



Reinsurance Reserving and the Insurance Cycle

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Agenda

- Scope and Introduction
- The Underwriting Cycle – Data from Schedule P
- The Winner's Curse
- Cognitive Biases – Optimism, Anchoring, and "Present-Bias"
- Reinsurance Reserving
- Final Thoughts

US P&C Primary – Schedule P Commercial Auto Liability

Accident Year	Gross Earned Premium	Estimated Ultimate Loss	Estimated Ultimate LR	Original 12 Mo Ultmate LR	% Error in 12 Mo Estimate
1996	\$15.27	\$13.22	87%	81%	-6%
1997	\$15.34	\$14.05	92%	84%	-8%
1998	\$15.01	\$14.46	96%	85%	-12%
1999	\$15.46	\$16.02	104%	85%	-18%
2000	\$17.04	\$16.81	99%	84%	-15%
2001	\$18.53	\$16.32	88%	80%	-9%
2002	\$21.79	\$15.79	72%	73%	1%
2003	\$23.86	\$15.36	64%	69%	7%
2004	\$24.45	\$15.48	63%	66%	5%
2005	\$25.07	\$15.78	63%	67%	6%
2006	\$24.77	\$15.83	64%	68%	7%
2007	\$24.33	\$16.16	66%	69%	4%
2008	\$23.03	\$15.59	68%	70%	3%
2009	\$21.23	\$14.18	67%	69%	4%
2010	\$20.03	\$14.29	71%	71%	

US P&C Primary – Schedule P

Other Liability Occ + Products Occ & CM

Accident Year	Gross Earned Premium	Estimated Ultimate Loss	Estimated Ultimate LR	Original 12 Mo Ultmate LR	% Error in 12 Mo Estimate
1996	\$19.16	\$16.32	85%	78%	-8%
1997	\$19.55	\$18.56	95%	78%	-18%
1998	\$20.80	\$22.56	108%	82%	-24%
1999	\$21.90	\$27.20	124%	84%	-33%
2000	\$22.57	\$28.41	126%	84%	-33%
2001	\$27.80	\$30.24	109%	78%	-28%
2002	\$33.03	\$26.97	82%	71%	-13%
2003	\$40.30	\$25.76	64%	67%	5%
2004	\$44.83	\$24.21	54%	68%	26%
2005	\$46.31	\$25.72	56%	65%	17%
2006	\$48.10	\$28.30	59%	66%	12%
2007	\$47.41	\$30.22	64%	68%	7%
2008	\$43.91	\$29.87	68%	71%	5%
2009	\$38.89	\$27.55	71%	73%	2%

US P&C Primary – Schedule P Workers Compensation

<u>Accident Year</u>	<u>Gross Earned Premium</u>	<u>Estimated Ultimate Loss</u>	<u>Estimated Ultimate LR</u>	<u>Original 12 Mo Ultimate LR</u>	<u>% Error in 12 Mo Estimate</u>
1996	\$31.70	\$23.51	74%	76%	3%
1997	\$29.62	\$25.51	86%	79%	-8%
1998	\$29.17	\$29.53	101%	87%	-14%
1999	\$28.45	\$31.97	112%	88%	-22%
2000	\$31.03	\$34.52	111%	87%	-22%
2001	\$34.71	\$35.69	103%	89%	-13%
2002	\$39.58	\$32.16	81%	79%	-3%
2003	\$44.32	\$30.82	70%	74%	7%
2004	\$46.51	\$29.84	64%	74%	15%
2005	\$50.16	\$31.01	62%	74%	19%
2006	\$51.65	\$33.82	65%	73%	12%
2007	\$49.95	\$35.17	70%	73%	3%
2008	\$47.08	\$35.95	76%	75%	-2%
2009	\$42.26	\$33.39	79%	79%	-1%
2010	\$40.30	\$33.30	83%	83%	

What causes good
actuaries to produce
bad loss ratio
estimates?



Winner's Curse – Simple Example

- You, and 2 competitors are bidding on a quota share
- Everybody uses the same expenses and profit load
- Differ only in estimate of the loss ratio
- Winner-takes-all auction
- Everybody is equally smart



Winner's Curse - The Estimates

Bidder	Loss Ratio Estimate
You	50%
Competitor A	60%
Competitor B	70%

Winner's Curse – Example

- Winning bid assumes 50% loss ratio
- Average bid indicates 60% loss ratio
- 50% as the reserving a priori loss ratio
- The contract will run at 60%
 - → ADVERSE DEVELOPMENT - (More on this later)

The Winner's Curse in Reinsurance

Hard vs Soft Market

■ Hard Market

- Fewer bidders
- Limited capacity
- Placements not fully filled
- Reinsurer drives price, terms and conditions.
- When demand exceeds supply, the winner's curse effects are minimal.

■ Soft Market

- Many bidders
- More capacity
- Placements over-subscribed
- Insurer drives price, terms and conditions
- More "winner's curse load" is needed – but in practice margins are trimmed



Winner's Curse - Observations

- Greater uncertainty increases effects
- Winner's Curse Mitigants
 - Treaties are monitored carefully
 - Teams of reinsurance underwriters and actuaries thoroughly evaluate each risk
 - Long term partnerships
- However....
 - Treaties can and are routinely marketed – turnover is great
 - Clients can and do "keep more net"
 - Basic Winner's Curse dynamics are in full force
- "Flatness" of 12 month Schedule P loss ratios might partially be explained by the Winner's Curse.



