



Introduction to Reinsurance Reserving

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Agenda

- Reinsurance Contract Types
- Data Grouping Dimensions
- Differences between Reinsurance and Primary that affect Loss Reserving
- Applications, Complications, and Considerations



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Reinsurance Contract Types

- What Policies Are Insured?
- Mechanics of the Cover



Reinsurance Contract Types

- What Policies Are Insured?
 - Facultative Reinsurance
 - Generally covers one insured/policy
 - The one insured/policy is known to the reinsurer at inception



Reinsurance Contract Types

- What Policies Are Insured?
 - Treaty Reinsurance
 - Covers multiple insured/policies which fit treaty specifications
 - These multiple insured/policies are unknown at inception but become known to the reinsurer during the treaty term



Reinsurance Contract Types

- Mechanics of the Cover
 - Proportional Reinsurance
 - “Follows the Fortunes” of the reinsured company First-dollar sharing of premium and loss between the parties
 - Reinsurer’s relative participation is predetermined
 - Examples: Quota Share, Surplus Share



Reinsurance Contract Types

- Mechanics of the Cover
 - Excess Reinsurance
 - Responds when a loss, group of losses, or a loss ratio exceeds a set figure
 - Reinsurer's relative participation is NOT predetermined, but depends on the size of the loss or loss ratio
 - Examples: Per Risk, Per Occurrence, Aggregate
 - Others



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Data Grouping Dimensions

- Accident Year vs. Underwriting Year
 - Or “Losses Occurring” vs. “Risks Attaching”
- Casualty vs. Property
- Treaty vs. Facultative
- Excess of Loss vs. Proportional
- Broker vs. Direct



Data Grouping Dimensions

- Accident Year vs. Underwriting Year
 - Accident Year allows for easiest application of standard techniques
 - Premium fixed as of December 31
 - Population of claims fixed at December 31 as well, though many may be unknown
 - May not always be an option for reinsurance



Data Grouping Dimensions

- Accident Year vs. Underwriting Year
 - Underwriting Year is often used in reinsurance, especially for proportional contracts
 - This is problematic as an UY can cover two policy years and three calendar years for losses
 - The current UY as of 12 months is “incomplete”

