



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

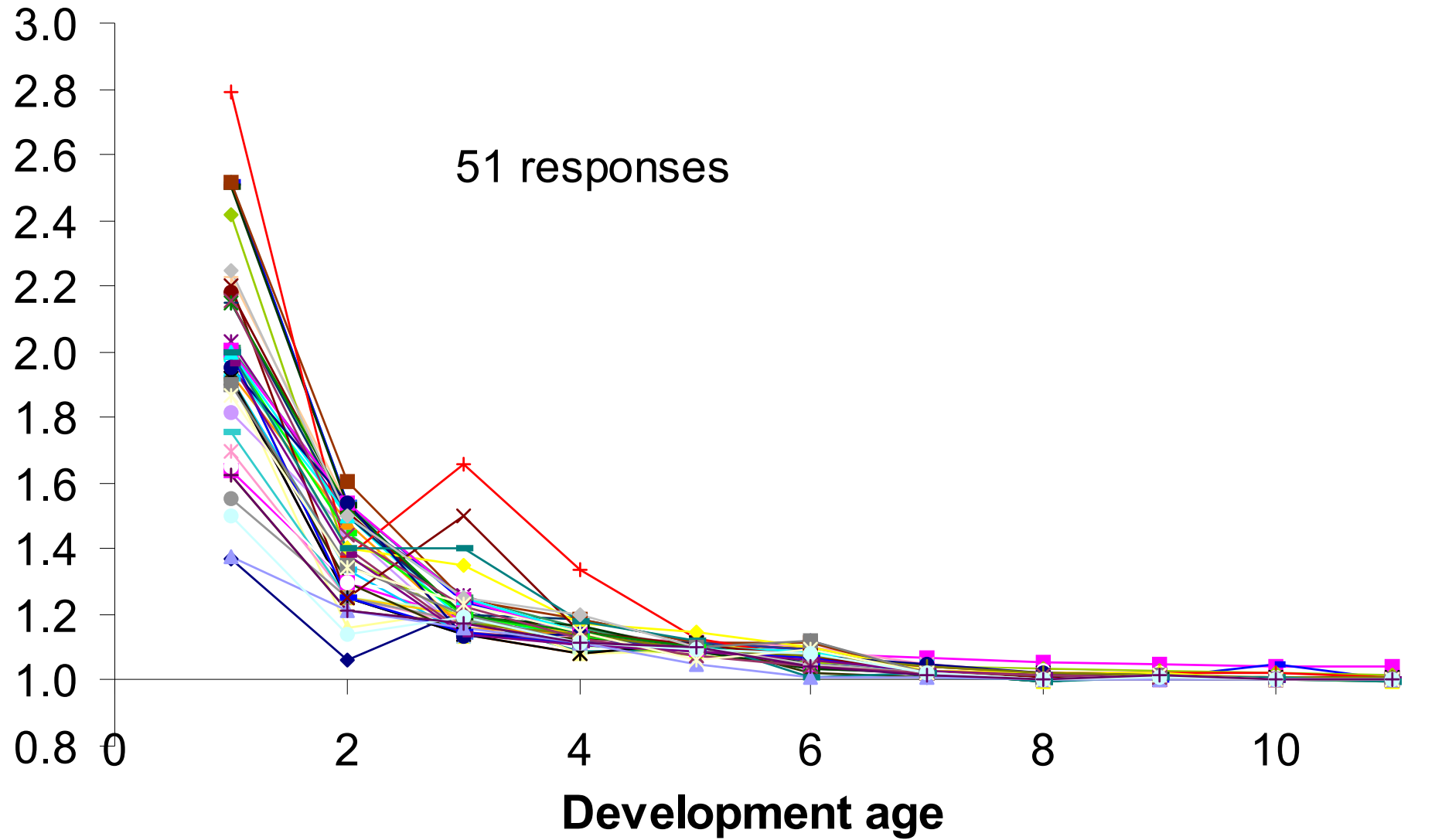


Responses

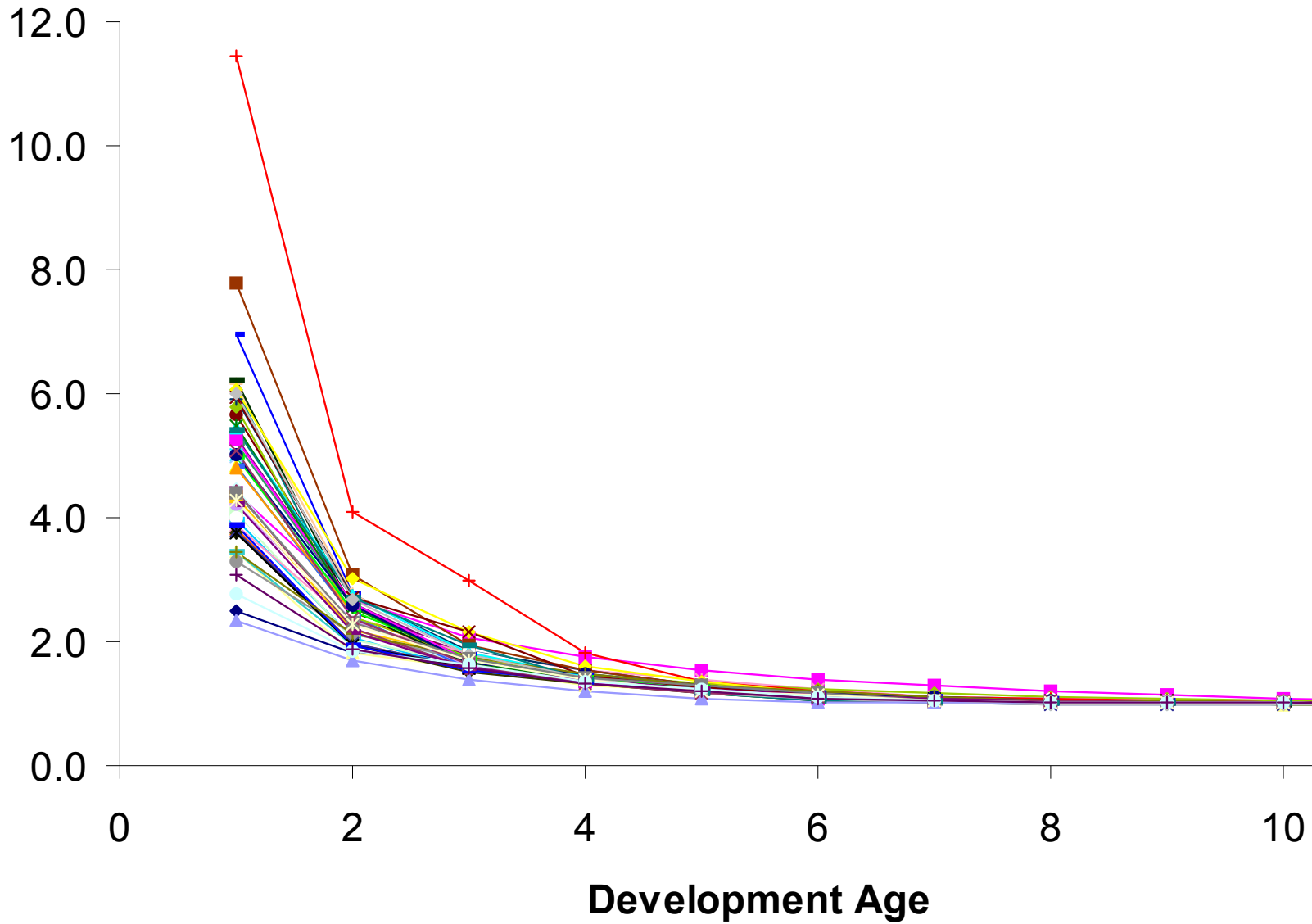
- “Great and gutsy project!”
- “I believe the whole notion of “picking factors” with no statistical guidance is something of a disgrace to the profession...”
- You need to look beyond the triangle!



