

Unstable Loss Development Factors

http://www.casact.org/pubs/forum/09spforum/01Blumsohn.pdf

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CARe Seminar:

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Background

- Committee on Reinsurance Research
- Practical questions:
 - □ Actuaries mostly learn to do loss development on the job
 - □ Can we give guidance to improve approaches
 - especially on unstable triangles?



The Questions

- What types of averages do people use?
- Statistical tests and methods
- Smoothing
- Reversals
- Downward development
- Ignore tail-factor issue



Umbrella incurred loss triangle

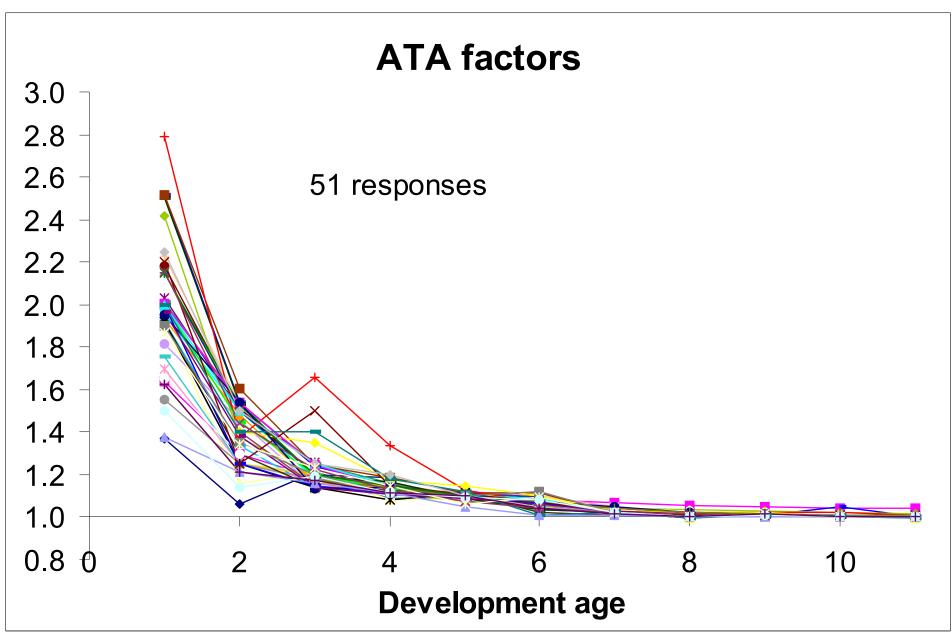
Accident												
Year	1	2	3	4	5	6	7	8	9	10	11	12
1991	1,782	3,000	6,924	10,167	12,369	14,047	13,577	14,289	13,831	14,419	14,563	14,484
1992	430	2,814	3,557	5,745	9,033	7,884	8,715	8,982	9,048	8,934	8,856	
1993	2,234	3,902	10,841	14,262	17,666	19,154	19,411	19,021	18,854	19,085		
1994	3,335	12,937	23,694	20,477	19,715	23,689	23,955	25,066	25,269			
1995	2,006	5,406	9,802	8,949	10,611	10,623	16,633	16,699				
1996	7,640	8,485	12,085	13,515	15,418	18,894	19,029					
1997	6,643	13,184	18,530	17,782	20,867	21,358						
1998	2,474	9,684	10,636	16,266	16,649							
1999	4,229	6,135	5,972	8,613								
2000	2,065	2,982	3,384									
2001	3,448	4,240										
2002	1,736											
Age-to-age												
1991	1.684	2.308	1.468	1.217	1.136	0.967	1.052	0.968	1.043	1.010	0.995	
1992	6.544	1.264	1.615	1.572	0.873	1.105	1.031	1.007	0.987	0.991		
1993	1.747	2.778	1.316	1.239	1.084	1.013	0.980	0.991	1.012			
1994	3.879	1.831	0.864	0.963	1.202	1.011	1.046	1.008				
1995	2.695	1.813	0.913	1.186	1.001	1.566	1.004					
1996	1.111	1.424	1.118	1.141	1.225	1.007						
1997	1.985	1.405	0.960	1.173	1.024							
1998	3.914	1.098	1.529	1.024								
1999	1.451	0.973	1.442									
2000	1.444	1.135										
2001	1.230											