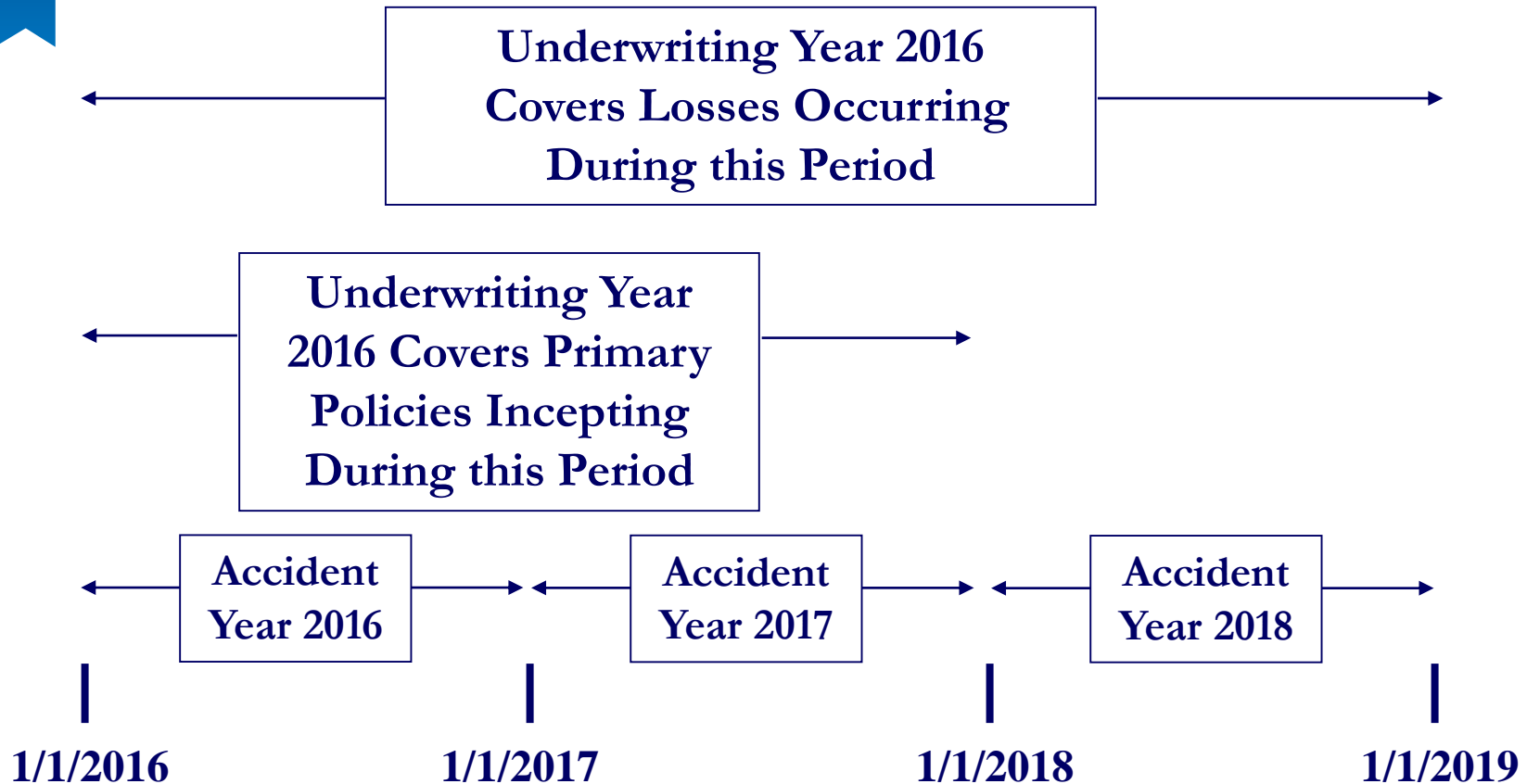


“Incomplete Underwriting Year”

- UY 2018 includes treaties written by the reinsurer in 2018
 - “Risks Attaching” and/or “Policies Incepting”
 - UY 2018 can span two years and three accident years
- At 12/31/2018, UY 2018 is “incomplete”
 - Standard development methods derived from the past UYs will overstate the development of UY 2018
 - Historical development after 12 months includes exposures yet to be earned
 - Provision for these losses should not be included in reserves at the 12/31/2018 accounting date



"Incomplete Underwriting Year"



Sample Time Line



Data Grouping Dimensions

- Casualty vs. Property
 - Casualty business generally has a longer development tail
 - Line of business (LOB) detail is often not available to the reinsurer, but if it is you might want to further subdivide by LOB as different LOBs may develop differently





Data Grouping Dimensions

- Treaty vs. Facultative
 - These display different development patterns, all else equal



Data Grouping Dimensions

- Excess of Loss vs. Proportional
 - Can be more important to split than line of business
 - Different development patterns
 - Possible reserve adequacy mix
 - Excess of Loss - Case reserves generally reviewed by reinsurer claim department and “ACRs” established
 - Proportional - Case reserves booked as reported by ceding company without reinsurer review
 - Split Excess by layer - low, high, catastrophe



Data Grouping Dimensions

- Broker vs. Direct
 - Reinsurers obtain business either directly from cedant or through broker (or both)
 - Data flowing through broker may create additional reporting lag and result in different development patterns



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Differences Between Primary and Reinsurance

- Reporting Lag/Development Lag
- Data
- Increased Variability
- Tailor-Made or Atypical Contracts or Features
- “Accumulation of Issues”



Differences Between Primary and Reinsurance

- Reporting Lag/Development Lag
 - Primary losses development faster than reinsurance losses if only due to time lag for data to reach reinsurer
 - Proportional business: Accounts not due to reinsurer until 30-90 days after quarter close
 - It is possible that losses booked by ceding company in calendar year “X” will be realized and booked by reinsurer in calendar year “X+1”



Differences Between Primary and Reinsurance

- Reporting Lag/Development Lag
 - Excess business: Reporting lag compounds with development lag
 - Reinsurer not notified immediately of the loss
 - The losses do not “hit” the reinsurer’s data until they exceed the threshold established in the Excess reinsurance contract



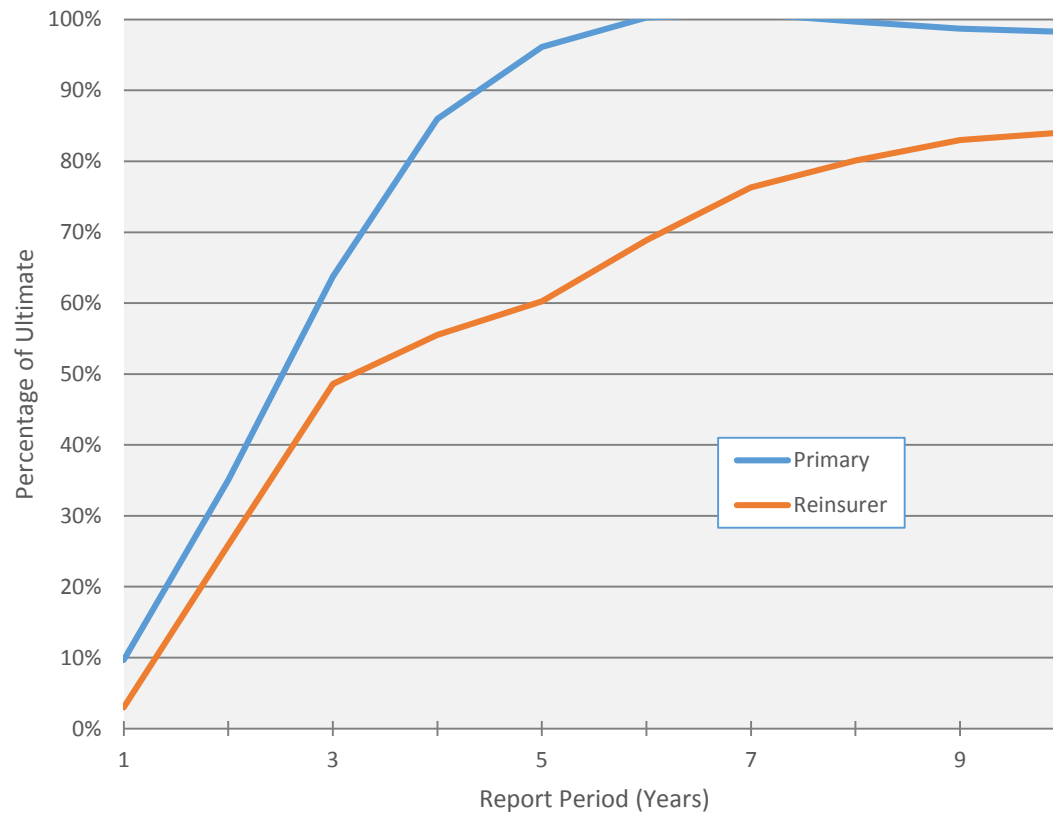
Differences Between Primary and Reinsurance