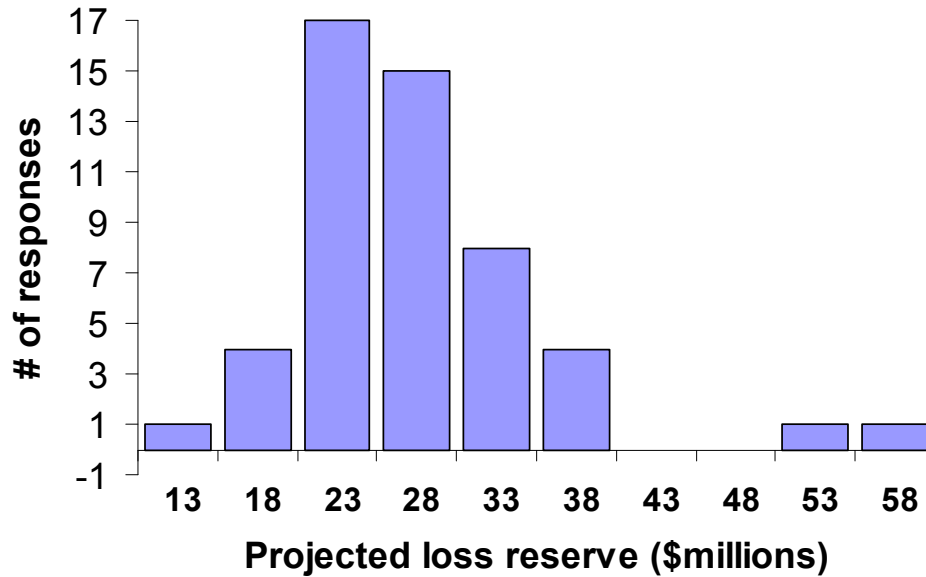
ATA factors



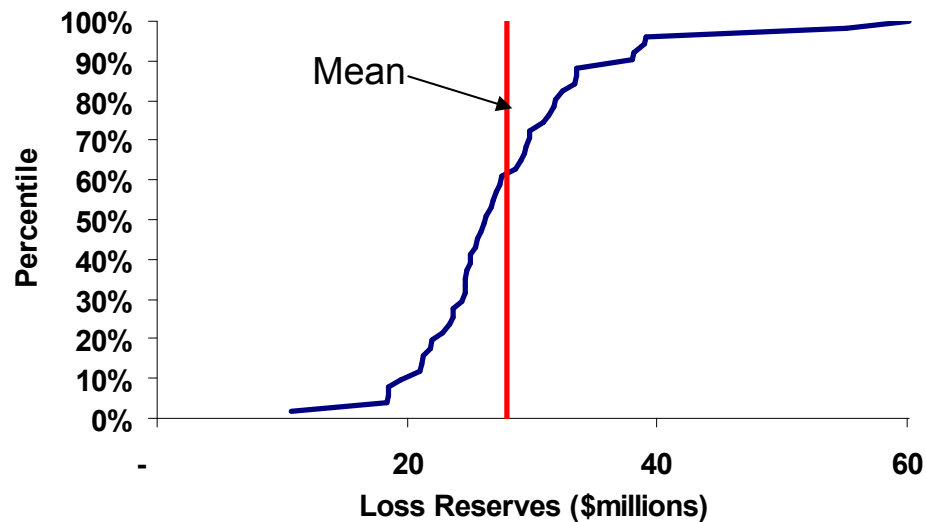
ATU factors



Frequency of Reserves

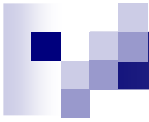


Cumulative Distribution of Loss Reserves

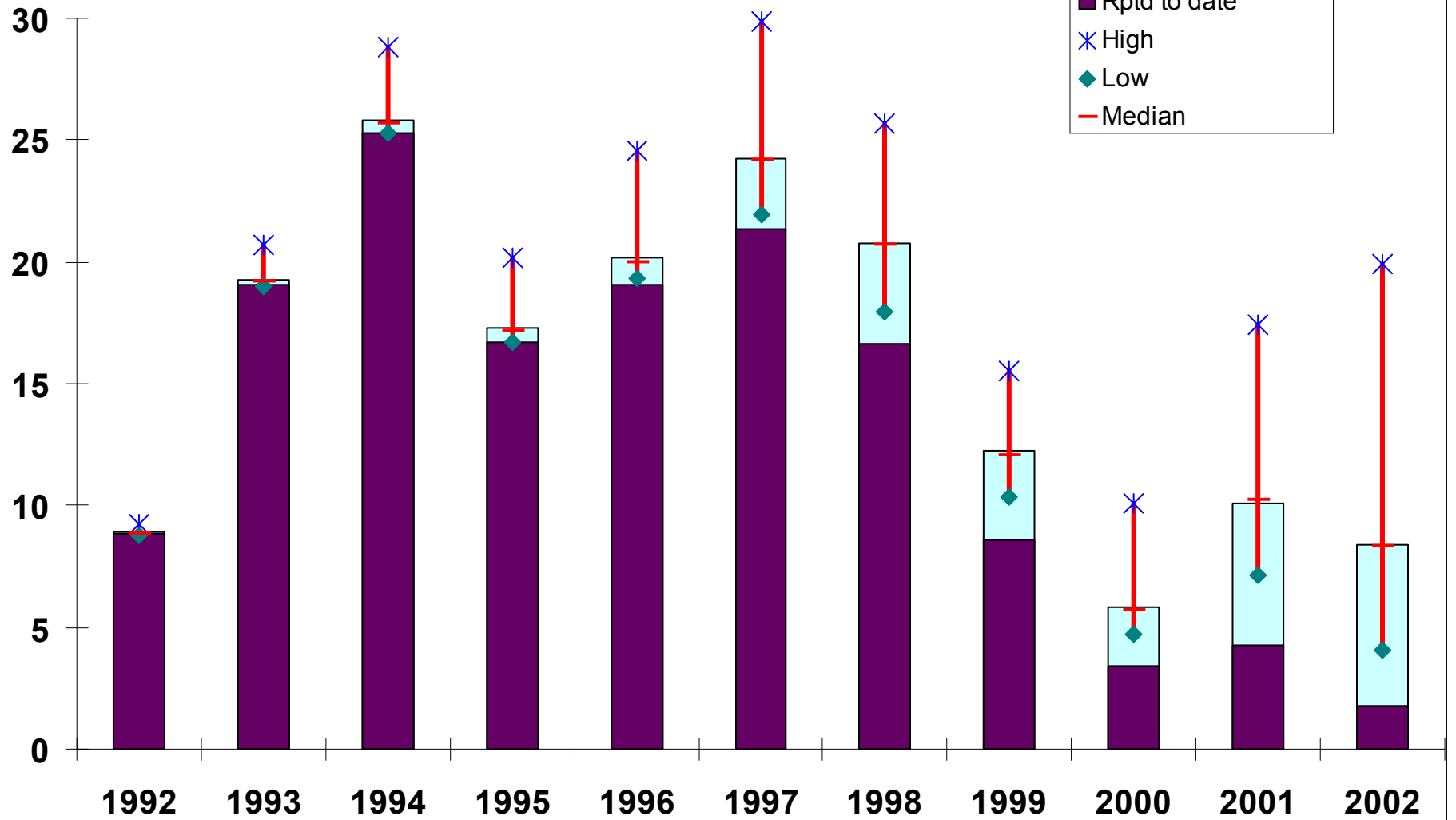
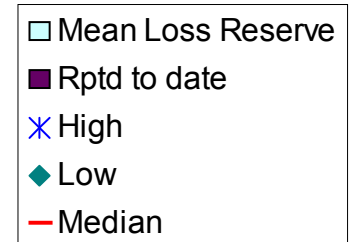


