AR-4: Reserving in Two Steps: Total IBNR = Pure IBNR + IBNER

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Purpose

- Needed a different way to analyze:
  - Distortions in development due to law change regarding late reporting (affects pure IBNR only);
  - At the same time, a court ruling affected the adjudication of certain open claims (affects known claims only);
- Also needed a different way to communicate: Dispute between actuary and management specifically regarding the development on known claims
  - Problem: Standard actuarial methods (link ratio, B-F, etc) combine the two sources of IBNR

The Method

- First, develop known claims
  - Link ratio-type method (see next slide)
  - Exposure-based method
  - Mathematical function
- Then, project separately pure IBNR
  - Exposure-based method (subsequent slide)
  - Frequency/Severity
- Other standard actuarial techniques could also be applied

Developing Known Claims w/Link Ratios

Standard Triangle									
LDFs									
Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.008	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.032	1.027	1.021				
2007	1.612	1.074	1.031	1.025					
2008	1.666	1.069	1.099						
2009	1.868	1.151							
2010	1.870								
Simple Average	1.725	1.078	1.038	1.016	1.007	1.002	1.001	1.001	1.000

Known at 12 months									
LDFs									
Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.000	1.097	1.038	1.018	1.000	1.001	1.002	1.001	1.000
2003	1.696	1.068	1.027	1.010	1.009	0.998	1.001	1.001	
2004	1.510	1.061	1.018	1.008	1.001	1.001	1.000		
2005	1.604	1.036	1.010	1.008	1.005	1.008			
2006	1.469	1.063	1.029	1.028	1.021				
2007	1.560	1.074	1.028	1.025					
2008	1.625	1.066	1.098						
2009	1.811	1.148							
2010	1.826								
Average	1.678	1.077	1.035	1.016	1.007	1.002	1.001	1.001	1.000

- This would provide for an estimate for AY 2011
- Also need triangle of known at 24 months for AY 2010
- And, triangle of Known at 36 months for AY 2009…

Exposure-Based Method for Pure IBNR

Accident Year	Exposures	12	24	36	48	60	72	84	96	108	120
2002	50,645	-	743,702	912,511	986,360	990,967	987,236	988,927	1,000,823	1,003,619	1,003,967
2003	68,274	-	613,972	687,418	767,025	785,778	787,671	776,861	784,471	809,667	
2004	55,783	-	401,706	446,875	451,092	453,822	451,913	451,913	451,913		
2005	44,724	-	368,431	389,864	461,246	475,721	479,317	482,903			
2006	42,487	-	237,945	266,627	304,144	297,915	297,915				
2007	44,220	-	381,500	417,308	468,623	476,017					
2008	47,790	-	305,299	354,583	402,836						
2009	45,849	-	617,506	758,623							
2010	44,112	-	781,226								
2011	29,289	-									

Accident Year	Exposures	12	24	36	48	60	72	84	96	108	120
2002	50,645		743,702	168,810	73,849	4,607	(3,731)	1,691	11,896	2,795	349
2003	68,274		613,972	73,446	79,607	18,753	1,893	(10,811)	7,610	25,196	
2004	55,783		401,706	45,169	4,216	2,730	(1,909)	-	-		
2005	44,724		368,431	21,433	71,382	14,475	3,596	3,586			
2006	42,487		237,945	28,682	37,517	(6,230)	-				
2007	44,220		381,500	35,807	51,315	7,394					
2008	47,790		305,299	49,284	48,253						
2009	45,849		617,506	141,116							
2010	44,112		781,226								
2011	29,289										

