LIFE ACTUARIAL (A) TASK FORCE

Draft: 12/19/23

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Life Actuarial (A) Task Force
Orlando, Florida
November 29–30, 2023

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The Life Actuarial (A) Task Force met in Orlando, FL, Nov. 29–30, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill (TX); Scott A. White, Vice Chair, represented by Craig Chupp (VA); Lori K. Wing-Heier represented by Sharon Comstock (AK); Mark Fowler represented by Sanjeev Chaudhuri (AL); Ricardo Lara represented by Ahmad Khamil, Ted Chang, and Thomas Reedy (CA); Andrew N. Mais represented by Wanchin Chou (CT); Doug Ommen represented by Mike Yanacheak (IA); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Amanda Fenwick and Michael Cebula (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); Jon Pike represented by Tomasz Serbinowski (UT); and Allan L. McVey represented by Joylynn Fix (WV).

1. <u>Adopted its Nov. 2, Oct.11, Oct. 5, Sept. 28, Sept. 14, and Aug. 31 Minutes and the Reports of the IUL Illustration (A) Subgroup, the Longevity Risk (E/A) Subgroup, and the Variable Annuities Capital and Reserve (E/A) Subgroup</u>

The Task Force met Nov. 2, Oct.11, Oct. 5, Sept. 28, Sept. 14, and Aug. 31. During these meetings, the Task Force took the following action: 1) adopted its Summer National Meeting minutes; 2) exposed amendment proposal form (APF) 2023-11, which removes references to risk-based capital (RBC) from the *Valuation Manual* that are inconsistent with the purpose, scope, and intended use of RBC; 3) exposed APF 2023-12, which clarifies expectations for the reflection of equity return volatility in asset adequacy testing (AAT); 4) adopted the 2024 Generally Recognized Expense Tables (GRET); 5) exposed APF 2023-10, which would change the discount rate for the stochastic reserve in *Valuation Manual* (VM)-20, Requirements for Principle-Based Reserves for Life Products, to be the net asset earned rate (NAER); 6) adopted the Task Force's 2024 proposed charges; 7) adopted APF 2023-09, which requires the use of historical mortality improvement (HMI) for company mortality experience in VM-20; 8) exposed acceptance criteria and stylized facts for the generator of economic scenarios (GOES); 9) adopted a memorandum directed to the Society of Actuaries (SOA) regarding the changes to the SOA's educational pathway; 10) adopted APF 2023-08, which clarified the treatment of interest maintenance reserves (IMR) in the *Valuation Manual* along with an IMR template and temporary guidance; 11) adopted the *Actuarial Guideline LIII— Application of the Valuation Manual for Testing the Adequacy of Life Insurer Reserves* (AG 53) templates for year-end 2023; and 12) adopted the 2023 VM-20 HMI and future mortality improvement (FMI) rates.

The Task Force reviewed the reports of the Indexed Universal Life (IUL) Illustration (A) Subgroup, the Longevity Risk (E/A) Subgroup, and the Variable Annuities Capital and Reserve (E/A) Subgroup.

Chupp made a motion, seconded by Weber, to adopt the Task Force's Nov. 2 (Attachment One), Oct. 11 (Attachment Two), Oct. 5 (Attachment Three), Sept. 28 (Attachment Four), Sept. 14 (Attachment Five), and Aug. 31 minutes (Attachment Six) and the reports of the IUL Illustration (A) Subgroup (Attachment Seven), the Longevity Risk (E/A) Subgroup (Attachment Eight), and Variable Annuities Capital and Reserve (E/A) Subgroup (Attachment Nine). The motion passed unanimously.

2. <u>Adopted the Report of the VM-22 (A) Subgroup</u>

Slutsker delivered the report of the VM-22 (A) Subgroup.

Slutsker made a motion, seconded by Chupp, to adopt the report of the VM-22 (A) Subgroup (Attachment Ten), including its Nov. 15 (Attachment Eleven) and Nov. 8 (Attachment Twelve) minutes. The motion passed unanimously.

3.   Heard an Update from the VM-22 Policyholder Behavior Drafting Group

Tsang walked through the preliminary results (Attachment Thirteen) of an experience study performed by the SOA and LIMRA on surrender and withdrawal activity for fixed deferred annuities. Hemphill asked about the rounding methodology for the lapse assumption given that it seemed that some expected patterns based on in-the-moneyness (ITM) did not seem to be developing. Tsang noted that the base lapse assumptions were currently rounded to half a percent in order to smooth out some of the random variation in the experience, but that he was open to the will of the VM-22 (A) Subgroup if it wanted to change the level of rounding. Steve Tizzoni (Equitable) then discussed the partial withdrawal experience. Carmello asked about the limited number of ITM assumption buckets. Tizzoni responded that Equitable did not see a lot of variation in the partial withdrawal experience until it was deeper ITM.

Karl Lund (Pacific Life) then walked through the dynamic lapse formula determined from the experience. Serbinowski asked about the extremes covered by the dynamic lapse formula where, for example, the difference between the company's credited rate and the market rate was around 20%. Lund noted that the extreme portions of the dynamic lapse formula were more theoretical than practical, but the purpose was to illustrate out to where the lapse assumption would be capped. Serbinowski then asked why the option budget was used as a parameter in the dynamic lapse formula for fixed indexed annuities (FIAs) when this feature was not transparent to policyholders. Lund noted that there was a wide variety of FIA features that were transparent to the policyholder, such as caps and participation rates, but that it was challenging to come up with a coherent assumption given all of the product variation. Therefore, Lund said that the option budget was used as a proxy for a credited rate. Slutsker asked whether the intention was to have one dynamic lapse formulas for both traditional fixed deferred annuities and FIAs, to which Tsang confirmed that the single formula was meant to address both products.

Tsang concluded by announcing that he would be stepping down as the Chair of the VM-22 Policyholder Behavior Drafting Group and announced that Slutsker would be looking for a replacement. Tsang thanked the Task Force for the opportunity to serve, and Hemphill acknowledged Tsang for his efforts.

4.   Heard a Presentation on the Mortality Experience Data Collection and Adopted the Report of the Experience Reporting (A) Subgroup

Pat Allison (NAIC) walked through a presentation (Attachment Fourteen) that gave a status update on the NAIC's mortality experience data collection initiative. Serbinowski asked what the basis was for the expected in the actual to expected reports that the NAIC delivers to participating companies, to which Allison responded that it was the 2015 Valuation Basic Table (VBT). Tsang asked how prevalent COVID-19 deaths were in the experience collected by the NAIC. Allison noted that the NAIC had not studied that in detail but stated that initial reviews showed a lot of variation in the COVID-19 deaths across different companies.

Andersen then proposed that the Experience Reporting (A) Subgroup consider the creation of mandatory experience collection that would be housed in VM-50, Experience Reporting Requirements. Andersen stated that this was necessary due to the insufficient coverage of industry experience currently captured through existing voluntary experience studies.

Andersen made a motion, seconded by Eom, to 1) adopt the report of the Experience Reporting (A) Subgroup and 2) expose a series of questions related to the group annuity experience data collection for a 90-day public comment period ending March 1, 2024. The motion passed unanimously.

5. <u>Discussed Comments Received on the GOES Corporate Model Decision</u>

Jason Kehrberg (American Academy of Actuaries—Academy) walked through the Academy's comments on the GOES corporate model decision (Attachment Fifteen). Brian Bayerle (American Council of Life Insurers—ACLI) then discussed the ACLI's comment letter (Attachment Sixteen), noting areas of agreement with the Academy and Moody's Analytics on the level of documentation necessary for transparency into the workings of the corporate model. Eom asked if it was possible the ACLI could support the use of the Conning corporate model if full documentation could be provided. Bayerle stated preliminarily that it was possible that the ACLI could support the Conning model under those circumstances, assuming that the results of the model after recalibration were satisfactory.

Jack Cheyne (Moody's Analytics), Steve Strommen (Blufftop LLC), and Mark Tenney (Mathematical Finance Company) then walked through each of their respective comment letters (Attachment Seventeen, Attachment Eighteen, and Attachment Nineteen, respectively). Yanacheak noted that in his position as a state insurance regulator, he did not see it as his role to use the GOES to forecast the future of the market, but rather to develop scenario sets that help state insurance regulators and companies evaluate their solvency positions. Yanacheak further noted reluctance with moving forward with the Academy model to the extent that it would set up a reliance on the Academy to maintain the model. Kehrberg responded, and Conning confirmed, that Conning would take over the maintenance of the Academy corporate model should state insurance regulators decide to move forward with that direction and pending a satisfactory arrangement that would allow Conning to legally use the Academy model. Yanacheak said that could address some of his concerns, but that he still had preference for the Conning model given Conning's ongoing research and development into its model. Carmello asked if either model encouraged more company investment into junk bonds. Dan Finn (Conning) noted that both models are going to be calibrated to the same targets, and that those targets should address the potential for lower rated debt instruments to be overly attractive from a risk-reward perspective.

6. <u>Discussed Comments Received on the GOES Acceptance Criteria and Stylized Facts</u>

Kehrberg walked through the Academy's comment letter (Attachment Twenty) on the previously exposed GOES acceptance criteria and stylized facts. In response to the Academy's commentary regarding a desire for a more comprehensive set of acceptance criteria, Hemphill stated that it was the Task Force's view that some of the stylized facts could stand on their own without an associated acceptance criteria. Weber added that the introduction of more acceptance criteria could lead to subjectivity in the selection of a scenario set, as certain criteria are not met and others are. Kehrberg noted that the subjectivity could be addressed through a robust governance process, with more time on the front-end developing a calibration and a more streamlined review during the monthly scenario production cycle.

Bayerle then discussed the ACLI's comment letter (Attachment Twenty-One) followed by Philip Wunderlich (Nationwide), who discussed Nationwide's comment letter (Attachment Twenty-Two). Responding to Nationwide's comment that there were no issues that have been identified with the Academy's equity model, Carmello noted that he thought there had been discussions of issues with that model. Hemphill noted that during the variable annuity reform process, questions were brought up regarding whether an equity-Treasury linkage should be implemented. Tizzoni then walked through Equitable's comment letter (Attachment Twenty-Three). Hemphill asked if Equitable's suggestion to use the conditional tail-expectancy (CTE)-95 metric for capital instead of CTE 98 would include altering the C3 RBC formula. Tizzoni noted that perhaps with a more robust generator, the CTE 95 metric could be swapped with the CTE 98 without adjusting the formula, but that he was open to the

discussion. Kehrberg, responding to the Equitable analysis of historical data and the relationship between equity returns and Treasury rates, noted that sampling of overlapping 20-year data periods does not lead to independent data points and that the correlation between interest rates and equity returns does not necessarily imply causation.

Strommen noted two key items from his comment letter (Attachment Twenty-Four) 1) that acceptance criteria were distinct from stylized facts and should be used as a gatekeeper to evaluate scenario sets, and 2) that the low-for-long acceptance criteria based off of the Dec. 31, 2020 starting conditions was too severe and could lead to insurance companies not being able to offer products. Tenney then walked through his comment letter (Attachment Twenty-Five).

7. Heard a Presentation on AG 53

Andersen and Jennifer Frasier (NAIC) delivered a presentation (Attachment Twenty-Six) on state insurance regulators' reviews of AG 53 filings and plans for engaging with companies going forward.

8. Heard a Presentation on the Results of a New Calibration of the GOES.

Scott O'Neal (NAIC) and Finn delivered a presentation (Attachment Twenty-Seven) on the results of a new calibration of the GOES. Carmello asked about whether the equity acceptance criteria based on the C3 Phase II calibration criteria were final, to which Hemphill responded that they were temporary pending additional guidance from the Academy. Connie Tang (Retired) asked about whether setting the initial Treasury yields and equity volatility to the long-term level for purposes of producing the equity scenarios was intended as the approach going forward or just used as a placeholder. Finn noted that it was the latter, and that state insurance regulators would need to make a decision regarding the equity-Treasury linkage going forward. Slutsker noted progress in reducing negative interest rates and the frequency and severity of inversions, but he asked what in the model was the main constraining factor in further improving on those aspects. Finn responded that the tabular high-for-long criteria at the 30-year/99th percentile level were the most constraining.

9. Adopted the Report of the GOES (E/A) Subgroup and Received an Update on the GOES Project Timeline

O'Neal provided an update (Attachment Twenty-Eight) on the GOES project timeline.

Yanacheak made a motion, seconded by Slutsker, to adopt the report of the GOES (E/A) Subgroup. The motion passed unanimously.

10. Heard an Update from the Academy Economic Scenario Generator Subcommittee on Equity Acceptance Criteria.

Kehrberg discussed the Academy's comment letter (Attachment Twenty-Nine) on GOES equity acceptance criteria. Hemphill noted the group did not deliver a single recommendation due to members supporting different constrained expected equity returns and asked if there was more support for one approach over the other. Kehrberg said that the majority of the group favored constraining the expected equity return to 8.75%. Len Mangini (Mangini Actuarial and Risk Advisory LLC) noted challenges using historical data given that some circumstances, such as the invention of the internet, are one-offs and the associated equity returns are unlikely to occur in the future. Therefore, Mangini suggested using a shorter historical period to develop the equity acceptance criteria. Kehrberg responded that the Academy could take a look at using alternative historical periods to see how much the acceptance criteria would change.

Finn said the stochastic log volatility models the Academy used to develop the equity acceptance criteria tend to be very sensitive to the volatility parameter, and he asked the Academy whether it would view initial volatility level as being important to the development of acceptance criteria. Karpov stated that the group discussed this issue and felt that the impact of the initial volatility level tends to decay quickly, and thus they did not include that impact in the acceptance criteria.

11. Discussed Comments Received on APF 2023-10

Hemphill introduced APF 2023-10, which would change the discount rate used in the VM-20 stochastic reserve calculation to be the NAER. Hemphill further stated that state insurance regulators had a desire to see impact analysis to try to understand the materiality of the change. Bayerle spoke to the ACLI's comment letter (Attachment Thirty) but noted that the ACLI did not feel any changes to the APF were needed as some of the concerns laid out in their comment letter had been addressed by speaking with the Academy. Slutsker said that consideration of adoption should be held off until the GOES project reached a conclusion and an impact analysis could be performed. Bayerle noted that the ACLI is comfortable with delaying the consideration of APF 2023-10 for now and that companies may have an opportunity to perform impact analysis concurrently with the unaggregated GOES field. Reedy noted the importance of impact analysis, especially given the dramatic changes to interest rates in the past few years. Dylan Strother (Academy) noted that his group had seen some data but not enough to consider a re-exposure of APF 2023-10. Strother noted that his group could continue to gather more data and would like to re-expose with additional analysis once it is available.

12. Re-exposed APF 2023-12 for a 60-day public comment period ending Jan. 29

Andersen introduced APF 2023-12, which would require proper reflection of equity market volatility in asset adequacy testing. Di Yang (Equitable) presented Equitable's comment letter (Attachment Thirty-One) followed by Bayerle who spoke to the ACLI's comment letter (Attachment Thirty-Two). Slutsker suggested including an edit from the ACLI to exclude surplus notes, bond exchange-traded funds (ETFs), and stock ETFs from the definition of equity-like instruments in a re-exposure of APF 2023-12. Hemphill added an additional edit to APF 2023-12 to account for a comment from Chang on including the reinvestment strategy in addition to the existing portfolio of assets.

Andersen made a motion, seconded by Leung, to re-expose APF 2023-12 (Attachment Thirty-Three) with the edits suggested by Slutsker and Hemphill for a 60-day public comment period ending Jan. 29, 2024. The motion passed unanimously.

13. Exposed APF 2023-13

Linda Lankowski (RGA) walked through the APF 2023-13, which modifies VM-M, Appendix M – Mortality Tables, to allow for the use of international mortality tables for relevant business and also adds the 1994 Group Annuity Reserving (GAR) and 1983 Table mortality tables for use in the future VM-22, Requirements for Principle-Based Reserves for Non-Variable Annuities. Slutsker asked if there were any examples of when a table would need to be developed by the insurer when an appropriate industry mortality table is not available. Lankowski noted that India was one such example where the industry mortality tables are developed based on the experience of rural portions of India and that was not appropriate to the segment of the population that was buying these particular insurance products.

Leung made a motion, seconded by Slutsker, to expose APF 2023-13 (Attachment Thirty-Four) for a 60-day public comment period ending Jan. 29, 2024. During the discussion of the motion, Yanacheak asked that commenters discuss what would happen if an approved industry table was subsequently changed, to which Lankowski noted she would look into the issue. The motion passed unanimously.

14. Heard an Update from the SOA on Research and Education

Dale Hall (SOA) and Kate Eubank (SOA) delivered a presentation (Attachment Thirty-Five) on the SOA's research and education initiatives. Ann Weber (SOA) then updated the Task Force on the SOA's Fellowship educational pathway redesign, noting that the new regulatory educational certificates were expected to be launched in 2026 to allow for ample discussion time with state insurance regulators. Slutsker asked what portion of the universal life business in the lapse study had secondary guarantees, noting that VM-20 still referred to a Canadian term-to-100 lapse study to use for universal life with secondary guarantee business. Eubank noted that she did not have the details handy, but the universal life study was robust and so she would expect good data on that.

15. Heard an Update from the Academy Council on Professionalism and Education

Lisa Slotznick (Academy), Laura Hanson (Actuarial Standards Board—ASB) and Cande Olsen (Actuarial Board for Counseling and Discipline—ABCD), jointly delivered the Academy Council on Professionalism and Education's update. Slotznick noted that the Committee on Qualifications received 43 questions and responded to each questioner individually. Olsen said that the ABCD had received more than 100 requests for guidance from actuaries, with approximately one-quarter of those requests coming from the life practice area. Hanson noted that a new Actuarial Standard of Practice (ASOP) related to reinsurance pricing was being developed, and that the following ASOPs were in the process of being revised: ASOP 7 *Analysis of Life, Health, or Property/Casualty Insurer Cash Flows*; ASOP 12, *Risk Classification (for All Practice Areas)*; and ASOP 41 , *Actuarial Communication*s.

16. Heard an Update from the Academy Life Practice Council

Amanda Barry-Moilanen (Academy) delivered a presentation (Attachment Thirty-Six) on the activities of the Academy Life Practice Council.

17. Discussed Revisions to the VM-20 FMI Rates and Appropriate Application

Hemphill noted that the SOA had made a correction to the VM-20 FMI rates on its website in October. Hemphill noted that as the originally posted FMI rates would generally be expected to be more conservative than the corrected rates, companies could use the VM-20 modeling simplifications justification to use the original rates. Hemphill also reminded the Task Force and interested parties that limited underwriting and simplified issue business should assume zero historical and future mortality improvement.

18. Adopted a Request to the Academy for Life Knowledge Statements for U.S. Appointed Actuaries, Illustration Actuaries and Qualified Actuaries

Hemphill walked through a request to the Academy for life knowledge statements pertaining to the work of appointed actuaries, illustration actuaries, and qualified actuaries. Slotznick noted that the Academy would build out a project plan to address the request, if the request was adopted by the Task Force, and set the appropriate expectations for the work.

Weber made a motion, seconded by Tsang, to adopt the request to the Academy (Attachment Thirty-Seven). The motion passed unanimously.

19. Received an Update on the Work of the Compact's Product Standards Committee

Serbinowksi noted that the Product Standards Committee of the Interstate Insurance Product Regulation Commission (Compact) was developing a filing standard for index-linked variable annuities (ILVAs). Serbinowski further stated that only the hypothetical portfolio approach was being allowed that states that the interim values must be consistent with that of a hypothetical portfolio. Thus, Serbinowski stated, this was a deviation from *Actuarial Guideline LIV—Nonforfeiture Requirements for Index-Linked Variable Annuity Products* (AG 54) where an additional alternative methodology is contemplated. Serbinowski also stated that the standard would require a standard template be used for product filing where companies would need to document how the interim values worked.

20. Heard Other Matters

Hemphill said that the Task Force had become aware that some companies may be requesting exceptions to the requirements in the *Valuation Manual* that could affect reserve and/or capital calculations and that this issue would be discussed in regulator-to-regulator sessions of the Valuation Analysis (E) Working Group and/or the Task Force.

Having no further business, the Life Actuarial (A) Task Force adjourned.

SharePoint/NAIC Support Staff Hub/Committees/Member Meetings/A CMTE/LATF/2023-3-Summer/National Meeting/Minutes Packet/LATF Fall National Meeting Minutes.docx

Draft: 11/16/23

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Life Actuarial (A) Task Force
Virtual Meeting
November 2, 2023

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The Life Actuarial (A) Task Force met Nov. 2, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill (TX); Scott A. White, Vice Chair, represented by Craig Chupp (VA); Mark Fowler represented by Sanjeev Chaudhuri (AL); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil, Thomas Reedy, and Ted Chang (CA); Andrew N. Mais represented by Wanchin Chou (CT); Doug Ommen represented by Mike Yanacheak (IA); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Timothy N. Schott represented by Marti Hooper (ME); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Amanda Fenwick (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1. Adopted its Summer National Meeting Minutes

Hemphill introduced the Task Force's Summer National Meeting minutes for adoption. Chupp requested that a few editorial changes be made.

Chupp made a motion, seconded by Yanacheak, to adopt the Task Force's Summer National Meeting minutes with Chupp's suggested language changes (*see NAIC Proceedings – Summer 2023, Life Actuarial (A) Task Force*). The motion passed unanimously.

2. Exposed APF 2023-11

Hemphill walked through amendment proposal form (APF) 2023-11, which seeks to ensure references to risk-based capital (RBC) in the *Valuation Manual* are consistent with the regulatory intent and scope of RBC.

Chupp made a motion, seconded by Andersen, to expose APF 2023-11 (Attachment One-A) for a 21-day public comment period ending Nov. 22. The motion passed unanimously.

3. Exposed APF 2023-12

Andersen discussed APF 2023-12, which looks to clarify state insurance regulator expectations regarding equity return assumptions in VM-30, Actuarial Opinion and Memorandum Requirements. Chang asked whether the appointed actuary would be required to use a metric with a certain confidence level in determining the equity return assumptions. Andersen noted that the APF sought to maintain the same confidence level as reserves but that flexibility around that standard could be discussed. Chang, noting language in the APF that referenced a company's current portfolio, said that the reinvestment strategy of the company was also important when considering the appropriateness of the equity return assumptions. Hemphill and Andersen noted that it makes sense to consider language changes during the exposure period in light of Chang's comments.

Andersen made a motion, seconded by Chupp, to expose APF 2023-12 (Attachment One-B) for a 21-day public comment period ending Nov. 22. The motion passed unanimously.

4. Reported a Regulator-Only Task Force Discussion

Hemphill noted that the Task Force met in regulator-to-regulator session Oct. 26, pursuant to paragraph 3 (specific companies, entities, or individuals) of the NAIC Policy Statement on Open Meetings. Hemphill further stated that during this meeting, state insurance regulators discussed reviews of indexed universal life (IUL) insurance illustrations and heard an update on the product filings of certain index-linked variable annuities (ILVAs). Hemphill stated that state insurance regulators decided to collaborate on future reviews of IUL products as a result of the meeting.

Having no further business, the Life Actuarial (A) Task Force adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/LATF Calls/11 02/Nov 02 Minutes.docx

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation, and a very brief description (title) of the issue.

    Identification:
    Rachel Hemphill, PhD, FSA, FCAS, MAAA

    Title of the Issue:
    Remove references to RBC in VM-20 and VM-21 that are inconsistent with the purpose, scope, and intended use of RBC and be consistent with improvements made in related Sections of the VM-22 draft.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    VM-20 Section 8.C.17 and VM-21 Section 1.C.3

    January 1, 2023 NAIC Valuation Manual

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted, or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    VM-20 Section 8.C.17:

    17. In setting any margins required by Section 8.C.15 and Section 8.C.16 to reflect potential uncertainty regarding the receipt of cash flows from a counterparty, the company shall take into account the ratings or other available information related to the probability of the risk of default by the counterparty, as well as any security or other factor limiting the impact on cash flows.

    VM-21 Section 1.C.3 (remove entire section, and renumber subsequent Section 1.C.4 to 1.C.3):

4. State the reason for the proposed amendment? (You may do this through an attachment.)

A couple existing references to RBC in VM-20 and VM-21 are inconsistent with the RBC Preamble's description of the purpose, scope, and intended use (as well as confidentiality) of RBC.

Related to the VM-21 change, the "risk not necessarily reflected" is proposed to be removed in the VM-22 draft, as it was not necessary to have in addition to the "risks reflected" and "risks not reflected" sections. The "risks reflected" in VM-21 Section 1.C.1 already specifically states they are those "Directly related to the contracts falling under the scope of these requirements or their supporting assets."

Note that there are no cross-references to VM-21 Section 1.C.3 or 1.C.4 that need to be updated as a result of this change.

Dates: Received	Reviewed by Staff	Distributed	Considered
10/24	SO		
Notes: 2023-11			

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Deleted: 3. The risks not necessarily reflected in the calculation of reserves under these requirements are: ¶
a. Those not reflected in the determination of RBC. ¶
b. Those reflected in the determination of RBC but arising from obligations of the company not directly related to the contracts falling under the scope of these requirements, or their supporting assets, as described above.¶

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Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation, and a very brief description (title) of the issue.

    Identification:
    Fred Andersen, FSA, MAAA and Ben Slutsker, FSA, MAAA

    Title of the Issue:
    Clarify expectations on reflection of equity return volatility in VM-30 cash-flow testing.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    VM-01

    VM-30 Section 3.B (new item 7 with items below renumbered)

    January 1, 2023 NAIC Valuation Manual

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted, or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    Add the following definition to VM-01

    - The term "equity-like instruments" means assets that include the following:
        - Any assets that, for purposes of risk-based capital C-1 reporting, are in the category of common stock, i.e., have a 30% or higher risk-based capital charge.
        - Any assets that are captured on Schedule A or Schedule BA of the annual statement.
        - Bond funds.

