book. Solution: analyze individual treaties.
  - Pick a materiality threshold. Consider
    - Credibility
    - Time and effort

Applicability of portfolio experience

- Consider and adjust for
  - Change in attachment points
  - Underlying treaties' inception dates
  - Geographical distribution
  - Extraordinary losses
- Possible adjustments could be in form of relativity factors based on industry benchmarks
  - RAA LDF's by range of attachment point
- Adjusted company experience could be used to validate pricing benchmark LDF's

The Cycle Messes It All Up.

- On the downslope – overstate or understate
  - Rate drop
  - Loss ratio
- If combined with lousy economy?
  - Could the spread between CPI and severity trend be affected?
- Are there trends in LDF's?
  - Reporting lag – could be measured in reserving data
  - Affects the tail
  - Case reserve may lag if the spread expands
- LDF triangle (the real life one)

Underwriting Cycle Affects the Loss Development Patterns

Reinsurance Association of America (RAA) Loss Development Study
Presented by Chris Bozman, FCAS, MAAA (TW) at the CLRS 2011

Accident Year	1	2	3	4	5	6	7	8	9	10	11
1988						1.082	1.061		1.022	0.998	1.001
1989					1.062	1.044		0.989	0.996	1.010	0.969
1990				1.092	1.095		0.977	0.998	1.037	0.992	1.005
1991			1.264	1.142		1.032	1.052	1.041	1.023	1.057	1.019
1992		1.255	1.060		1.031	1.052	1.016	1.041	1.102	1.057	1.030
1993	2.689	1.305		1.108	1.113	1.043	1.014	1.096	1.091	1.008	1.020
1994	2.321		1.124	1.112	1.050	1.067	1.089	1.060	1.037	1.085	1.107
1995		1.397	1.198	1.115	0.974	1.059	1.137	1.094	1.129	1.059	1.032
1996	2.224	1.299	1.193	1.072	1.122	1.153	1.123	1.064	1.096	1.076	1.032
1997	2.345	1.090	1.145	1.176	1.162	1.150	1.118	1.088	1.066	1.058	1.068
1998	2.451	1.192	1.468	1.248	1.168	1.131	1.102	1.111	1.084	1.127	
1999	2.129	1.526	1.334	1.202	1.169	1.154	1.088	1.060	1.091		
2000	2.471	1.385	1.370	1.309	1.174	1.161	1.103	1.099			
2001	2.192	1.331	1.472	1.267	1.175	1.145	1.092				
2002	2.342	1.387	1.465	1.230	1.176	1.097					
2003	1.853	1.213	1.178	1.111	1.110						
2004	2.645	1.278	1.226	1.166							
2005	2.460	1.208	1.093								
2006	2.258	1.243									
2007	2.286										
2008											

Straight averages

1988-96	2.411	1.314	1.168	1.107	1.064	1.066	1.059	1.048	1.059	1.038	1.024
1997-01	2.318	1.305	1.358	1.240	1.170	1.148	1.101	1.089	1.080	1.093	1.068
post 2001	2.307	1.266	1.240	1.169	1.143	1.097	NA	NA	NA	NA	NA

Miscellaneous

- Classic Five. The claims excluded from experience. They'll never happen again. In pricing, used a large loss (or CAT) load.
- Did the experience support the approach?

- Return on Equity. Do cash flow assumptions come through as expected?

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Connect the Dots

- Sadly, reserving actuaries do not know everything
- But what they do see, should be shared with pricing (and underwriting)
- Particularly when things look different from expected in terms of
  - Exposure (losses happen to be products as opposed to prem/ops or PPO instead of LS)
  - Number of large losses (or CAT's)
  - Loss emergence or payout pattern
  - Premium flows
- Knowing what happens with the rates (within the cycle) could help distinguish patterns from aberrations