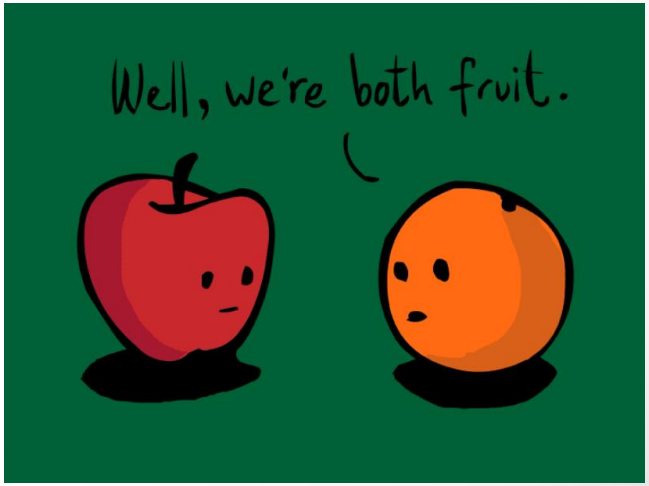
Pure IBNR at 12 months

Accident Year	Exposures		12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	50,645		14.685	3.333	1.458	0.091	(0.074)	0.033	0.235	0.055	0.007
2003	68,274		8.993	1.076	1.166	0.275	0.028	(0.158)	0.111	0.369	
2004	55,783		7.201	0.810	0.076	0.049	(0.034)	-	-		
2005	44,724		8.238	0.479	1.596	0.324	0.080	0.080			
2006	42,487		5.600	0.675	0.883	(0.147)	-				
2007	44,220		8.627	0.810	1.160	0.167					
2008	47,790		6.388	1.031	1.010						
2009	45,849		13.468	3.078							
2010	44,112		17.710								
	Simple Average		10.101	1.411	1.050	0.126	0.000	(0.011)	0.115	0.212	0.007

- So, estimate for Pure IBNR, for AY 2011, would be =29,189* (10.101+1.411+1.050+…) = $379,815
- Again, need triangles for each AY projection

The Results

- In hindsight, we know that this method produced more accurate results in this specific case, than what standard methods produced
- The more important result for our use was the ability to provide estimates to management of separate amounts for pure IBNR and for development on known claims
- The "apples and oranges" problem was on full display when management had a chart prepared with their pure IBNR number next to our total IBNR number



When to Use these Methods

- When you need to calculate the two numbers separately for communications purposes
- When changes in one of the two sources of total IBNR is seeing distortions, while the other is not

Why it's Difficult

- The data doesn't currently exist for most companies
  - Significant increase in data manipulation
- More picks/judgment necessary
- Non-actuaries will struggle even more with this method than standard methods

Standard Triangle

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.008	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.032	1.027	1.021				
2007	1.612	1.074	1.031	1.025					
2008	1.666	1.069	1.099						
2009	1.868	1.151							
2010	1.870								

Known at 12 months

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.000	1.097	1.038	1.018	1.000	1.001	1.002	1.001	1.000
2003	1.696	1.068	1.027	1.010	1.009	0.998	1.001	1.001	
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2005	1.604	1.036	1.010	1.008	1.005	1.008			
2006	1.469	1.063	1.029	1.028	1.021				
2007	1.560	1.074	1.028	1.025					
2008	1.625	1.066	1.098						
2009	1.811	1.148							
2010	1.826								

Known at 24 months

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.007	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.031	1.027	1.021				
2007	1.612	1.073	1.030	1.025					
2008	1.666	1.068	1.099						
2009	1.868	1.151							
2010	1.870								

Known at 36 months

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.007	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.031	1.027	1.021				
2007	1.612	1.074	1.030	1.025					
2008	1.666	1.069	1.099						
2009	1.868	1.151							
2010	1.870								

Known at 48 months

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.007	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.032	1.027	1.021				
2007	1.612	1.074	1.031	1.025					
2008	1.666	1.069	1.099						
2009	1.868	1.151							
2010	1.870								

Known at 60 months

LDFs

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-Ult
2002	2.059	1.101	1.039	1.017	0.999	1.001	1.002	1.001	1.000
2003	1.738	1.069	1.029	1.010	1.009	0.998	1.001	1.002	
2004	1.550	1.062	1.017	1.008	1.001	1.001	1.000		
2005	1.659	1.036	1.016	1.009	1.005	1.008			
2006	1.507	1.064	1.032	1.027	1.021				
2007	1.612	1.074	1.031	1.025					
2008	1.666	1.069	1.099						
2009	1.868	1.151							
2010	1.870								

Concerns

- Does this decrease credibility?
  - Depends on circumstances (but I don't think so)
- More time-consuming
  - More data organization effort
  - Two different analyses
  - Many more factor selections

What we Learned

- Sometimes standard actuarial methods amount to putting a square peg in a round hole
  - Developing pure IBNR separate from development on known can match the underlying drivers of loss development to the assumptions used
- Just the willingness to show management that you looked at it the way they want to can make a difference

Other thoughts/uses

- Model made it very easy to fill out quarterly stat statement (Part 3, or "the quarterly schedule P")
- Clarifies source of development for management
  - Unexpected development in pure IBNR: change in reporting requirements?
  - Unexpected development in development on known: changes in claims practices?