Implied Reserves

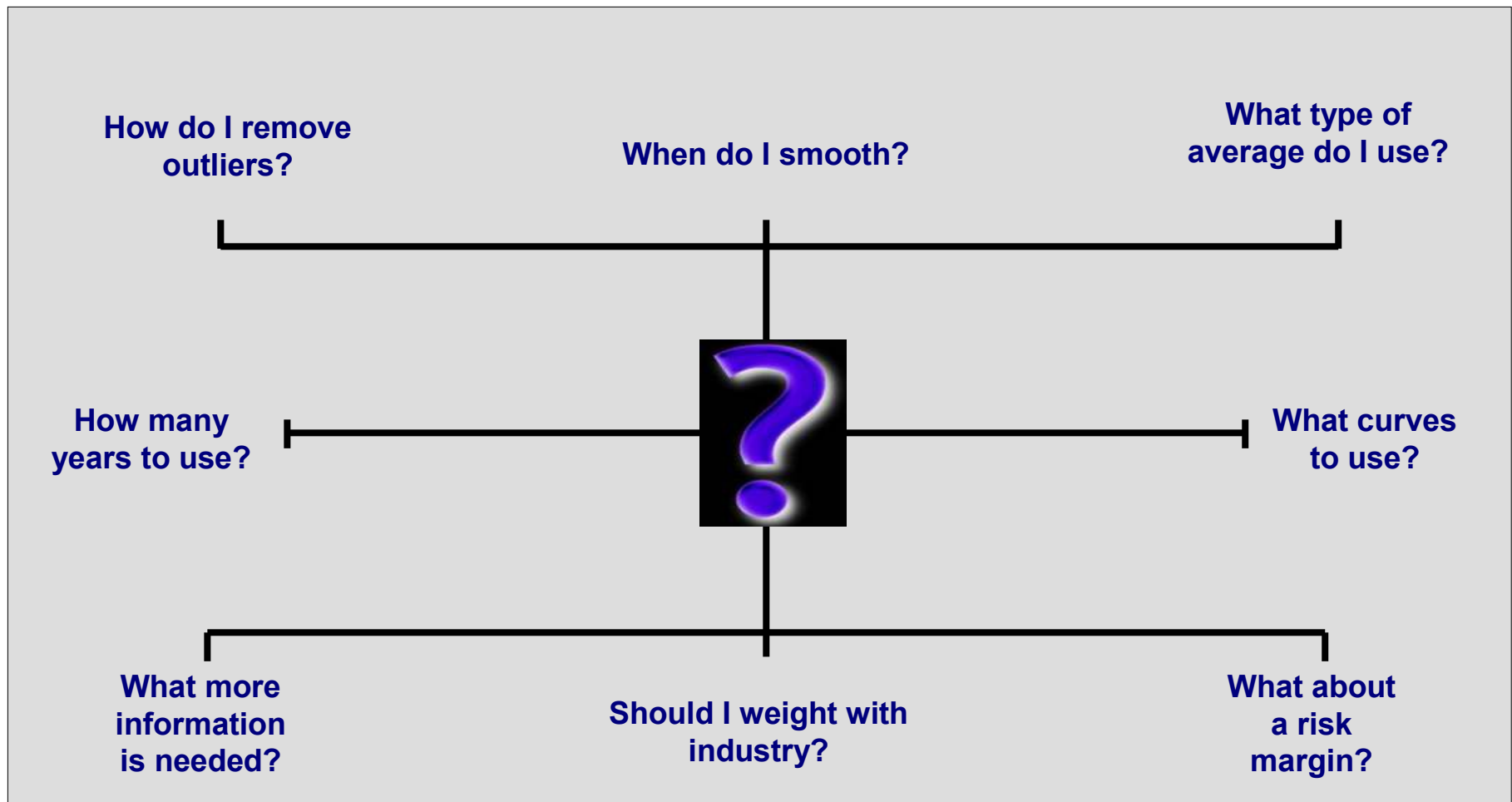
	(in \$millions)
Mean	28.0
Std. Dev	8.3
Minimum	10.7
2 nd lowest	18.3
25 th percentile	23.7
Median	26.2
75 th percentile	31.1
2 nd highest	55.2
Maximum	60.2



Loss Reserves (in \$millions)



Basic Challenge



Results—Number of Respondents

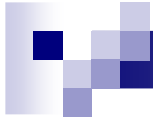
Remove Outliers	Yes 15	No 21
Smooth Links	Yes 23	No 13
Only Factors ≥ 1.00	Yes 12	No 5 ●
Volume Weighted Averages	Yes 30	No 3 ↑
Straight Averages	Yes 8 ✨	No 24
Ex-Hi-Low Averages	Yes 12	No 17
All Years	Yes 19	No 11 ↓

