Future Mortality Improvement Scale Development (VM-20)
2022 HMI and FMI Recommendations

Academy Mortality Improvements Life Work Group (MILWG);
SOA Mortality and Longevity Oversight Advisory Council (MLOAC)

Life Actuarial Task Force (LATF) Meeting—September 22, 2022

Agenda

- Description of different historical mortality improvement (HMI) and future mortality improvement (FMI) approaches considered for 2022
- Recommendation for 2022
- Reserve impact analysis for the HMI/FMI approaches exposed
- Next steps

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HMI 2022 Scale: Considered Approaches

MS0

1. Remove shock impact of COVID-19 from historical average
   - Approach 1: Remove 2020 from the data in determining the 10-year historical average; use average from 2009-2019
   - Approach 2: Use average from 2010-2020 but include 2020 mortality = 2019 mortality—results in less mortality improvement in general than Approach 1

2. Include full COVID-19 shock in historical average
   - Approach 3: Include 2020 data in 10-year historical average

FMI 2022 Scale: Considered Approaches

Approach 1:

- Basic scale
  - Grade from HMI 2022 MI level to long-term (LT) MI level based on Social Security Administration (SSA) Intermediate Projection at year 10 (2022–2032)
- Loaded scale (prudent estimate)
  - Basic Scale plus 25% general margin for uncertainty in trend*

*Reduce improvement by 25% or increase deterioration by 25%

FMI 2022 Scale: Considered Approaches

MS2

Approach 2:

- Basic scale : include COVID-19 impact (deterioration in mortality) in early years of the FMI scale
  - Assume deterioration for 2023 and 2024 followed by zero improvement in 2025.
  - Then grade to long-term (LT) MI level based on Social Security Administration Intermediate Projection at year 10 (grade from 2025–2032).
- Loaded scale (prudent estimate) = scale Basic scale plus 25% general margin for uncertainty in trend*

Approach 3:

Use Approach 2 but assume 50% greater deterioration for 2023 and 2024 than Approach 2 followed by zero improvement in 2025.

*Reduce improvement by 25% or increase deterioration by 25%

Recommendation for 2022 HMI and FMI

HMI Approach 2:

Use average from 2010–2020 but include 2020 mortality = 2019 mortality

- Assumes zero improvement for 2020
- Results in less mortality improvement in general than HMI Approach 1

FMI Approach 2:

MS1

Basic scale : include COVID-19 impact (deterioration in mortality) in early years of the FMI scale

- Assume deterioration for 2023 and 2024 followed by zero improvement in 2025.
- Then grade to long-term (LT) MI level based on Social Security Administration (SSA) Intermediate projection at year 10 (grade from 2025–2032).

Loaded scale (prudent estimate) = scale above plus 25% general margin for uncertainty in trend