- Reporting Lag/Development Lag
 - Excess business: Reporting lag compounds with development lag
 - Example:
 - \$400,000 excess of \$100,000 per risk cover
 - Loss occurs in Year 1, reserved for \$25,000
 - Year 3 - reserve increased to \$50,000, reinsurer verbally notified that loss MAY eventually reach their contract
 - Year 5 - reserve increased to \$150,000, reinsurer incurs loss 4 years after the primary company



Primary vs. Reinsurer

Primary vs. Reinsurer
Historical Loss Development
Medical Professional Liability



Source: RAA Historical Loss Development Study, 2015 Edition
Milliman analysis of MPL-Occ Schedule P data from S&P Global Market Intelligence



Differences Between Primary and Reinsurance

- Reporting Lag/Development Lag
 - Premium Estimates
 - Needed in reinsurance more than for primary insurance
 - Reserves must be set against premium earned as of the accounting date
 - Reporting lag can cause large earned premium amounts to be unreported to the reinsurer as of the accounting date
 - Creates a need to estimate premium and losses associated with this premium



Differences Between Primary and Reinsurance

- Data
 - Quantity
 - The “infinite” detail of primary company data is often lost when reported to reinsurers as data gets “collapsed” along several dimensions
 - Accident dates not reported
 - Lines of business not reported
 - Industry benchmarks by line of business or accident year can thus be difficult to use



Differences Between Primary and Reinsurance

- Data

- Quality - affected by “varied quantity”

- Some ceding companies report more detail to reinsurers than do others
- As reinsurance data for reserving is organized at the level of common detail in terms of reported data fields, this has an impact on the quality of the analysis



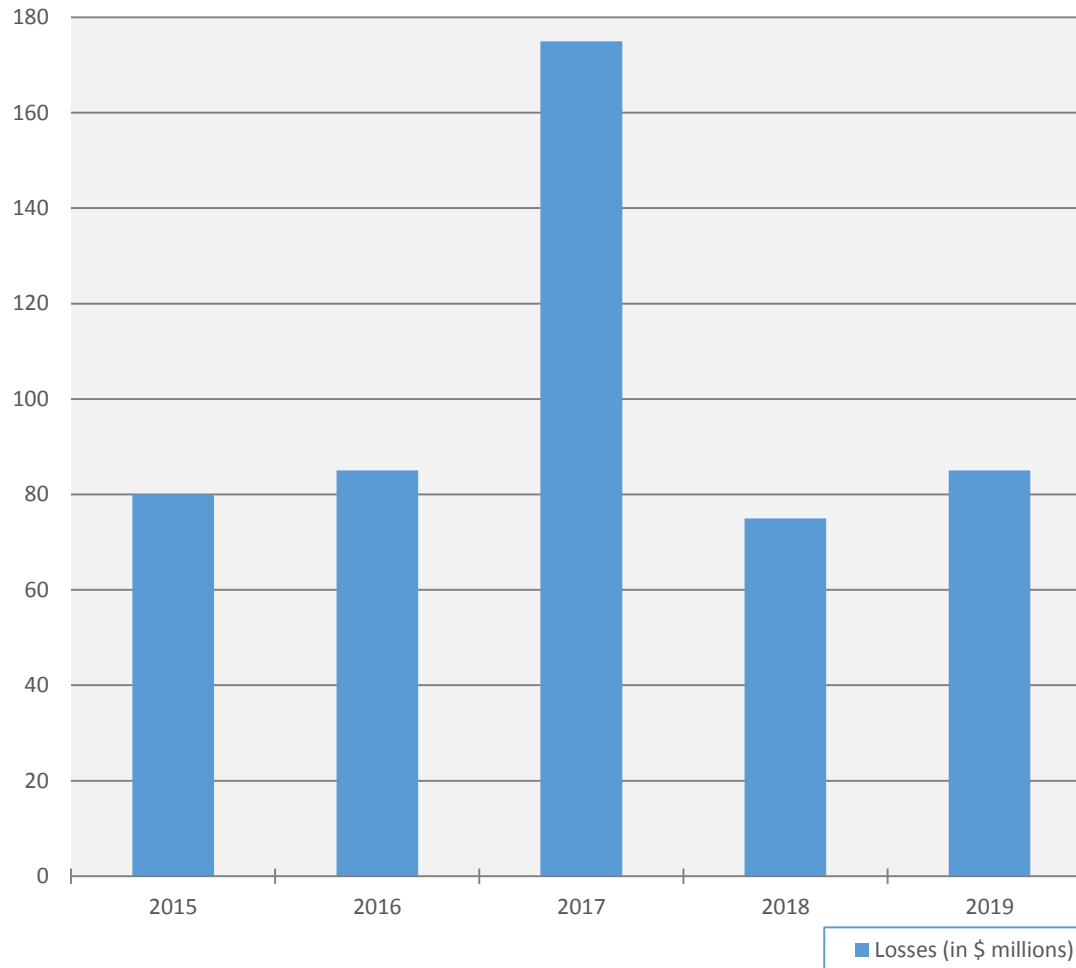
Differences Between Primary and Reinsurance