↓ 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

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

➤ Pricing

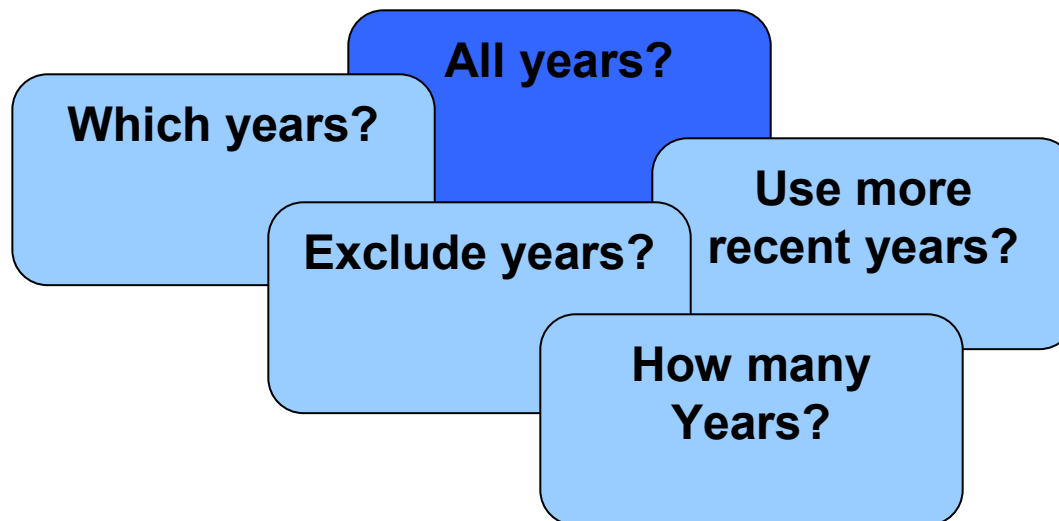
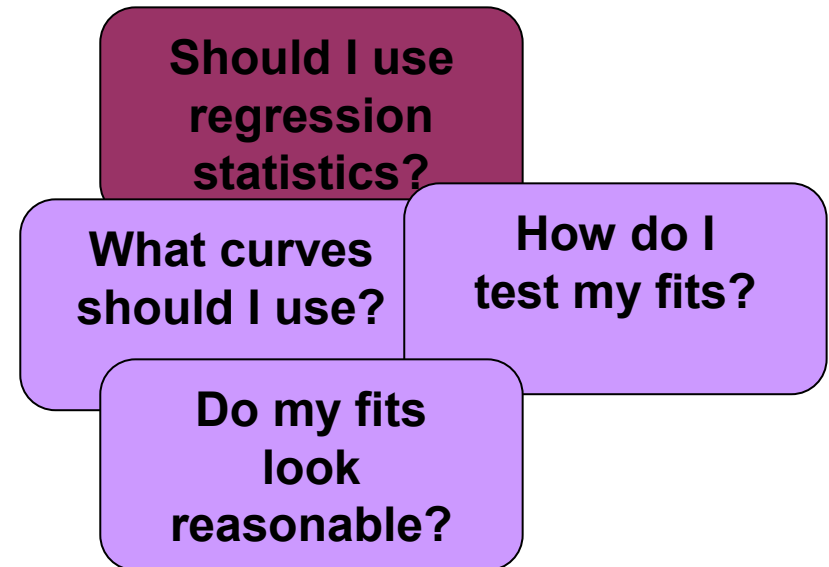
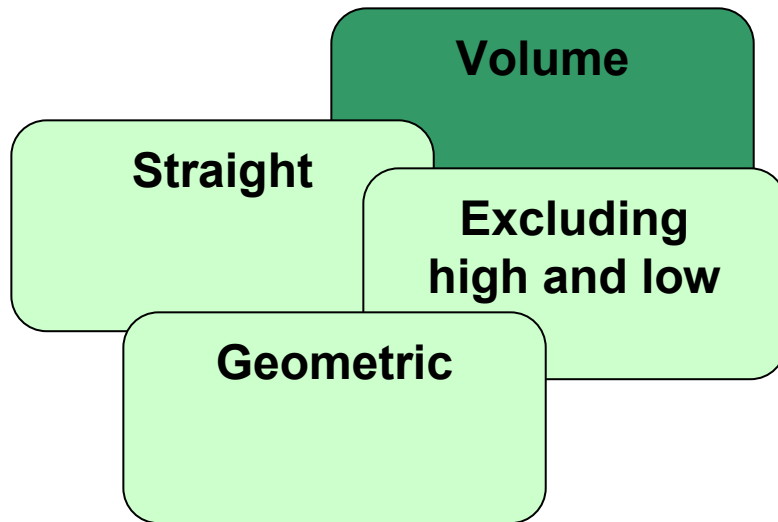
Line	Offered Price	Market	Variance
General Liability	\$75	\$100	-\$25
Professional	100	75	+25
Auto Liability	100	120	-20
<u>Property</u>	<u>120</u>	<u>100</u>	<u>+20</u>
All	\$395	\$395	\$0