    Add the following subsection 3.B.7. and renumber the items below:

    7. When the form of asset adequacy analysis is cash-flow testing, investment return assumptions for equity-like instruments shall not solely project the anticipated long-term average return (e.g., a single level assumption set to the long-term average) but account for the volatility of such returns which may be expected in moderately adverse conditions.

        a. To accomplish the accounting for volatility, one or more of the following approaches may be employed, as appropriate:

            i.   Stochastic modeling for equity returns, with accompanying analysis of risk metrics.

            ii. As relevant to capture the risk, including up, down, and/or volatile equity return scenarios for each given set of interest rate paths.

            iii. Projecting one or more market drops, taking into consideration future points at which cash-flow testing results could be vulnerable to market downturns.

iv. Reflecting a level return assumption set equal to a tail risk metric, for example, setting investment returns to the average of the worst 30% of future scenarios, i.e., CTE70.

b. A qualitative description of why the equity return scenario used in asset adequacy analysis is moderately adverse in light of the company's portfolio should be provided.

4. State the reason for the proposed amendment? (You may do this through an attachment.)

As presented at the August 2023 NAIC meeting, Actuarial Guideline 53 reviews revealed usage of flat, high, unchanging equity return assumptions for the length of 30+ year projections by many industry members.

We believe that, just as fixed securities should have their risks appropriately reflected in cash-flow testing, so should equity-like instruments.

This proposal stops short of establishing a guardrail on equity return assumptions (as exists in other Valuation Manual sections), but such a guardrail may also be a consideration if regulators do not see an appropriate reflection of equity market volatility.

Dates: Received	Reviewed by Staff	Distributed	Considered
10/25/23	SO		
Notes: 2023-12			

Draft: 11/16/23

Life Actuarial (A) Task Force
E-Vote
October 11, 2023

The Life Actuarial (A) Task Force conducted an e-vote that concluded Oct. 11, 2023. The following Task Force members participated: Scott A. White, Vice Chair, represented by Craig Chupp (VA); Mark Fowler represented by Sanjeev Chaudhuri (AL); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil (CA); Andrew N. Mais represented by Wanchin Chou (CT); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Timothy Schott represented by Marti Hooper (ME); Grace Arnold represented by Fred Andersen (MN); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Amanda Fenwick (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1.   Adopted Memorandum on Planned Changes to U.S. Regulatory Content in the SOA's Curriculum

The Life Actuarial (A) Task Force conducted a joint e-vote with the Health Actuarial (B) Task Force and the Casualty Actuarial and Statistical (C) Task Force to consider adoption of the memorandum on planned changes to U.S. regulatory content in the Society of Actuaries' (SOA's) Fellowship educational pathway. For the Life Actuarial (A) Task Force, Chupp made a motion, seconded by Li, to adopt the memorandum (Attachment Two-A) and distribute it to the SOA. The motion passed unanimously.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/LATF Calls/10 11/Oct 11 Minutes.docx

TO: John Robinson, FSA, MAAA, FCA, President, Society of Actuaries (SOA)

Gregory W. Heidrich, Chief Executive Officer, SOA

Stuart Klugman, FSA, CERA, PhD, Staff Fellow, SOA

FROM: Christian Citarella, Chair, Casualty Actuarial and Statistical (C) Task Force

Julie Lederer, Vice-Chair, Casualty Actuarial and Statistical (C) Task Force

Paul Lombardo, Chair, Health Actuarial (B) Task Force

Kevin Dyke, Vice-Chair, Health Actuarial (B) Task Force

Rachel Hemphill, Chair, Life Actuarial (A) Task Force

Craig Chupp, Vice-Chair, Life Actuarial (A) Task Force

CC: Bill Michalisin, Executive Director, American Academy of Actuaries (AAA)

Ken Kent, President, AAA

Lisa Slotznick, President-Elect, AAA

RE: Society of Actuaries (SOA) Planned US Regulatory Basic Education Changes

DATE: October 4, 2023

The Life Actuarial (A) Task Force, Health Actuarial (B) Task Force, and Casualty Actuarial and Statistical (C) Task Force are generally appreciative and supportive of the Society of Actuaries' educational efforts. We understand and can appreciate the desire to be more flexible for candidates and supportive of international students. However, we are very concerned by the movement of United States (US) regulatory material to an optional regulatory certificate course for US actuaries. We believe that US regulatory material must be a required educational component for all actuaries practicing in the US.

There has been a suggestion that US regulatory material could be an "as-needed" supplement, particularly noting that appointed actuaries may need the US regulatory certificate. As much as we value the work of appointed actuaries, no one supposes that they are a one-person shop. Moreover, US regulatory material is not just essential for appointed actuaries and qualified actuaries, but for:

- Valuation actuaries,
- Actuaries performing experience studies,
- Investment actuaries,
- Illustration actuaries,
- Product filing actuaries,
- ... and regulatory actuaries!

In fact, there is no insurance industry actuarial role where it would be appropriate to remove the basic education on US laws and regulations for actuaries practicing in the US. Moreover, it is important to

note that we do not think that an FSA would qualify you to meet the US Qualifications Standards (USQS) for signing general statements of opinion if the US regulatory material were removed. The USQS includes "US-specific knowledge", in addition to Basic Education. However, if the Basic Education were modified to no longer provide foundational knowledge in US regulatory requirements, we do not believe that the "US-specific knowledge" component could be adequately satisfied through individual continuing education alone. While the SOA has noted that the basic education will include GAAP and IFRS, this does not address the concern. US statutory laws and regulations are not a tweak, variant, or refinement of GAAP or IFRS. Without being provided foundational US regulatory knowledge in their Basic Education, new actuaries would be left in a situation where they do not know what gaps in education they have and what additional study would be needed to be qualified to issue an opinion. We do not see how this differs from removing any other fundamental component of the actuarial education and leaving it to the individual to study on their own. If we believe that the actuarial education process is valuable (and we do), and we believe that a knowledge of US regulatory material is necessary to practice in the US (and we do), divorcing this essential material from the regular educational process is a disservice to the profession. For regulators, the most critical concern is that the lack of awareness would lead to a lack of compliance and an inability to rely on the professionalism of company actuaries. For example, we have observed that actuaries that had principle-based reserving (PBR) material as part of their Basic Education are more conversant in general PBR topics, more aware of the intricate details, and better able to comply with the requirements. An inability of regulators to rely on the professionalism of company actuaries would then lead to negative repercussions for insurance companies, as it would fundamentally undermine efforts that hinge on that reliance, such as efforts to make reserving and other areas more principles based. Moreover, thinking about the professionalism that actuaries are valued for, a key component of that professionalism is knowledge of and adherence to regulatory requirements.

During the NAIC summer national meeting and in subsequent discussions, our task forces have urged the SOA to detail the regulatory material being removed from the ASA/FSA syllabus as soon as possible. While we appreciate the SOA announcing the framework of changes planned for 2025, regulators will need the detailed changes in time to consider modifications to qualified actuary requirements for the 2025 Annual Statement Instructions, which must be submitted by February 2024. In addition, jurisdictions will need sufficient time to consider changes to their qualified actuary definitions for other regulatory requirements such as rate filings, captive reserve opinions, and various rate certifications.

Several years ago, the NAIC completed a P/C Appointed Actuary Job Analysis Project, which documented the knowledge and abilities required of a P/C Appointed Actuary. The NAIC's P/C Educational Standards and Assessment Project then determined what should be included in an actuary's basic education to ensure that the actuary attains this knowledge. The NAIC determined that an FSA who completes the general insurance track and takes the United States' version of the Financial and Regulatory Environment Exam and the Advanced Topics in General Insurance Exam has obtained an "Accepted Actuarial Designation," which means that the designation meets or exceeds the minimum P/C actuarial education standards for purposes of signing a P/C statement of actuarial opinion. Any changes in the SOA's basic education will require the NAIC to review the changes, with the help of the SOA, and assess whether an actuary who goes through the SOA's revised educational program will still obtain the knowledge and abilities required of a P/C Appointed Actuary. This process should start as soon as possible, especially since it may entail changes to the P/C Statement of Actuarial Opinion instructions.

US regulatory content is necessary to provide general statements of actuarial opinion in the US. Whether it is part of the FSA, a supplemental course offered by the SOA, or a supplemental course offered by the American Academy of Actuaries (AAA), it should be required of all actuaries practicing in the US. To ensure the continued strength and value of the US actuarial profession, we recommend the AAA produce a comprehensive minimum basic and specific education standard, in the USQS or in some other way. Without this type of standard, a new or existing actuarial organization could leave almost all material to self-study. We appreciate the SOA presenting on this topic to our task forces and providing us an opportunity for input on such a critical issue. We look forward to continued dialogue with the SOA.

Draft: 11/1/23

Life Actuarial (A) Task Force
Virtual Meeting
October 5, 2023

The Life Actuarial (A) Task Force met Oct. 5, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill (TX); Scott A. White, Vice Chair, represented by Craig Chupp (VA); Mark Fowler represented by Sanjeev Chaudhuri (AL); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil and Thomas Reedy (CA); Andrew N. Mais represented by Wanchin Chou (CT); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Timothy N. Schott represented by Marti Hooper (ME); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Amanda Fenwick (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1. Adopted APF 2023-09

Hemphill introduced amendment proposal form (APF) 2023-09. She noted that the amendment is intended to allow the Society of Actuaries (SOA) to develop industry historical and future mortality rates, and the Task Force approves these rates. She said that while these rates were developed in what the SOA working group believed to be the most theoretically appropriate way to avoid any inconsistency with the methodology companies use to develop company-specific historical mortality improvement, the currently exposed language would not have been sufficient to avoid all inconsistencies with the company's mortality improvement assumptions. Therefore, Hemphill recommended that the Task Force consider adopting APF 2023-09 and remove the additional language that requires companies to reflect mortality improvement considerations adopted by the Task Force, which is posted on the SOA's website. Brian Bayerle (American Council of Life Insurers—ACLI) noted that his group's concerns were addressed through Hemphill's suggested changes to APF 2023-09.

Leung made a motion, seconded by Schallhorn, to adopt APF 2023-09 with Hemphill's suggested language changes (Attachment Three-A). The motion passed unanimously.

2. Adopted the Task Force's 2024 Proposed Charges

Weber made a motion, seconded by Schallhorn, to adopt the Task Force's 2024 proposed charges. The motion passed unanimously.

3. Exposed Acceptance Criteria for the Generator of Economic Scenarios (GOES)

Following three regulator-to-regulator meetings on Sept. 26, Sept. 21, and Sept. 9/18, Scott O'Neal (NAIC) walked through a presentation (Attachment Three-B) on acceptance criteria to be used in calibrating the next version of the generator of economic scenarios (GOES). After O'Neal walked through the equity acceptance criteria, Jason Kehrberg (American Academy of Actuaries—Academy) noted that the Academy intended to provide an updated analysis that would add more recent data and more percentiles to the Academy's proposed equity acceptance criteria. Dan Kim (American Equity) asked what the frictional cost component represented in the corporate acceptance criteria. Kehrberg noted that the frictional cost captured the trading cost for the bond fund as individual bonds move outside of the fund target and need to be replaced with others.

Slutsker made a motion, seconded by Reedy, to expose the GOES acceptance criteria for a 36-day public comment period ending Nov. 10. The motion passed unanimously.

Having no further business, the Life Actuarial (A) Task Force adjourned.

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Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation and a very brief description (title) of the issue.

    Identification:
    Rachel Hemphill, FSA, FCAS, MAAA, Ph.D.

    Title of the Issue:
    Add guidance on consistency of HMI and FMI rates.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    VM-20 Section 9.C.2.h

    January 1, 2023 NAIC Valuation Manual

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    See attached.

4. State the reason for the proposed amendment? (You may do this through an attachment.)

    For the last two years, the SOA has been restricted in the form of the historical and future mortality improvement rates that they are able to recommend, as the *Valuation Manual* pairs the industry future mortality improvement with both company-specific historical mortality improvement as well as industry historical mortality improvement. Therefore, the SOA's future mortality improvement recommendation has not been able to assume a specific treatment of any considerations, such as COVID, in the historical mortality improvement.

    Rather than continuing this restricted form of recommendations, this APF proposes to require that companies ensure that they are applying historical mortality improvement rates that are consistent with any considerations specifically identified by the SOA, adopted by LATF, and published along with the mortality improvement factors (e.g., COVID).

    Also, because mortality improvement may be negative, the requirement should be that HMI "shall" be applied to the company mortality rates not "may" be applied.

* This form is not intended for minor corrections, such as formatting, grammar, cross–references or spelling. Those types of changes do not require action by the entire group and may be submitted via letter or email to the NAIC staff support person for the NAIC group where the document originated.

NAIC Staff Comments:

Dates: Received	Reviewed by Staff	Distributed	Considered
7/20/23, 10/5/23	SO		
Notes: 2023-09			

VM-20 9.C.2.h

h. Mortality improvement shall not be incorporated beyond the valuation date in the company experience mortality rates. However, historical mortality improvement from the central point of the underlying company experience data to the valuation date shall be incorporated.

Guidance Note: Mortality improvement may be positive or negative (i.e., deterioration).

Deleted: may

Generator of Economic Scenarios (GOES) Stylized Facts and Acceptance Criteria

October 5, 2023

NAIC NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

Table of Contents

Treasury Model Acceptance Criteria

Retained Treasury Model Acceptance Criteria

Item	Category	Criteria

T1.	Prevalence of High Rates, Upper Bound on Treasury Rates	a) The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments
		b) Upper Bound:
		  i. [20%] is >= [99%]-tile on the 3M yield fan chart, and no more than [5%] of scenarios have 3M yields that go above [20%] in the first 30 years
		  ii. [20%] is >= [99%]-tile on the 10Y yield fan chart, and no more than [5%] of scenarios have 10Y yields that go above [20%] in the first 30 years

T2.	Lower Bound on Negative Interest Rates, Arbitrage Free Considerations	Apply the following guidance for negative rates: a) All maturities could experience negative interest rates b) Interest rates may remain negative for multi-year time periods c) Rates should generally not be lower than -1.5%
T3.	Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape	a) Review initial actual vs. fitted spot curve differences for a sampling of 5 dates representing different shapes and rate levels for the entire curve and review fitted curves qualitatively to confirm they stylistically mimic the different actual yield curve shapes b) The frequency of different yield curve shapes in early durations should be reasonable considering the shape of the starting yield curve (e.g. a flatter yield curve leads to more inversions). c) The steady state curve has normal shape (not inverted for short maturities, longer vs shorter maturities, or between long maturities)

Modified Treasury Model Acceptance Criteria

Item	Category	Criteria
T4.	Low For Long: 12/31/20 Starting Conditions	a) At least 10% of scenarios need a 10-year geometric average of the 20-year UST below **1.45%** b) At least 5% of scenarios need a 30-year geometric average of the 20-year UST below **1.95%** **Note: As part of the model acceptance process, a given calibration of the GOES will be tested at multiple starting dates. This criteria is relevant for the 12/31/20 starting yield curve.**

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Additional Treasury Model Acceptance Criteria

Item	Category	Criteria
T5.	Low- and High-For-Long at Varying Starting Conditions	a) For each scenario, calculate the geometric average of the [20-year] UST yield over the first [10] and [30] years of the projection. b) Calculate the [1st] and [99th] percentiles of the distribution of geometric average rates (for both the 10 and 30-year horizons). c) Look up criteria based on the starting level of the 20-year UST yield (interpolate if necessary).

Period	Initial UST20	10-year Geom Avg		30-year Geom Avg	
		1st percentile should be less than:	99th percentile should be greater than:	1st percentile should be less than:	99th percentile should be greater than:
Interim (years 0-10 or 0-30)	1%	0.94%	3.43%	1.50%	6.25%
	2%	1.23%	5.05%	1.68%	7.71%
	3%	1.62%	6.55%	1.86%	8.72%
	4%	2.15%	7.74%	2.06%	9.62%
	5%	2.66%	8.87%	2.26%	10.46%
	6%	3.15%	9.96%	2.50%	11.16%
	7%	3.63%	11.03%	2.78%	11.61%
	8%	4.10%	12.07%	3.06%	11.99%
	9%	4.64%	13.08%	3.34%	12.33%
	10%	5.21%	14.01%	3.65%	12.63%

Note: AAA recommended steady state portion of low- and high-for-long was not included in regulator criteria

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Equity Model Acceptance Criteria

Equity Model Acceptance Criteria

Item	Category	Criteria
E1.	Low and High Accumulated Equity Returns	Use the former C3 Phase II equity model Calibration Criteria as a rough placeholder benchmark when evaluating equity scenarios.

Large Cap (S&P 500) Gross Wealth Factors

Percentile	1 year	5 years	10 years	20 years
2.5%	0.78	0.72	0.79	
5.0%	0.84	0.81	0.94	1.51
10.0%	0.9	0.94	1.16	2.1
90.0%	1.28	2.17	3.63	9.02
95.0%	1.35	2.45	4.36	11.7
97.5%	1.42	2.72	5.12	

Corporate Model Acceptance Criteria

Corporate Model Acceptance Criteria

Item	Category	Criteria
C1.	Target Steady State Excess Returns and Average Annualized Excess Returns in Years 20-30	a) Set steady state excess return targets for each bond fund according to the criteria below. b) Average annualized excess returns for each bond fund in years 20 through 30 of the projection should be no greater than the steady state excess returns, but no less than the steady state excess returns minus a buffer.

Historical Data

Historical averages (1999 to 2021) from Bloomberg *(bps)*	IG 1-5	IG 5-10	IG Long	HY
Option Adjusted Spread *(OAS)*	124	156	1.80	534
Spread Return *(determined from OAS and duration series)*	129	168	1.95	559
Excess Return	98	100	88	311
Frictional Cost *(Spread Return - Excess Return)*	31	68	107	248

Historical OAS split –Frictional Cost vs. Excess Return	IG 1-5	IG 5-10	IG Long	HY
Frictional Cost % of OAS	25%	44%	60%	46%
Excess Return % of OAS	75%	56%	40%	54%

Criteria

Steady state targets *(bps)*	IG 1-5	IG 5-10	IG Long	HY
Target OAS *(avg. VM-20 ult. spread at [12/31/21])*	107	141	163	448
Target Excess Return *(Target OAS * Excess Return % of OAS)*	80	79	66	240
Criteria for avg. annualized Excess Return in years [20-30]	80 -[10]	79 -[10]	66 -[10]	240 -[20]

Stylized Facts

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Treasury Model Stylized Facts

1. **The level of interest rates (the cost of borrowing money) changes due to a variety of complex and interrelated factors (e.g., supply of and demand for financing, business cycle, GDP, inflation, central bank actions to stimulate the economy or control inflation**
   a) Short-term rates (which the Fed has more control of) have generally fallen within a range of 0% to 20% and have most often been within the lower part of that range. Long-term rates have generally been within 300 bps of short-term rates.
   b) Negative interest rates are possible (have been observed outside the U.S.) but unlikely due to structural and market differences between the U.S. and other economies.
   c) Interest rates can exhibit multi-year trends (e.g., up, down, low-for-long). Interest rates can stay at very low levels for several years. Short-term rates can stay low and rangebound ~~very near their lower bound~~ for several years while higher long-term rates continue to fluctuate.

2. **The volatility of interest rates varies over time, with periods of both high and low volatility.**
   a) Monthly changes in interest rates are generally limited in size (less than 80 bps) but changes tend to be greater when the level of interest rates is higher.
   b) Monthly changes in short-term rates tend to be larger than monthly changes in long-term rates when short-term rates are not near their lower bound, but the opposite relationship tends to hold when short-term rates are ~~near their lower bound~~ low or negative.
   c) ~~Volatility tends to increase in stressed markets.~~
   d) The standard deviation of monthly rate changes should generally be consistent with the historical data, given the level of interest rates.*

3. **The yield curve embodies the term structure of interest rates and takes a variety of shapes.**
   a) The normal yield curve shape is upward sloping (long-term rates greater than short-term rates) and concave downward. Normal yield curve shapes can persist for extended periods of time.
   b) Non-normal yield curve shapes include inversions (downward sloping), humps, and valleys. Inversions (and other non-normal yield curve shapes) are often associated with key points in the business cycle (e.g., recession indicator) but generally don't persist for extended periods of time.
   c) The slope of the yield curve tends to be lower (even negative/inverted) when short-term rates are at relatively high levels.
   d) Percentile metrics of the slope of the yield curve across scenarios should generally be consistent with history given the starting rate level.**

*added in place of AAA rate volatility criteria
**added in place of AAA rate slope criteria

Equity Model Stylized Facts

1. Equity indices (indeed, all asset classes) tend to exhibit **consistent risk/reward relationships** over long time horizons.

2. Cumulative equity returns tend to exceed the compounded risk-free rate (positive observed **equity risk premium**) over long time horizons, but over short time horizons the equity risk premium fluctuates due to several factors and can be negative.

3. Equities **fluctuate between bull and bear markets** (bubbles tend to burst) – markets can experience significant losses but eventually tend to **move back into positive territory** (cumulative equity returns over long time horizons tend to be positive).

4. Cumulative equity returns *over long time horizons* **are not materially impacted by initial market conditions**.

5. The **volatility of equity returns varies over time but has a strong tendency to revert to normative levels**. Changes in volatility over time increase the probability of both extreme gains and extreme losses from one period to the next (i.e., the distribution has fat tails, or *positive kurtosis*). Furthermore, the **volatility of equity returns is higher in bear markets**. This increases the probability of extreme losses relative to extreme gains (i.e., the distribution has a longer left tail, or *negative skewness*).

6. Equity markets contain **pathwise dynamics** over long time horizons that aren't present in the distribution of single-period returns. Future equity scenarios should have reasonable distributions of cumulative equity returns over long time horizons (e.g., 10, 20, 30 years), especially since these distributions are key to the performance of long-duration life and annuity products.

7. Future equity scenarios should include events that are plausibly **more extreme than history.**

8. Equity returns have both a **price and dividend component**, and they behave differently – Dividend returns tend to be more stable than price returns.

9. Returns between different equity indices are **generally positively correlated** over **long** time horizons. This correlation may increase sharply in bear markets, but it tends to revert to normative levels in a short period of time.

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Corporate Model Stylized Facts

1. **General nature of credit markets and credit spreads**
   a) Credit markets tend to be cyclical with elevated defaults and migrations at the end of credit cycles. Credit-related losses tend to be "lumpy" or episodic.
   b) Credit spreads are positive and have a strong tendency to revert to long-term normative levels (generally within three to four years).
   c) Credit spreads exhibit volatility clustering (i.e., regimes of high and low volatility), and volatility has a strong tendency to revert to long-term normative levels.

2. **Corporate Credit Spreads: Relation across qualities and maturities**
   a) As a bond's credit quality decreases credit spreads, spread volatility, and the risk of loss increase.
   b) Longer maturity bonds generally have higher credit spreads than shorter maturity bonds. However, the credit spreads on shorter maturity bonds are more sensitive to current market conditions, so during market stresses credit spreads on shorter maturity bonds may increase more than credit spreads on longer maturity bonds.
   c) Credit spreads for different qualities and maturities tend to be strongly correlated (e.g., 80% or more).

3. **Corporate Credit Spreads: Relation to other market variables**
   a) Credit spreads tend to be higher and more volatile in equity bear markets (i.e., strong positive correlation to equity volatility, strong negative correlation to equity returns).
   b) Credit spreads tend to be negatively correlated with Treasury rates (i.e., flight to quality during market stress).

4. **General nature of bond index funds**
   a) A corporate bond fund is generally actively managed (regularly rebalanced) to meet defined maturity and quality targets (e.g.,- 5 to 10-year investment grade bonds) by trading individual bonds into and out of the fund. Such trading tends to increase when the corporate bond market experiences high levels of credit migration.

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Corporate Model Stylized Facts (continued)

5. **Bond index fund return dynamics**
    a) Bond index fund total returns reflect the impact of risk-free rates (and changes in risk-free rates) as well as credit-related returns in "excess" of risk-free rates.
        -   Total return = Risk free return + Excess return
        -   Excess return = Spread-based return -Frictional costs
        -   Spread-based return reflects credit spread income and price returns (i.e., changes in market price due to spread movement).
        -   Frictional costs reflect costs due to defaults (net of recoveries), migrations (e.g., selling downgraded bonds at a loss when they no longer meet the fund's quality targets), and rebalancing.
    b) Bond index fund returns vary with the credit cycle.
        -   Spread-based return tends to decline significantly when spreads explode but then recover as spreads mean revert and migrations/defaults occur (i.e., the portfolio is purged).
        -   Frictional costs (which are generally not recoverable) tend to cluster and accumulate rapidly as bonds migrate/default, with severity depending on the magnitude and duration of the credit cycle.

6. **Bond Index Fund Returns: Relation to other asset classes**
    a) Bond funds have risk/reward relationships that are generally consistent with other asset classes over long horizons.
    b) Credit spreads for bond funds held in the separate account should be consistent with economic assumptions for bonds held in the general account.

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

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Timeline for Testing and Major Milestones

NAIC NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

Timeline for Testing and Major Milestones

5-Oct	Expose Interest Rate, Equity, and Corporate Model Stylized Facts and Acceptance Criteria until 11/10.
10/12 or 10/19	Expose Corporate Model Quantitative and Transparency/Documentation Comparisons until 11/10.
Oct-Early Nov	Conning Recalibrate Models based on exposed Stylized Facts and Acceptance Criteria. NAIC Model Office Improvements.
29-Nov	Review Stylized Facts and Acceptance Criteria Comments, Conning Scenarios after re-calibration in Orlando. Potentially Adopt Final Stylized Facts and Acceptance Criteria. Review Corporate Model Comparisons. Potentially select Corporate Model.
Nov-Feb	NAIC Model Office Testing. Circulate any promising scenario sets. Individual Companies with capacity that wish to do so are encouraged to test using their own models and share results with regulators. GOES Subgroup calls to review scenario statistics against acceptance criteria, review model office results. Adopt Final Stylized Facts and Acceptance Criteria if regulators have substantial edits. Conning recalibrations, if so.
3/14/2024	Present Model Office Results, Expose Scenario Set(s).
March-June	Unaggregated GOES Field Test (VM-20, VM-21/C3P2, and C3P1), If Needed
June-July	Reg-Only Company Presentations of Unaggregated GOES Field Test (VM-20, VM-21/C3P2, and C3P1) Results, If Needed
July-Sept	VM-22 Field Test

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Draft: 11/2/23

Life Actuarial (A) Task Force
Virtual Meeting
September 28, 2023

The Life Actuarial (A) Task Force met Sep. 28, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill; Scott A. White, Vice Chair, represented by Craig Chupp (VA); Mark Fowler represented by Sanjeev Chaudhuri (AL); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil (CA); Andrew N. Mais represented by Wanchin Chou (CT); Doug Ommen represented by Mike Yanacheak (IA); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Timothy N. Schott represented by Marti Hooper (ME); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Amanda Fenwick (NY); Judith L. French represented by Peter Weber (OH); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1. Adopted the 2023 GRET Tables

Leung made a motion, seconded by Weber, to adopt the 2023 Generally Recognized Expense Tables (GRETs) (Attachment Four-A). The motion passed unanimously.