- **Increased Variability**

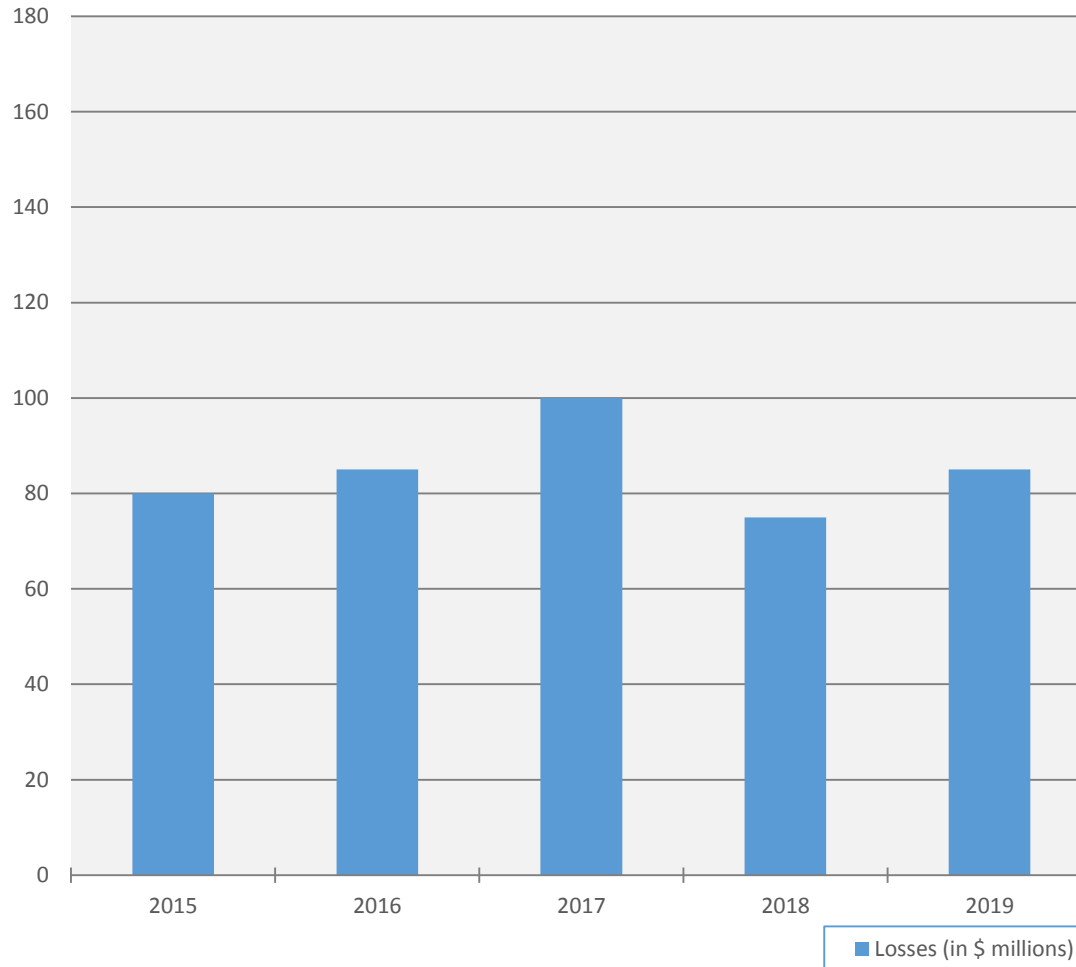
- Primary insurers purchase reinsurance (among other reasons) to make their results less variable (i.e. from catastrophes)
- Reinsurer data is subject to this reinsured variation
- Depending on the type of reinsurance cover, reinsurer data may BE this variation