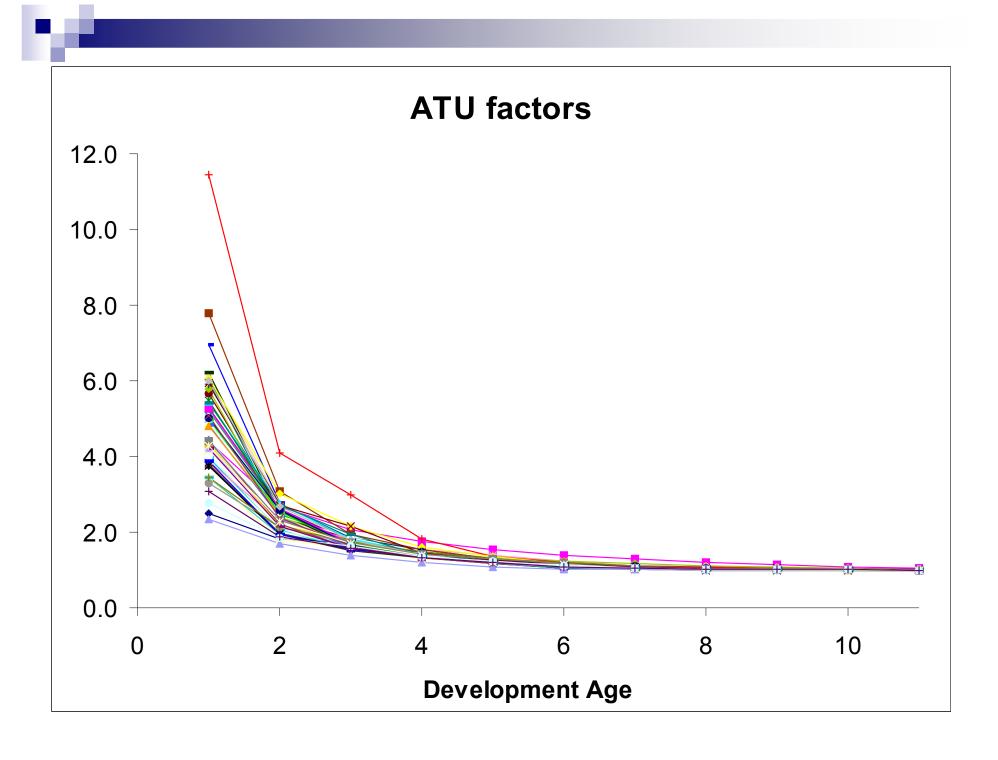


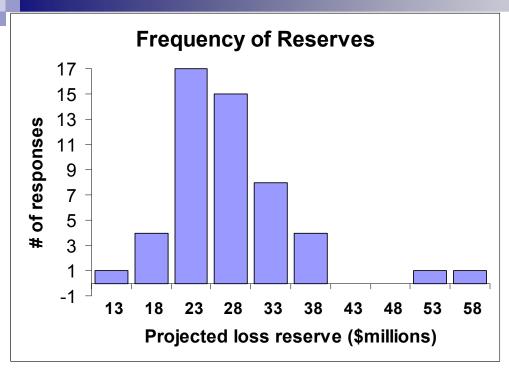
Responses

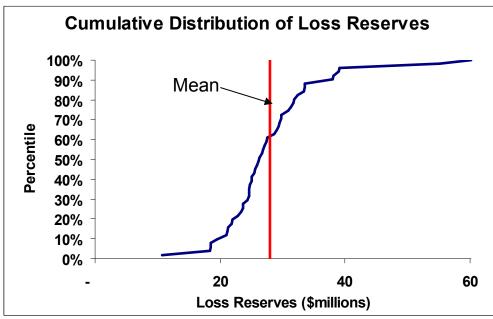
- "Great and gutsy project!"
- "I believe the whole notion of "picking factors" with no statistical guidance is something of a disgrace to the profession..."
- You need to look beyond the triangle!