2. Exposed APF 2023-10

Hemphill introduced amendment proposal form (APF) 2023-10, noting that it was submitted by the American Academy of Actuaries' (Academy's) Life Reserve Working Group (LRWG), and the amendment sought to change the discount rate used in the VM-20, Requirements for Principle-Based Reserves for Life Products, stochastic reserve calculation to be the net asset earned rate on additional assets rather than 105% of the scenario-specific 1-year U.S. Treasury rate currently in place. Chupp noted that he thought a reference in the rationale section of APF 2023-10 needed to be corrected, and Hemphill agreed. Chupp then asked what the original rationale was for using the 105% of the 1-year U.S. Treasury rate as the discount rate. Dylan Strother (Academy) noted that the LRWG did some research into the current VM-20 stochastic reserve discount rate and noted that it may simply have been ported from C3 Phase II during the development of VM-20, but the discount rate used in C3 Phase II has now been updated to be the net asset earned rate on additional assets.

Slutsker asked if field testing would be needed to assess the impact of changing the VM-20 discount rate, especially considering the changes that are coming to the economic scenario generator used in VM-20. Strother noted that the LRWG did some initial testing and did not see large impacts, but one of the benefits of exposing APF 2023-10 could be that it would prompt companies to perform some of their own testing on this change and share the impacts with regulators and/or interested parties. Hemphill noted that she would like to see analysis performed by commenters to understand whether this was a material issue now or would only become more impactful after the adoption of a new economic scenario generator. Hemphill also walked through a number of small typos that she wanted to correct in the exposed version of APF 2023-10.

Leung made a motion, seconded by Chupp, to expose APF 2023-10 (Attachment Four-B) with the reference and typo corrections identified by Chupp and Hemphill for a 47-day public comment period ending Nov. 13. The motion passed unanimously.

3. Exposed the Task Force's 2024 Proposed Charges

Hemphill walked through the change that was made to the Task Force's 2024 proposed charges to remove the evaluation of the Standard Projection Amount (SPA) for VM-21, Requirements for Principle-Based Reserves for Variable Annuities, noting that the evaluation had been performed. Connie Tang (retired) asked if the evaluation of the SPA also applied to VM-22, Requirements for Principle-Based Reserves for Non-Variable Annuities. Slutsker noted that the overarching expectation is that VM-21 and VM-22 would have consistency. Slutsker further stated that discussion of the VM-22 SPA will take place in a few months from now when a fuller methodology is expected to be ready for commentary.

Yanacheak made a motion, seconded by Weber, to expose the Task Force's 2024 proposed charges for a 7-day public comment period ending Oct. 4 (Attachment Four-C). The motion passed unanimously.

Having no further business, the Life Actuarial (A) Task Force adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/LATF Calls/09 28/Sep 28 Minutes.docx

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TO: Rachel Hemphil, FFA, FCAS, MAAA, PHD, Chair, Life Actuarial (A) Task Force

FROM: Pete Miller, ASA, MAAA, Experience Study Actuary, Society of Actuaries (SOA) Research Institute
Tony Phipps, Chair, SOA Research Institute Committee on Life Insurance Company Expenses

DATE: August 4, 2023

RE: 2024 Generally Recognized Expense Table (GRET) – SOA Research Institute Analysis

Dear Ms. Hemphill:

As in previous years, the Society of Actuaries Research Institute expresses its thanks to NAIC staff for their assistance and responsiveness in providing Annual Statement expense and unit data for the 2024 GRET analysis for use with individual life insurance sales illustrations. The analysis is based on expense and expense-related information reported on each company's 2021 and 2022 Annual Statements. This project has been completed to assist the Life Actuarial Task Force (LATF) in considering potential revisions to the GRET that could become effective for the calendar year 2024. This memo describes the analysis and resultant findings.

NAIC staff provided Annual Statement data for life insurance companies for calendar years 2021 and 2022. This included data from 766 companies in 2021 and 749 companies in 2022. This decrease resumes the trend of small decreases from year to year. Of the total companies, 379 were in both years and passed the outlier exclusion tests and were included as a base for the GRET factors (382 companies passed similar tests last year).

APPROACH USED

The methodology for calculating the recommended GRET factors based on this data is similar to that in the last several years. The methodology was last altered in 2015. The changes made then can be found in the recommendation letter sent to LATF on July 30, 2015.

To calculate updated GRET factors, the average of the factors from the two most recent years (2021 and 2022 for those companies with data available for both years) of Annual Statement data was used. For each company, an actual-to-expected ratio was calculated. Companies with ratios that fell outside predetermined parameters were excluded. This process was completed three times to stabilize the average rates. The boundaries of the exclusions have been modified from time to time; however, there were no adjustments made this year. Unit expense seed factors (the seeds for all distribution channel categories are the same), as shown in Appendix B, were used to compute total expected expenses. Thus, these seed factors were used to implicitly allocate expenses between acquisition and maintenance expenses, as well as among the three acquisition expense factors (on a direct of ceded reinsurance basis).

Companies were categorized by their reported distribution channel (four categories were used as described in Appendix A included below). There remain a significant number of companies for which no distribution channel was provided, as no responses to the annual surveys have been received from those companies. The characteristics of these companies vary significantly, including companies not currently writing new business or whose major line of business is not individual life insurance. Any advice or assistance from LATF in future years to increase the response rate to the surveys of companies that submit Annual Statements to reduce the number of companies in the "Other" category would be most welcomed.

The intention is to continue surveying the companies in future years to enable the enhancement of this multiple distribution channel information.

Companies were excluded from the analysis if in either 2021 or 2022, (1) their actual to expected ratios were considered outliers, often due to low business volume, (2) the average first year and single premium per policy were more than $40,000, (3) they are known reinsurance companies or (4) their data were not included in the data supplied by the NAIC. To derive the overall GRET factors, the unweighted average of the remaining companies' actual-to-expected ratios for each respective category was calculated. The resulting factors were rounded, as shown in Table 1.

THE RECOMMENDATION

The above methodology results in the proposed 2024 GRET values shown in Table 1. To facilitate comparisons, the current 2023 GRET factors are shown in Table 2. Further characteristics of the type of companies represented in each category are included in the last two columns in Table 1, including the average premium per policy issued and the average face amount ($000s) per policy issued.

To facilitate comparisons, the current 2023 GRET factors are shown in Table 2. Further characteristics of the type of companies represented in each category are included in the last two columns in Table 2, including the average premium per policy issued and the average face amount ($000s) per policy issued.

TABLE 1
PROPOSED 2024 GRET FACTORS, BASED ON AVERAGE OF 2021/2022 DATA

DESCRIPTION	Acquisition per Policy	Acquisition per Unit	Acquisition per Premium	Maintenance per Policy	Companies Included	Average Premium Per Policy Issued During Year	Average Face Amt (000) Per Policy Issued During Year
Independent	$198	$1.10	50%	$59	140	3,433	222
Career	206	1.10	52%	62	90	2,325	196
Direct Marketing	217	1.20	54%	65	23	767	122
Niche Marketing	132	0.70	33%	40	31	347	10
Other*	162	0.90	41%	49	95	917	80
* Includes companies that did not respond to this or prior year surveys					379		

TABLE 2
CURRENT 2023 GRET FACTORS, BASED ON AVERAGE OF 2020/2021 DATA

Description	Acquisition per Policy	Acquisition per Unit	Acquisition per Premium	Maintenance per Policy	Companies Included	Average Premium Per Policy Issued During Year	Average Face Amt (000) Per Policy Issued During Year
Independent	$180	$1.00	45%	$54	141	3,073	204
Career	203	1.10	51%	61	84	2,296	197
Direct Marketing	197	1.10	49%	59	21	899	57
Niche Marketing	147	0.80	37%	44	30	507	14
Other*	153	0.90	39%	46	106	853	72
* Includes companies that did not respond to this or prior year surveys					382		

2

In previous recommendations, an effort was made to reduce volatility in the GRET factors from year to year by limiting the yearly change in GRET factors to about ten percent of the prior value. The changes from the 2023 GRET were reviewed to ensure that a significant change was not made in this year's GRET recommendation.

All GRET factors for the Independent and the Direct Marketing distribution channel experienced changes greater than ten percent, so the factors for these lines were capped at the ten percent level (or slightly above/below 10% due to rounding of the factor) from the corresponding 2023 GRET values. The volatility occurred due to an increasing median actual-to-expected ratio for each distribution channel, which allowed for additional companies with higher actual-to-expected ratios to be included in the calculation that were previously dropped. The driving force behind the notable increase in median actual-to-expected ratios for Independent and Direct Marketing were several significant outlier companies. Niche Marketing experienced the opposite, with lower median actual-to-expected ratios allowing several additional companies with lower actual-to-expected ratios, and the factors need to be capped at a ten percent drop.

USAGE OF THE GRET
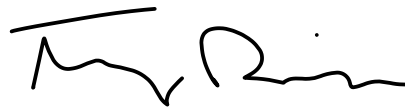
This year's survey, responded to by each company's Annual Statement correspondent, included a question regarding whether the 2023 GRET table was used in its illustrations by the company. Last year, 35% of the responders indicated their company used the GRET for sales illustration purposes, with similar percentage results by company size; this contrasted with about 31% in 2021. This year, 44% of responding companies indicated they used the GRET in 2023 for sales illustration purposes. The range covered all distribution methods, including 48% for Independent, 32% for Career, 40% for Niche Marketers, and 60% for Direct Marketing. Based on the information received over the last several years, the variation in GRET usage appears to be in large part due to the relatively small sample size and different responders to the surveys.

We hope LATF finds this information helpful and sufficient for consideration of a potential update to the GRET. If you require further analysis or have questions, please contact Pete Miller at 847-706-3566.

Kindest personal regards,

Pete Miller, ASA, MAAA
Experience Studies Actuary
Society of Actuaries Research Institute

Tony Phipps, FSA, MAAA
Chair, SOA Research Institute Committee on
Life Insurance Company Expenses

3

APPENDIX A -- DISTRIBUTION CHANNELS

The following is a description of distribution channels used in the development of recommended 2023 GRET values:

1. <u>Independent</u> – Business written by a company that markets its insurance policies through an independent insurance agent or insurance broker not primarily affiliated with any one insurance company. These agencies or agents are not employed by the company and operate without an exclusive distribution contract with the company. These include most PPGA arrangements.

2. <u>Career</u> – Business written by a company that markets insurance and investment products through a sales force primarily affiliated with one insurance company. These companies recruit, finance, train, and often house financial professionals who are typically referred to as career agents or multi-line exclusive agents.

3. <u>Direct Marketing</u> – Business written by a company that markets its own insurance policies direct to the consumer through methods such as direct mail, print media, broadcast media, telemarketing, retail centers and kiosks, internet, or other media. No direct field compensation is involved.

4. <u>Niche Marketers</u> – Business written by home service, pre-need, or final expense insurance companies as well as niche-market companies selling small face amount life products through a variety of distribution channels.

5. <u>Other</u> – Companies surveyed were only provided with the four options described above. Nonetheless since there were many companies for which we did not receive a response (or whose response in past years' surveys confirmed an "other" categorization (see below), values for the "other" category are given in the tables in this memo. It was also included to indicate how many life insurance companies with no response (to this survey and prior surveys) and to indicate whether their exclusion has introduced a bias into the resulting values.

4

APPENDIX B – UNIT EXPENSE SEEDS

The expense seeds used in the 2014 and prior GRETs were differentiated between branch office and all other categories, due to the results of a relatively old study that had indicated that branch office acquisition cost expressed on a per Face Amount basis was about double that of other distribution channels. Due to the elimination of the branch office category in the 2015 GRET, non-differentiated unit expense seeds have been used in the current and immediately prior studies.

The unit expense seeds used in the 2024 GRET and the 2023 GRET recommendations were based on the average of the 2006 through 2010 Annual SOA expense studies. These studies differentiated unit expenses by type of individual life insurance policy (term and permanent coverages). As neither the GRET nor the Annual Statement data provided differentiates between these two types of coverage, the unit expense seed was derived by judgment based this information. The following shows the averages derived from the Annual SOA studies and the seeds used in this study. Beginning with the 2020 Annual Statement submission this information will become more readily available.

2006-2010 (AVERAGE) CLICE STUDIES:

	Acquisition/ Policy	Acquisition/ Face Amount (000)	Acquisition/ Premium	Maintenance/ Policy
Term				
Weighted Average	$149	$0.62	38%	$58
Unweighted Average	$237	$0.80	57%	$76
Median	$196	$0.59	38%	$64
Permanent				
Weighted Average	$167	$1.43	42%	$56
Unweighted Average	$303	$1.57	49%	$70
Median	$158	$1.30	41%	$67

CURRENT UNIT EXPENSE SEEDS:

	Acquisition/ Policy	Acquisition/ Face Amount (000)	Acquisition/ Premium	Maintenance/ Policy
All distribution channels	$200	$1.10	50%	$60

5

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation and a very brief description (title) of the issue.

   Identification:
   American Academy of Actuaries, Life Reserves Subcommittee (formerly LRWG)

   Title of the Issue:
   Discount Rate for VM-20 Stochastic Reserve

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

   January 1, 2023, NAIC Valuation Manual

   VM-20 sections 5.B and 7.H.4; VM-31 sections 3.D.2 and 3.D.6

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

   See attached. The proposed changes are extracted from existing language in VM-21 (see VM-21 Section 4.B.3) or from existing language in VM-31 related to the deterministic reserves but modified for the stochastic reserve

4. State the reason for the proposed amendment? (You may do this through an attachment.)

   We propose modifying the discount rate used to calculate the scenario reserves within the VM-20 Stochastic Reserve (SR) to be the Net Asset Earned Rate (NAER) on additional assets while also allowing for the Direct Iteration Method (DIM) as an alternative approach to calculating these scenario reserves. The principal reason for making this change is to address concerns related to APF 2023-03 Part 4, which deals with borrowing costs. In particular, it has been noted that a disconnect would now exist between the borrowing rate and the scenario discount rate used in calculating the scenario reserves for the VM-20 SR. Secondly, the upcoming changes to the Economic Scenario Generator will likely lead to instances of negative interest rates, which calls into question the appropriateness of discounting at 105% of a Treasury rate. Changing to the NAER will allow for more appropriate discounting in these types of scenarios. Thirdly, the existing methodology of using SR discount rates equal to 105% of the path of 1-year Treasury rates does not have a clear, strong rationale for use. The methodology originated from C3P2 Standard Scenario for variable annuities, and the discount rate in C3P2 was later revised and eventually the Standard Scenario was eliminated altogether. This methodology for discounting is not used in most current applications where GPVAD are calculated.

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* This form is not intended for minor corrections, such as formatting, grammar, cross–references or spelling. Those types of changes do not require action by the entire group and may be submitted via letter or email to the NAIC staff support person for the NAIC group where the document originated.

NAIC Staff Comments:

Dates: Received	Reviewed by Staff	Distributed	Considered
8/17/23	K.K		
Notes: APF 2023-10			

VM-20

Section 5: Stochastic Reserve

For a group of one or more policies for which a SR is to be calculated, the company shall calculate the SR as follows:

A. Project cash flows in compliance with the applicable requirements in Section 7, Section 8 and Section 9 using the stochastically generated scenarios described in Section 7.G.2., and further described in Appendix 1. In determining the SR, the company shall determine the number and composition of subgroups for aggregation purposes in a manner that is consistent with how the company manages risks across products with significantly different risk profiles, and that reflects the likelihood of any change in risk offsets that could arise from distributional shifts between product types due to, for example, differing policyholder behavior. If a company is managing the risks of two or more products with significantly different risk profiles as part of an integrated risk management process, then the products may be combined into the same subgroup for aggregation purposes. If policies from more than one VM-20 Reserving Category are included in such a subgroup, the reserve for each VM-20 Reserving Category shall also be determined, as described in Section 5.G.

> **Guidance Note:** Aggregation refers to the number and composition of subgroups of policies that are used to combine cash flows. Aggregating policies into a common subgroup allows the cash flows arising from the policies for a given stochastic scenario to be netted against each other (i.e., allows risk offsets between policies to be recognized). Note Section 5.G regarding the calculation of the SR on a stand-alone basis for each VM-20 Reserving Category.

B. Calculate the scenario reserve for each stochastically generated scenario using the method described in either Section 5.B.1 or Section 5.B.2:

1. Present Value Method

    a. For each model segment at the model start date and end of each projection year, calculate the discounted value of the negative of the projected statement value of general account and separate account assets using the path of discount rates for the model segment determined in compliance with Section 7.H.4 from the projection start date to the end of the respective projection year. The balance of policy loans on the valuation date (if explicitly modeled under Section 7.F.3.b) and the balance of separate account assets on the valuation date are modeled each period in compliance with the applicable changes in these asset balances as defined in Section 7.

> **Guidance Note:** The projected statement value of general account and separate account assets for a model segment may be negative or positive.

    b. Sum the amounts calculated in Subparagraph 1 above across all model segments at the model start date and end of each projection year.

> **Guidance Note:** The amount in Subparagraph 2 above may be negative or positive.

    c. Set the scenario reserve equal to the sum of the statement value of the starting assets across all model segments and the maximum of the amounts calculated in Subparagraph b above.

2. Direct Iteration Method

    Solve for the amount of starting assets which, when projected along with all contract cash flows, result in the defeasement of all projected future benefits and expenses at the end of the projection

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horizon with no accumulated deficiencies at the end of any projection year during the projection period.

C. Rank the scenario reserves from lowest to highest.

D. Calculate CTE 70.

E. Determine any additional amount needed to capture any material risk included in the scope of these requirements but not already reflected in the cash-flow models using an appropriate and supportable method and supporting rationale.

F. Add the CTE amount (D) plus any additional amount (E) less the positive or negative PIMR balance allocated to the group of one or more policies being modeled under Section 7.D.7.

G. The SR equals the amount determined in Section 5.F. If the company includes policies from two or more VM-20 Reserving Category in a subgroup for aggregation purposes as described in Section 5.A, the company shall calculate the SR for policies from each VM-20 Reserving Category on a stand-alone basis by following the process of A through F above.

Section 7.H

4. The company shall use the path of NAER on an additional invested asset portfolio of general account assets for each model segment within each scenario as the discount rates in the SR calculations in Section 5.

    a. The additional invested asset portfolio for a scenario is a portfolio of general account assets as of the valuation date, outside of the starting asset portfolio, that is required in that projection scenario so that the projection would not have a positive accumulated deficiency at the end of any projection year. This portfolio may include only (i) general account assets available to the company on the valuation date that do not constitute part of the starting asset portfolio; and (ii) cash assets.

Guidance Note: Additional invested assets should be selected in a manner such that if the starting asset portfolio were revised to include the additional invested assets, the projection would not be expected to experience any positive accumulated deficiencies at the end of any projection year. It is assumed that the accumulated deficiencies for this scenario projection are known.

    b. To determine the NAER on additional invested assets for a given scenario:

        i. Project the additional invested asset portfolio as of the valuation date to the end of the projection period,

            a) Investing any cash in the portfolio and reinvesting all investment proceeds using the company's investment policy.

            b) Excluding any liability cash flows.

            c) Incorporating the appropriate returns, defaults, and investment expenses for the given scenario.

        ii. If the value of the projected additional invested asset portfolio does not equal or exceed the accumulated deficiencies at the end of each projection year for the scenario, increase the size of the initial additional invested asset portfolio as of the valuation date, and repeat the preceding step.

        iii. Determine a vector of annual earned rates that replicates the growth in the additional invested asset portfolio from the valuation date to the end of the projection period for the scenario. This vector will be the NAER for the given scenario.

Guidance Note: There are multiple ways to select the additional invested asset portfolio at the valuation date. Similarly, there are multiple ways to determine the earned rate vector. The company shall be consistent in its choice of methods, from one valuation to the next.

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Guidance Note: The use of different discount rate paths for the deterministic and scenario reserves is driven by differences in methodology. The DR is based on a present value of all liability cash flows, with the discount rates reflecting the investment returns of the assets backing the liabilities. The scenario reserve is based on a starting estimate of the reserve and assets that support that estimate, plus the greatest present value of accumulated deficiencies. Here, the discount rates are the investment returns of only the marginal assets needed to eliminate either a positive or negative deficiency.

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VM-31

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Section 3.D.2

    i.   Stochastic Reserve Method – Identification of the method used to determine the scenario reserve, either (1) the present value method described in VM-20 Section 5.B.1.; or (2) the direct iteration method described in VM-20 Section 5.B.2

Section 3.D.6

    i.   Net Asset Earned Rate – For each model segment's DR: If the gross premium valuation method outlined in VM-20 Section 4.A was used, a listing or graph of the path of calculated NAER for all years of the projection and an explanation of any abnormally high or low NAER values or unusual patterns over time. For each model segment's SR: If the present value method outlined in VM-20 Section 5.B.1. was used, a description of the vectors of NAER, including graphs or tables of summary statistics helpful to the understanding of the NAER vectors produced for each scenario, with a statement that a complete listing of NAER will be made available in electronic spreadsheet format upon request.

    v.   Additional Assets – For each model segment's SR: If the present value method outline in VM-20 Section 5.B.1 was used, a summary of the amounts of additional assets needed to fund the present value of the accumulated deficiency, including a description of the calculation process and the types of assets included.

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Draft: 9/15/23
Adopted by the Executive (EX) Committee and Plenary, ___ __, ____
Adopted by the Life Insurance and Annuities (A) Committee, ___ __, ____
Adopted by the Life Actuarial (A) Task Force, ___ __, ____

2023 Proposed Charges

LIFE ACTUARIAL (A) TASK FORCE

The mission of the Life Actuarial (A) Task Force is to identify, investigate, and develop solutions to actuarial problems in the life insurance industry.

Ongoing Support of NAIC Programs, Products, or Services

1. The **Life Actuarial (A) Task Force** will:
    A. Work to keep reserve, reporting, and other actuarial-related requirements current. This includes principle-based reserving (PBR) and other requirements in the *Valuation Manual*, actuarial guidelines, and recommendations for appropriate actuarial reporting in blanks. Respond to charges from the Life Insurance and Annuities (A) Committee and referrals from other groups or committees, as appropriate.
    B. Report progress on all work to the Life Insurance and Annuities (A) Committee and provide updates to the Financial Condition (E) Committee on matters related to life insurance company solvency. This work includes the following:
        i. Work with the American Academy of Actuaries (Academy) and the Society of Actuaries (SOA) to develop new mortality tables for valuation and minimum nonforfeiture requirements, as appropriate, for life insurance and annuities.
        ii. Provide recommendations for guidance and requirements for accelerated underwriting (AU) and other emerging underwriting practices, as needed.
        iii. Work with the SOA on the annual development of the Generally Recognized Expense Table (GRET) factors.
        iv. Provide recommendations and changes, as appropriate, to other reserve and nonforfeiture requirements to address issues, and provide actuarial assistance and commentary to other NAIC committees relative to their work on actuarial matters.
        v. Work with the selected vendor to develop and implement the new generator of economic scenario generators (GOES) for use in regulatory reserve and capital calculations.
        vi. Monitor international developments regarding life and health insurance reserving, capital, and related topics. Compare and benchmark these with PBR requirements.

2. The **Experience Reporting (A) Subgroup** will:
    A. Continue the development of the experience reporting requirements within the *Valuation Manual*. Provide input, as appropriate, for the process regarding the experience reporting agent, data collection, and subsequent analysis and use of experience submitted.

LIFE ACTUARIAL (A) TASK FORCE (*continued*)

3. The **Generator of Economic Scenarios (GOES) (E/A) Subgroup** of the Life Risk-Based Capital (E) Working Group and the Life Actuarial (A) Task Force will:

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Deleted: <#>Evaluate and provide recommendations regarding the VM-21, Requirements for Principle-Based Reserves for Variable Annuities/*Actuarial Guideline XLIII—CARVM for Variable Annuities* (AG 43) standard projection amount (SPA), which may include continuing as a required floor or providing as disclosure. This evaluation is to be completed prior to year-end 2023.¶

    A. Monitor that the economic scenario governance framework is being appropriately followed by all relevant stakeholders involved in scenario delivery.
    B. Review material GOES updates, either driven by periodic model maintenance or changes to the economic environment and provide recommendations.
    C. Regularly review key economic conditions and metrics to evaluate the need for off-cycle or significant GOES updates and maintain a public timeline for GOES updates.
    D. Support the implementation of the GOES for use in statutory reserve and capital calculations.
    E. Develop and maintain acceptance criteria that reflect history as well as plausibly more extreme scenarios.

4. The **Indexed Universal Life (IUL) Illustration (A) Subgroup** will:
    A. Consider changes to *Actuarial Guideline XLIX-A—The Application of the Life Illustrations Model Regulation to Policies with Index-Based Interest to Policies Sold On or After December 14, 2020* (AG 49-A), as needed. Provide recommendations for the consideration of changes to the *Life Insurance Illustrations Model Regulation* (#582) to the Task Force, as needed.

5. The **Longevity Risk (E/A) Subgroup** of the Life Actuarial (A) Task Force and the Life Risk-Based Capital (E) Working Group will:
    A. Provide recommendations for recognizing longevity risk in statutory reserves and/or risk-based capital (RBC), as appropriate.