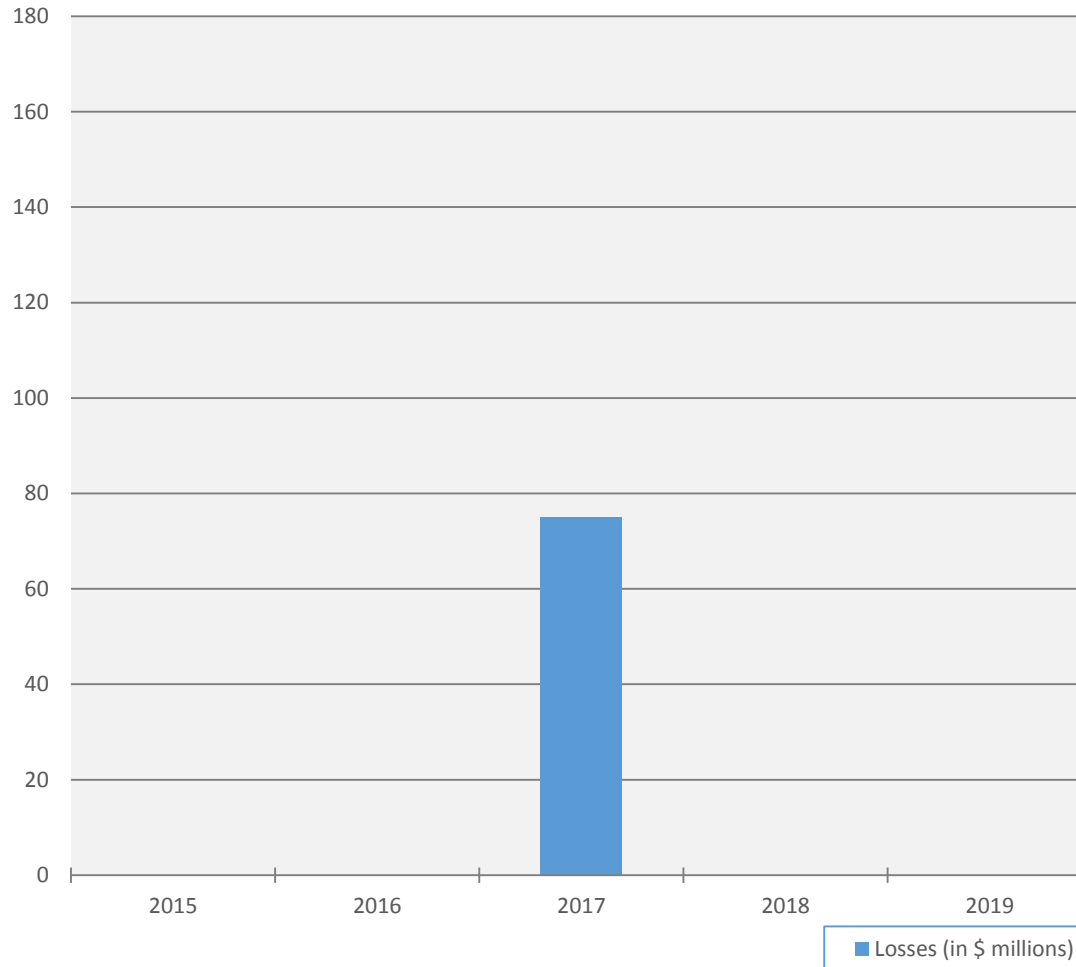
Primary Experience Gross of Reinsurance



Primary Experience Net of Reinsurance



Reinsurance Experience



Differences Between Primary and Reinsurance

- **Tailor-made or Atypical Contracts or Features**
 - Many (possibly large) reinsurance contracts have features that affect the way their experience will develop relative to other contracts with which they would otherwise be grouped
 - Examples: Stop loss arrangements, loss corridors, sunset clauses, etc.



Differences Between Primary and Reinsurance

- “Accumulation of Issues”
 - Each primary insurer faces issues (e.g. changes in reserve adequacy, settlement patterns, etc.)
 - Issues affect company’s loss reserving data, and reserving analyst has tools to neutralize the effects
 - Reinsurance loss reserving data is an accumulation of primary data each of which may have these issues
 - Adds a further complication to the reinsurance loss reserving process



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- *Applications, Complications, and Considerations*





Applications, Complications, and Considerations

- Application of Projection Methods
 - Loss Development Method
 - Loss Ratio Method
 - Bornhuetter-Ferguson Technique
 - Other Methods



Applications, Complications, and Considerations

- **Complications**
 - Parameter uncertainty
 - Volatility in RTR factors
 - Result can be very leveraged by tail factor selection
 - Loss trend factors
 - Expected loss ratios
 - Data constraints
 - Line of business definition
 - Claim count information often lacking
- **Other considerations**
 - Qualitative information



