Commercial Lines - A Potpourri of Reserving Issues

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Backward Recursive Method

Something's Not Quite Right

AY	Open Claims	Case Reserves	IBNR	IBNR/ Case
1998	12	808,509	1,096,384	136%
1999	8	2,309,683	1,655,406	72%
2000	19	1,544,035	2,038,573	132%
2001	9	519,640	1,622,146	312%
2002	10	846,627	1,478,367	175%
2003	13	1,145,788	1,644,929	144%
2004	4	238,029	1,075,759	452%

Characteristics

- IBNR (supplemental) projection based upon historical case reserve development
- Development factor applied to the case reserve ONLY
- Resultant IBNR (supplemental) independent of losses paid or incurred to date
- Forward looking
- Requires intimate knowledge of claims department case reserving practices and consistency

Applicable Lines of Business

- Claims-made policies:
  - Medical professional
  - Non-medical professional
  - Directors & officers
- Workers' compensation (AYs X-3 and prior)
- Occurrence coverage with "short" statute of limitations, e.g. auto liability with 2-3 years
- All other occurrence policies on a report year basis (when coupled with a "Pure IBNR" projection method)

The Backward Recursive Formula

$$Dk = (Rk * D(k-1)) + Pk$$

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Dk is the development factor which, when applied to the case reserve at age k, projects the case reserve to a fully developed, ultimate basis

Pk is the proportion of case reserve of age k which will be paid by age k+1

Rk is the ratio of case reserve at age k+1 to the case reserve at age k

The Backward Recursive Formula – Dk

$$Dk = (Rk * D(k-1)) + Pk$$

- If case reserves are always exactly adequate, Dk will always = 1.00 and the sum of Rk + Pk will always = 1.00
- If case reserves are always inadequate (e.g. "stair-stepping"), Dk will always > 1.00 and the sum of Rk + Pk will always > 1.00
- If case reserves are always redundant (yeah, sure) Dk will always < 1.00 and the sum of Rk + Pk will always < 1.00

Backward Recursive Example

Paid Loss Development

Year	12	24	36	48	60	ULT
X-4	20	50	65	75	85	100
X-3	20	50	65	75		100
X-2	20	50	65			100
X-1	20	50				100
X	40					200

Incurred Loss Development

Year	12	24	36	48	60	ULT
X-4	50	75	85	90	95	100
X-3	50	75	85	90		100
X-2	50	75	85			100
X-1	50	75				100
X	50					100

Backward Recursive Example

Case Reserves

Year	12	24	36	48	60	ULT
X-4	30	25	20	15	10	0
X-3	30	25	20	15		
X-2	30	25	20			
X-1	30	25				
X	10					

Pk Ratio

Year	24/12	36/24	48/36	60/48	Ult/60	
X-4	0.83	0.80	0.75	0.67	0	
X-3	0.83	0.80	0.75			
X-2	0.83	0.80				
X-1	0.83					
Chosen	0.83	0.80	0.75	0.67	0.00	

Backward Recursive Example

Incremental Paid Losses

Year	24/12	36/24	48/36	60/48	Ult/60	
X-4	30	15	10	10	15	
X-3	30	15	10			
X-2	30	15				
X-1	30					

Pk Ratio

Year	24/12	36/24	48/36	60/48	Ult/60	
X-4	1.00	0.60	0.50	0.67	1.50	
X-3	1.00	0.60	0.50			
X-2	1.00	0.60				
X-1	1.00					
Chosen	1.00	0.60	0.50	0.67	1.50	

Backward Recursive Example

Projection of Ultimate Losses					
AY	X	X-1	X-2	X-3	X-4
Cumulative Development Factor Dk = (Rk * D(k-1))+Pk	2.67	2.00	1.75	1.67	1.50
Case	10	25	20	15	10
Case + IBNR	26.67	50	35	25	15
Paid	40	50	65	75	85
Ultimate	66.67	100	100	100	100

What are the advantages of using the Backward Recursive Method?

Why do we like the Backward Recursive Method?

- Intuitive appeal and ease of communication
- Lack of "Pure IBNR" claims reduces uncertainty
- Loss development is solely a function of case reserve adequacy (not affected by changes in claims settlement/termination timing)
- Produces cosmetically appealing IBNR/case reserve ratios by AY on Schedule P (avoids nonsensical implied ultimates)
- Method requires continuous communications between actuarial & claims. You must get inside the claims adjustors head

What don't we like about the Backward Recursive Method?

- Diminishing case reserve base makes Pk and Rk ratios more fortuitous and less stable
- Selection of the "tail factor" can be highly subjective, e.g. workers' compensation losses could be paid out over 50 years or more
- Selected Pk and Rk ratios are highly leveraged…much judgment may be involved to prevent "hyper-development" or unexplainable "reversals"
- Change in case reserving philosophies and settlement practices will dramatically negate benefits of the method

"Try it, you'll like it"

Reluctance of actuaries to consider use of the Backward Recursive method, even on claims-made business. At least try it - no Alka-Seltzer needed