Review of Life Mortality Risk-Based Capital (RBC)

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American Academy of Actuaries

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Work Group Purpose:

The C-2 Work Group was formed in 2017 to review the current National Association of Insurance Commissioners (NAIC) C-2 RBC requirement for life insurance. The group is reviewing assumptions and methodology and will recommend revisions, as appropriate, which may include structure and factor updates.

In-Scope	Out-of-Scope

▪ Life Insurance
  ▪ Individual & Industrial Life
  ▪ Group & Credit Life
	▪ Accident & Health Insurance
	▪ Annuities*
	*The group is working with the Longevity Risk Task Force (LRTF) to reflect potential correlation between mortality and longevity risks in aggregate C-2

Overall Approach

- C-2 requirements cover mortality risk in excess of the mortality risk covered by statutory reserves
- C-2 requirements 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)

Status and Next Steps

- Status
  - Developed preliminary model and approximately replicated original 1993 factors
  - Developed preliminary distributions and assumptions for each mortality risk component (see Appendix)
- Next steps
  - LRBC presentation covering our mortality risk modeling approach
  - Continue model assumption development (e.g., mix-of-business, lapse rates, reinsurance)
  - Define group life approach
  - Finalize model development and testing
  - Recommend factors, targeting late 2019 for preliminary factors

Appendix

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Method and Assumption Comparison

Item	Original Work	Current Review - Preliminary
General Method	Monte-Carlo Model – PV of Death Benefits	Monte-Carlo Model – PV of Death Benefits
Capital Quantification	PV[95th] – 105%*PV[Expected] ▪ 105% represents assumed margin available to offset losses in excess of expected	PV[95th] – PV[84th] ▪ Capital based on requirement over reserves (assumed 95th percentile confidence level for capital)
Projection Period	5 years (3 years for Group) ▪ Assumed exposure past 5 years could be offset through management actions (raise premium, etc.)	Period consistent with length of material risk exposure
Discount rate	6% after tax	5% pre tax (3.95% after tax)
Base Mortality	88% of 1975-1980 Male Basic Table ▪ 15Y Select & Ultimate Structure ▪ Male/Female not explicitly modelled ▪ Underwriting adjustments applied based on generation	2017 Unloaded CSO ▪ 25Y Select & Ultimate structure ▪ Gender distinct – Male/Female ▪ 5 underwriting classes (3 non-smoker/2 smoker)
Base Improvement	Unknown source ▪ 1.00%	2017 Improvement Scale for AG-38 ▪ Varies by gender and age

Risk Distribution Approach Comparison

Risk	Original Work	Current Review - Preliminary
Volatility	Binomial(Policies, q)	Binomial(Policies, q)
Level	Implicit from Discrete Scenarios: ▪ 7 *Competitive Pressures* 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~N(0, σ_{Lev}); $\sigma_{Lev} = \sqrt{\sigma_{Cred}{}^2 + \sigma_{MVol}{}^2}$ ▪ Two independent components: • Credibility/statistical sampling volatility *(σ_{Cred})* • True mortality volatility *(σ_{MVol})* ▪ Continuous normal distribution
Trend	Discrete Distribution ▪ 7 scenarios adjust mortality improvement assumption	[MI_1, MI_2, …, MI_{C6}] ~ N(μ, Σ) ▪ 6 gender/age group improvement variables (MI_n) ▪ Correlated normally distributed random variables
Catastrophe	Discrete Distribution ▪ Pandemic	2 Discrete Distributions ▪ Pandemic – calibrated from multiple sources ▪ Terrorism – 5% probability of additional 0.05 / 1K

Questions?

Additional Questions, contact:

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