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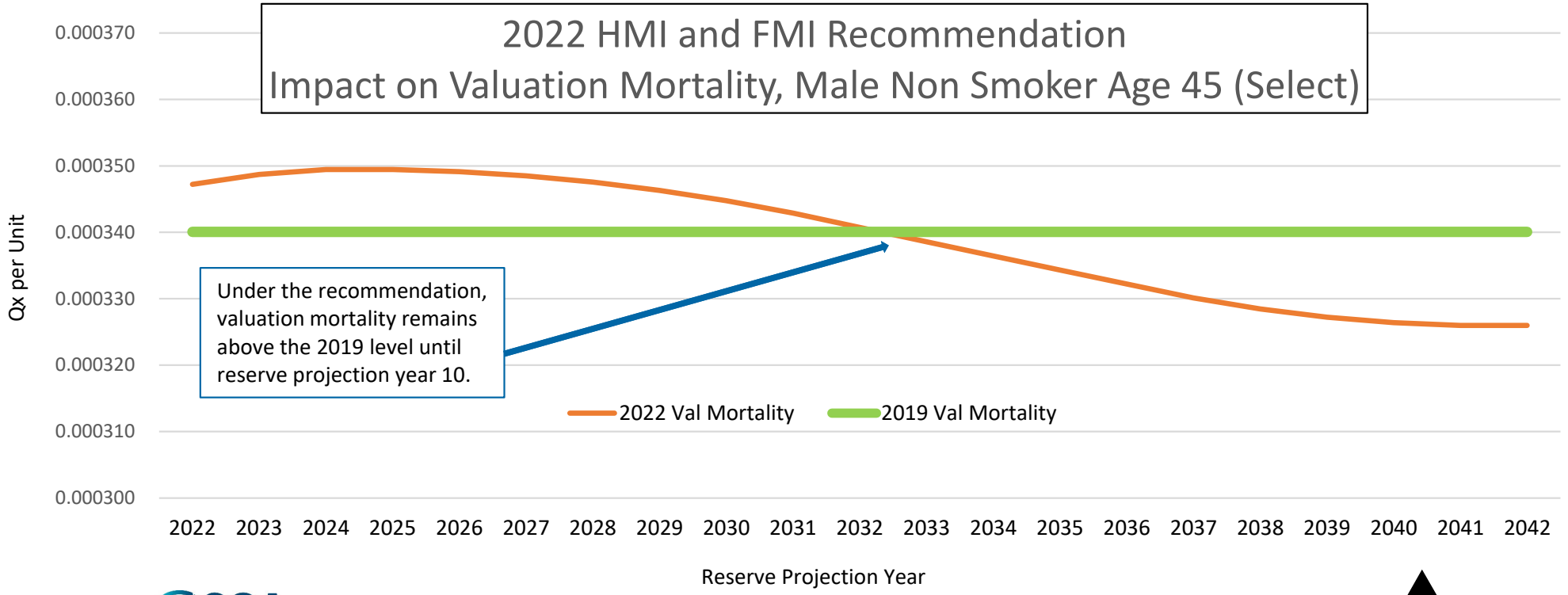
Issues Raised

MS0

- SSA Alt 2 reasonable basis for long-term rate
  - Primary criticism of SSA's intermediate projection has been concern that MI implied rates are too low
- Appropriateness of inclusion of COVID-19 impacts in FMI
  - Industry mortality group principle states that shock impact of COVID-19 or other short term mortality event should only be included in the future mortality expectations to the extent they are expected to continue
  - FMI deterioration in first 3 years of reserve projection estimates expected future impact of COVID-19

Impact on Valuation Mortality



HMI/FMI Approaches Exposed Per 8/25/2022 LATF Meeting

Approaches included in NAIC exposure

1. HMI 2 with FMI 2—recommendation
2. HMI 2 with FMI 3
3. HMI 1 with no FMI (eliminated—less conservative than 4.)
4. HMI 2 with no FMI

Reserve Impact—NAIC Model Office

- Universal Life with Secondary Guarantees (ULSG) model—long-duration product, larger potential for reserve reduction
  - Model office and assumptions same as used in the yearly renewable term (YRT) representative model analysis
  - Lifetime shadow account secondary guarantee
  - No reinsurance in the model

Component	Values
Issue ages	Decennial issue ages 30 – 70
Gender	Male Female
Risk classes	Preferred non-tobacco Standard non-tobacco Standard tobacco
Face bands	Low ($250,000) High ($1,000,000)

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Reserve Impact—NAIC Model Office

- Term Life Insurance Product with 10- and 20-year level premium periods
  - Model office and assumptions same as used in the YRT representative model analysis
  - Mature at age 95
  - 100% shock lapse at end of level term period

Component	Values
Issue ages	Decennial issue ages 20 – 60
Gender	Male Female
Risk classes	Preferred non-tobacco Standard non-tobacco Standard tobacco
Face bands	Low ($250,000) High ($1,000,000)
Term lengths	10 year 20 year

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Reserve Impact Results—ULSG

Mortality Improvement Basis	ULSG	
	Normalized VM-20 Deterministic Reserve (DR)	Percentage Change from Baseline
Baseline: **HMI: no change to HMI** **FMI: zero FMI**	**$ 1,000,000.00**	**----**
HMI: Approach 2 **FMI: Zero FMI**	**$ 1,014,962.02**	**1.50%**
RECOMMENDATION: **HMI: Approach 2** **FMI: Approach 2**	**$ 940,464.62**	**-5.95%**
Sensitivity: **HMI: Approach 2** **FMI: Approach 3**	**$ 938,346.28***	**-6.17%***

Approaches to HMI and FMI

HMI

Approach 1 = historical average 2009-2019

Approach 2 = historical average 2010-2020 (zero MI in 2020)