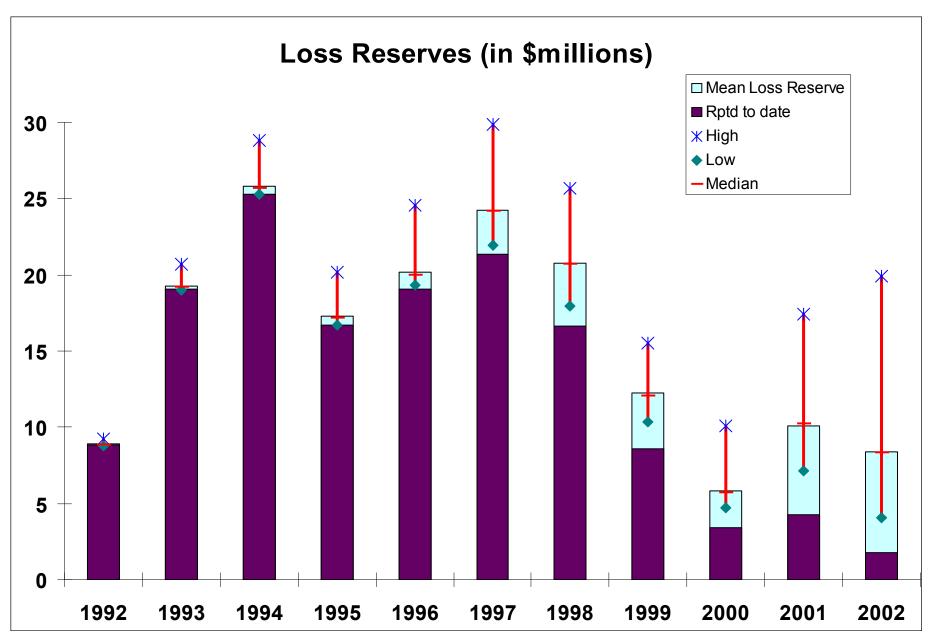






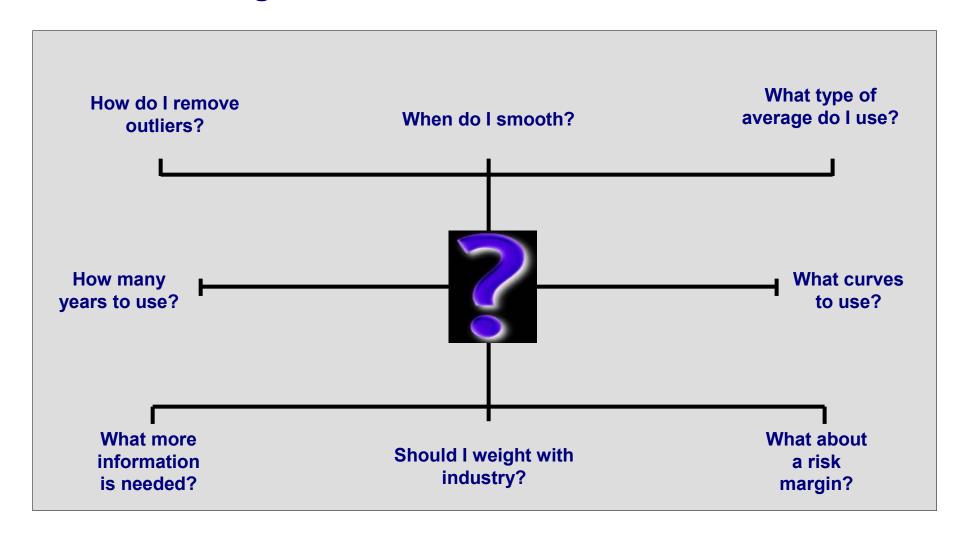
Implied Reserves				
	(in			
	\$millions)			
Mean	28.0			
Std. Dev	8.3			
Minimum	10.7			
2 nd lowest	18.3			
25 th percentile	23.7			
Median	26.2			
75 th percentile	31.1			
2 nd highest	55.2			
Maximum	60.2			







Basic Challenge



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Results—Number of Respondents

Remove Outliers	Yes 15	No 21
Smooth Links	Yes 23	No 13
Only Factors >= 1.00	Yes 12	No 5
Volume Weighted Averages	Yes 30	No 3
Straight Averages	Yes 8	No 24
Ex-Hi-Low Averages	Yes 12	No 17
All Years	Yes 19	No 11

