

Academy C-2 Mortality Work Group Update

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Agenda

- Review C-2 overall approach and current risk-based capital (RBC) factors
- Seeking regulator feedback:
 - ▣ Adding a new catastrophe component for a sustained mortality increase from an unknown risk
 - ▣ Differentiating factors for individual life products
- Next steps
- Appendix:
 - ▣ Methodology, assumption, and risk distribution comparisons



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C-2 Mortality Overall Approach

- C-2 requirement covers mortality risk up to the 95th percentile covering risk in excess of the 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 such as a pandemic or terrorism
 - ***New: sustained mortality increase from an unknown risk***
- Evaluate mortality risks using Monte Carlo simulation of projected statutory losses
- Discount pre-tax cash flows (current assumption is 5%)
- Express capital requirement using a factor-based approach (e.g., factor applied to Net Amount at Risk)



C-2 Life Mortality Risk-Based Capital

	Current Pre-Tax RBC Factors	
Per \$1000 of NAR	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

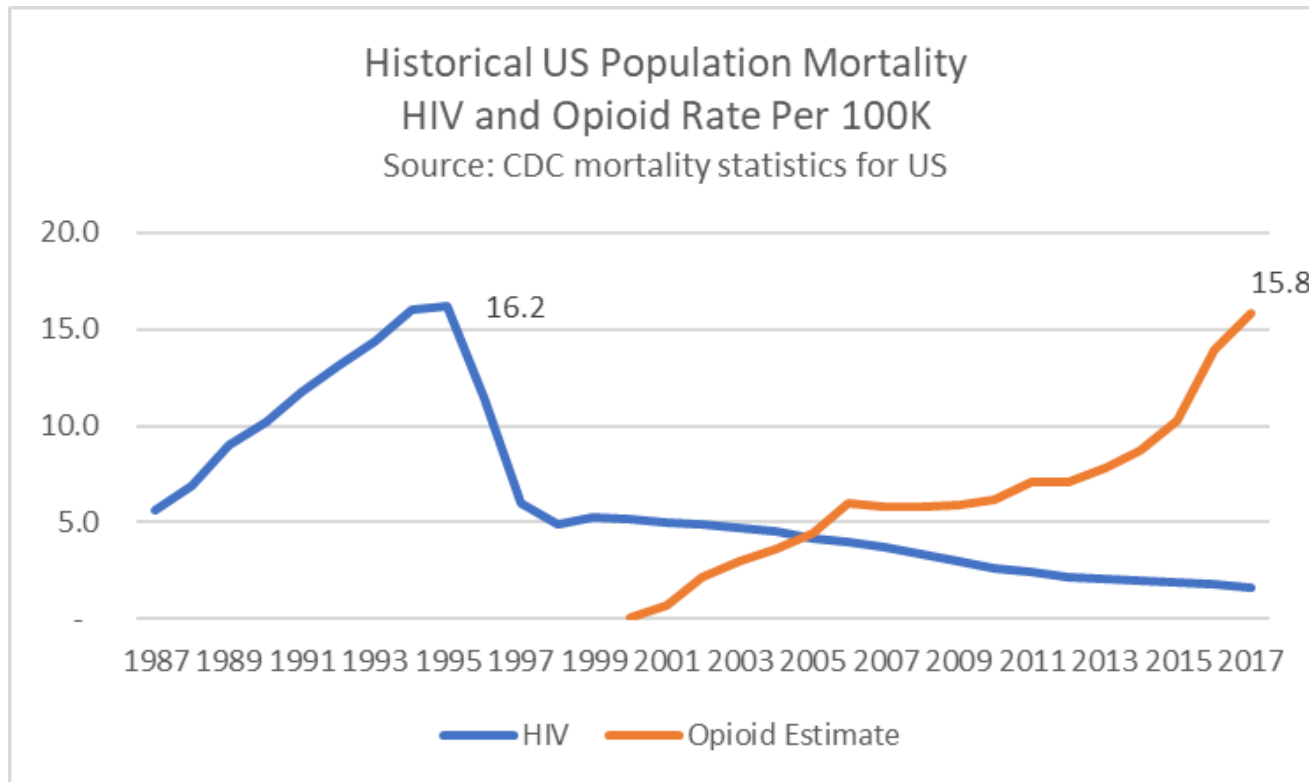


New Catastrophe Component for an Unknown Risk

- As shared at the [LRBCWG meeting](#) during the December 2019 NAIC National Meeting, preliminary modeling indicates an estimated decline in factors versus current
- Feedback from that meeting was that the C-2 Mortality Work Group should consider an additional catastrophe component for an unknown risk
- C-2 Mortality Work Group developed a new catastrophe component informed by historical health events impacting the U.S. population
 - Component is intended to cover unknown risks that could materialize in the insured population
 - Conceptually, the component assumes a low annual probability of a sustained severe mortality increase