Loss Development Method - Assumptions

- Assumes the relative change in a given year's reported loss & ALAE from one evaluation to the next will be similar to the relative change in prior years' reported loss & ALAE at similar evaluation points
 - RTR factors measure change in reported loss & ALAE at successive evaluations
 - Tail factor allows for development beyond the observed experience
- Assumes the relative adequacy of the company's case reserves has been consistent over time
- Assumes no material changes in the rate claims are paid or reported



Loss Development Method – Suggestions for Tail Factors

- Industry benchmarks
 - RAA for excess
 - Reinsurance industry data going back 40+ years
 - Available for treaty vs. facultative and by attachment range
 - Primary sources lagged for pro-rata
 - ISO
 - A.M. Best
 - NCCI
 - Curve fitting
 - Compare to benchmarks for reasonability



Loss Development Method – How to deal with variability in Historical Development

- Refine data
 - Line of business mix
 - At the very least need to split property vs. casualty & pro-rata vs. excess
 - Treaty vs. facultative
 - Attachment points/limits
 - Need to understand attachment points on a ground up basis
 - How are attachment points/limits changing over time
 - Segregate catastrophes
 - Assess whether or not data is still credible after making refinements



Loss Development Method – How to deal with variability in Historical Development

- Adjust for unique situations and claims
 - Commutations
 - Remove from analysis, otherwise projections will be overstated
 - Treat any finite contracts separately
 - E.g. aggregate stop loss covers - will not develop similarly to per occurrence excess
 - Be watchful of traditional contracts with “finite” features
 - Asbestos, pollution, mass tort claims should be subdivided and reviewed separately
 - If these claims are included in development data, the tail factor will be overstated for more recent periods



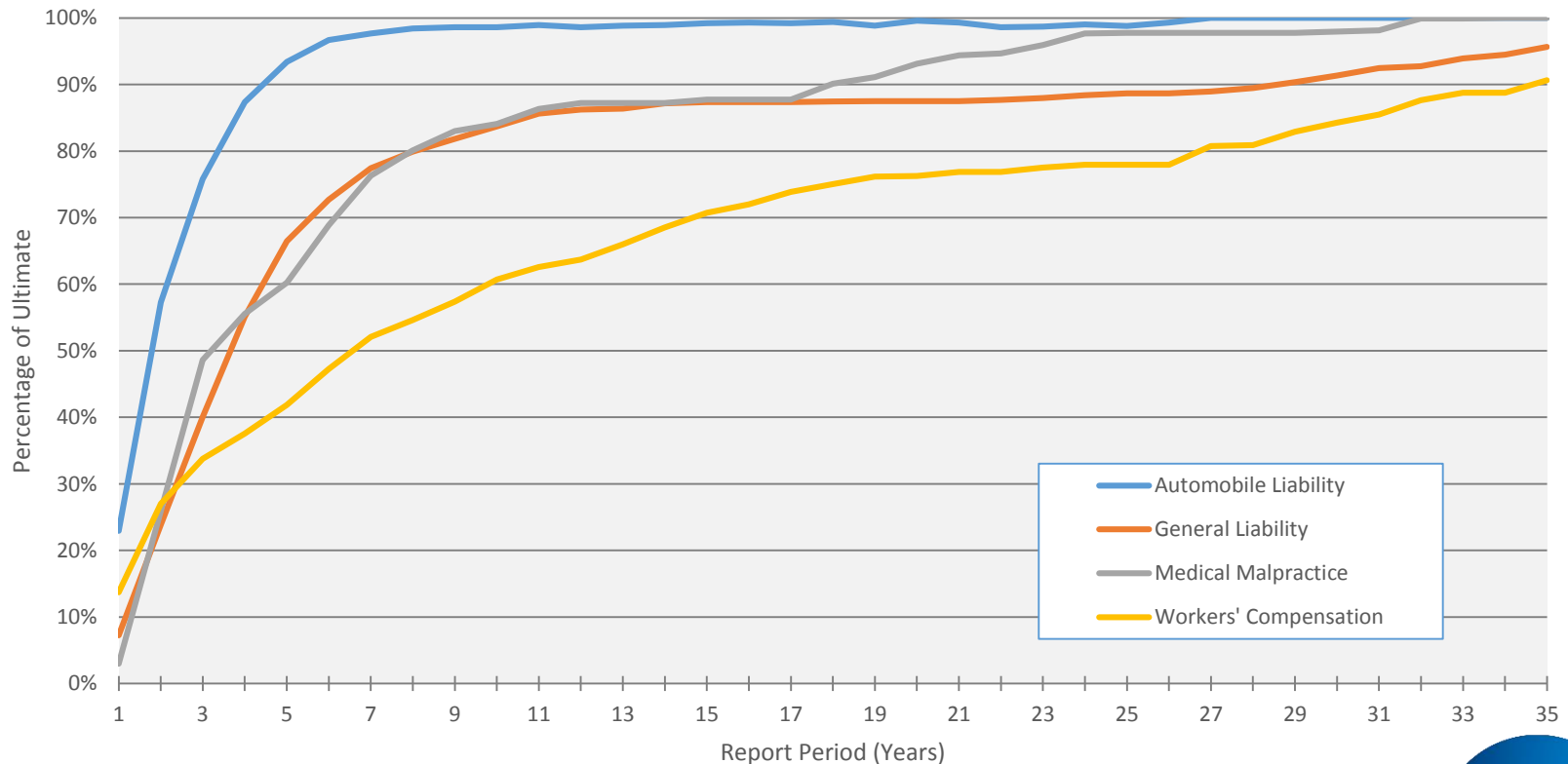
Loss Development Method – How to deal with variability in Historical Development