FMI - grades to SSA intermediate projection long-term rate over 10 years

Approach 1 = no FMI deterioration for COVID-19

Approach 2 = apply deterioration due to COVID for first 3 years

Approach 3 = apply greater 50 percent greater deterioration due to COVID-19 for first 3 years (sensitivity)

*The slight decrease in reserves for the sensitivity run compared to the recommendation seems counterintuitive given the higher initial mortality deterioration present in the sensitivity. However, specific impacts related to the net-amount-at-risk pattern (decreasing in the initial years due to fund value growth before growing in later years as fund value runs out and the secondary guarantee comes into effect) meant that the shift of death claims to earlier years from later years for the sensitivity run resulted in a slightly reduced deterministic reserve compared to the recommendation. Overall, the conclusion is that the additional margin did not have a material impact on the deterministic reserve calculation for this model office product.

Reserve Impact Results—Term

	Term	
Mortality Improvement Basis	**VM-20 DR**	**Reserve Change**
Baseline: **HMI: no change to HMI** **FMI: zero FMI**	**$ (79,846)**	**----**
HMI: Approach 2 **FMI: Zero FMI**	**$ (50,285)**	**$ 29,561**
RECOMMENDATION: **HMI: Approach 2** **FMI: Approach 2**	**$ (68,968)**	**$ 10,878**
Sensitivity: **HMI: Approach 2** **FMI: Approach 3**	**$ (66,303)**	**$ 13,543**

Approaches to HMI and FMI

HMI

Approach 1 = historical average 2009-2019

Approach 2 = historical average 2010-2020 (zero MI in 2020)

FMI - grades to SSA intermediate projection long-term rate over 10 years

Approach 1 = no FMI deterioration for COVID-19

Approach 2 = apply deterioration due to COVID-19 for first 3 years

Approach 3 = apply greater 50 percent greater deterioration due to COVID-19 for first 3 years (sensitivity)

Note: All of the valuation date deterministic reserves shown on this slide are negative

2023 Plan

- Revisit HMI historical component calculation method in light of recent and expected experience
- Review applicability of MI scale methodology for 2008 VBT Limited Underwriting (LU) table
- Insured vs. general population MI recommendation
- Revisit smoothing and margin structures

Questions?

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Appendix

Mortality/Mortality Improvement Principles

Mortality/MI Industry Group

- Group representing members of the American Academy of Actuaries ("Academy"), the Society of Actuaries, and members of the National Association of Insurance Commissioners (NAIC), Life Actuarial (A) Task Force (LATF)
- Convened in January 2022
- Focused on developing a set of consistent principles to be considered in reflecting the impact of COVID-19 or other shock to mortality in valuation assumptions

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Industry Group Principles

Valuation mortality assumption should not include the excess mortality due to the initial shock.

It should include:

"the expected ongoing mortality impact".

These principles are consistent with international views on mortality projection and COVID-19 impacts…

- Social Security Administration 2022 Trustees Report
  - "Projected death rates for years after 2023 are unchanged from the levels that would have been projected in the absence of the pandemic, under the assumption that increased deaths from the residual effects of living through the pandemic (both physiological and psychological) will be roughly offset by decreased deaths that instead happened sooner (during the pandemic)." https://www.ssa.gov/OACT/TR/2022/tr2022.pdf
- Continuous Mortality Investigation (CMI) Mortality Projections Committee
  - "If we gave full weight to 2020 data … the reduction in life expectancy would have been in excess of what most users of the model would consider reasonable."
  - CMI_2021 incorporates mortality data to 31 December 2021
    - 2020 and 2021 data is given 0% weight in the Core version – Consistent with approach for CMI_2020 supported by consultation – Data for 2020 and 2021 is unlikely to be indicative of future trends – Using 100% weight for 2020 and 2021 data would lead to excessive falls in life expectancy
- Mortality projections for Social Security Programs in Canada (Actuarial Studies No. 22 and 23)

Additional Considerations

- Insured population mortality materially lower than general population mortality
  - Insured population is generally in higher socioeconomic categories
  - Lower mortality and higher mortality improvement seen in higher socioeconomic categories (implicit margin in our recommendations)
- MI improvement scale annual updates should not create reserve volatility
- Individual companies should also consider their own business and make appropriate additional adjustments

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