New Catastrophe Component for an Unknown Risk— Historical Events



- HIV and opioid abuse are two historical events impacting the U.S. population that can inform the development of a catastrophic unknown risk event
- The impact of these events to insured population mortality has been lower than general population mortality



New Catastrophe Component for an Unknown Risk

Description (source: CDC mortality statistics for US)	% Incr. to US Population Mortality	Death rate per 100K
HIV mortality in peak year—1995, all ages	+1.9%	16.4
HIV mortality in peak year—1995, ages 35-44	+5.0%	44.4
Estimated opioids mortality in highest year—2017, all ages	+1.8%	15.8
Drug-induced mortality in highest year —2017, ages 35-44	+4.7%	40.6

- Probability: assumed to be a 2.5% annual likelihood of the event occurring
 - Provides for the likelihood of 1 sustained event over a 40-year period
 - While the impact of HIV and opioids abuse have occurred in the US population in the last 40 years, neither of these translated to an increase in insured population mortality at the magnitude assumed.
- Magnitude: if the event occurs, assumed to be a 5% immediate and sustained mortality increase
 - HIV (1995) and opioids (2017) both increased U.S. population mortality by 2% across all ages.
 - However, life insurers would most be affected by an increase in mortality at younger ages. The ages 35-44 data became the basis, representing the most severe impact to insurers.

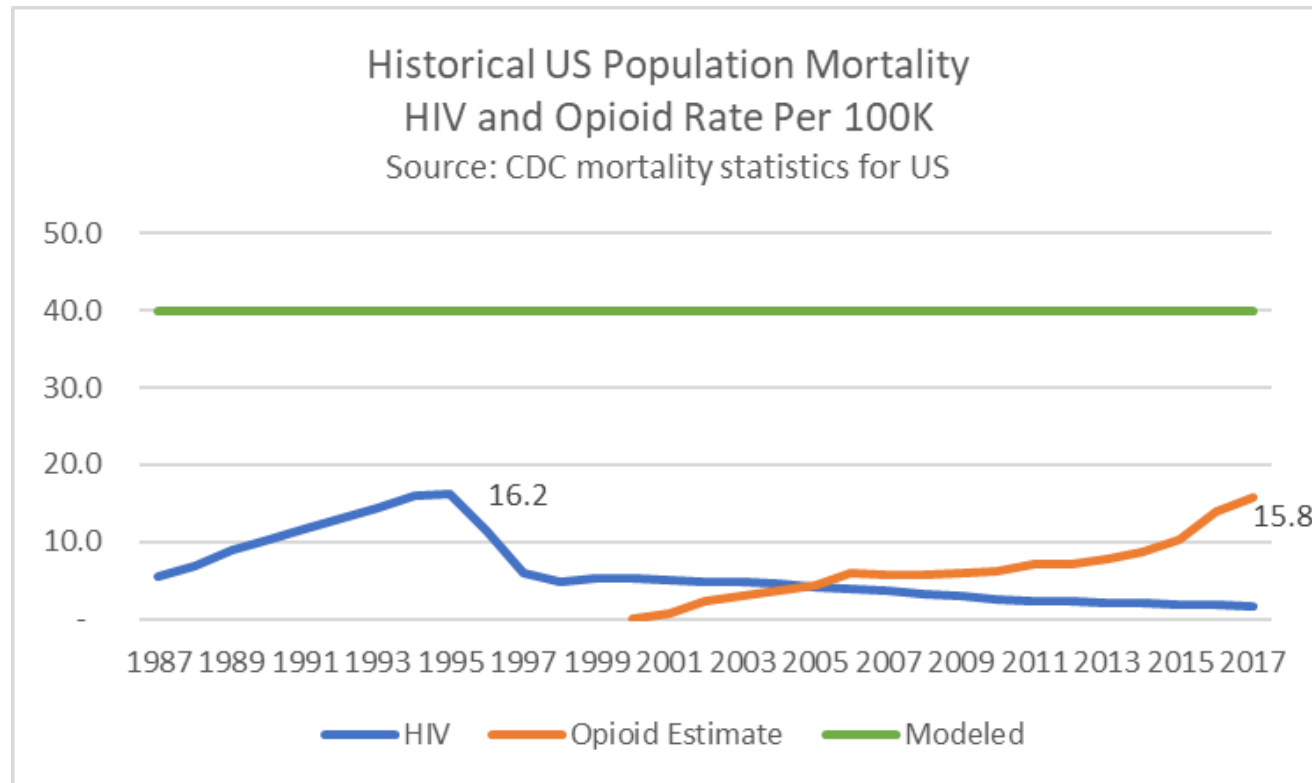


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New Catastrophe Component for an Unknown Risk— Historical and Modeled