➤ Portfolio

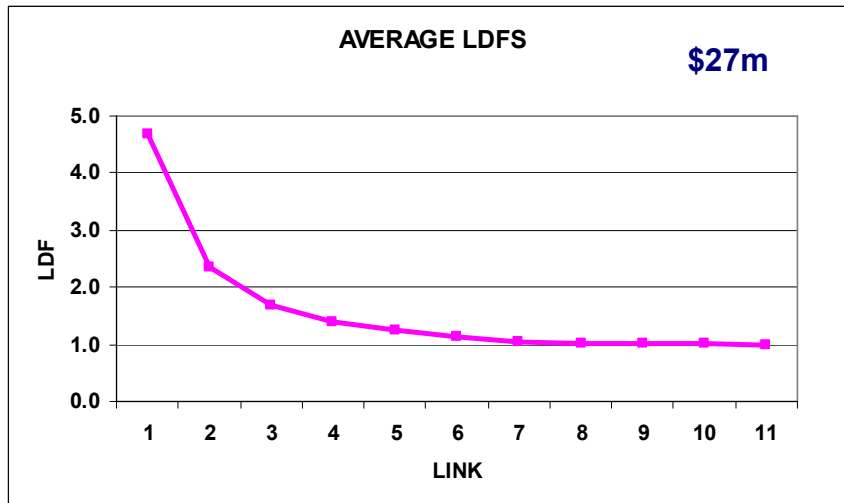
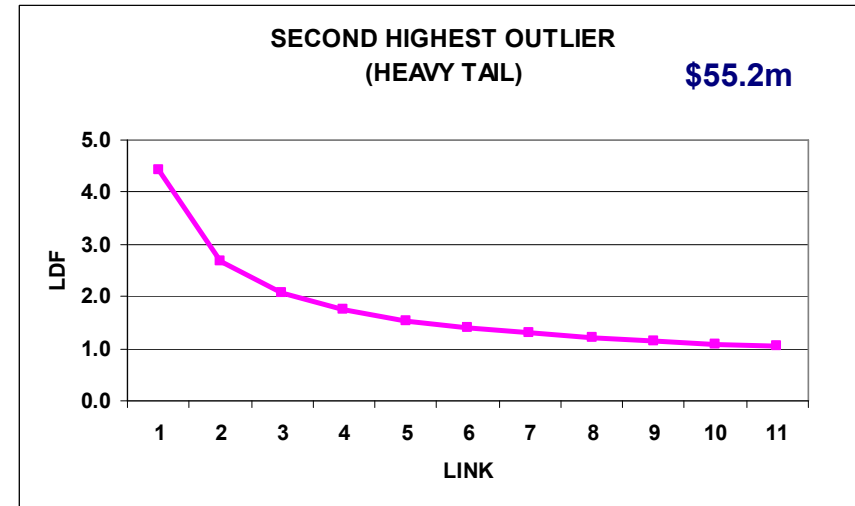
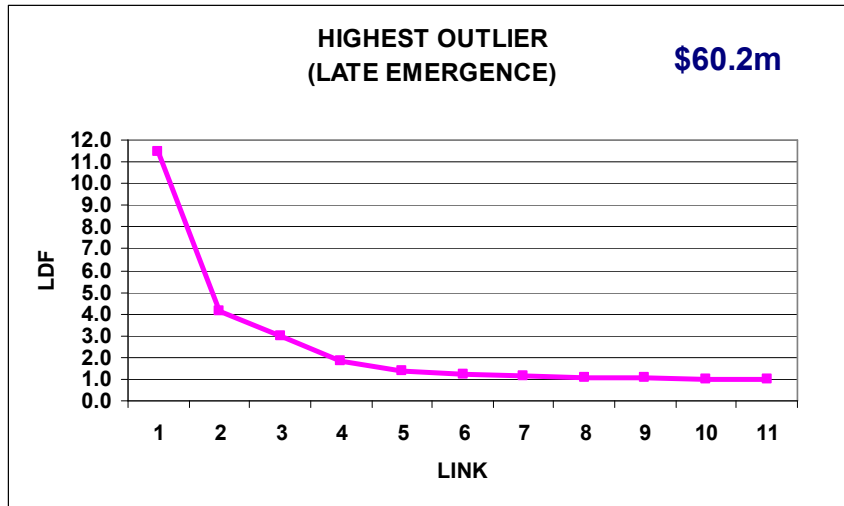
Line	Sold Price	Actual	Variance
General Liability	\$75	\$100	-\$25
Auto Liability	100	100	0
All	\$175	\$200	-\$25