Cognitive Biases

- **Cognitive bias** describes the inherent thinking errors that humans make in processing information.
- Field Pioneers - Kahneman and Tversky
- Popular Literature
 - Nudge
 - Why Smart People make Big Money Mistakes
 - Why we Make Mistakes
 - Wikipedia lists about 100 of cognitive biases
- Three Cognitive Biases potentially affecting the insurance cycle
 - Optimism (Overconfidence) and the Planning Fallacy
 - Anchoring and Adjustment
 - "Present-Bias" and Familiarity



Optimism and the Planning Fallacy

- It is fully human to be optimistic
 - My kid is smarter than average, and a good athlete too.
 - I drive better than most people
 - I'm going to live a long and healthy life

- The Planning Fallacy
 - We are optimistic about outperforming our competitors
 - Cost overruns on construction projects
 - Overpromising on deadlines



Optimism (Overconfidence) in Insurance

- Leaders are very confident, optimistic people
- Underwriting Managers - Personal Observations
 - Particularly confident, convincing
 - Excellent reputations
 - Results over the cycle are rarely seen
 - Planned Loss Ratios have been in a similar range since 2003
- Plan Loss Ratios are much flatter through the cycle than actual results

Anchoring and Adjustment

- Anchor – An initial value chosen as a reference point.
- How does an anchor bias estimates?
 - People start with the anchor and "adjust" until they reach an acceptable answer
 - Overwhelming experimental evidence shows that adjustments tend to be insufficient

Anchoring and Adjustment: Real Estate Appraisals Experiment

- Study uses 21 Real Estate Agents in Tuscon, AZ - 1987
- Provided identical, complete 10 page information packets with one exception – the listing price.
 - Two Listing Prices (Anchors) \$65,900 and \$83,900.
 - Actual Listing price and appraised value: \$74,900.
- Agents visited the home and were asked for estimates of
 - Appraised Value
 - Appropriate Listing Price
 - Reasonable Sales Price
 - Lowest offer they would accept as the Seller

Anchoring and Adjustment: Real Estate Appraisals Results

Results for Experiment 1				
Mean Estimates of Expert Subjects				
Listing Price	Average Appraisal Value	Average Listing Price	Average Purchase Price	Lowest Acceptable Offer
\$65,900	\$67,811	\$69,966	\$66,755	\$65,000
\$83,900	\$75,190	\$76,380	\$73,000	\$72,590
Source: Northcraft and Neale, 1987				

- Authors claim that that the arbitrary listing price biases the answers
- Agents generally claimed that listing price was not a factor
- Not addressed - Why was \$65,900 was adjusted less than \$83,900?

Anchoring and Adjustment in Insurance

■ Anchors in Insurance/ Reinsurance

- Plan Loss Ratios
- Client or Broker Analyses
- Last Year's loss ratio estimate
- Last Year's reserve estimate

■ Are actuarial estimates biased because we so commonly anchor on another estimate and adjust?

Present-Bias and Familiarity

■ "Present-Bias"

- Psychological tendency to be more responsive to immediate consequences than delayed ones

■ Familiarity

- People are more willing to harm strangers than individuals they know

Present-Bias and Familiarity in Insurance

■ Familiarity

- We know (and generally like) our colleagues and clients

■ Present-Bias

- Buying in to safe assumptions is easier than delivering bad news, even if bad news now is more helpful in the long run.

- Do we (unconsciously) take safe positions because we are hardwired to focus on the immediate consequences of our actions?

Combined Effects of Winner's Curse and Unconscious Biases

■ Soft Market

- Optimism → Aggressive plan loss ratios
- Anchoring, Discounting and Familiarity drive actuarial estimates to plan loss ratios or status quo
- The Winner's Curse ensures that sometimes when we win – we lose
- Most are declining a lot of business, fully believing that they are maintaining costing and underwriting integrity.

■ Hard Market

- Fear trumps overconfidence → Conservative plan loss ratios
- Plan loss ratios (anchors) are too high (why overpromise) and there is little incentive to adjust.
- Discounting and Familiarity drives loss ratio estimates to plan
- Winner's curse is less pervasive

Reinsurance Reserving

■ Bornhuetter-Ferguson

- Winner's Curse and Cognitive Biases may lead to pricing loss ratios that are flat over the cycle.
- Pricing Loss Ratios are ready made BF seeds since they are well vetted and analyzed

But...

■ Biased Pricing Loss Ratios → Biased Loss Reserves

Reinsurance Reserving

- "Walk Back" Current Loss Ratios
 - Use recent costing loss ratio
 - Estimate implied historical loss ratios using loss trend, exposure trend, and rate change assumptions
 - Compare walked back loss ratios with current reserving estimates
- Pre-determined Winner's Curse/Cycle adjustment to B-F Loss Ratios?
- Don't forget about Chain Ladder
 - Sometimes the simplest approaches give the best answers
- Get totally independent estimates to eliminate potential anchoring effects
- Mix shifts are a real challenge

Questions to Think About

- How does the Winner's Curse affect your world?
- How might cognitive biases be impacting your work?
- Would actuaries benefit from formal cognitive bias training?
- Can companies that take the potential biases seriously manage the cycle more effectively?

Sources and Further Reading

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Thank you