- Modeled catastrophe provides for deaths in excess of similar historical events due to assuming the impact at the worst age band



Individual Life Product Differentiation

- The C-2 Mortality Work Group is considering differentiating factors between products with near-term inforce pricing flexibility and those with minimal inforce pricing flexibility
- The impact on surplus is higher for products that have less inforce pricing flexibility
 - Products with less inforce pricing flexibility (e.g., longer level term and ULSG products)
 - Modeled with a 10-year projection period
 - Products with more inforce pricing flexibility (e.g., permanent whole life, current assumption universal life, and annually renewable term)
 - Modeled with a 5-year projection period
- Setting separate factors would require product specific data (e.g., face amount and reserves to derive net amount at risk) not currently reported at this level of detail in the annual statements



Next Steps for the C-2 Mortality Work Group

- ▣ Receive regulator feedback
 - Adding the unknown risk catastrophe component
 - Differentiating factors by individual life products
- ▣ Finalize model and assumptions
- ▣ Review group life premium stabilization reserve credit
- ▣ Review mortality capital requirements in other solvency regimes
- ▣ Review aggregate model output, complete documentation, and peer review
- ▣ Recommend updated factors to Life RBC



Appendix: Method and Assumption Comparison

Item	Original Work	Current Review - Preliminary
General Method	Monte Carlo Model – (Present Value (PV) of Death Benefits	Monte Carlo Model – PV of Statutory Losses <ul style="list-style-type: none"> Loss defined as death benefits minus reserves released
Capital Quantification	PV[95 th] – 105%*PV[Expected] <ul style="list-style-type: none"> 105% represents assumed margin available to offset losses in excess of expected 	GPVAD[95 th] <ul style="list-style-type: none"> Greatest present value of accumulated deficiencies (GPVAD) 5% margin/load assumed in reserve mortality
Projection Period	5 years (3 years for Group) <ul style="list-style-type: none"> Assumed exposure past 5 years could be offset through management actions (raise premium, etc.) 	5-10 years for Individual Life 3 years for Group Life
Discount rate	6% after tax	5% pre-tax (3.95% after tax)
Base Mortality	88% of 1975-1980 Male Basic Table <ul style="list-style-type: none"> 15Y Select & Ultimate Structure Male/Female not explicitly modelled Underwriting adjustments applied based on generation 	2017 Unloaded Commissioners’ Standard Ordinary Table (CSO) for Individual Life <ul style="list-style-type: none"> 25Y Select & Ultimate structure Gender distinct – Male/Female 5 underwriting classes (3 non-smoker/2 smoker) SOA 2016 Group Life Experience Study for Group Life <ul style="list-style-type: none"> Gender distinct – Male/Female
Base Improvement	Unknown source <ul style="list-style-type: none"> 1.00% 	2017 Improvement Scale for AG-38 <ul style="list-style-type: none"> Varies by gender and age



Appendix: 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"> 7 <i>Competitive Pressures</i> scenarios – risk of overoptimistic pricing assumptions 15 AIDS scenarios – early 90's estimates of the impact of AIDS on insured mortality (could fit in level, trend, or catastrophe) 	$LR \sim N(0, \sigma_{Lev}); \sigma_{Lev} = \sqrt{\sigma_{Cred}^2 + \sigma_{MVol}^2}$ <ul style="list-style-type: none"> Two independent components: <ul style="list-style-type: none"> Credibility/statistical sampling volatility (σ_{Cred}) True mortality volatility (σ_{MVol}) Continuous normal distribution
Trend	Discrete Distribution <ul style="list-style-type: none"> 7 scenarios adjust mortality improvement assumption 	$[MI_1, MI_2, \dots, MI_{C6}] \sim N(\mu, \Sigma)$ <ul style="list-style-type: none"> 6 gender/age group improvement variables (MI_n) Correlated normally distributed random variables
Catastrophe	Discrete Distribution <ul style="list-style-type: none"> Pandemic 	3 Discrete Distributions <ul style="list-style-type: none"> Pandemic – calibrated from multiple sources Terrorism – 5% probability of additional 0.05 / 1K Unknown Risk – calibrated from historic US population events



Questions?

Additional Questions, contact:

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