- Supplement with benchmarks
 - Utilize benchmark (or weighting of benchmarks) that is most appropriate for the book of business being analyzed
 - Consider:
 - Nature of underlying exposure (e.g. products versus premises)
 - Attachment points/limits
 - Actual historical development
 - Ceding company profile
 - Insolvent ceding companies will cause reporting delays



Development by Line of Business

Excess Reinsurance
Historical Loss Development

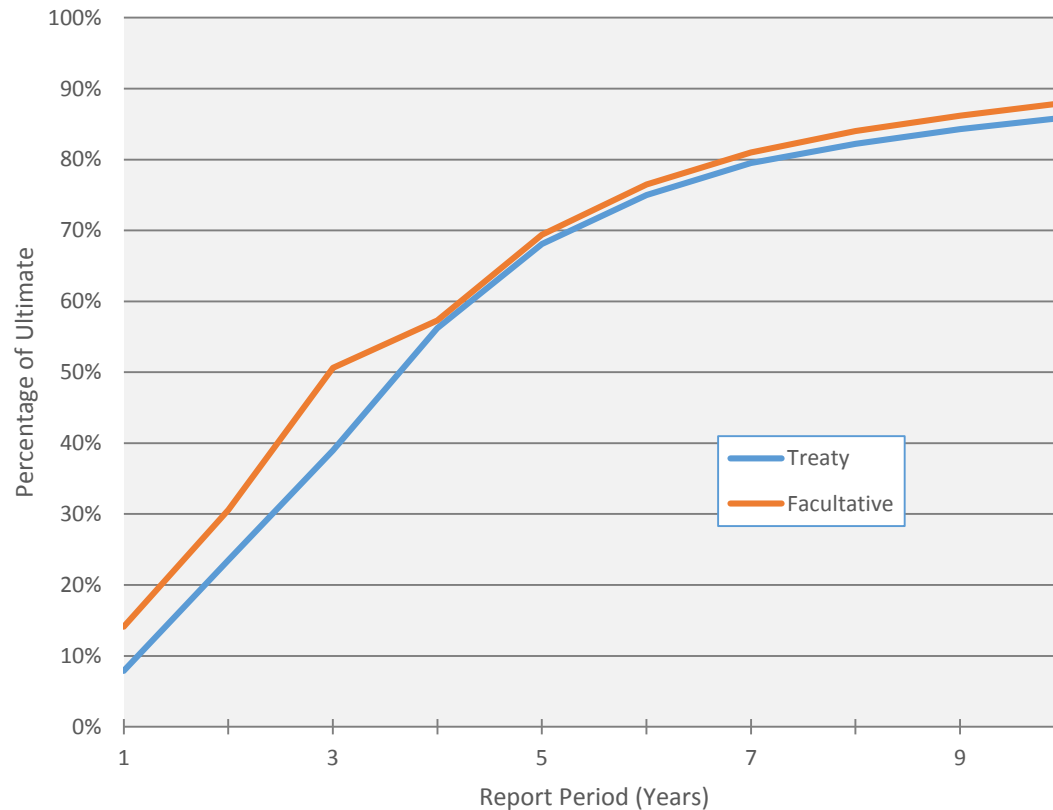


Based on combined treaty and facultative data; all patterns assume no development beyond oldest evaluation age in triangles.