6. The **Variable Annuities Capital and Reserve (E/A) Subgroup** of the Life Risk-Based Capital (E) Working Group and the Life Actuarial (A) Task Force will:
    A. Monitor the impact of the changes to the variable annuities (VA) reserve framework and RBC calculation and determine if additional revisions need to be made.
    B. Develop and recommend appropriate changes, including those to improve accuracy and clarity of VA capital and reserve requirements.

7. The **Valuation Manual (VM)-22 (A) Subgroup** will:
    A. Recommend requirements, as appropriate, for non-variable (fixed) annuities in the accumulation and payout phases for consideration by the Task Force. Continue working with the Academy on a PBR methodology for non-variable annuities.

NAIC Support Staff: Scott O'Neal/Jennifer Frasier

Draft: 10/24/23

Life Actuarial (A) Task Force
Virtual Meeting
September 14, 2023

The Life Actuarial (A) Task Force met Sept. 14, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill (TX); Scott A. White, Vice Chair, represented by Craig Chupp (VA); Mark Fowler represented by Sanjeev Chaudhuri (AL); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil (CA); Andrew N. Mais represented by Wanchin Chou (CT); Doug Ommen represented by Mike Yanacheak (IA); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Bill Carmello (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1. Reported its Regulator-to-Regulator Task Force Meeting

Hemphill said that the Task Force met Sept. 7 in regulator-to-regulator session, pursuant to paragraph 3 (specific companies, entities, or individuals) of the NAIC Policy Statement on Open meetings. She further noted that because of the discussion, the Task Force decided to distribute additional materials to state insurance regulators to assist them with their review of index-linked variable annuity (ILVA) product filings.

2. Adopted Year-End 2023 AG 53 Templates

Slutsker walked through the *Actuarial Guideline LIII—Application of the Valuation Manual for Testing the Adequacy of Life Insurer Reserves* (AG 53) templates to be used for 2023 year-end reporting, noting that the main changes included: 1) adding a tab to highlight the projected asset portfolio allocation; and 2) adding a tab to get a more refined breakdown of a company's nontraditional assets.

Slutsker made a motion, seconded by Yanacheak, to adopt the year-end 2023 AG 53 templates (Attachment Five-A). The motion passed unanimously.

3. Adopted the 2023 VM-20 HMI and FMI Rates

Marianne Purushotham (Society of Actuaries—SOA) walked through a presentation that contained the 2023 VM-20, Requirements for Principle-Based Reserves for Life Products, historical mortality improvement (HMI) and future mortality improvement (FMI) rate recommendation. Scott O'Neal (NAIC) then discussed a presentation (Attachment Five-B) that illustrated the impact of the new HMI and FMI rates using a VM-20 universal life with secondary guarantees (ULSG) model office. Chupp asked whether the impact of COVID-19 that was reflected in the HMI and FMI rates was solely the impact of COVID-19 and not from other excess mortality factors that may be related to COVID-19. Purushotham noted that their data did not distinguish between the initial shock mortality impact of COVID-19 and ongoing related mortality factors and that the methodology included both impacts in the development of the HMI and FMI rates. Slutsker asked if it could be made clear on the SOA's website that the HMI and FMI rates did not apply to limited underwriting, to which Purushotham responded that they would make it clear on the website. Chou asked about the large increase to deterministic reserves shown for younger ages due to the change in the smoothing method. O'Neal stated that much of the deterministic reserve increase for younger

ages was due to the impact of the smoothing methodology change on the HMI rates, further stating that companies with high levels of credibility would not be affected by the change in HMI rates until much later in the projection. Therefore, O'Neal said that the increase to company deterministic reserves resulting from the new HMI rates would likely be much less significant than what was implied in the presentation.

Chupp made a motion, seconded by Slutsker, to adopt the 2023 HMI and FMI rates (Attachment Five-C). The motion passed unanimously.

4. Heard a Presentation from the Academy on GOES Interim Interest Rate Acceptance Criteria

Jason Kehrberg (American Academy of Actuaries—Academy) and Iouri Karpov (Academy) walked through a presentation (Attachment Five-D) that highlighted the Academy's recommended generator of economic scenarios (GOES) interim interest rate acceptance criteria.

Having no further business, the Life Actuarial (A) Task Force adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/LATF Calls/09 14/Sep 14 Minutes.docx

Actuarial Guideline 53 Templates - Instructions

Overview

These templates are intended to serve as a standardized format for submitting mandatory testing, attribution, and disclosure required for the Actuarial Guideline 53, consistent with Section 6 of the Actuarial Guideline. The intent of the templates is to provide a standardized format to enhance asset adequacy analysis review and to assist in completing the exercise. In addition, companies may provide commentary to further explain certain data items or for regulators to consider in this submission. In no event should the inclusion of supporting documents, data, or other reporting intended to satisfy the requirements of this Actuarial Guideline in these templates be relied upon to the exclusion of the most adequacy testing submission. Notes that additional rows, columns, and modifications to formats are not permitted.

Company Information Tab

Company Name: Provide name of insurance entity.

NAIC Company Code: Provide number for NAIC Company Code.

Name of Lead Asset Adequacy: Provide the individual who is to submit to the AG 53 Report and/or to serve as the designated company contact.

Email Address: Provide the email address to contact for any questions on the AG53 Report.

Phone Number: Provide the phone number for contact for any question on the AG53 Report.

Asset Summary

Asset Summary - Individual Bonds - Reinvestment Bonds

Assumptions Tab Tab

Attribution - Initial Reinvestment Spread

Projected Margins Tab

Non-Traditional Assets Tab

Company Information

Company Name	
NAIC Company Code	

Name of Individual Submitting	
Email Address	
Phone number	

Total Company Initial Assets in Non-Unitized Separate Accounts ($M)	

Asset Summary for Asset Adequacy Testing

Asset Type	Amount[1] ($M)	%	P.H.N.Y. Amount ($M)	%	Affiliate[2] Amount ($M)	%	Reinvestment Strategy (%)
Treasuries and Agencies	0.0	0%	0	0%	0	0%	0%
Public Non-Callable, Non-Convertible Corporate Bonds[3]	0.0	0%	0	0%	0	0%	0%
Callable Bonds	0.0	0%	0	0%	0	0%	0%
Convertible Securities[4]	0.0	0%	0	0%	0	0%	0%
Floating Rate Corporate Notes	0.0	0%	0	0%	0	0%	0%
Municipal Bonds	0.0	0%	0	0%	0	0%	0%
Other Private Bonds	0.0	0%	0	0%	0	0%	0%
Non-Convertible Preferred Stock	0.0	0%	0	0%	0	0%	0%
Agency Mortgage Backed Securities	0.0	0%	0	0%	0	0%	0%
Non-Agency Commercial Mortgage Backed Securities	0.0	0%	0	0%	0	0%	0%
Non-Agency Residential Mortgage Backed Securities	0.0	0%	0	0%	0	0%	0%
Collateralized Loan Obligations	0.0	0%	0	0%	0	0%	0%
Other Asset Backed Securities	0.0	0%	0	0%	0	0%	0%
Equities or Equity-Like Instruments	0.0	0%	0	0%	0	0%	0%
Real Estate	0.0	0%	0	0%	0	0%	0%
Mortgage Loans	0.0	0%	0	0%	0	0%	0%
Schedule BA Assets - Equity-Like Instruments	0.0	0%	0	0%	0	0%	0%
Schedule BA Assets - Non-Equity-Like Instruments	0.0	0%	0	0%	0	0%	0%
Derivative Instruments	0.0	0%	0	0%	0	0%	0%
Other – Not Covered Above[5]	0.0	0%	0	0%	0	0%	0%
Total	**0.0**	**0%**	**0**	**0%**	**0**	**0%**	**0%**

(1) Amount provided should be consistent with the valuation basis held for statutory accounting (i.e., book value for corporate bonds, market value for equities, etc.) as of the valuation date
(2) "Affiliate Amount" means the amount of assets as of the valuation date within each category that is originated by affiliated legal entities or other entities within same insurance group
(3) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(4) Convertible securities include convertible preferred stock

(5) Description of assets within "Other - Not Covered Above" Category	Additional Commentary

Section 4a: Net Yield Component Summary for Asset Adequacy Testing - Initial Assets

Asset Type	Gross Yield[1]	Default Assumption	Investment Expenses	Other[4]	Net Yield	Max Gross Yield	Max Net Yield	Check
Treasuries and Agencies	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Public Non-Callable, Non-Convertible Corporate Bonds[2]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Callable Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Convertible Securities[3]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Floating Rate Corporate Notes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Municipal Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other Private Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Convertible Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Agency Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Agency Commercial Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Agency Residential Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Collateralized Loan Obligations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other Asset Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Equities or Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Real Estate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Mortgage Loans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Schedule BA Assets - Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Schedule BA Assets - Non-Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Derivative Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other - Not Covered Above	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*

(1) Yields provided should be consistent with the valuation basis held for statutory accounting (i.e., book value for corporate bonds, market value for equities, etc.)
(2) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(3) Convertible securities include convertible preferred stock

(4) Description of net yield component within "Other" Category	Additional Commentary

Section 4a: Net Yield Component Summary for Asset Adequacy Testing - Reinvestments

Asset Type	Gross Yield[1]	Default Assumption	Investment Expenses	Other[4]	Net Yield	Max Gross Yield	Max Net Yield	Check
Treasuries and Agencies	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Public Non-Callable, Non-Convertible Corporate Bonds[2]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Callable Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Convertible Securities[3]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Floating Rate Corporate Notes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Municipal Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other Private Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Convertible Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Agency Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Agency Commercial Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Non-Agency Residential Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Collateralized Loan Obligations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other Asset Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Equities or Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Real Estate	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Mortgage Loans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Schedule BA Assets - Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Schedule BA Assets - Non-Equity-Like Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Derivative Instruments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
Other - Not Covered Above	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*

(1) Yields provided should be consistent with the valuation basis held for statutory accounting (i.e., book value for corporate bonds, market value for equities, etc.)
(2) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(3) Convertible securities include convertible preferred stock

(4) Description of net yield component within "Other" Category	Additional Commentary

Section 5a: Sensitivity Test assuming Investment Grade Net Spread Benchmark

Asset Type	Percentage of Assets with Reduced Spread[1]	Spread Reduction[2]
Treasuries and Agencies	N/A	N/A
Public Non-Callable, Non-Convertible Corporate Bonds[4]	N/A	N/A
Callable Bonds	0.0%	0.0%
Convertible Securities[5]	0.0%	0.0%
Floating Rate Corporate Notes	0.0%	0.0%
Municipal Bonds	0.0%	0.0%
Other Private Bonds	0.0%	0.0%
Non-Convertible Preferred Stock	0.0%	0.0%
Agency Mortgage Backed Securities	0.0%	0.0%
Non-Agency Commercial Mortgage Backed Securities	0.0%	0.0%
Non-Agency Residential Mortgage Backed Securities	0.0%	0.0%
Collateralized Loan Obligations	0.0%	0.0%
Other Asset Backed Securities	0.0%	0.0%
Equities or Equity-Like Instruments	N/A	N/A
Real Estate	N/A	N/A
Mortgage Loans	0.0%	0.0%
Schedule BA Assets - Equity-Like Instruments	N/A	N/A
Schedule BA Assets - Non-Equity-Like Instruments	N/A	N/A
Derivative Instruments	N/A	N/A
Other - Not Covered Above	0.0%	0.0%
Total	**0.0%**	**0.0%**

(1) "Percentage of Assets with Reduced Spread" is the percentage of asset amount for which the net spread must be reduced to comply with the cap at the Investment Grade Net Spread Benchmark
(2) "Net Spread Reduction" means the aggregate net spread reduction in each asset category as a result of capping individual assets at the Investment Grade Net Spread Benchmark
(3) Intended to measure the impact of asset adequacy testing under the level scenario for the New York 7 (i.e., NY1); may use gross premium reserve if consistent with asset adequacy testing approach
(4) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(5) Convertible securities include convertible preferred stock

Sensitivity Test	Cash Flow Testing Present Value of Market Value of Surplus under Level Scenario[3]		
	Baseline	Sensitivity Test	Change
Investment Grade Net Spread Benchmark: Section 5ai(a) Test	0	0	0%
Equity Sensitivity: Section 5ai(b) Test	0	0	0%
Total Impact	**0**	**0**	**0%**

Additional Commentary

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Section 5b: Attribution for Asset Adequacy Testing Guideline Excess Spreads - Initial Assets

Asset Type	Net Market Spread	IG Net Spread Benchmark[1]	Guideline Excess Spread	Credit Risk	Illiquidity Risk	Excess Spread Components Related to Each Risk					Check
						[Other Risk Component #1]	[Other Risk Component #2]	[Other Risk Component #3]	[Other Risk Component #4]	[Other Risk Component #5]	
Treasuries and Agencies	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Public Non-Callable, Non-Convertible Corporate Bonds[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Callable Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Convertible Securities[3]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Floating Rate Corporate Notes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Municipal Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Other Private Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Convertible Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Agency Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Agency Commercial Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Agency Residential Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Collateralized Loan Obligations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Other Asset Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Equities or Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Real Estate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Mortgage Loans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Schedule BA Assets - Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Schedule BA Assets - Non-Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Derivative Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Other - Not Covered Above	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE

(1) "IG Net Spread Benchmark" = Investment Grade Net Spread Benchmark
(2) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(3) Convertible securities include convertible preferred stock

Additional Commentary

Section 5b: Attribution for Asset Adequacy Testing Guideline Excess Spreads - Reinvestments

Asset Type	Net Market Spread	IG Net Spread Benchmark[1]	Guideline Excess Spread	Excess Spread Components Related to Each Risk							Check
				Credit Risk	Illiquidity Risk	[Other Risk Component #1]	[Other Risk Component #2]	[Other Risk Component #3]	[Other Risk Component #4]	[Other Risk Component #5]	
Treasuries and Agencies	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Public Non-Callable, Non-Convertible Corporate Bonds[2]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Callable Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Convertible Securities[3]	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Floating Rate Corporate Notes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Municipal Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Other Private Bonds	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Convertible Preferred Stock	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Agency Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Agency Commercial Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Non-Agency Residential Mortgage Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Collateralized Loan Obligations	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Other Asset Backed Securities	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Equities or Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Real Estate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Mortgage Loans	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE
Schedule BA Assets - Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Schedule BA Assets - Non-Equity-Like Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Derivative Instruments	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Other - Not Covered Above	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TRUE

(1) "IG Net Spread Benchmark" = Investment Grade Net Spread Benchmark
(2) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(3) Convertible securities include convertible preferred stock

Additional Commentary

Projected Asset Allocation

Asset Type	Year 5	Year 10	Year 20	Year 30	Check
Treasuries and Agencies	0%	0%	0%	0%	FALSE
Public Non-Callable, Non-Convertible Corporate Bonds[1]	0%	0%	0%	0%	FALSE
Callable Bonds	0%	0%	0%	0%	FALSE
Convertible Securities[2]	0%	0%	0%	0%	FALSE
Floating Rate Corporate Notes	0%	0%	0%	0%	
Municipal Bonds	0%	0%	0%	0%	
Other Private Bonds	0%	0%	0%	0%	
Non-Convertible Preferred Stock	0%	0%	0%	0%	
Agency Mortgage Backed Securities	0%	0%	0%	0%	
Non-Agency Commercial Mortgage Backed Securities	0%	0%	0%	0%	
Non-Agency Residential Mortgage Backed Securities	0%	0%	0%	0%	
Collateralized Loan Obligations	0%	0%	0%	0%	
Other Asset Backed Securities	0%	0%	0%	0%	
Equities or Equity-Like Instruments	0%	0%	0%	0%	
Real Estate	0%	0%	0%	0%	
Mortgage Loans	0%	0%	0%	0%	
Schedule BA Assets - Equity-Like Instruments	0%	0%	0%	0%	
Schedule BA Assets - Non-Equity-Like Instruments	0%	0%	0%	0%	
Derivative Instruments	0%	0%	0%	0%	
Other - Not Covered Above	0%	0%	0%	0%	
Total	**0%**	**0%**	**0%**	**0%**	

(1) Only include public non-convertible, fixed-rate corporate bonds with no or immaterial callability
(2) Convertible securities include convertible preferred stock

Additional Commentary

Tranche Rating and Type for Non-Traditional Assets

Asset Type	CLO	Non-Agency RMBS	Non-Agency CMBS	[Material Other ABS #1]	[Material Other ABS #2]	All Other ABS Assets	Check
Tranche Rating							
AAA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	*TRUE*
AA	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
BBB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
BB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
B	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
CCC and Lower (Non-Residual)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Unrated (Non-Residual)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Residual	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Allocation across Type							
Broadly Syndicated	0.0%	N/A	N/A	N/A	N/A	N/A	*TRUE*
Middle Market	0.0%	N/A	N/A	N/A	N/A	N/A	
Payment In Kind (PIK)							
Approximate Percentage of Total Portfolio with PIK Feature	0.0%						
Approximate Percentage of Total Portfolio Currently in PIK Status	0.0%						

Identification & Description of Feeder Funds or Rated Notes in the Portfolio

Description of Asset Types within Schedule BA

Description of Assets that are Payment In Kind

VM-20 Historical and Future Mortality Improvement: NAIC Model Office Results and Considerations

Scott O'Neal FSA, MAAA

September 14, 2023

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NAIC Model Office

ULSG

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)

Term

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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Male Mortality Adjustment Comparison
30-year-old vs 50-year-old issued in 2023

Adjustment to 2015 VBT for 30-yo Male

Adjustment to 2015 VBT for 50-yo Male

New Smoothing (2023)   Current Smoothing (2023)   No new scale adopted (2022)

2023 New Smoothing HMI & FMI   2023 Current Smoothing HMI & FMI   No new scales adopted (2022 published)

3

Female Mortality Adjustment Comparison
30-year-old vs 50-year-old issued in 2023

Adjustment to 2015 VBT for 30-yo Female

Adjustment to 2015 VBT for 50-yo Female

2023 New Smoothing HMI & FMI   2023 Current Smoothing HMI & FMI   No new scales adopted (2022 published)
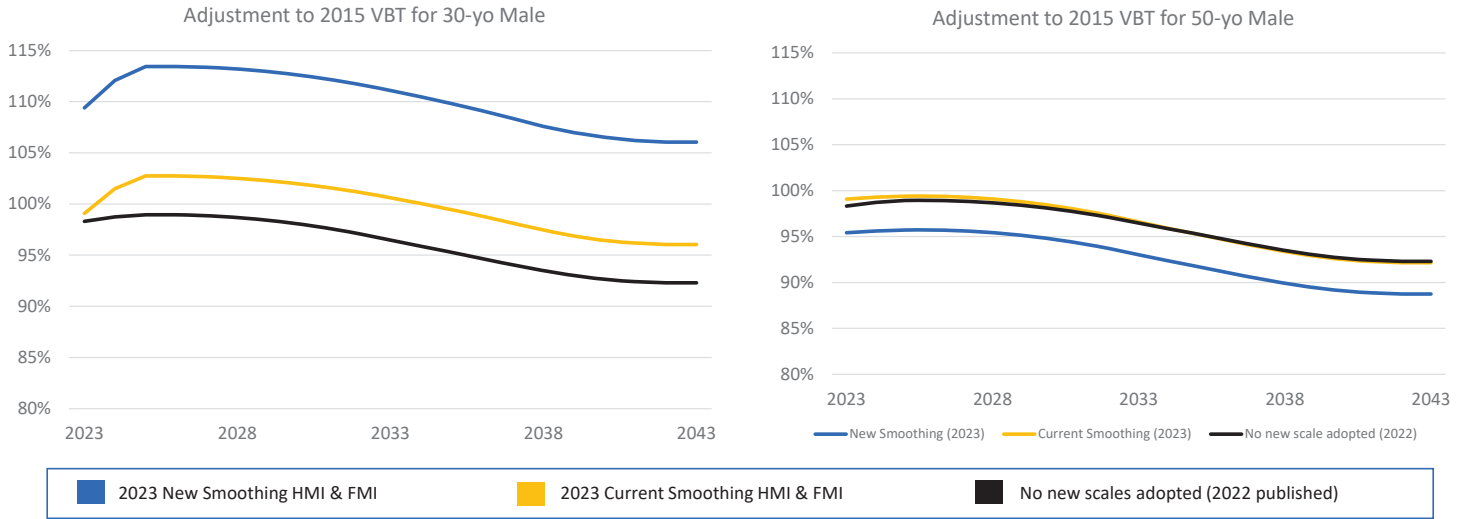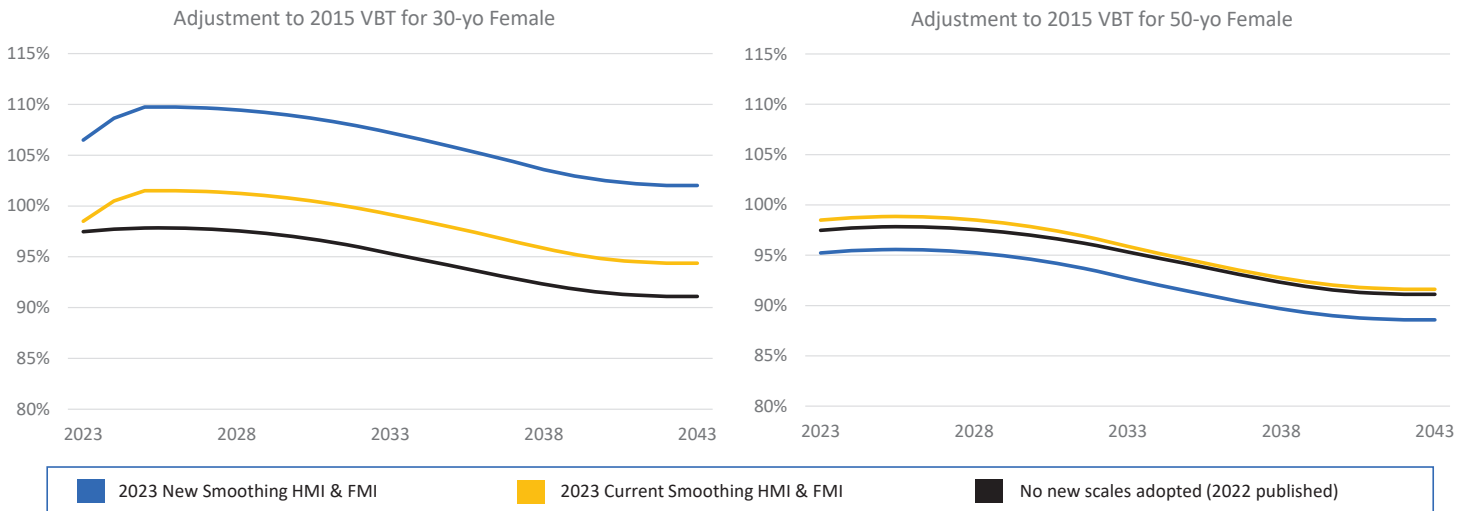
4

NAIC Model Office Considerations

- Model office has an equal weight of each issue age, risk class, gender, face amount which may not be representative of the industry.
- For Year-end 2023, the scalar applied to the model office is: (1-HMI)^8.5 (6/2015 to 12/2023)
  - The proposed HMI has deterioration for the proposed smoothing method for ages 25-40: **1.09** for a 30-year-old male
  - The proposed HMI has slight improvement to mortality for ages 45-60: **0.95** for a 50-year-old male
- We apply the HMI factors to both industry and company mortality in the model office, though companies that have highly credible data may not use the HMI to adjust the company mortality.
- GOES Field Test Participation:
  - Term: About half the GOES Field Test Participants for VM-20 had negative Term DR
  - ULSG: All baseline DR was positive

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ULSG Model Office Results

Percentage Change in VM-20 Deterministic Reserves (DR) Compared to Baseline

- The VM-20 DR was determined for a Baseline run using the 2022 Published HMI and FMI rates, which was then compared to a run using the 2023 Proposed HMI with the 2022 Published FMI and another using both the 2023 Proposed HMI and FMI rates.
- For each of these runs, separate results were determined for the full model population, a cohort of 30-year-olds, and a cohort of 50-year-olds to isolate the distinct impacts of the attained-age varying HMI and FMI rates.
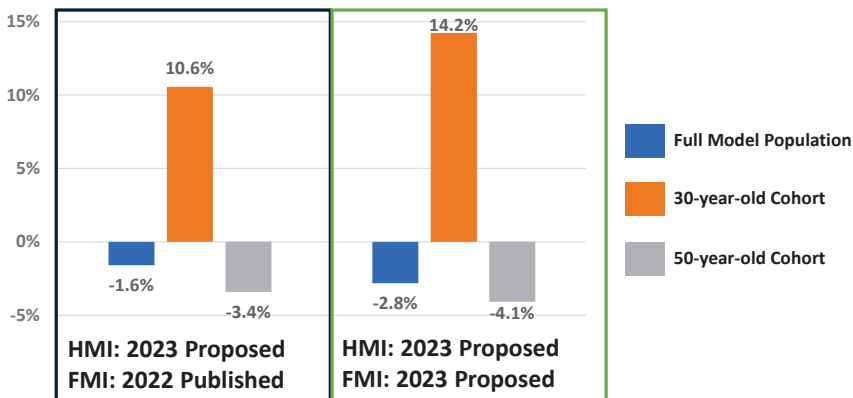
While the overall impact of the proposed 2023 HMI and FMI rates is muted in the model office results with the full population, the impact can vary when looking at distinct age cohorts. However, much of the impact in the NAIC model office is coming from the HMI rates, which may not be representative of companies using their company mortality experience in much of the early durations of the reserve calculation.