Lowest Results

Lowest Standard Deviation

Highest Results

Highest Standard Deviation



... impact of outliers in the data ... bias

- Is there a bias in removing outliers?
 - limited data means the bias might be higher
 - tail of triangle might be particularly sensitive



... impact of outliers in the data ... winner's curse

> Reserving

> Pricing

> Portfolio

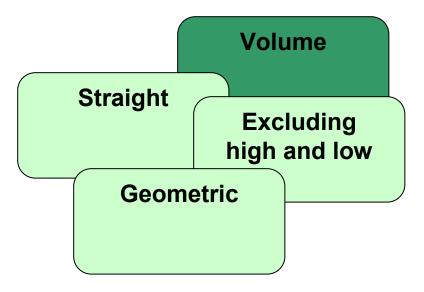
Line	Reserve	Actual	Variance
General Liability	\$75	\$100	-\$25
Professional	100	100	0
Auto Liability	100	100	0
<u>Property</u>	<u>120</u>	<u>100</u>	<u>+20</u>
All	\$395	\$400	-\$5

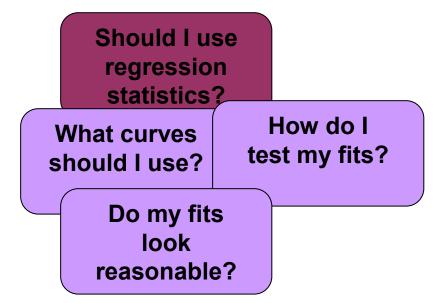
Line	Offered Price	Market	Variance
General Liability	\$75	\$100	-\$25
Professional	100	75	+25
Auto Liability	100	120	-20
<u>Property</u>	<u>120</u>	<u>100</u>	<u>+20</u>
All	\$395	\$395	\$0

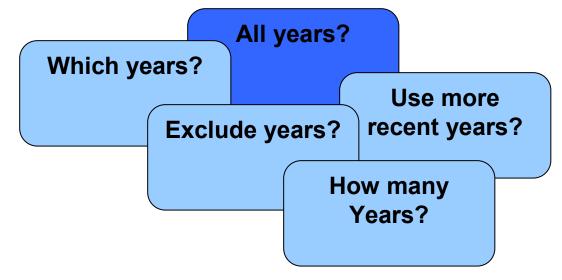
Line	Sold Price	Actual	Variance
General Liability	\$75	\$100	-\$25
Auto Liability	100	100	0
All	\$175	\$200	-\$25