Type of average/method



Two outlier respondents—Development Factors



- Late emergence
- Heavy tail
- Average of all selections



Average results and majority results

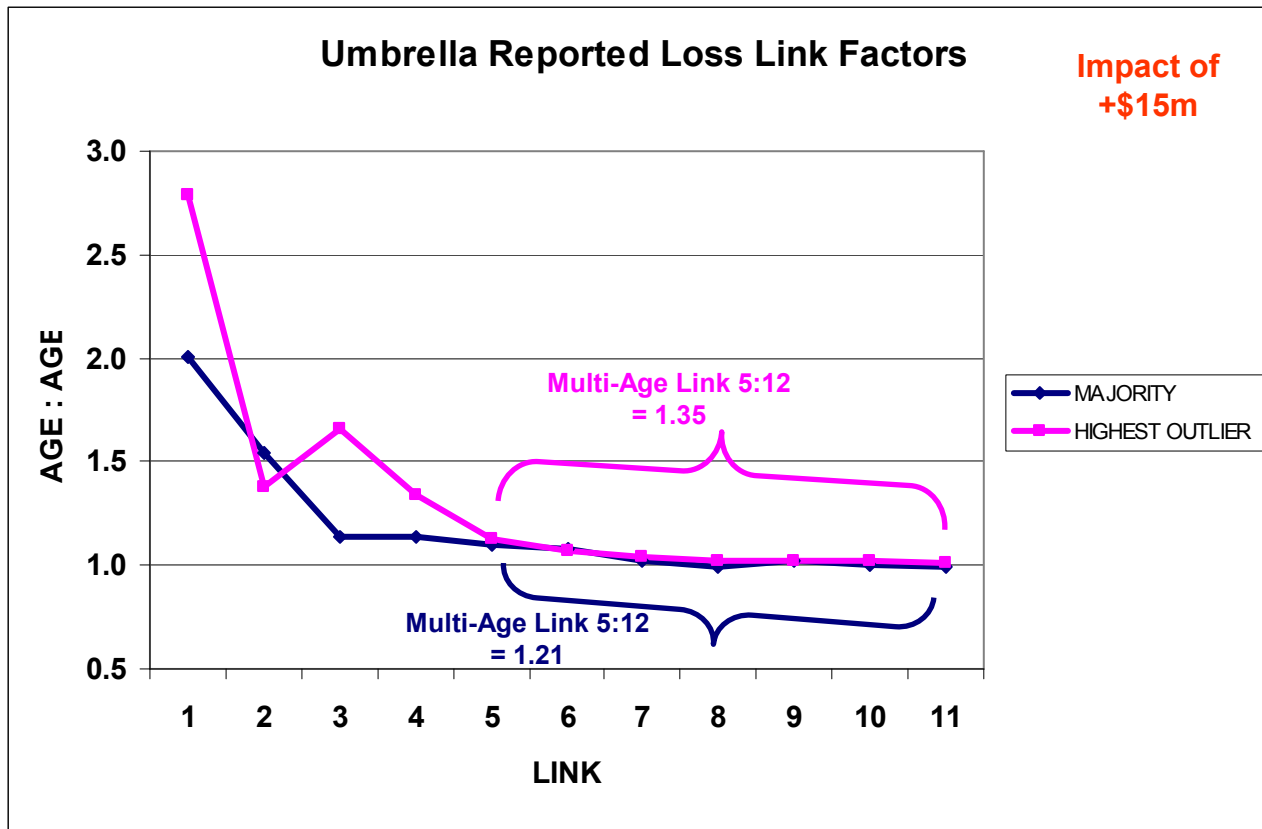
- Average vs. “majority” rules
- Average of respondents = \$27.2m
- Calculated method using majority rules:

All Years
Volume Weighted
Smoothed
Factors ≥ 1.00
No Outliers

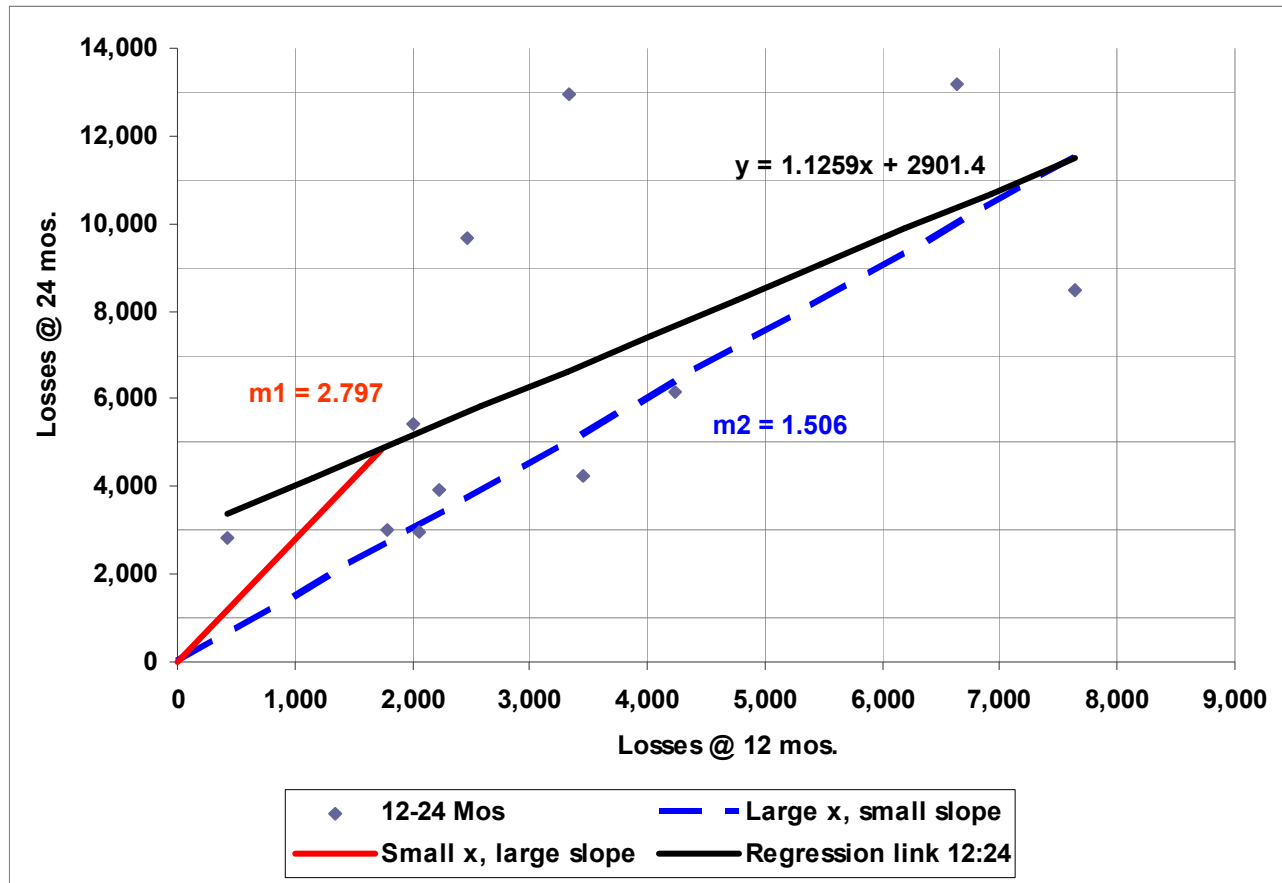


\$26.3m

Outlier Respondent—Highest



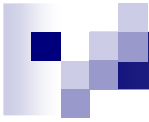
Negative Correlation





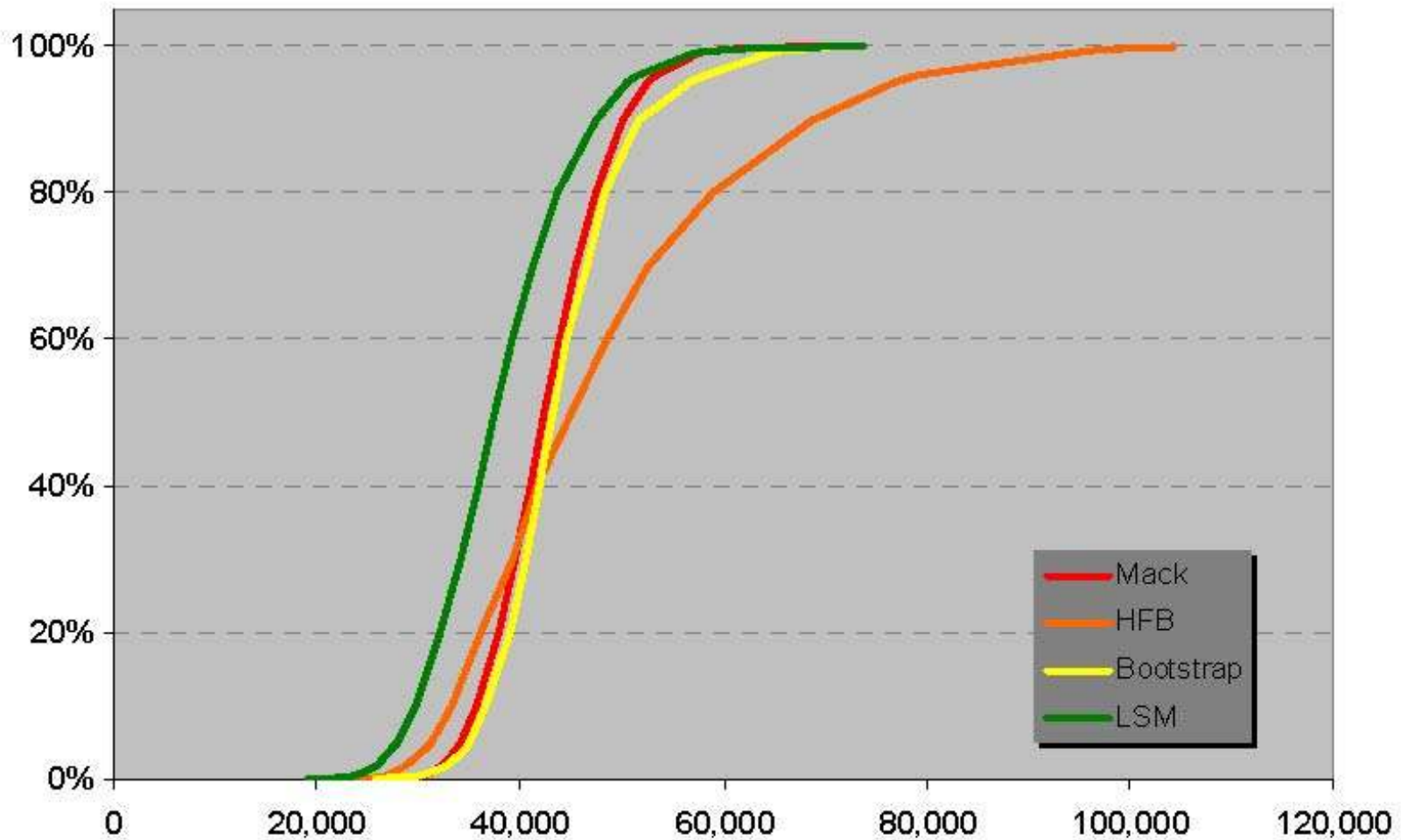
Lessons

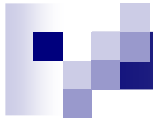
- Benchmark selections against reasonable defaults (all-year weighted average?)
- Use multiple approaches
- Humility



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