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ULSG Model Office Results – Impact of Change in Smoothing Methodology

Percentage Change in VM-20 Deterministic Reserves (DR) Compared to Baseline

Legend:
- ■ Full Model Population
- ■ 30-year-old Cohort
- ■ 50-year-old Cohort

Left chart group:
- HMI: 2023 Proposed / FMI: 2022 Published — Full Model Population: -1.6%, 30-year-old Cohort: 10.6%, 50-year-old Cohort: -3.4%
- HMI: 2023 Proposed / FMI: 2023 Proposed — Full Model Population: -2.8%, 30-year-old Cohort: 14.2%, 50-year-old Cohort: -4.1%

Right chart group:
- HMI: 2023 w/ Current Smoothing / FMI: 2022 Published — Full Model Population: 3.3%, 30-year-old Cohort: 1.5%, 50-year-old Cohort: 1.3%
- HMI: 2023 w/ Current Smoothing / FMI: 2023 Proposed — Full Model Population: 1.2%, 30-year-old Cohort: 5.1%, 50-year-old Cohort: 0.2%

The proposed smoothing methodology allowed for more differentiated **mortality improvement rates** across attained ages, resulting in mortality deterioration for younger attained ages and mortality improvement for older attained ages. On the other hand, applying the current smoothing methodology to the latest experience data results in a small level of mortality improvement across all attained ages. **Applying the current smoothing methodology for the HMI rates used in the model office resulted in more consistent and relatively smaller increases across the different attained ages.**

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Mortality Improvements Life Working Group (MILWG):
2023 HMI and FMI Scale Recommendation for Approval

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

Life Actuarial Task Force (LATF)—9/14/23

Agenda

- □ Overview of the changes to Life Historical Mortality Improvement (HMI) and Future Mortality Improvement (FMI) scale methodologies for 2023

- □ Recommendation for 2023 HMI and FMI scales

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HMI and FMI Methodology Changes

1. **Smoothing method (HMI and FMI) - greater detail by attained age group**

2. **Adjustment for potential disconnect between HMI and FMI scales applied**
   - 2024 100% deterioration implied by full impact of COVID in the HMI methodology applied
   - 2025 50% of the deterioration applied
   - 2026 FMI= 0
   - 2027-2033 grades to the long term MI assumption at 2033
   - 2033-2043 grades to 0 MI at end of 20 years

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Review Smoothing Approach

	Current Method	Recommendation
1. Ages 0-15 (juvenile)	Use adult average (18-84) x 1.5	Use 0-20 average
2. Ages 16-20	Linear interpolation from juvenile rate to adult rate at age 21	Use 0-20 average
3. Ages 21-84	**Use Adult Average 18-84**	**Break into more detailed age groups:** **0-20** **25-40** **45-60** **65-85** **Linear interpolation between groups.**
4. Ages 85-94	Linear interpolation from adult rate to .0025 per year ultimate level at age 95	Linear interpolation from 65-85 average to .001 per year ultimate level at age 95 (use .001 due to COVID considerations)
5. Ages 95 and later	Use constant .0025 (used .001 for 2022 due to COVID impact considerations)	Use constant .001 due to COVID considerations

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Comparison of Smoothing Approaches

Smoothing—OLD

2023 Recommended HMI scale
Smoothing—NEW

5
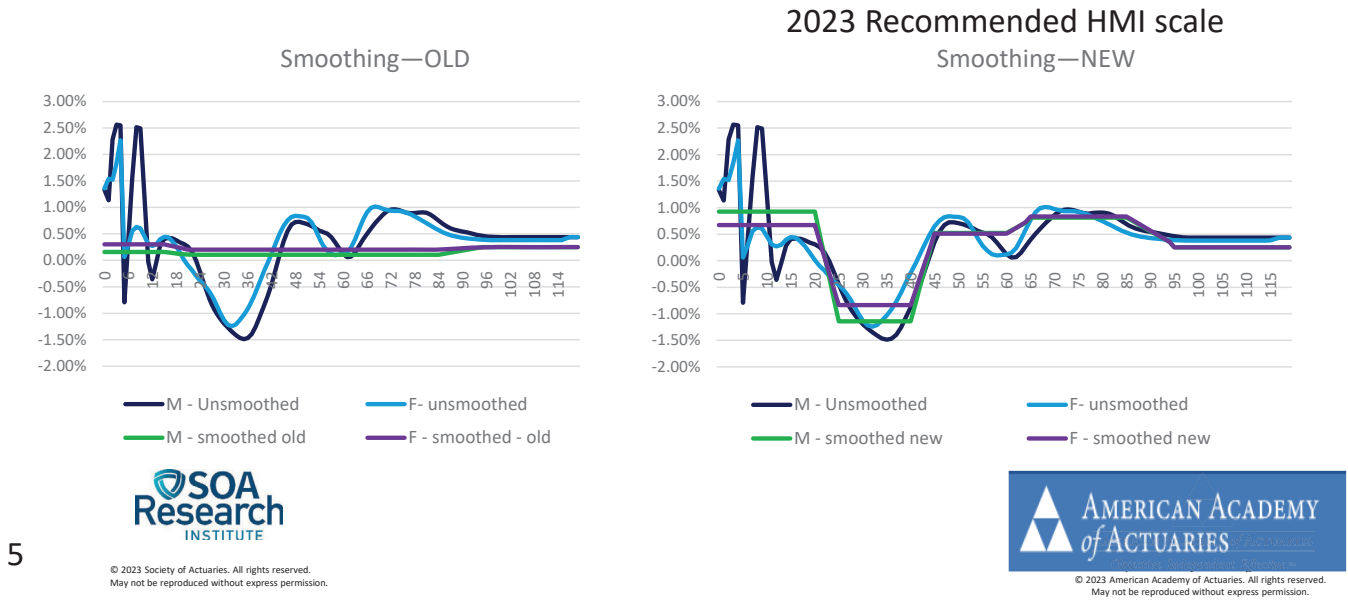
HMI 2023 Recommendation
Male, Mortality Improvement Rates

6
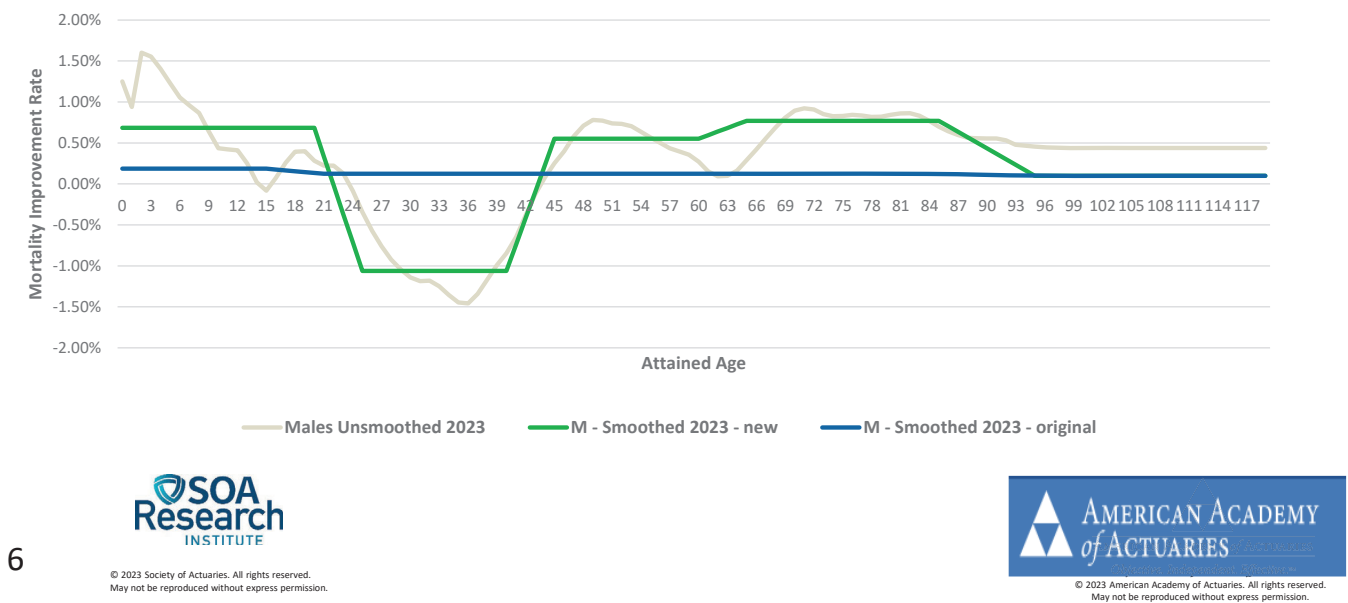
HMI 2023 Recommendation
Female, Mortality Improvement Rates
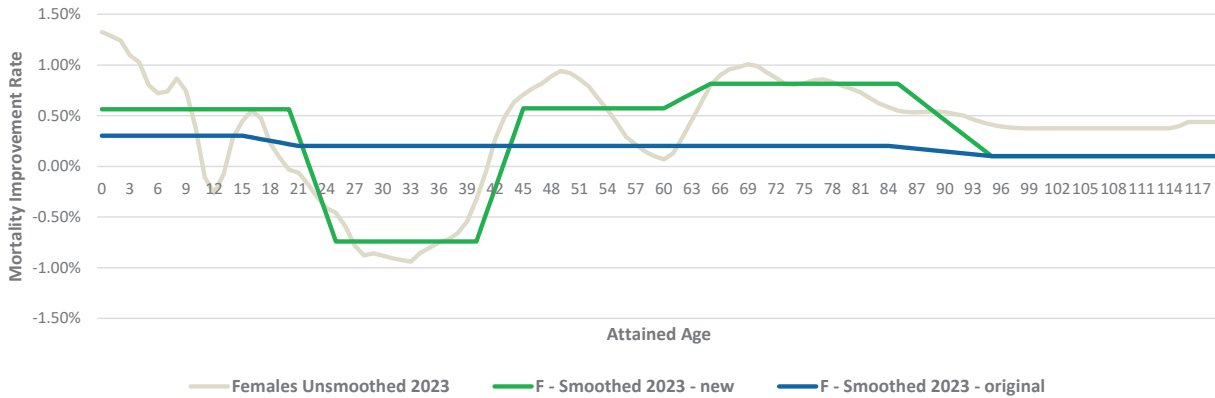
Legend: Females Unsmoothed 2023 — F - Smoothed 2023 - new — F - Smoothed 2023 - original

7

FMI 2023 Recommendation—Basic Scale
Male, Future Mortality Improvement Rates
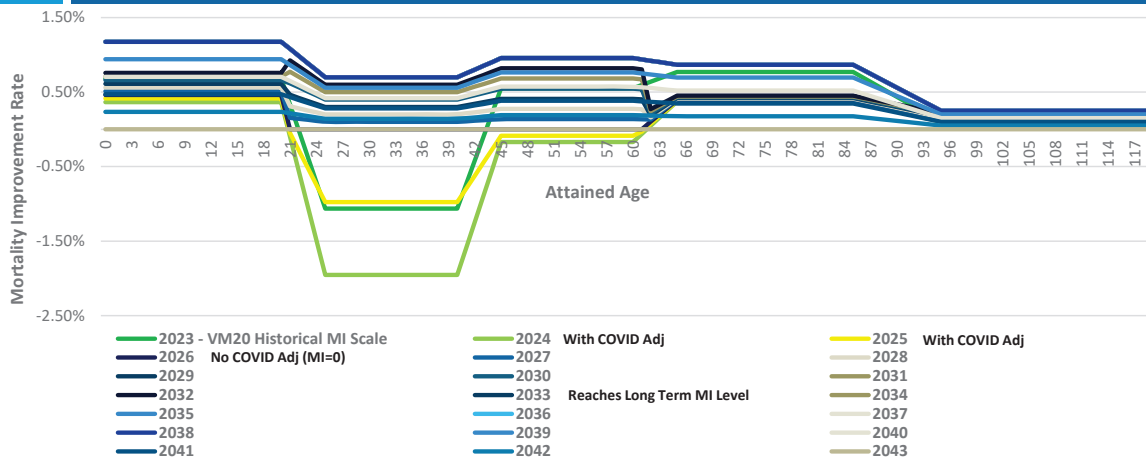
MI LTR (Males)

Age:
0-20   1.2%
21-60   .7% - 1%
60-85   .9%-1%
85+   grades to
         .25% at 95

Legend:
2023 - VM20 Historical MI Scale | 2024 With COVID Adj | 2025 With COVID Adj
2026 No COVID Adj (MI=0) | 2027 | 2028
2029 | 2030 | 2031
2032 | 2033 Reaches Long Term MI Level | 2034
2035 | 2036 | 2037
2038 | 2039 | 2040
2041 | 2042 | 2043

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FMI 2023 Recommendation—Basic Scale
Female, Future Mortality Improvement Rates
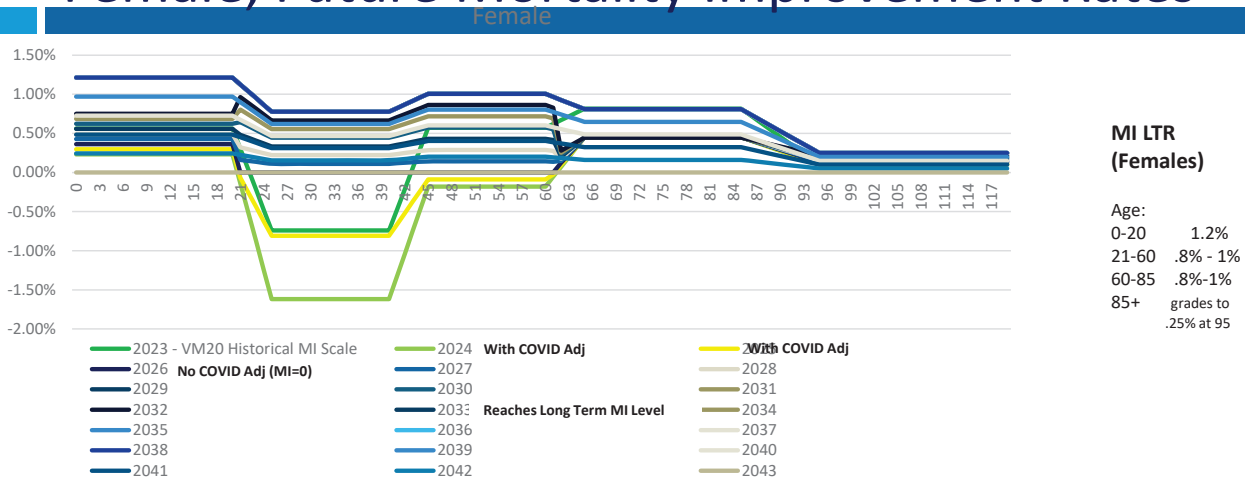
MI LTR (Females)

Age:
0-20	1.2%
21-60	.8% - 1%
60-85	.8%-1%
85+	grades to .25% at 95

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Questions?

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Contact Information

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Larry Stern, FSA, MAAA
Mark Rosa, FSA, MAAA
Cynthia MacDonald, FSA, MAAA

Members available to provide supplementary information and
explanation as needed.

Appendix

2023 Work Plan

Presented at 2023 NAIC Spring Meeting

- ☐ Revisit historical HMI methodology in light of recent and expected experience - completed
- ☐ Revisit smoothing approach for HMI and FMI—completed
- ☐ Approach to COVID-19 impact for 2023—FMI (future mortality improvement) and HMI (historical mortality improvement)—completed
- ☐ Insured vs. general population HMI and FMI recommendations (begin work in 2023)
- ☐ Revisit FMI margin structure
- ☐ Review recommendation for MI with 2008 VBT Limited Underwriting (LU) table

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HMI/FMI General Methodology

HMI Scale Year	Historical Component: *Historical Data (10 yrs)* *SSA Data = General Population Mean*	Estimated/Future Component: *SSA (Social Security Administration)* *Alt2 Projection (20 yr average)*
2023	Averaging Period: 2011-2021	Averaging Period: 2023-2043
FMI Scale Year	**Process**	**Long-Term Rate (LTR)**
2023	**Basic Scale:** • Grades to LTR at projection yr 10 (2033) • Remains at LTR for projection yrs 10-15 • Grades to no additional MI at projection yr 20 (2043) • Margin for uncertainty included to develop **"Loaded Scale" – 25% flat reduction in MI**	Average of SSA Alt 2 MI for projection years 10-15

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Revisit HMI Methodology

HMI/FMI General Methodology

Scale Year = 2023

HMI Scale:
Average of Historical and Future Components

FMI Scale:
Basic Scale = grade from HMI 2023 to MI long term rate (LTR*) at projection year 10
Loaded Scale = Basic MI Scale reduced by 25%

End FMI: 2043

2011   2021   2023   2026   2033   2038

Historical Component:
SSA Historical Data
(10 year geometric average)

Future/Est. Component:
SSA Alt 2 Projection (20 year geometric average)

Grade from HMI level at 2023 to LTR at 2033

Remains at LTR from 2033 to 2038

Grade from LTR to MI=0 at 2043

Last year SSA historical data available

FMI reaches LTR

Items under review

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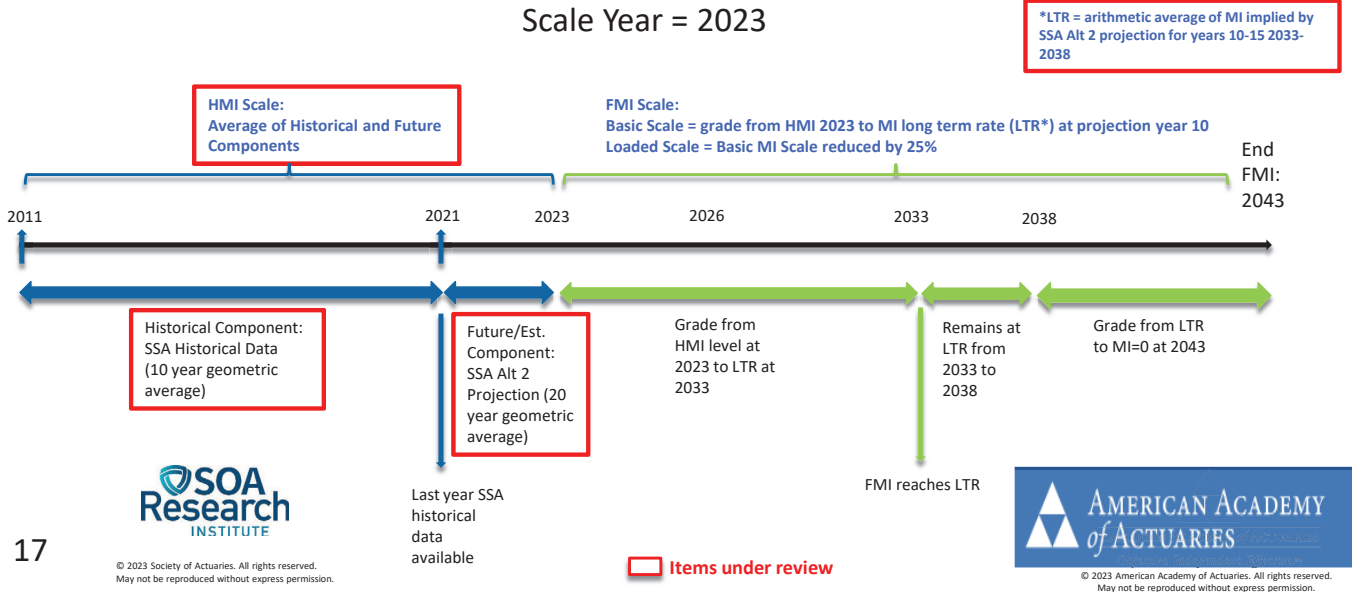
HMI Methodology Recommendation:
Historical Averaging Period (currently 10 years)

Recommendation: remain at 10 years

- Recent experience (2011-2021)

- Reduces year-to-year potential volatility of shorter periods but experience is relevant

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HMI Methodology Recommendation: Future Averaging Period (currently 20 years)

Recommendation: remain at 20 years

☐ Smooths out potential SSA Alt 2 early projection year bumps

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HMI Methodology Recommendation: Averaging Method

Averaging method: currently use geometric average over historical and future periods

Recommendation: continue to use geometric approach for 2023

Consider moving to arithmetic average rather than geometric for both historical and future components (will re-examine for 2024 scale work)

☐ Relies less on only the beginning and ending year experience

☐ Not much difference between arithmetic and geometric average results for years since we implemented the annual life MI scale updates

☐ Consistent with the FMI LTR determination

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Calculation of Historical MI Averages
Comparison of Approaches
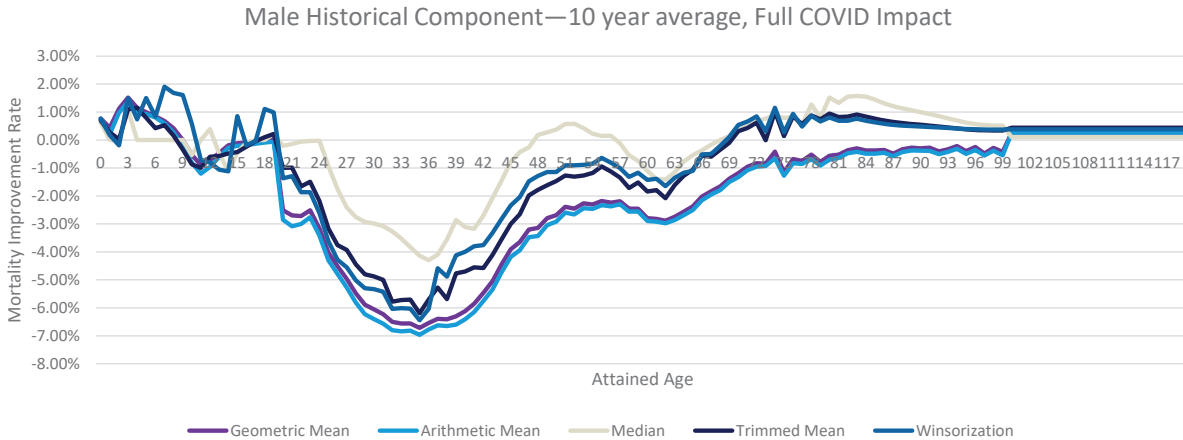
Male Historical Component—10 year average, Full COVID Impact

Legend: Geometric Mean, Arithmetic Mean, Median, Trimmed Mean, Winsorization

X-axis: Attained Age
Y-axis: Mortality Improvement Rate

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HMI Methodology Recommendation:
Weighting of Historical and Future Components of HMI

Recommendation:

Keep 50/50 weighting on averaging

☐ No data-focused basis for changing at this point

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COVID-19 Impact—2023 Approach

COVID-19 Impact

COVID-19 impact considerations

☐ Ensuring COVID-19 impact is considered

☐ Some companies with high credibility will use their best estimate mortality (including implied historical improvement) for long periods before grading to industry

    ◻ Creates potential disconnect between HMI and the recommended industry FMI scale

<u>Recommendation</u>: Follow 2022 method – remove COVID from historical average for HMI and put in an adjustment for COVID in first few years of FMI

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2023 vs 2022: Male—Old Smoothing Historical Mortality Improvement Rates
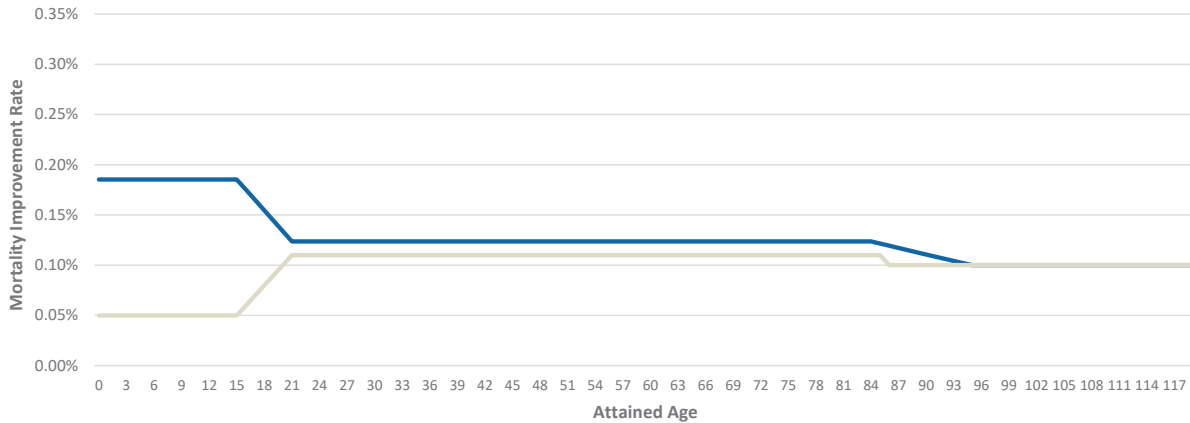
25

2023 vs 2022: Female—Old Smoothing Historical Mortality Improvement Rates
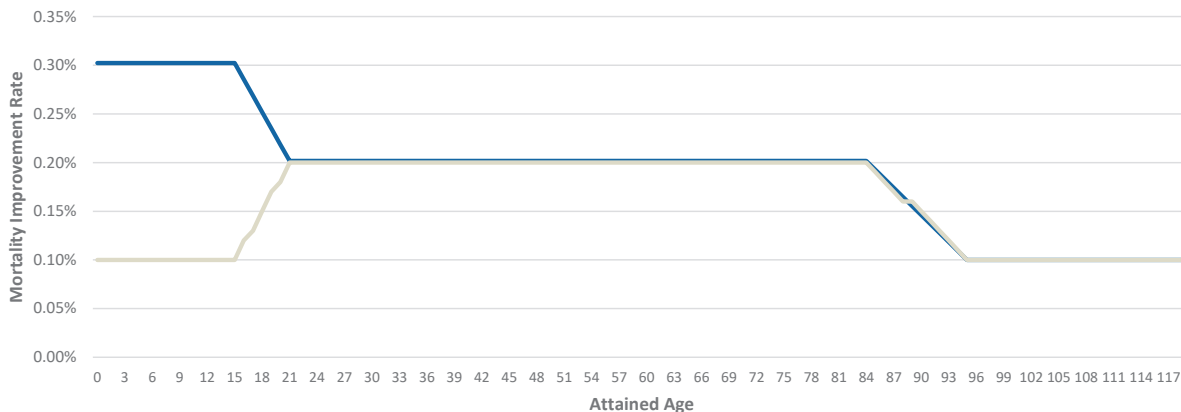
26