Type of average/method

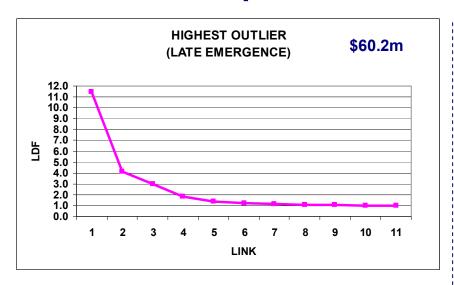


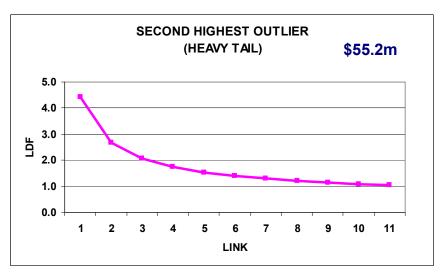


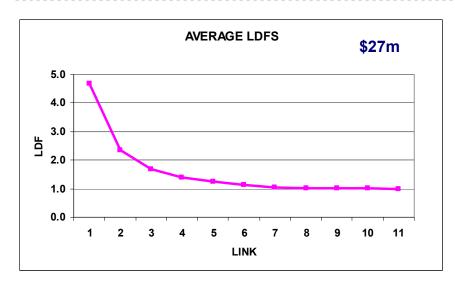




Two outlier respondents—Development Factors





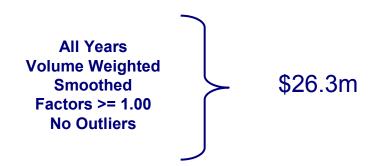


- > Late emergence
- > Heavy tail
- > Average of all selections



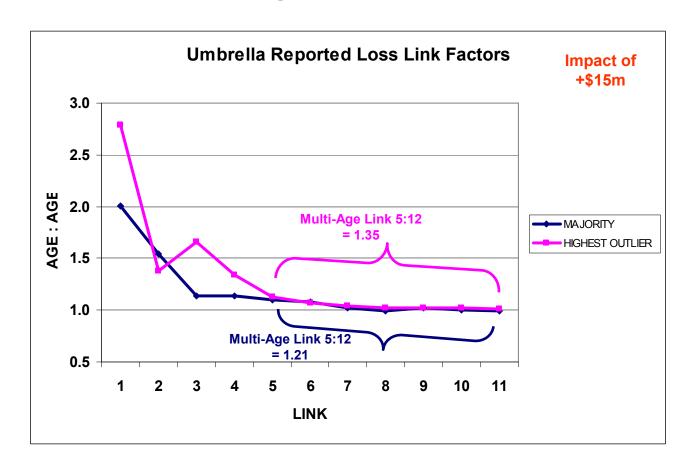
Average results and majority results

- > Average vs. "majority" rules
- Average of respondents = \$27.2m
- Calculated method using majority rules:

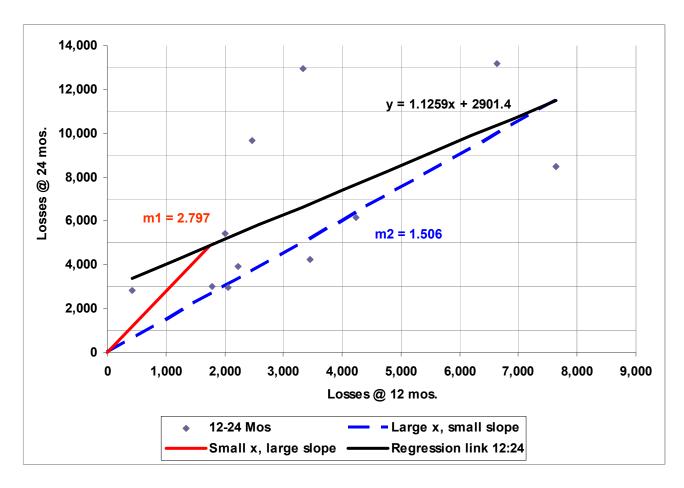


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Outlier Respondent—Highest



Negative Correlation





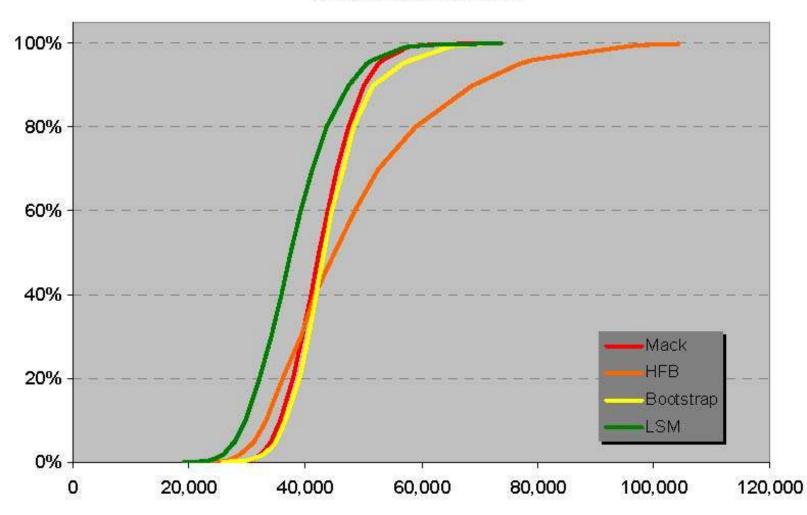
Lessons

- Benchmark selections against reasonable defaults (all-year weighted average?)
- Use multiple approaches
- Humility



Task Force On The Reputation Of Casualty Actuaries

Reserve Distributions





What next?

- Original project not really started.
- Need guidance on:
 - What's broadly reasonable
 - ☐ How to think about things
 - □ Range of techniques