Treaty vs. Facultative – General Liability

Treaty vs. Facultative
Historical Loss Development
General Liability

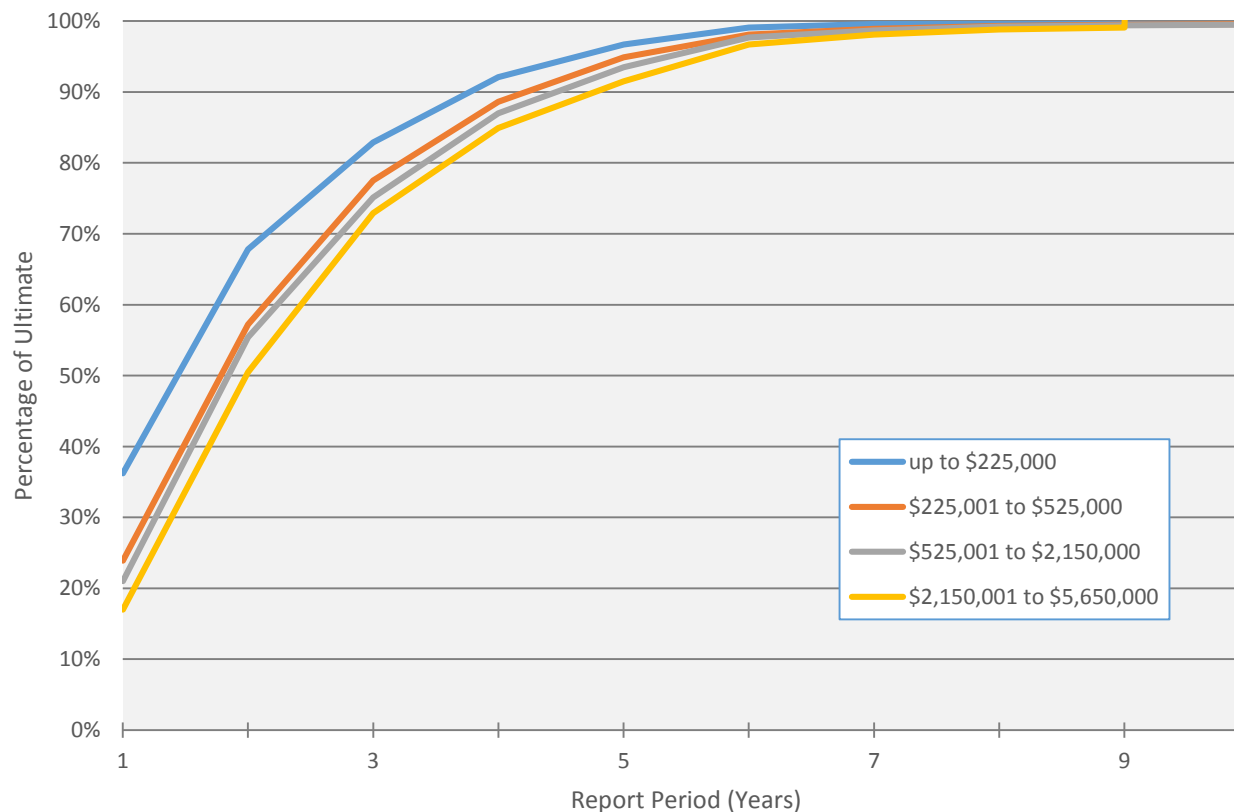


Source: Milliman analysis of RAA Historical Loss Development Study, 2015 Edition



Impact of Attachment Points – Auto Liability

Impact of Attachment Points on
Historical Loss Development
Automotive Liability



Source: Milliman analysis of RAA Historical Loss Development Study, 2015 Edition



Loss Development Method

- Application same for primary business

<u>Layer</u>	<u>Accident Year</u>	<u>Excess Loss & ALAE @ 12/31/2019</u>	<u>LDF</u>	<u>Ultimate Loss & ALAE (3) x (4)</u>
(1)	(2)	(3)	(4)	(5)
800 x 200	2014	\$1,543	1.355	\$2,090.77
800 x 200	2015	1,255	1.488	1,867
800 x 200	2016	1,988	1.755	3,489
750 x 250	2017	1,868	2.336	4,364
750 x 250	2018	863	3.473	2,997
700 x 300	2019	0	8.196	0
	<u>Total</u>	<u>\$7,517</u>		<u>\$14,808</u>

- Results leveraged
 - No claims = no IBNR
 - Large claims = large IBNR



Loss Development Method

- Paid Loss Development Method not very common for reinsurance reserving
 - Little data
 - No industry benchmarks on development
 - May not be appropriate for property or low limit proportional business (e.g. nonstandard auto liability)



Loss Ratio Method

- Useful for new business or immature years
- Need premium base and *a priori* expectation regarding loss ratio
- Advantage: stability
 - Ultimate loss estimate does not change unless the premium or loss ratio are revised
- Potential problem: lack of responsiveness
 - Ignores actual loss experience as it emerges



Loss Ratio Method

- Ultimate Loss = Earned Premium x ELR

Accident Year	Earned Premium	Expected Loss Ratio	Ultimate Loss & ALAE (2) x (3)
(1)	(2)	(3)	(4)
2014	\$3,994	66.5%	\$2,656.01
2015	3,577	70.0%	2,504
2016	4,161	73.5%	3,058
2017	2,564	76.5%	1,961
2018	2,769	78.8%	2,182
2019	2,654	85.4%	2,267
Total	\$19,719		\$14,628



Loss Ratio Method

- Selecting the loss ratio:
 - Historical experience
 - Paid and incurred loss experience
 - LDF projection
 - Adjusted to appropriate year
 - Rate changes
 - Trends
 - Coverage changes
 - Underwriting considerations
 - Underwriting files
 - Actuarial pricing
 - Market considerations
 - Benchmarks (industry results)



Adjustment for Incomplete Years

- Recent underwriting or policy years may not be fully earned as of the evaluation date
 - May need to scale back loss development projections
 - Apply ultimate loss ratio to earned premium as of evaluation date
- **Ultimate Loss Ratio = Ultimate Loss / Ultimate Premium**
- **Ultimate premium**
 - Project development
 - Seek underwriter input





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