2023 vs 2022—Male
Future Mortality Improvement Rates
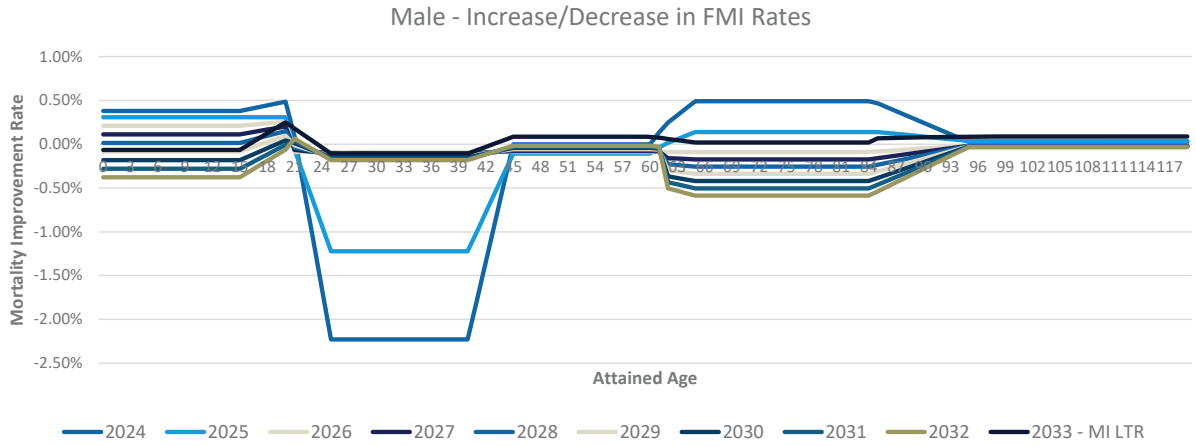
27

2023 vs 2022—Female
Future Mortality Improvement Rates
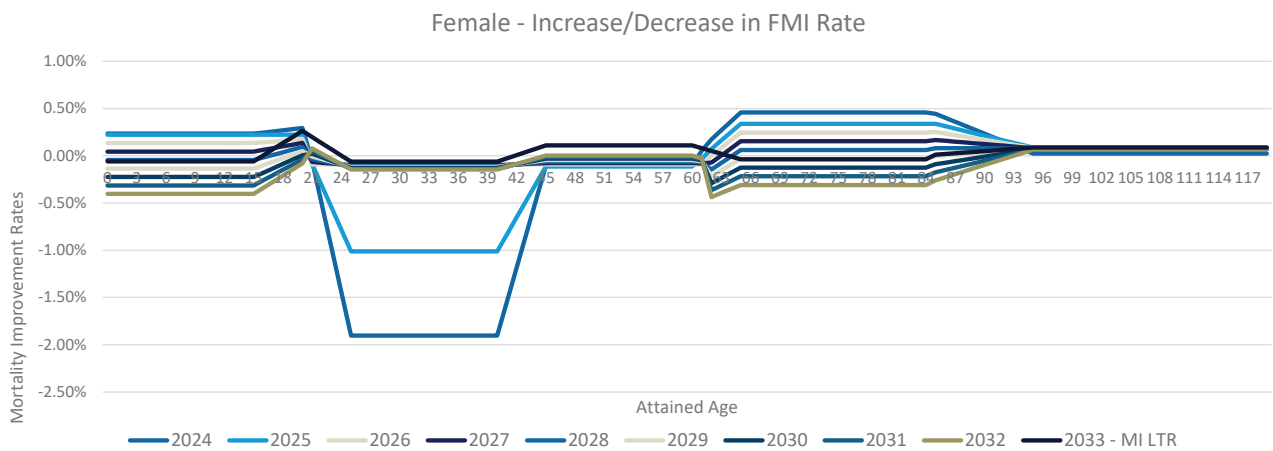
28

Update on Next Steps for 2023

- ◻ Insured vs. general population HMI and FMI recommendations (work continues)
- ◻ Revisit FMI margin structure
- ◻ Review recommendation for MI with 2008 VBT Limited Underwriting (LU) table
  - ◼ Keep the HMI and FMI scales at 0 MI for all ages
  - ◼ Look at additional data sources to support this

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Interest Rates—
Acceptance Criteria for *Interim* Rate Levels

Jason Kehrberg, MAAA, FSA
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National Association of Insurance Commissioners (NAIC)
Life Actuarial (A) Task Force (LATF)—September 14, 2023

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Agenda—Acceptance Criteria for *Interim* Rate Levels   2

1. Background
2. Interim Rate Criteria
3. Reference Models
4. Summary and Q&A
5. Appendix—Reference Model Results Supporting Interim Rate Criteria

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1.

Background

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Background

LATF asked the Academy to deliver a series of presentations focused on proposing qualitative **Stylized Facts** and quantitative **Acceptance Criteria** for the three major components of an ESG used for statutory reporting purposes: **Interest Rates**, **Equity Returns**, and **Corporate Bond Fund Returns**.

This presentation presents the Academy's proposal for **Acceptance Criteria for *Interim* Rate Levels**.

Prior presentations in this series:
- A Framework for Working with ESGs (8/8/22)
- ESG Governance Considerations (8/8/22)
- Equity Returns—Stylized Facts (8/9/22)
- Corporate Credit & Bond Fund Returns—Stylized Facts, Acceptance Criteria, and a Simplified Model (10/27/22)
- Interest Rates—Stylized Facts and Acceptance Criteria (12/11/22)
- Interest Rates—Update on Proposed Acceptance Criteria (8/12/23)

This and future presentations in this series:
- ➢ **Acceptance Criteria for *Interim* Rate Levels (9/14/23)**
- Equity Returns—Acceptance criteria, including criteria for the joint distribution of equity returns and interest rates (TBD)

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A framework for developing, implementing, and evaluating ESGs and the scenario sets they produce

5

1. **Define Purpose**: The intended purpose of the ESG informs the economic variables to be simulated and the relative importance of their "stylized facts."

2. **Develop Stylized Facts**: Stylized facts describe properties of the economic variables to be simulated. They are based on historical market data and economic theory and are prioritized relative to the defined purpose at hand. The establishment of stylized facts is critical for selecting candidate ESG models and a key prerequisite for the development of acceptance criteria.

3. **Develop Acceptance Criteria**: A set of quantitative metrics or target values at different time horizons or in different economic conditions that provide a simplified framework for ensuring sets of scenarios produced by the ESG are consistent with key stylized facts.

4. **Implementation and Governance**: ESG models are selected based on their ability to reflect the stylized facts, then calibrated in accordance with acceptance criteria. Validation reports are produced on each candidate scenario set generated by the ESG. These reports compare scenario set statistics to acceptance criteria and contain other charts and tables useful for evaluation and signoff, which is ultimately a matter of judgement (no automatic "pass" or "fail" based only on acceptance criteria). Implementation is an iterative process. It is important to periodically review and recalibrate the ESG as market conditions change over time.

"Statistical criteria are important in assessing the quality of an ESG. Statistical calibration criteria are usually numerically specified but can also be qualitative in nature. Statistical criteria belong to one of two broad categories: qualitative features and quantitative measures. The issues one must address in both categories are not amenable to a checklist approach, however, and expert judgment plays a role."

(quote from p. 96 of the 2020 CAS/Conning research paper on ESGs)

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2.

Interim Rate Criteria

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Why is it important to consider ESG behavior during interim periods?　　7

- ESG behavior in earlier years (i.e., how the scenarios evolve from initial conditions to the steady state) can be more significant for the purpose at hand than the theoretical steady state.
  - Different models and calibrations can have similar steady state distributions but be materially different in the earlier years that matter most when using scenarios for purposes of determining statutory reserves and capital for long duration insurance products.
- Interim rate criteria can help ensure a sufficiently wide range of behavior as rates move from initial conditions to the desired steady state distribution.
  - Criteria for rates at specific interim points-in-time can help ensure sufficient rate volatility and dispersion for adequately modeling disintermediation, liquidity, and hedging risks (e.g., the recent run up in interest rates).
  - Criteria for geometric average rates over specific interim horizons can help ensure sufficient low- and high-for-long rate behavior for adequately modeling long-term reinvestment risks.
- Overly narrow rate distributions can imply an overly optimistic degree of certainty and lead to artificial volatility between reporting periods when rates change more than expected.

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A fan chart illustrates how two different calibrations (#1a and #1b) of the same model can produce materially different rate dispersion over time　　8

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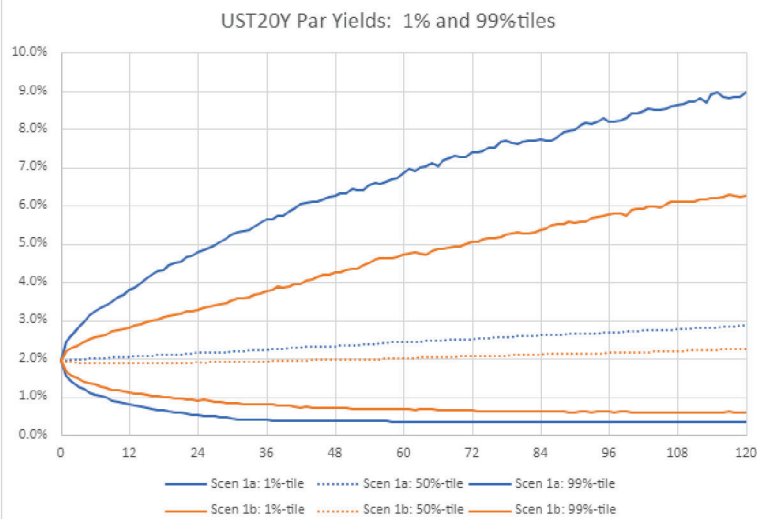
Two scenario sets (#1a and #1b) from the same model (different calibrations) illustrate different levels of rate dispersion and how it compares to history

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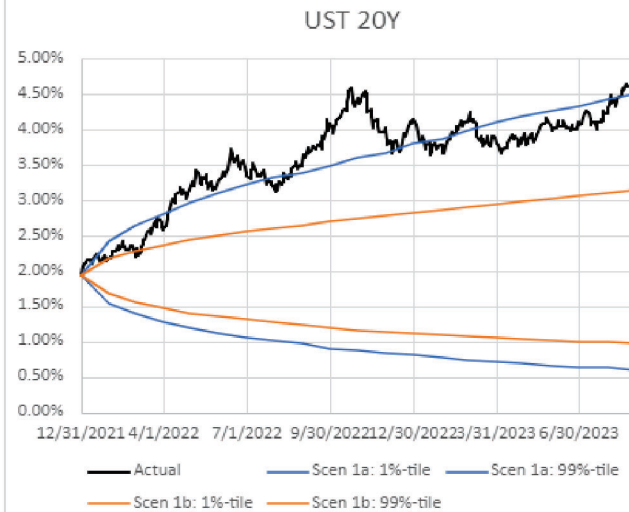
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Two types of interim rate criteria are proposed for 20-year UST yields   10

1. Criteria based on percentiles of the distribution of rates at selected points-in-time:
   - Left-Tail Point-in-Time (Low PIT) Criteria (1st percentile)
   - Right-Tail Point-in-Time (High PIT) Criteria (99th percentile)

2. Criteria based on percentiles of the distribution of geometric average rates over selected horizons *(note, a steady state version of this criteria is also proposed)*:
   - Low-for-Long (L4L) Criteria (1st percentile)
   - High-for-Long (H4L) Criteria (99th percentile)

Due to a lack of historical data to inform interim rate criteria across multiple starting rate levels, interim rate criteria were developed using multiple reference models calibrated to the Academy's existing *steady state* criteria for interest rates.
- Rather than relying solely on judgment, appropriately calibrated reference models allow insight into interim rate behavior under a variety of conditions where historical data is limited.
- Three reference models were used to model the evolution of the 20-year UST yield: Black-Karasinski (BK), Brennan-Schwartz (BS), and Cox-Ingersoll-Ross (CIR).
- Multiple mean-reversion speeds were tested.
- Proposed criteria are based on the *least binding* statistics from the reference models used.

In addition to low-for-long criteria for the left tail, the Academy believes it is prudent to also establish high-for-long criteria for the right tail. High rates, for example, are a key driver of disintermediation risk for many product types.

Interim rate criteria can help ensure the relationship between mean reversion and volatility produces sufficient dispersion *regardless* of starting rate level.

Unlike steady state criteria, thresholds for interim criteria generally depend on initial conditions and are therefore expressed in tabular form (i.e., many numbers, even for these two rather simple categories of interim criteria).

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Proposed interim point-in-time criteria

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1. Calculate the [1st] and [99th] percentiles of the distribution of [20-year] UST yields at the end of years [1], [5], and [10].
2. Use the starting level of the 20-year UST yield to look up the corresponding criteria from the table (interpolate if necessary).

Initial UST20	EOY 1 Point-In-Time		EOY 5 Point-In-Time		EOY 10 Point-In-Time	
	1st percentile should be less than:	99th percentile should be greater than:	1st percentile should be less than:	99th percentile should be greater than:	1st percentile should be less than:	99th percentile should be greater than:
1%	0.54%	1.92%	0.60%	3.89%	0.72%	6.05%
2%	1.22%	3.30%	0.79%	5.75%	0.81%	8.10%
3%	1.92%	4.66%	1.20%	7.48%	0.95%	9.62%
4%	2.62%	6.01%	1.62%	8.83%	1.23%	10.77%
5%	3.31%	7.22%	2.03%	10.03%	1.50%	11.87%
6%	3.99%	8.38%	2.43%	11.21%	1.75%	12.93%
7%	4.68%	9.52%	2.81%	12.35%	2.00%	13.95%
8%	5.46%	10.64%	3.18%	13.46%	2.23%	14.92%
9%	6.26%	11.76%	3.58%	14.56%	2.45%	15.78%
10%	7.06%	12.86%	4.09%	15.62%	2.66%	16.48%

During model implementation and/or calibration, the Academy suggests using this criteria to check interim rate behavior at a variety of starting rate levels, e.g., 2%, 5%, and 8%.

During monthly production, this criteria can be applied by using the starting rate level to interpolate between neighboring values.

Note that only a single row (interpolated to the starting level of the UST20 yield) is needed to apply this criteria to a set of scenarios.

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Stacked column charts can illustrate how the interim rate dispersion criteria widen as the starting rate level increases

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Proposed Criteria: Minimum 1% to 99%-tile Point-in-Time Ranges

YE2021 examples: 1% to 99%-tile Ranges

AIRG examples: 1% to 99%-tile Ranges

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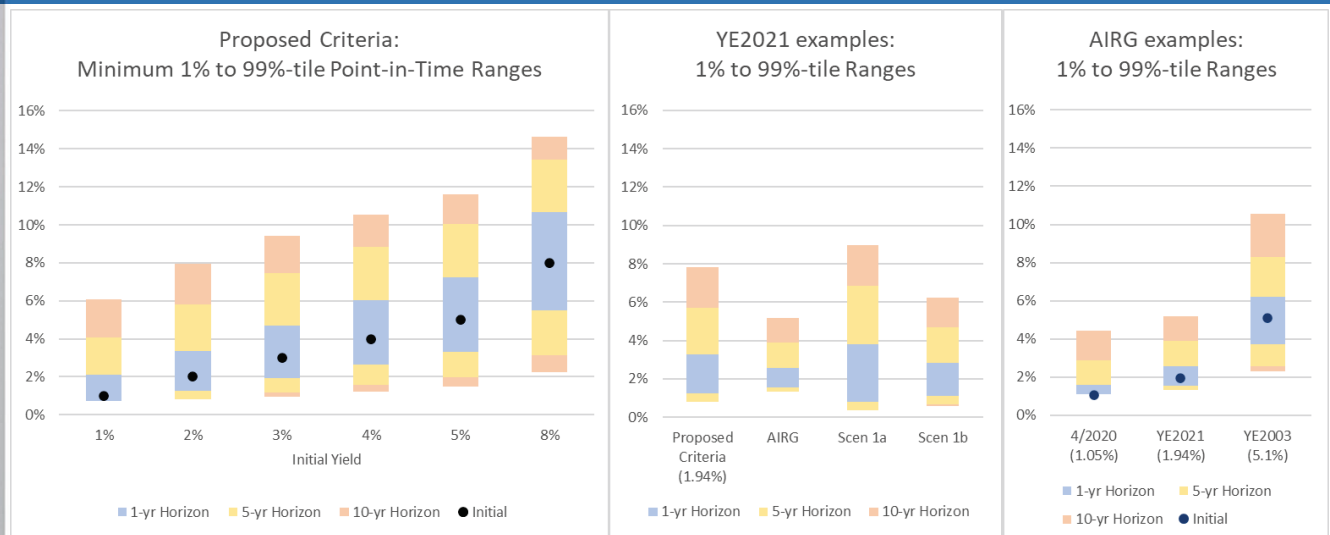
Illustrative application of interim point-in-time criteria for the 20-year UST yield

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Point-In-Time UST20 starting from year 0

Field Test Set #1a/1b (starting rate = 1.94%) and Field Test Set #2a/2b (starting rate = 4.24%)
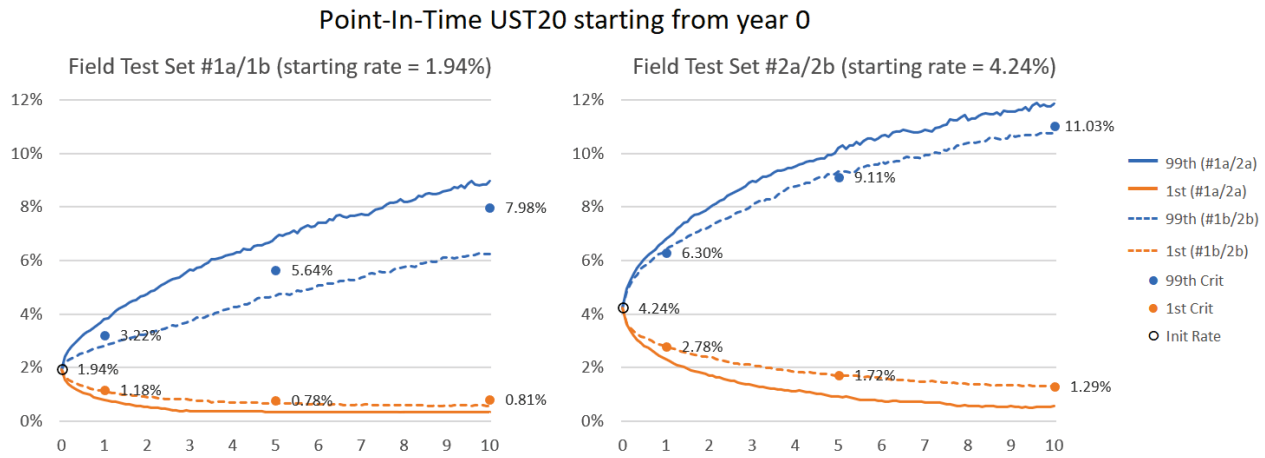
Sets satisfy this interim point-in-time criteria if the percentiles (blue/orange lines) lie outside the criteria (blue/orange dots)

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Proposed Low- and High-for-Long (L4L and H4L) geometric average criteria for UST20

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1. For each scenario, calculate the geometric average of the [20-year] UST yield over the first [10] and [30] years of the projection.
2. Calculate the [1st] and [99th] percentiles of the distribution of geometric average rates (for both the 10 and 30-year horizons).
3. Look up criteria based on the starting level of the 20-year UST yield (interpolate if necessary).

		10-year Geom Avg		30-year Geom Avg	
Period	**Initial UST20**	1st percentile should be less than:	99th percentile should be greater than:	1st percentile should be less than:	99th percentile should be greater than:
Interim (years 0-10 or 0-30)	1%	0.94%	3.43%	1.50%	6.25%
	2%	1.23%	5.05%	1.68%	7.71%
	3%	1.62%	6.55%	1.86%	8.72%
	4%	2.15%	7.74%	2.06%	9.62%
	5%	2.66%	8.87%	2.26%	10.46%
	6%	3.15%	9.96%	2.50%	11.16%
	7%	3.63%	11.03%	2.78%	11.61%
	8%	4.10%	12.07%	3.06%	11.99%
	9%	4.64%	13.08%	3.34%	12.33%
	10%	5.21%	14.01%	3.65%	12.63%
Steady State (years 70-80 or 70-100)	**Any**	1.34%	13.57%	1.94%	11.45%

During model implementation and/or calibration, the Academy suggests using this criteria to check interim rate behavior at a variety of starting rate levels, e.g., 2%, 5%, and 8%.

During monthly production, this criteria can be applied by using the starting rate level to interpolate between neighboring values.

As with the Point-In-Time criteria, note that only a single row (interpolated to the starting level of the UST20 yield) is needed to apply this interim criteria to a set of scenarios.

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Illustrative application of *interim* Low-for-Long (L4L) and High-for-Long (H4L) criteria for geometric averages of the 20-year UST yield

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Geometric Average UST20 starting from year 0

Field Test Set #1a/1b (starting rate = 1.94%)

- 7.62%
- 4.95%
- 1.94%
- 1.22%
- 1.67%

Field Test Set #2a/2b (starting rate = 4.24%)

- 9.82%
- 8.01%
- 4.24%
- 2.27%
- 2.10%

Legend:
— 99th (#1a/2a)
— 1st (#1a/2a)
-- 99th (#1b/2b)
-- 1st (#1b/2b)
● 99th Crit
● 1st Crit
○ Init Rate
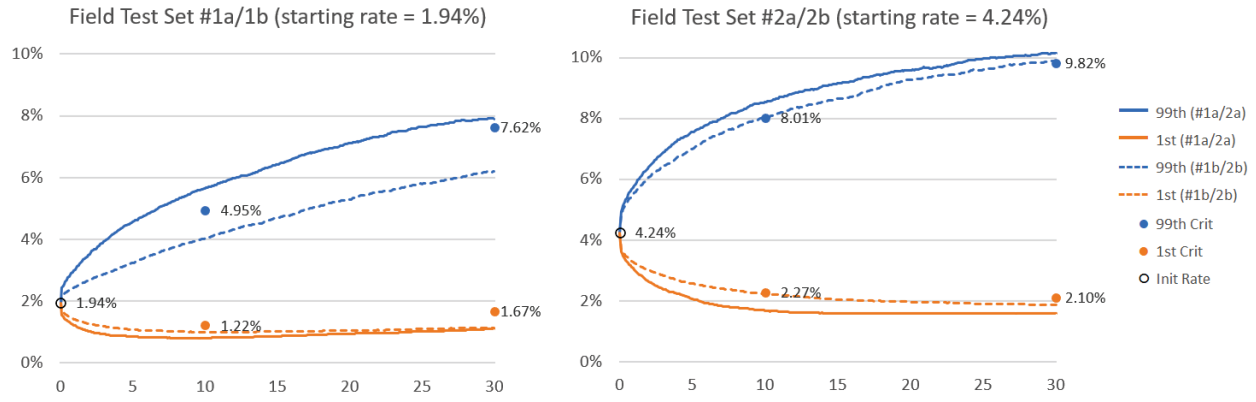
Sets satisfy this Interim Geom Avg criteria if the percentiles (blue/orange lines) lie outside the criteria (blue/orange dots)

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Illustrative application of *steady state* Low-for-Long (L4L) and High-for-Long (H4L) criteria for geometric averages

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Geometric Average UST20 starting from year 70

Field Test Set #1a/1b (starting rate = 1.94%)

- 13.44%
- 13.57%
- 11.45%
- 1.12%
- 1.34%
- 1.94%

Field Test Set #2a/2b (starting rate = 4.24%)

- 13.44%
- 13.57%
- 11.45%
- 1.12%
- 1.34%
- 1.94%

Legend:
— 99th (#1a/2a)
— 1st (#1a/2a)
-- 99th (#1b/2b)
-- 1st (#1b/2b)
● 99th Crit
● 1st Crit
○ 99th PEW
○ 1st PEW
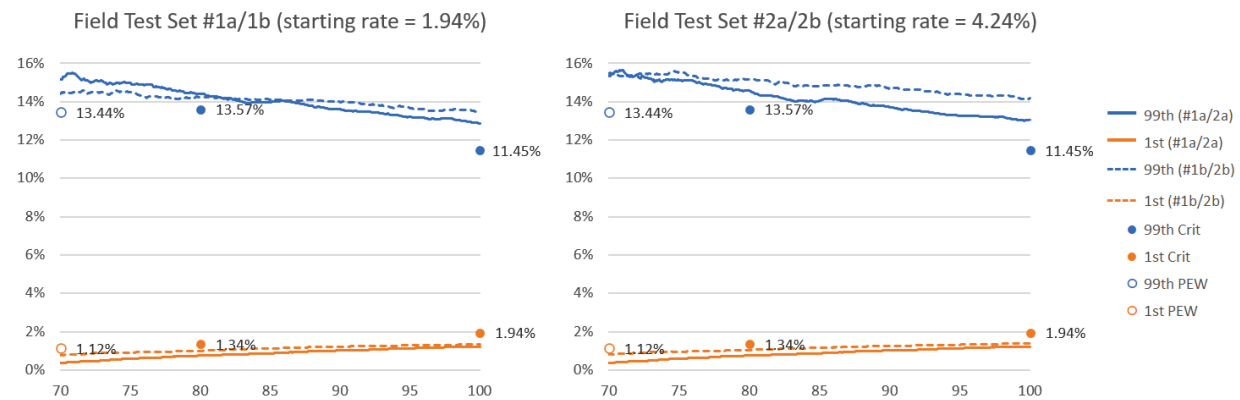
Sets satisfy this Steady State Geom Avg (and PEW) criteria if the percentiles (blue/orange lines) lie outside the criteria (blue/orange dots)

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Comparison to NAIC's low-for-long criteria used for the field test　17

1. NAIC preliminary boundary guidance for goal #5 (*"The ESG should be capable of producing low interest rates for an extended period of time"*) — *For scenarios of the 20-year UST yield generated as of 12/31/20 (i.e., starting at a level of 1.45%):*
   a. *After 10 years, at least 10% of scenarios should have a geometric average below (the starting level of) 1.45%*
   b. *After 30 years, at least 5% of scenarios should have a geometric average below (the starting level of) 1.45%*

2. For comparison, the Academy's 20-year UST reference models (used to develop the criteria in this presentation) were started at 1.45% to determine rate levels corresponding to the NAIC's preliminary boundary guidance:

Horizon	Percentile	Percentiles of geometric average UST20 rates *when starting at 1.45%*									Least Binding (max)	
		Black Karasinski (BK)			Brennan-Schwartz (BS)			Cox Ingersoll Ross (CIR)				
		HL=10yr	HL=12yr	HL=15yr	HL=10yr	HL=12yr	HL=15yr	HL=10yr	HL=12yr	HL*=15yr		
1st 10 yrs	10th	1.30%	1.25%	1.21%	**1.48%**	1.41%	1.35%	1.48%	1.39%	1.33%	**1.48%**	
1st 30 yrs	5th	1.67%	1.54%	1.40%	1.89%	1.77%	1.64%	**1.96%**	1.80%	1.66%	**1.96%**	

* HL = Half-life of time required for median UST20 to reach steady state

   a. 10-year geometric average (starting at 1.45%) – Seven of the nine reference model calibrations produced a 10th percentile below 1.45%, with a maximum (i.e., least-binding) overall percentile of 1.48% (slightly above 1.45%).
   b. 30-year geometric average (starting at 1.45%) – Only one of the nine reference model calibrations produced a 5th percentile below 1.45%, with a maximum (i.e., least-binding) overall percentile of at 1.96% (moderately above 1.45%).
   This suggests that 1.b. above may have been one of the NAIC's more constraining pieces of preliminary boundary guidance.

