

# Academy C-2 Mortality Work Group Update

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# Agenda

- Methods and assumptions
  - ▣ [Follow-up from June update](#)
  - ▣ Directional change in individual life C-2 mortality factors
- Next steps



# C-2 Mortality Overall Approach

- C-2 requirement covers mortality risk at the 95<sup>th</sup> percentile and is net of risk covered in statutory reserves
- C-2 requirement includes mortality risks related to:
  - ▣ Volatility Risk – natural statistical deviations in experienced mortality
  - ▣ Level Risk – error in base mortality assumption
  - ▣ Trend Risk – adverse mortality trend
  - ▣ Catastrophe Risk – large temporary mortality increase from a severe event
- Evaluate mortality risks using Monte Carlo simulation
- Express capital requirement using a factor-based approach (e.g., factor applied to NAR)



# Current C-2 Life Mortality Risk-Based Capital

Per \$1000 of NAR	Pre-Tax RBC Factors*	
	Individual	Group
First \$500M	2.23	1.75
Next \$4.5B	1.46	1.16
Next \$20B	1.17	0.87
>\$25B	0.87	0.78

\*Reflects updates due to tax reform



# Method and Assumption Comparison

Item	Current	Updated - Preliminary
General Method	Monte-Carlo Model—PV of Mortality Losses	Monte-Carlo Model—PV of Mortality Losses
Capital Quantification	95 <sup>th</sup> [PV(Scenario Actual) – 105%*PV(Scenario Expected)] <ul style="list-style-type: none"> <li>105% represents assumed margin (approx. one standard deviation) available to offset losses in excess of expected</li> </ul>	Evaluating multiple methods including: <ul style="list-style-type: none"> <li>Same as described in “Current”</li> <li>PV(95<sup>th</sup>) – PV(84<sup>th</sup>)</li> </ul>
Projection Period	5 years (3 years for Group) <ul style="list-style-type: none"> <li>Assumed exposure past 5 years could be offset through management actions (raise premium, etc.)</li> </ul>	5 years (3 years for Group) <ul style="list-style-type: none"> <li>Will consider other periods as well</li> </ul>
Discount rate	6% after tax	5% pretax (3.95% after tax)
Base Mortality	88% of 1975–1980 Male Basic Table <ul style="list-style-type: none"> <li>15Y Select &amp; Ultimate Structure</li> <li>Male/Female not explicitly modelled</li> <li>Underwriting adjustments applied based on generation</li> </ul>	2017 Unloaded CSO <ul style="list-style-type: none"> <li>25Y Select &amp; Ultimate structure</li> <li>Gender distinct—Male/Female</li> <li>5 underwriting classes (3 nonsmoker/2 smoker)</li> </ul>
Base Improvement	Unknown source <ul style="list-style-type: none"> <li>1.00%</li> </ul>	2017 Improvement Scale for AG-38 <ul style="list-style-type: none"> <li>Varies by gender and age</li> </ul>



# Directional Impact on Individual Life C-2 Factors

Risk Component	Impact on current factors
Volatility	↓
Level	↓
Trend	↑
Catastrophe	↑
Overall	Possible decrease

Assumes 5-year projection period



# Risk Component Comparison

Risk Component	Key Updates	Estimated Directional Impact on the C-2 Factor
Volatility	<ul style="list-style-type: none"><li>• Lower base mortality rates</li></ul>	<i>Decrease 5-10%</i>
Level	<ul style="list-style-type: none"><li>• Exclusion of AIDS scenarios based on early '90s estimates</li></ul>	<i>Decrease 20-30%</i>



# Risk Component Comparison

Risk Component	Key Updates	Estimated Directional Impact the C-2 factor
Trend	<ul style="list-style-type: none"><li>• Greater range of mortality trends and possible differences by age/sex cohort</li></ul>	<i>Increase 5-15%</i>
Catastrophe	<ul style="list-style-type: none"><li>• Similar pandemic severity</li><li>• Addition of 9/11-type terrorism event</li></ul>	<i>Increase 0-5%</i>





# Summary of Current Developments

- Preliminary analysis suggests a possible decrease in C-2 requirement, however more analysis needed
- Biggest reductions are due to exclusion of AIDS scenarios at early '90s estimates and improvement in mortality levels compared to what was expected in the original C-2 factors
- Some increase in trend and catastrophe components



# Next Steps

- Additional analysis
  - Appropriate projection period
  - Differences between products
  - Size breakpoints; exposure base
  - Analysis of industry data; implication of “high” vs. “low” mortality company
  - Group Life
- Preliminary factor development completion targeted for 2020
- Provide LRBCWG call update in Q1/Q2



# Questions?

## Additional Questions, contact:

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# Appendix

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# Risk Distribution Approach Comparison

Risk	Original Work	Current Review- Preliminary
Volatility	Binomial(Policies, q)	Binomial(Policies, q)
Level	Implicit from Discrete Scenarios: <ul style="list-style-type: none"> <li>7 <i>Competitive Pressures</i> scenarios – risk of overoptimistic pricing assumptions</li> <li>15 AIDS scenarios – early '90s estimates of the impact of AIDS on insured mortality</li> <li>4 Adverse Lapse Scenarios</li> </ul>	$LR \sim N(0, \sigma_{Lev}); \sigma_{Lev} = \sqrt{\sigma_{Stat\ Samp.}^2 + \sigma_{Natural}^2}$ <ul style="list-style-type: none"> <li>Two independent components:               <ul style="list-style-type: none"> <li>Statistical sampling/credibility volatility (<math>\sigma_{Stat\ Samp.}</math>)</li> <li>Natural mortality volatility (<math>\sigma_{Natural}</math>)</li> </ul> </li> <li>Continuous normal distribution</li> </ul>
Trend	Discrete Distribution <ul style="list-style-type: none"> <li>7 scenarios adjust mortality improvement assumption</li> </ul>	$[D_1, D_2, \dots, D_6] \sim N(\mu, \Sigma)$ <ul style="list-style-type: none"> <li>6 gender/age group improvement deviation variables (<math>D_n</math>)</li> <li>Correlated normally distributed random variables</li> </ul>
Catastrophe	Discrete Distribution <ul style="list-style-type: none"> <li>Pandemic</li> </ul>	2 Discrete Distributions <ul style="list-style-type: none"> <li>Pandemic – calibrated from multiple sources</li> <li>Terrorism – 5% probability of additional 0.05 / 1K</li> </ul>