Applications of Reserve Ranges and Variability in Practice

Casualty Actuarial Society Fall 2013 Meeting

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- Enjoy the exchange of information and ideas.
- Contribute.

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The Authors (Your Panelists)

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Outline for our Discussion

- Business Applications
- Concepts in the Literature
- Approaches in Practice
- Illustrations

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- Aggregate Ranges
- Take-Away's

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Business Applications of Variability Concepts

- Statements of Actuarial Opinion and Actuarial Opinion Summary Discussions of the business and its qualities that may introduce variability; assessment of RMAD; optional in AOS
- Securities and Exchange Commission filings
 Discussion of analysis that developed the carried reserve and variability in that
 estimate; recently expanded disclosure by registrants.
- Financial Audits

Even for non-insurance entities, "how much of a difference is too much" is a constant question in assessing self-insurance estimates

• Mergers and Acquisitions May affect subsequent year "true ups" or the decision to purchase third-party reinsurance, and how much.

Internal Revenue Service Considerations Supportable "reasonable ranges" may factor into on-going or future IRS actions. pue State of State



- Thomas Mack Method "Distribution free" technique using loss development; no guidance on what constitutes "reasonable range"
- Boot-Strapping Simulation process with observed development being one "observation"
- Sensitivity Testing Not explicitly described in literature, though widely used reflecting alternative high/low assumptions

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Approaches in Practice

Judgment

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Includes "rule of thumb"; lacks substantive analytical or qualitative evidence; increasingly ignored by regulators and other third parties

• Sensitivity-Testing

Some commonalities, such as adjustment of tail factors; changes in severity assumptions; inflation; or inclusion/exclusive of large single events

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Sensitivity Testing

- Evaluate the dispersion of indications from one or more methods applied to one or more types of data. An actuary might elect to evaluate the dispersion of indications for all accident years combined, or for each accident year, or deviation from "actuarial central estimate."
- Evaluate the effect of alternate judgments for the key elements of the methods as applied to the various sets of data, and generally keep the same judgment about relative preferences among the methods.

We consider the second approach to be preferred.

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	Estimat	ed Ultimate	Unpaid Claims Estimate		
AY	Baseline	Alternate (High)	Baseline	Alternate (High	
2003	1,147	1,147	20	20	
2004	1,188	1,188	11	11	
2005	1,109	1,109	23	23	
2006	1,155	1,155	35	35	
2007	1,626	1,628	41	44	
2008	1,451	1,457	92	99	
2009	1,453	1,467	162	176	
2010	1,464	1,487	286	309	
2011	1,778	1,824	580	626	
2012	1,570	1,646	1,000	1,076	
Sum	13,940	14,108	2,250	2,418	
			Difference	168	
Г	Difference as %	Baseline Unpaid Cl	aims Estimate	7%	



AY	Estimated S Paid Data	Standard Error Reported Data	The che the me of \$2,2	osen ESE an unpai 50.	of \$197 is 9% of l claim estimate		
2003			Based of	on the as	sumed di	stribution	
2004		1 1	the Hig	sh estima	te (from	sensitivity	
2005		1 1	testing) of \$2,41	18 corres	ponds	
2006		1 2	with the 80 th percentile of the				
2007	1	2 2	distrib	ition.			
2008	2	1 23					
2009	30	0 33	Percer	tiles of	Unnai	d Claim	
2010	3	1 33	Distri	bution	Esti	imate	
2011	10	9 76	Low	High	Low	High	
2012	160	6 132					
			20%	80%	2,082	2,418	
All Veare	1.219	9 175 г					



















Summary of Sample Testing								
	High-End of Reasonable Range as % Reserves	Percentiles of Distribution aligning with High-End of Reasonable Range	# Std Dev's from Mean to High-End of Reasonable Range	Estimated Standard Deviation of Distribution as % Mean Reserve Estimate				
Personal Auto Liability	3% to 6% 8% to 12%	75th to 85th	0.7 to 1.0	3% to 7% 12% to 16%				
Homeowners		70th to 80th	0.6 to 0.9					
GL Occurrence	6% to 10%	75th to 85th	0.7 to 1.0	6% to 12%				
GL Occurrence See accompany	6% to 10%	/ 5th to 85th	0.7 to 1.0 ig in Section 5.3 of	6% to 12%				
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Consideration of Ranges on an Aggregate Basis

Bottom-Up Approach

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- Evaluate individual segments
- Aggregate segment results, considering correlations
- Aggregations at 0% correlation and at 100% correlation may be helpful
- In practice, actuaries often sum the low and high ends to develop a range of unpaid claim estimates in the aggregate.

Consideration of Ranges on an Aggregate Basis

Top-Down Approach

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- Evaluate range at an aggregate level, by applying a technique (for instance, sensitivity testing or the Mack approach) to the aggregated data*
- A primary advantage is to implicitly address correlation among individual segments.
- * We do not generally advocate an analysis of aggregated data for evaluating a point estimate, but consider it potentially useful to perform sensitivity testing or stochastic analysis in order to assess an aggregate range of reasonable estimates. The mix of underlying coverages should be relatively stable over the experience period for such an analysis of aggregate data; to the extent that there are substantial shifts of the mix of business (for instance, relative proportion of long and short tail business), we would caution against this approach.

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Take-Away's

- Applications of variability of unpaid claim estimates arise in a variety of business settings; the approach must reflect the situation with appropriate disclosure regarding the type of finding being expressed.
- We believe that the days of expressions of reasonable ranges based solely on judgment or rules of thumb are over, as stakeholders seek a more-reasoned response to questions regarding the basis of a stated range.
- We believe the framework described herein is practical and can be reasonably explained to the variety of stakeholders who seek insights and opinions from actuaries on point-estimates and the associated uncertainty.
- We identified an apparent relationship that the sample ranges of reasonable estimates for the three reviewed lines tended to align with portions of the distribution of outcomes that extend up to one standard deviation above and below the mean. This may be an area of further research.

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Thank you

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