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3.

Reference Models

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Rationale for reference models used to inform interim rate criteria

- Goals for selecting reference models to that resulting interim rate criteria accommodates reasonably calibrated models:

  - Sample a variety of potential distributions and dynamic relationships between volatility and rate level, calibrated to multiple mean-reversion speeds, resulting in more inclusive criteria with sufficient tolerance for different model forms.

  - Long-standing, well-understood models that are used elsewhere in actuarial practice and finance.

  - Relatively simple models with parameters that allow for direct setting of various mean reversion speeds, and effective targeting of existing steady state criteria for mean reversion level and volatility (manageable calibration exercise).

Model Class	Distribution of Monthly Rate Changes	Volatility is proportional to	Example of other actuarial use
Black Karasinski (BK)	Lognormal	Level of shifted rate	AIRG (*non*-shifted version of BK)
Brennan Schwartz (BS)	Normal	Level of shifted rate	CIA's ESG criteria
Cox Ingersoll Ross (CIR)	Normal	Square root of level of shifted rate	CIA's ESG criteria

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Three reference models for the 20-year UST yield were used to support the development of interim criteria

Black Karasinski (BK)

- Based on an Extended Lognormal Model, like the AIRG, but with a constant volatility scalar, σ:

  - $lr_t = log(rate_t + shift)$ $\qquad lr_{t+1} = lr_t + \beta(\log(\tau + shift) - lr_t) + \sigma\left(\frac{(rate_t + shift)^{cev}}{(rate_t + shift)}\right)Z_t$

  - With *cev=1* the extended lognormal model simplifies to a shifted Black Karasinski form, which is like the AIRG model but with a constant diffusion term.

Brennan Schwartz (BS)

- Based on a Generalized Shifted CEV model with *shift=0* and *cev=1*.

Cox Ingersoll Ross (CIR)

- Based on a Generalized Shifted CEV model with *shift=0* and *cev=0.5*.

Generalized Shifted CEV model:
$$rate_{t+1} = rate_t + \beta(\tau - rate_t) + \sigma\,(rate_t + shift)^{cev}\,Z_t$$

All reference models were calibrated to steady state criteria previously proposed by the Academy.

Each model was calibrated to 4 different half-lives within the previously proposed half-life criteria range of 10–20 years (i.e., 10, 12, 15, and 20 years).

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Reference model parameters, mean reversion speeds, and associated residuals
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Model Parameters	Black Karasinski (BK)				Brennan Schwartz (BS)				Cox Ingersoll Ross (CIR)			
Half-Life (HL)	10yr	12yr	15yr	20yr	10yr	12yr	15yr	20yr	10yr	12yr	15yr	20yr
shift	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-0.0025	-0.0025	-0.0025	-0.0025
cev	1	1	1	1	1	1	1	1	0.5	0.5	0.5	0.5
sigma	0.05124	0.04691	0.04186	0.03572	0.05774	0.05268	0.04691	0.04330	0.01445	0.01323	0.01184	0.01027
beta	0.00576	0.00480	0.00384	0.00288	0.00576	0.00480	0.00384	0.00288	0.00576	0.00480	0.00384	0.00288
tau	0.048	0.048	0.048	0.048	0.051	0.051	0.051	0.055	0.055	0.0545	0.055	0.0545
implied vol target	0.0071	0.0065	0.0058	0.00495	0.008	0.0073	0.0065	0.0060	0.0083	0.0076	0.0068	0.0059

Mean Reversion Speed and Weight of Initial Rates at year 50 and 80				
Half-Life (HL)	10yr	12yr	15yr	20yr
Annual Mean Reversion Speed (MRS)	6.7%	5.6%	4.5%	3.4%*
Weight of initial rates at year 50 (Wt$_{50}$)	3.12%	5.57%	9.92%	17.68%†
Weight of initial rates at year 80 (Wt$_{80}$)	0.39%	0.98%	2.48%	6.25%

*MRS = 1 - 0.5$^{(1/HL)}$, e.g., 3.4% = 1 - 0.5$^{(1/20)}$ † Wt$_{yr}$ = (1 - MRS)^{yr}, e.g., 17.68% = (1 - 3.4%)^{50}

Reference "volatility target" measures annualized model rate volatility at specified reference point. Assuming monthly model parameters and a reference rate = 3%, i.e., $volatility\ target = \sqrt{12}\ \sigma\ (.03 + shift)^{cev}$

All modeled rates are subject to hard floor/cap of 0.25%/20%, and soft floor/cap of 0.5%/18%

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Reference models (starting with 20Y UST at 1.45%) compared against previously proposed *steady state* criteria (red if outside desired range)
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Model	Black Karasinski (BK)				Brennan Schwartz (BS)				Cox Ingersoll Ross (CIR)			
Half-Life (HL)	10yr	12yr	15yr	20yr	10yr	12yr	15yr	20yr	10yr	12yr	15yr	20yr
Worse-than-History Frequency												
Pr(>16.97%) = 0.5% to 1.5%	0.76%	0.77%	0.76%	0.74%	0.90%	0.88%	0.88%	1.19%	0.51%	0.53%	0.56%	0.55%
Pr(<0.05%) = 0.5% to 1.5%	1.01%	1.05%	1.06%	1.02%	1.03%	1.02%	0.98%	0.99%	0.99%	1.04%	0.99%	1.07%
Rate Volatility												
Vol(BOM rate <= 3%) = 0.31% to 0.92%	0.57%	0.52%	0.47%	0.40%	0.64%	0.58%	0.52%	0.48%	0.69%	0.63%	0.56%	0.49%
Vol(3% < BOM rate <= 8%) = 0.37% to 1.12%	1.11%	1.01%	0.90%	0.77%	1.21%	1.11%	0.99%	0.92%	1.12%	1.02%	0.91%	0.79%
Vol(BOM rate > 8%) = 0.78% to 2.33%	2.11%	1.93%	1.72%	1.45%	2.46%	2.24%	1.99%	1.86%	1.59%	1.46%	1.30%	1.13%
Rate Level (Bounds/PEWs)												
Min = 0.00% to 0.50%	0.32%	0.33%	0.34%	0.36%	0.41%	0.40%	0.40%	0.38%	0.40%	0.39%	0.39%	0.39%
1st = 0.22% to 1.12%	1.03%	1.03%	0.98%	0.99%	0.99%	0.99%	1.02%	1.03%	0.97%	1.00%	1.03%	1.01%
5th = 0.98% to 1.78%	1.64%	1.64%	1.63%	1.64%	1.52%	1.51%	1.52%	1.52%	1.63%	1.60%	1.61%	1.57%
15th = 1.61% to 2.31%	2.53%	2.53%	2.54%	2.55%	2.18%	2.19%	2.20%	2.27%	2.51%	2.49%	2.53%	2.50%
30th = 2.23% to 2.83%	3.48%	3.47%	3.48%	3.48%	2.94%	2.95%	2.97%	3.07%	3.53%	3.49%	3.52%	3.48%
50th = 3.35% to 4.89%	4.72%	4.73%	4.74%	4.76%	4.02%	4.03%	4.03%	4.24%	4.87%	4.78%	4.86%	4.82%
70th = 5.77% to 7.77%	6.33%	6.33%	6.36%	6.38%	5.54%	5.51%	5.55%	5.88%	6.53%	6.45%	6.53%	6.49%
85th = 7.56% to 9.81%	8.37%	8.35%	8.38%	8.32%	7.62%	7.60%	7.65%	8.13%	8.51%	8.44%	8.49%	8.43%
95th = 9.50% to 12.00%	11.45%	11.49%	11.44%	11.34%	11.14%	11.12%	11.09%	11.79%	11.24%	11.25%	11.25%	11.21%
99th = 13.44% to 16.19%	15.06%	15.04%	14.99%	15.01%	15.20%	15.25%	15.22%	15.80%	14.67%	14.54%	14.69%	14.64%
Max = 17.00% to 20.00%	20.00%	19.34%	19.26%	18.65%	20.00%	19.61%	19.51%	19.49%	18.79%	18.50%	18.46%	18.37%

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Some additional observations from testing multiple reference models   23

1. There is moderate variation across model forms, with BS better suited to PEWs/boundary conditions, and producing more stabilized low-for-long (L4L) statistics. Other model forms had difficulty hitting 15% PEW criterion but produced lower (i.e., more conservative) L4L statistics vs. BS. No single model is overly the least binding.
2. Extending half-life (lowering mean reversion speed) results in more pro-cyclical/volatile geometric average levels relative to initial rates.
3. BK (i.e., lognormal) models tend to produce lower (i.e., more conservative) L4L statistics when starting at lower rates relative to relative to BS and CIR.
4. BS models produce lower (i.e., more conservative) L4L statistics when starting at higher rates, while other models generally converge when starting rates are close to the median.
5. Due to the high weight of initial rates associated with the 20-year half-life mean reversion speed (i.e., 17.68% weighting after 50 years, 6.25% weighting after 80 years), only 10, 12, and 15-year half-life mean reversion speeds were used to support the proposed criteria.
6. Overall, 30-year-horizon L4L statistics are within 50-70 basis points (bps) across all reference models.
7. Criteria were set based on the *least binding* result from the nine selected reference model calibrations (calibrated to the Academy's previously proposed steady state criteria) in order to accommodate a range of reasonably calibrated models. An additional tolerance (cushion) could be considered to accommodate an even wider range of models.

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4.

Summary and Q&A

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Summary

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Categories of interest rate criteria proposed by the Academy:

[* criteria proposed in this presentation (i.e., 1.a and 3.)

1. **Rate Level Criteria**
   - (a) Steady state "PEW" Criteria; (b) Interim "Point-In-Time" Criteria* (varies by starting rate level)
2. **Min/Max & Worse-Than-History (WTH) Frequency Criteria**
   - Developed for both rate level and slope
   - For slope, varies by level of 20-year rate (can be used for both interim and steady state)
3. **Rate Low- and High-for-Long (Geometric Average) Criteria***
   - Both interim and steady state (interim criteria varies by starting rate level)
4. **Rate Volatility Criteria**
   - Varies by beginning-of-month rate level (can be used for both interim and steady state)
5. **Slope Criteria**
   - Varies by level of 20-year rate (can be used for both interim and steady state)
6. **Mean Reversion Speed Criteria**
   - Developed for both rate level and slope
   - For application across the entire projection (interim and steady state)

Comments regarding newly proposed interim rate criteria (1.a and 3.):

Insurance company projected cashflows can vary significantly depending on how interest rates transition from known starting values to the targeted steady state distribution.

Compared to steady state, interim criteria are more complex since it must cover a broad range of initial conditions where historical data is often limited.

Although more complex, interim criteria are an important component of this limited but practical set of acceptance criteria proposed for use in this regulatory setting.

Without robust, interim rate behavior under a variety of initial conditions, models may introduce artificial volatility in reserve and capital calculations when rates move substantially from one period to the next.

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Thank You

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5.

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Appendix—Reference Model Results Supporting Interim Rate Criteria

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Reference model results supporting 10-year Low-for-Long criteria (left tail)

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| Period | Starting level of UST20 | 10-year horizon Geometric Average at 1st percentile (UST20) | | | | | | | | | Criteria = least binding (i.e., max) |
| | | Black-Karasinki (BK) | | | Brennan-Schwartz (BS) | | | Cox-Ingersoll-Ross (CIR) | | | |
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (years 0-10)	1%	0.8%	0.7%	0.7%	**0.9%**	0.9%	0.8%	0.9%	0.9%	0.8%	0.9%
	2%	1.1%	1.1%	1.1%	**1.2%**	1.2%	1.2%	1.2%	1.2%	1.1%	1.2%
	3%	1.5%	1.6%	**1.6%**	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.6%
	4%	2.0%	2.1%	**2.1%**	1.9%	1.9%	2.0%	1.9%	1.9%	2.0%	2.1%
	5%	2.4%	2.5%	**2.7%**	2.2%	2.3%	2.4%	2.3%	2.3%	2.5%	2.7%
	6%	2.9%	3.0%	**3.1%**	2.6%	2.7%	2.9%	2.7%	2.8%	3.0%	3.1%
	7%	3.3%	3.4%	**3.6%**	2.9%	3.1%	3.3%	3.1%	3.3%	3.5%	3.6%
	8%	3.7%	3.9%	**4.1%**	3.2%	3.4%	3.7%	3.6%	3.8%	4.1%	4.1%
	9%	4.1%	4.3%	4.6%	3.6%	3.8%	4.1%	4.1%	4.3%	**4.6%**	4.6%
	10%	4.4%	4.7%	5.0%	3.9%	4.2%	4.5%	4.6%	4.8%	**5.2%**	5.2%
Steady State (years 70-80)	Any	1.2%	1.2%	1.1%	1.3%	1.2%	1.2%	**1.3%**	1.3%	1.2%	1.3%

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Reference model results supporting 10-year High-for-Long criteria (right tail)

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Period	Starting level of UST20	10-year horizon Geometric Average at 99th percentile (UST20)									Criteria = least binding (i.e., min)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (years 0-10)	1%	4.3%	3.9%	**3.4%**	4.7%	4.2%	3.8%	4.9%	4.5%	4.0%	3.4%
	2%	5.9%	5.5%	**5.0%**	6.2%	5.8%	5.3%	6.2%	5.8%	5.4%	5.0%
	3%	7.4%	7.0%	**6.6%**	7.7%	7.3%	6.8%	7.3%	7.0%	6.6%	6.6%
	4%	8.8%	8.5%	8.0%	9.2%	8.8%	8.3%	8.4%	8.1%	**7.7%**	7.7%
	5%	10.1%	9.8%	9.3%	10.6%	10.2%	9.8%	9.5%	9.2%	**8.9%**	8.9%
	6%	11.3%	11.0%	10.6%	11.8%	11.5%	11.2%	10.5%	10.3%	**10.0%**	10.0%
	7%	12.2%	12.1%	11.8%	12.7%	12.6%	12.4%	11.5%	11.3%	**11.0%**	11.0%
	8%	13.1%	13.0%	12.9%	13.5%	13.5%	13.4%	12.5%	12.3%	**12.1%**	12.1%
	9%	13.8%	13.8%	13.8%	14.2%	14.2%	14.2%	13.4%	13.3%	**13.1%**	13.1%
	10%	14.3%	14.4%	14.5%	14.7%	14.8%	14.8%	14.1%	14.1%	**14.0%**	14.0%
Steady State (years 70-80)	Any	**13.6%**	13.7%	14.1%	13.6%	13.8%	14.1%	13.7%	13.9%	14.2%	13.6%

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Reference model results supporting 30-year Low-for-Long criteria (left tail)

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Period	Starting level of UST20	30-year horizon Geometric Average at 1st percentile (UST20)									Criteria = least binding (i.e., max)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (years 0-30)	1%	1.2%	1.1%	1.0%	1.5%	1.4%	1.2%	**1.5%**	1.4%	1.2%	1.5%
	2%	1.4%	1.3%	1.3%	1.7%	1.6%	1.5%	**1.7%**	1.6%	1.4%	1.7%
	3%	1.7%	1.6%	1.6%	1.8%	1.8%	1.7%	**1.9%**	1.8%	1.7%	1.9%
	4%	2.0%	1.9%	1.9%	2.0%	2.0%	1.9%	**2.1%**	2.0%	1.9%	2.1%
	5%	2.2%	2.2%	2.2%	2.2%	2.1%	2.1%	**2.3%**	2.2%	2.2%	2.3%
	6%	2.4%	2.4%	**2.5%**	2.3%	2.3%	2.3%	2.5%	2.4%	2.5%	2.5%
	7%	2.6%	2.7%	**2.8%**	2.5%	2.5%	2.6%	2.7%	2.7%	2.7%	2.8%
	8%	2.9%	2.9%	**3.1%**	2.7%	2.7%	2.8%	2.9%	2.9%	3.0%	3.1%
	9%	3.1%	3.2%	3.3%	2.8%	2.9%	3.0%	3.1%	3.2%	**3.3%**	3.3%
	10%	3.3%	3.4%	3.6%	3.0%	3.1%	3.2%	3.4%	3.4%	**3.6%**	3.6%
Steady State (years 70-100)	Any	1.7%	1.6%	1.5%	1.8%	1.7%	1.6%	**1.9%**	1.8%	1.7%	1.9%

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Reference model results supporting 30-year High-for-Long criteria (right tail)

31

Period	Starting level of UST20	30-year horizon Geometric Average at 99th percentile (UST20)									Criteria = least binding (i.e., min)
		Black-Karasinski (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (years 0-30)	1%	7.4%	6.9%	**6.2%**	7.8%	7.4%	6.7%	7.7%	7.3%	6.7%	6.2%
	2%	8.5%	8.2%	**7.7%**	8.6%	8.4%	8.0%	8.5%	8.2%	7.8%	7.7%
	3%	9.3%	9.2%	8.9%	9.4%	9.3%	9.1%	9.3%	9.0%	**8.7%**	8.7%
	4%	10.0%	10.0%	9.9%	10.1%	10.2%	10.1%	9.9%	9.8%	**9.6%**	9.6%
	5%	10.6%	10.7%	10.8%	10.8%	10.9%	11.0%	10.6%	10.6%	**10.5%**	10.5%
	6%	**11.2%**	11.3%	11.5%	11.3%	11.5%	11.7%	11.2%	11.2%	11.2%	11.2%
	7%	**11.6%**	11.9%	12.1%	11.8%	12.1%	12.4%	11.7%	11.9%	12.0%	11.6%
	8%	**12.0%**	12.3%	12.6%	12.2%	12.5%	12.9%	12.2%	12.4%	12.6%	12.0%
	9%	**12.3%**	12.7%	13.0%	12.6%	12.9%	13.3%	12.7%	12.9%	13.2%	12.3%
	10%	**12.6%**	13.0%	13.4%	12.9%	13.3%	13.7%	13.1%	13.4%	13.7%	12.6%
Steady State (years 70-100)	Any	11.6%	12.0%	12.4%	**11.5%**	11.9%	12.3%	12.1%	12.4%	12.8%	11.5%

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Reference model results supporting 1-year Point-in-Time criteria at 1st percentile (left tail)

32

Period	Starting level of UST20	1-year Point-in-Time at 1st percentile (UST20)									Criteria = least binding (i.e., max)
		Black-Karasinski (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 1)	1%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
	2%	1.1%	1.2%	1.2%	1.0%	1.1%	1.2%	0.9%	1.0%	1.1%	1.2%
	3%	1.7%	1.8%	1.9%	1.6%	1.7%	1.8%	1.5%	1.6%	1.7%	1.9%
	4%	2.4%	2.5%	2.6%	2.2%	2.3%	2.4%	2.2%	2.3%	2.4%	2.6%
	5%	3.0%	3.1%	3.3%	2.7%	2.9%	3.1%	2.8%	3.0%	3.2%	3.3%
	6%	3.6%	3.8%	4.0%	3.3%	3.5%	3.7%	3.5%	3.7%	3.9%	4.0%
	7%	4.2%	4.4%	4.7%	3.9%	4.1%	4.4%	4.2%	4.4%	4.7%	4.7%
	8%	4.9%	5.1%	5.3%	4.4%	4.7%	5.0%	5.0%	5.2%	5.5%	5.5%
	9%	5.5%	5.7%	6.0%	5.0%	5.3%	5.6%	5.7%	6.0%	6.3%	6.3%
	10%	6.1%	6.3%	6.7%	5.6%	5.9%	6.3%	6.5%	6.7%	7.1%	7.1%

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Reference model results supporting 1-year Point-in-Time criteria at 99th percentile (right tail)

33

Period	Starting level of UST20	1-year Point-in-Time at 99th percentile (UST20)									Criteria = least binding (i.e., min)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 1)	1%	2.2%	2.1%	1.9%	2.4%	2.2%	2.1%	2.6%	2.4%	2.2%	1.9%
	2%	3.7%	3.5%	3.3%	3.9%	3.7%	3.4%	4.0%	3.8%	3.6%	3.3%
	3%	5.1%	4.9%	4.7%	5.3%	5.1%	4.8%	5.3%	5.1%	4.8%	4.7%
	4%	6.5%	6.3%	6.0%	6.8%	6.5%	6.2%	6.5%	6.3%	6.0%	6.0%
	5%	7.9%	7.7%	7.3%	8.2%	7.9%	7.6%	7.7%	7.5%	7.2%	7.2%
	6%	9.3%	9.0%	8.7%	9.7%	9.3%	8.9%	8.9%	8.7%	8.4%	8.4%
	7%	10.7%	10.4%	10.0%	11.1%	10.7%	10.3%	10.1%	9.8%	9.5%	9.5%
	8%	12.0%	11.7%	11.3%	12.6%	12.2%	11.7%	11.2%	10.9%	10.6%	10.6%
	9%	13.4%	13.0%	12.6%	14.0%	13.6%	13.0%	12.3%	12.1%	11.8%	11.8%
	10%	14.7%	14.3%	13.9%	15.5%	15.0%	14.4%	13.4%	13.2%	12.9%	12.9%

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Reference model results supporting 5-year Point-in-Time criteria at 1st percentile (left tail)

34

Period	Starting level of UST20	5-year Point-in-Time at 1st percentile (UST20)									Criteria = least binding (i.e., max)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 5)	1%	0.5%	0.5%	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
	2%	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.8%
	3%	1.0%	1.1%	1.2%	1.0%	1.0%	1.1%	0.9%	0.9%	1.0%	1.2%
	4%	1.4%	1.5%	1.6%	1.2%	1.3%	1.4%	1.1%	1.2%	1.3%	1.6%
	5%	1.7%	1.8%	2.0%	1.4%	1.6%	1.7%	1.4%	1.5%	1.7%	2.0%
	6%	2.0%	2.2%	2.4%	1.6%	1.8%	2.1%	1.7%	1.9%	2.2%	2.4%
	7%	2.3%	2.5%	2.8%	1.9%	2.1%	2.4%	2.1%	2.3%	2.6%	2.8%
	8%	2.6%	2.9%	3.2%	2.1%	2.3%	2.7%	2.4%	2.7%	3.1%	3.2%
	9%	2.9%	3.2%	3.5%	2.3%	2.6%	3.0%	2.8%	3.1%	3.6%	3.6%
	10%	3.2%	3.5%	3.9%	2.5%	2.9%	3.3%	3.2%	3.6%	4.1%	4.1%

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Reference model results supporting 5-year Point-in-Time criteria at 99th percentile (right tail)

Period	Starting level of UST20	5-year Point-in-Time at 99th percentile (UST20)									Criteria = least binding (i.e., min)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 5)	1%	5.0%	4.5%	3.9%	5.6%	5.0%	4.4%	5.9%	5.3%	4.7%	3.9%
	2%	7.0%	6.4%	5.7%	7.4%	6.8%	6.1%	7.4%	6.8%	6.2%	5.7%
	3%	8.8%	8.2%	7.5%	9.2%	8.5%	7.8%	8.7%	8.1%	7.6%	7.5%
	4%	10.4%	9.8%	9.1%	11.0%	10.3%	9.5%	9.9%	9.4%	8.8%	8.8%
	5%	12.0%	11.4%	10.7%	12.8%	12.1%	11.3%	11.0%	10.6%	10.0%	10.0%
	6%	13.5%	12.9%	12.2%	14.5%	13.8%	13.0%	12.2%	11.7%	11.2%	11.2%
	7%	14.8%	14.4%	13.7%	15.9%	15.4%	14.6%	13.3%	12.8%	12.3%	12.3%
	8%	15.9%	15.6%	15.1%	16.8%	16.6%	16.1%	14.3%	13.9%	13.5%	13.5%
	9%	16.7%	16.6%	16.2%	17.4%	17.3%	17.0%	15.3%	15.0%	14.6%	14.6%
	10%	17.3%	17.2%	17.0%	17.8%	17.8%	17.6%	16.2%	16.0%	15.6%	15.6%

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Reference model results supporting 10-year Point-in-Time criteria at 1st percentile (left tail)

Period	Starting level of UST20	10-year Point-in-Time at 1st percentile (UST20)									Criteria = least binding (i.e., max)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 10)	1%	0.6%	0.6%	0.5%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%
	2%	0.7%	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.8%
	3%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.9%	0.9%
	4%	1.1%	1.1%	1.2%	1.0%	1.0%	1.1%	1.0%	1.0%	1.0%	1.2%
	5%	1.3%	1.4%	1.5%	1.1%	1.2%	1.3%	1.1%	1.1%	1.2%	1.5%
	6%	1.4%	1.6%	1.8%	1.2%	1.3%	1.4%	1.2%	1.3%	1.5%	1.8%
	7%	1.6%	1.8%	2.0%	1.3%	1.4%	1.6%	1.4%	1.5%	1.7%	2.0%
	8%	1.8%	2.0%	2.2%	1.4%	1.5%	1.8%	1.5%	1.7%	2.0%	2.2%
	9%	1.9%	2.1%	2.4%	1.5%	1.7%	2.0%	1.7%	1.9%	2.3%	2.4%
	10%	2.1%	2.3%	2.7%	1.6%	1.8%	2.1%	1.9%	2.2%	2.6%	2.7%

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Reference model results supporting 10-year Point-in-Time criteria at 99th percentile (right tail)

37

Period	Starting level of UST20	10-year Point-in-Time at 99th percentile (UST20)									Criteria = least binding (i.e., min)
		Black-Karasinki (BK)			Brennan-Schwartz (BS)			Cox-Ingersoll-Ross (CIR)			
		10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	10yr HL	12yr HL	15yr HL	
Interim (end of year 10)	1%	8.0%	7.1%	6.1%	8.8%	7.8%	6.7%	8.7%	7.9%	7.0%	6.1%
	2%	10.0%	9.1%	8.1%	10.6%	9.6%	8.5%	9.9%	9.2%	8.4%	8.1%
	3%	11.6%	10.9%	9.9%	12.2%	11.4%	10.4%	11.0%	10.3%	9.6%	9.6%
	4%	13.1%	12.4%	11.6%	13.8%	13.1%	12.2%	12.0%	11.4%	10.8%	10.8%
	5%	14.3%	13.8%	13.1%	15.0%	14.6%	13.9%	12.9%	12.5%	11.9%	11.9%
	6%	15.2%	14.9%	14.4%	15.9%	15.7%	15.2%	13.9%	13.4%	12.9%	12.9%
	7%	15.9%	15.8%	15.4%	16.6%	16.5%	16.3%	14.7%	14.4%	14.0%	14.0%
	8%	16.4%	16.4%	16.2%	17.0%	17.0%	16.9%	15.4%	15.2%	14.9%	14.9%
	9%	16.8%	16.8%	16.8%	17.3%	17.4%	17.4%	16.0%	15.9%	15.8%	15.8%
	10%	17.1%	17.1%	17.2%	17.6%	17.6%	17.6%	16.5%	16.5%	16.5%	16.5%

AMERICAN ACADEMY
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Draft: 10/11/23

Life Actuarial (A) Task Force
Virtual Meeting
August 31, 2023

The Life Actuarial (A) Task Force met Aug. 31, 2023. The following Task Force members participated: Cassie Brown, Chair, represented by Rachel Hemphill (TX); Scott A. White, Vice Chair, represented by Craig Chupp (VA); Lori K. Wing-Heier represented by Sharon Comstock (AK); Ricardo Lara represented by Ahmad Kamil and Thomas Reedy (CA); Andrew N. Mais represented by Wanchin Chou (CT); Doug Ommen represented by Mike Yanacheak (IA); Dana Popish Severinghaus represented by Vincent Tsang (IL); Amy L. Beard represented by Scott Shover (IN); Vicki Schmidt represented by Nicole Boyd (KS); Grace Arnold represented by Fred Andersen and Ben Slutsker (MN); Chlora Lindley-Myers represented by William Leung (MO); Eric Dunning represented by Michael Muldoon (NE); D.J. Bettencourt represented by Jennifer Li (NH); Justin Zimmerman represented by Seong-min Eom (NJ); Adrienne A. Harris represented by Bill Carmello (NY); Judith L. French represented by Peter Weber (OH); Glen Mulready represented by Andrew Schallhorn (OK); Michael Humphreys represented by Steve Boston (PA); and Jon Pike represented by Tomasz Serbinowski (UT).

1. <u>Adopted Amendment Proposal Form 2023-08, Optional Interest Maintenance Reserve Template, and Temporary Interest Maintenance Reserve Guidance</u>

Hemphill said that comments on the exposure of amendment proposal form (APF) 2023-08, the optional interest maintenance reserve (IMR) template, and the temporary IMR guidance had been discussed at the Task Force's meeting during the Summer National Meeting. Hemphill then walked through APF 2023-08 and the temporary guidance.

Leung made a motion, seconded by Chupp, to adopt APF 2023-08 (Attachment Six-A) and the temporary IMR guidance (Attachment Six-B). The motion passed unanimously.

Hemphill then discussed the optional IMR template and edits and corrections that had been made after hearing from commenters.

Leung made a motion, seconded by Weber, to adopt the optional IMR template (Attachment Six-C). The motion passed unanimously.

<u>Referred a Memorandum on Changes to the Society of Actuaries' Fellowship Pathway to the Health Actuarial (B) Task Force and Casualty Actuarial and Statistical (C) Task Force</u>

Hemphill noted that she and several Task Force members had expressed concern regarding the removal of regulatory content from the Society of Actuaries' (SOA's) fellowship educational pathway at the Summer National Meeting. Hemphill said that these comments had been incorporated into a memorandum addressed to the SOA that would serve as a formal response from the Task Force. Additionally, Hemphill stated that this memorandum could be referred to the Health Actuarial (B) Task Force and Casualty Actuarial and Statistical (C) Task Force to determine if those groups would join the Life Actuarial (A) Task Force in a joint memorandum to the SOA. Chou said that the referral to the Health Actuarial (B) Task Force and the Casualty Actuarial and Statistical (C) Task Force was the appropriate way to move forward in responding to the SOA's educational changes.

Ann Weber (SOA) noted that the SOA was early in the process of updating its fellowship pathway, and a more comprehensive report on the specific changes was expected to be delivered at the Life Actuarial (A) Task Force,

Health Actuarial (B) Task Force, and Casualty Actuarial and Statistical (C) Task Force meetings in November. Weber further stated that the SOA was taking concerns raised by state insurance regulators very seriously. Hemphill stated that she had concerns with receiving the SOA feedback too late in the process for the SOA to incorporate the feedback in the updates to the fellowship pathway. Weber responded that the SOA is planning to allow for sufficient time to review feedback before implementing the updates to the fellowship pathway.

Yanacheak made a motion, seconded by Andersen, to refer the memorandum (Attachment Six-D) to HATF and CASTF. During discussion of the motion, Serbinowski stated that he did not share the concerns regarding the changes to the fellowship pathway, noting that an actuary who went through the SOA's educational curriculum in the 1980s would have needed to do a significant amount of self-study to keep up with the changes to regulations and actuarial methodologies and that the same type of self-study could be employed for regulatory material. Hemphill acknowledged Serbinowski's point but stated that it was important to develop a foundation of regulatory knowledge through the fellowship pathway so that an actuary can build from that foundation as regulations evolve over time. Chupp agreed with Hemphill, stating that there would be a lack of awareness of regulatory issues without inclusion in the fellowship pathway.

Rhonda Ahrens (Thrivent) noted that from her experience as a former state insurance regulator, there was no process in place for regulators to audit if the SOA's regulatory material was adequate and that she hoped that the potential changes to the fellowship pathway would spur more interest on the regulatory content. Hemphill agreed that there is no process in place for the Task Force to review the SOA's education regulatory content but noted that several regulators are active as volunteers for the SOA's educational initiatives. Andersen noted that he supported the memorandum because: 1) there had been situations where certain regulatory material was cut that led to errors in company filings; and 2) it was significant that the SOA had called out that it is removing regulatory material from the required curriculum. Reedy said that when he and his colleagues perform on-site reviews of insurance companies, they work with more than just the appointed actuary, which points to a broader need for exposure to regulatory content. Reedy further stated that he was concerned that the removal of the regulatory content from the fellowship pathway would reinforce the notion that statutory reporting is a secondary framework, and Hemphill agreed.

The motion passed unanimously.

Having no further business, the Life Actuarial (A) Task Force adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/LATF Calls/08 31/Aug 31 Minutes.docx

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1.   Identify yourself, your affiliation and a very brief description (title) of the issue.

Identification:
Rachel Hemphill, FSA, FCAS, MAAA, Ph.D.

Title of the Issue:
Clarifying guidance for allocation of negative IMR.

2.   Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

VM- 20 Section 7.D.7, VM-30 Section 3.B.5

January 1, 2023 NAIC Valuation Manual

3.   Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

See attached.

4.   State the reason for the proposed amendment? (You may do this through an attachment.)

Clarify allocation of negative IMR for VM-20 and VM-30; in particular, non-admitted IMR is excluded. Note that VM-21 Section 4.A.7 currently requires a treatment consistent with VM-30, and so additional guidance is not needed for VM-21.

* This form is not intended for minor corrections, such as formatting, grammar, cross–references or spelling. Those types of changes do not require action by the entire group and may be submitted via letter or email to the NAIC staff support person for the NAIC group where the document originated.

NAIC Staff Comments:

Dates: Received	Reviewed by Staff	Distributed	Considered
05/22/23	SO		
Notes: APF 2023-08			

VM-20 7.D.7

7. Under Section 7.D.1, any PIMR balance allocated to the group of one or more policies being modeled at the projection start date is included when determining the amount of starting assets and is then subtracted out, under Section 4 and Section 5, as the final step in calculating the modeled reserves. The determination of the PIMR allocation is subject to the following:

   a. The amount of PIMR allocable to each model segment is the approximate statutory interest maintenance reserve liability that would have developed for the model segment, assuming applicable capital gains taxes are excluded. The allocable PIMR may be either positive or negative.
   b. In performing the allocation to each model segment, any portion of the total company IMR balance that is not admitted under statutory accounting procedures shall first be removed. The company shall use a reasonable approach to allocate the total company balance, after removing any non-admitted portion thereof, between PBR and non-PBR business and then allocate the PBR portion among model segments in an equitable fashion.
   c. The company may use a simplified approach to allocate the PIMR, if the impact of the PIMR on the minimum reserve is minimal.

VM-30 Section 3.B.5

5. An appropriate allocation of assets in the amount of the IMR, whether positive or negative, shall be used in any asset adequacy analysis. In performing the allocation, any portion of the total company IMR balance that is not admitted under statutory accounting procedures shall first be removed. Analysis of risks regarding asset default may include an appropriate allocation of assets supporting the asset valuation reserve; these AVR assets may not be applied for any other risks with respect to reserve adequacy. Analysis of these and other risks may include assets supporting other mandatory or voluntary reserves available to the extent not used for risk analysis and reserve support.

| Deleted: the company shall use a reasonable approach to allocate |
| Deleted: disallowable |
| Deleted: (i.e., when the total company balance is an asset rather than a liability). |

August XX, 2023

To: Members of the Life Actuarial (A) Task Force
From: NAIC Staff
RE: Guidance on Allocating Negative IMR (PIMR) In VM-20, VM-21, and VM-30

Executive Summary
Statutory Accounting Practices (E) Working Group (SAPWG) adopted changes in INT 23-01T on August 13, 2023 that allowed the admittance of some portion of negative Interest Maintenance Reserve (IMR) under certain conditions. Given this update, continued guidance on the proper practice for allocating IMR for principles-based reserving (PBR) and asset adequacy testing purposes may be helpful for companies in the near term.

Background
LATF issued guidance on November 17, 2022 (Attachment A) on allocating negative IMR (PIMR) in VM-20, VM-30, VM-31. Since then, SAPWG has adopted changes to allow the admittance of some portion of negative IMR under certain conditions. In light of these ongoing discussions, continued guidance is needed to ensure consistent treatment for negative IMR in PBR and asset adequacy testing. Due to the timing of Valuation Manual updates, the earliest that such guidance can practically be added to the Valuation Manual is for year-end 2025. Therefore, LATF is issuing additional guidance for 2023 and 2024.

Recommendation
In order to assist state regulators and companies in achieving uniform outcomes for year-end 2023 and 2024 , we have the following recommendation: the allocation of IMR in VM-20, VM-21, and VM-30 should be principle- based, "appropriate", and "reasonable". Companies are not required to allocate any non-admitted portion of IMR (or PIMR, as applicable) for purposes of VM-20, VM-21, and VM-30, as being consistent with the asset handling for the non-admitted portion of IMR would be part of a principle-based, reasonable and appropriate allocation. However, any portion of negative IMR that is an admitted asset, should be allocated for purposes of VM-20, VM-21, and VM-30, as again a principle- based, reasonable and appropriate IMR allocation would be consistent with the handling of the IMR asset.

This recommended guidance is for year-end 2023 and 2024, to address the current uncertainty and concerns with the "double-counting" of losses. This recommended guidance will help ensure consistency between states and between life insurers in this volatile rate environment. This guidance is expected to be incorporated in the 2025 Valuation Manual.

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Attachment A
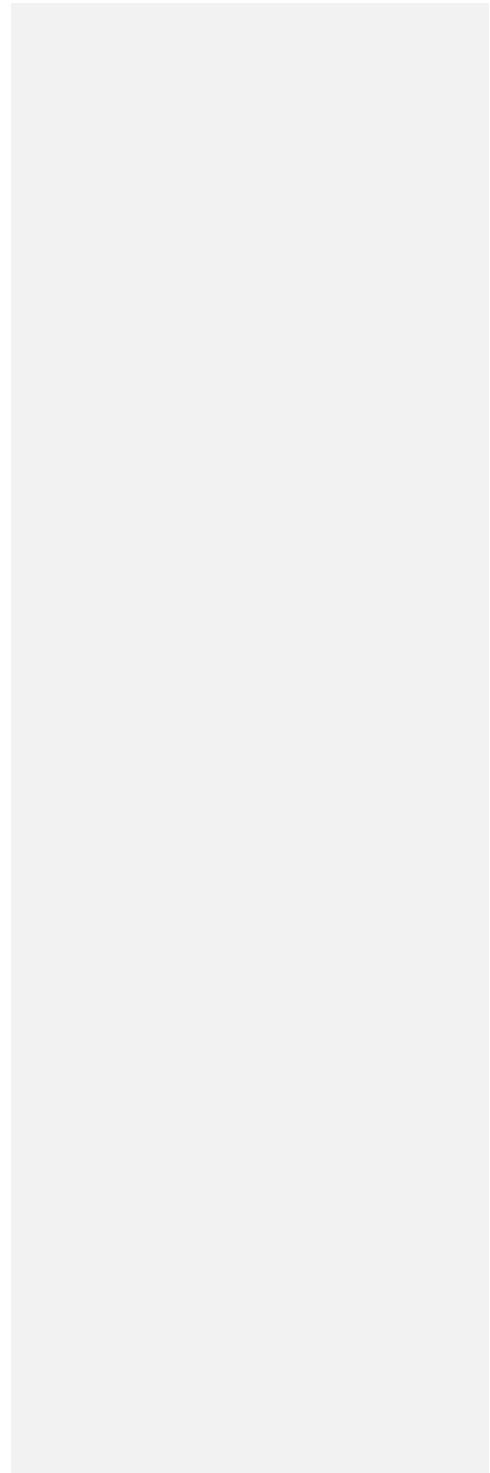
November 17, 2022

To: Members of the Life Actuarial (A) Task Force
From: NAIC Staff
RE: Guidance on Allocating Negative IMR (PIMR) In VM-20, VM-21, and VM-30

Executive Summary
With the rapidly rising interest rate environment, companies selling fixed income assets for a loss are seeing their Interest Maintenance Reserve (IMR) balances decrease or even become negative. Current statutory accounting treatment makes negative IMR a non-admitted asset. While a longer-term evaluation of IMR is being considered by the Statutory Accounting Practices (E) Working Group (SAPWG), additional guidance on the proper practice for allocating IMR for Asset Adequacy Testing and Principle-based Reserving purposes may be helpful for companies in the near term.

Background
The letter to SAPWG from the American Council of Life Insurers (ACLI) (Attachment 1) notes that "…with the inclusion of a negative IMR balance in asset adequacy testing, the disallowance of a negative IMR can result in double counting of losses (i.e., through the disallowance on the balance sheet and the potential AAT-related reserve deficiency)." There are several sections of the Valuation Manual and RBC instructions where IMR is referenced in the letter. Some of these references contemplate allocating negative IMR (or pre-tax IMR (PIMR), as applicable) at the level of business that is being analyzed/reserved for. However, these references do not detail what to do when the total company IMR balance is negative – and therefore a non-admitted asset under current statutory guidance.

Other references do provide additional insight as to the allocation of IMR when the total company balance is negative/disallowable. VM-20 Section 7.D.7.b notes that "…the company shall use a reasonable approach to allocate any portion of the total company balance that is disallowable under statutory accounting procedures (i.e., when the total company balance is an asset rather than a liability)." Question 22 of the AAA's Asset Adequacy Practice Note (Attachment 2) states that "… a negative IMR is not an admitted asset in the annual statement. So, some actuaries do not reflect a negative value of IMR in the liabilities used for asset adequacy analysis." However, Question 22 also notes a 2012 survey data that showed varying practices across companies, including some companies that allocated negative IMR.

Recommendation
In order to assist state regulators and companies in achieving uniform outcomes for year-end 2022, we have the following recommendation: the allocation of IMR in VM-20, VM-21, and VM-30 should be principle-based, "appropriate", and "reasonable". Companies are not required to allocate any non-admitted portion of IMR (or PIMR, as applicable) for purposes of VM-20, VM-21, and VM-30, as being consistent with the asset handling for the non-admitted portion of IMR would be part of a principle-based, reasonable and appropriate allocation. However, if a company was granted a permitted practice to admit negative IMR as an asset, the company should allocate the formerly non-admitted portion of negative IMR, as again a principle-based, reasonable and appropriate IMR allocation would be consistent with the handling of the IMR asset. This recommended guidance is for year-end 2022, to address the current uncertainty and concerns with the "double-counting" of losses. This recommended guidance will help ensure consistency between states and between life insurers in this volatile rate environment. Refinement of this guidance may be considered beyond year-end 2022.

Attachment 1

///ACLI
Financial Security for Life

Mike Monahan
Senior Director, Accounting Policy
202-624-2324 t
mikemonahan@acli.com

Paul Graham
Senior Vice President, Chief Actuary
202-624-2164 t
paulgraham@acli.com

October 31, 2022

Mr. Dale Bruggeman, Chairman
Statutory Accounting Principles Working Group
National Association of Insurance Commissioners
1100 Walnut Street, Suite 1500
Kansas City, MO 64106-2197

Dear Mr. Bruggeman:

Re: Proposal for the NAIC to Fulfil the Original Intent of the Interest Maintenance Reserve

The American Council of Life Insurers (ACLI) would like to request urgent action on an issue that was never fully resolved by the NAIC and has become a pressing matter for the industry due to the rapid rise in interest rates – the allowance of a net negative Interest Maintenance Reserve (IMR) balance.

The ACLI proposes the allowance of a negative IMR balance in statutory accounting. Negative IMR balances are expected to become more prevalent in a higher interest rate environment and their continued disallowance will only serve to project misleading optics on insurers' financial strength (e.g. inappropriate perception of decreased financial strength through lower surplus and risk-based capital even though higher rates are favorable to an insurer's financial health) while creating uneconomic incentives for asset-liability management (e.g. discourage prudent investment transactions that are necessary to avoid mismatches between assets and liabilities just to avoid negative IMR).

ACLI believes the necessary changes can be implemented quickly and with minimal changes to the annual statement reporting instructions.

American Council of Life Insurers | 101 Constitution Ave, NW, Suite 700 | Washington, DC 20001-2133

The remainder of this letter expands upon these points.

Historical Context and Background

The IMR, first effective in statutory accounting in 1992, requires that a realized fixed income gain or loss, attributable to changes in interest rates (but not gains or losses that are credit related), be amortized into income over the remaining term to maturity of the fixed income investments (and related hedging programs) sold rather than being reflected in income immediately.

Since statutory accounting practices for life insurance companies are the primary determinant of obtaining an accurate picture for assessing solvency, it was imperative that the accounting practices be consistent for assets, liabilities, and income and that they be reported on a financially consistent basis. If assets and liabilities were not reported on a financially consistent basis, then the financial statements would not be useful in determining an accurate assessment of solvency or whether there were sufficient assets to pay contractual obligations when they become due.

Amortized cost valuation of fixed income investments reflects the outlook at the time of purchase and amortization reflects the yields available at time of purchase. Policy reserve liabilities are established at the same time, and the interest rate assumptions are consistent with the yields at that time. But if fixed income investments are sold, with the proceeds reinvested in new fixed income investments, a new amortization schedule is established which may be based on an entirely different yield environment, which may be inconsistent with the reserve liabilities when they were established.

IMR was created to prevent the timing of the realization of gains or losses on fixed income investments, related to interest rates changes, to affect the immediate financial performance of the insurance company. This recognized that the gains and losses were transitory without any true economic substance since the proceeds would be reinvested at offsetting lower or higher interest rates.

For example, without the IMR, if a company sold all bonds in a declining interest environment (e.g., from 4% to 2%), and reinvested in new bonds, surplus would increase through significant realized gains. The increased surplus would inappropriately reflect increased financial strength that is illusory, due to a now lower yielding portfolio, as there would be no change to the income needed to support the liabilities.

Likewise, if a company sold all bonds in an increasing interest rate environment (e.g., from 2% to 4%), and reinvested in new bonds, surplus would decrease through significant realized losses. The decreased surplus would inappropriately reflect decreased financial strength that is similarly illusory due to the reinvestment at higher yields relative to when the bonds were originally purchased.

A net negative IMR is currently disallowed in statutory accounting. This handling is contrary to its original intent which recognized that interest related gains and losses are both transitory without any true economic substance since the proceeds would be reinvested at offsetting lower or higher interest rates, respectively. See attachment I to this letter that illustrates the financially consistent

treatment of assets, liabilities, and income and how IMR is needed to achieve that objective for both realized gains and losses.

That IMR should conceptually apply to both realized gains and losses was recognized by the NAIC during and after IMR development. The below is a quote from a 2002 report by the NAIC AVR/IMR Working Group to the E-Committee:

> *"The basic rationale for the IMR would conclude that neither a maximum nor a minimum is appropriate. If the liability values are based on the assumption that the assets were purchased at about the same time as the liabilities were established, then there should be no bounds to the reserve which corrects for departures from that assumption;* **if a company has to set up a large reserve because of trading gains, it is in no worse position that if it had held the original assets. As for negative values of the IMR, the same rationale applies. However, the concept of a negative reserve in the aggregate has not been adopted."**

While realized losses can offset realized gains in IMR, the IMR instructions require the disallowance of a net negative IMR balance (e.g., as noted in the last sentence of the aforementioned quote). See attachment II to this letter, which includes the pertinent IMR instructions where negative IMR balances are currently disallowed and in need of amendment.

When IMR was originally developed, it was intended to achieve its purpose in both a declining and rising interest rate environment. The originally adopted disallowed status of a negative IMR was expected to be addressed in subsequent years. However, over time with the persistent declining interest rates, the issue lost urgency since a negative IMR would not have been a significant issue for any company. The NAIC AVR/IMR Working Group ultimately disbanded without ever addressing this longstanding item on their agenda.

With a rising interest rate environment, it is important that the allowance of a negative IMR be addressed to fulfill its original purpose. In general, rising interest rates are favorable to the financial health of the insurance industry as well as for policyowners.

Without a change, the rising interest rate environment will give the inappropriate perception of decreased financial strength through lower surplus and risk-based capital and worse, create incentives for insurance companies to take action, or not take actions, to prevent uneconomic surplus impacts where the actions (or lack thereof) themselves may be economically detrimental.

Symmetrical treatment of a negative IMR (i.e., the allowance of a negative IMR balance) would appropriately not change surplus as a sale and reinvestment would not affect the underlying insurance company liquidity, solvency, or claims paying ability, just like with a positive IMR. See attachment III to this letter that illustrates that the sale of a fixed income investment, and reinvestment in a new fixed income investment, has no bearing on a life insurance company's liquidity, solvency, or claims paying ability.

As it was initially recognized by the NAIC that IMR should apply to both gains and losses, adequate safeguards were already built into the IMR instructions for asset adequacy, risk-based capital, and troubled companies.

Negative IMR – Reserve Adequacy and Risk-Based Capital

When IMR was developed, it was anticipated that a negative IMR balance would be reflected in asset adequacy analysis. This inclusion ensures that the assets, with the appropriate allocation from the IMR (whether negative or positive), would be adequate to fund future benefit obligations and related expenses of the company.

From the standpoint of reserve adequacy, the inclusion of a negative IMR balance appropriately reduces the investment income in asset adequacy testing. Without the inclusion of negative IMR, reserve inadequacies would potentially not be recognized.

Further, with the inclusion of a negative IMR balance in asset adequacy testing, the disallowance of a negative IMR can result in double counting of losses (i.e., through the disallowance on the balance sheet and the potential AAT-related reserve deficiency). The Actuarial Opinion that covers asset adequacy analysis requires the appropriate assessment of negative IMR in its analysis.

If a negative IMR balance is used in the asset adequacy analysis, its allowance is appropriate. Likewise, if only a portion of a company's negative IMR balance is reflected in the asset adequacy analysis, only the allowance for that portion of the negative IMR balance reflected is appropriate. If a negative IMR balance is disallowed, it would be inappropriate to include in asset adequacy analysis. It is imperative there is symmetry between both reserving and accounting considerations, and there is already precedent in the asset adequacy analyses for inclusion of IMR.

Below are the current references to IMR in the valuation manual and risk-based capital calculations.

Regulation	Use	IMR references
Actuarial Opinion and Memorandum Regulation (VM-30)	Asset adequacy analysis for annual reserve opinion	An appropriate allocation of assets in the amount of the IMR, whether positive or negative, shall be used in any asset adequacy analysis.
Life principle-based reserves (VM-20)	Calculation of deterministic reserve	Calculate the deterministic reserve equal to the actuarial present value of benefits, expenses, and related amounts less the actuarial present value of premiums and related amounts, less the positive or negative pre-tax IMR balance at the valuation date allocated to the group of one or more policies being modeled
Life principle-based reserves (VM-20)	Calculation of stochastic reserve	Add the CTE amount (D) plus any additional amount (E) less the positive or negative pre-tax IMR balance allocated to the group of one or more policies being modeled
Variable annuities principle-based reserves (VM-21)	Reserving for variable annuities	The IMR shall be handled consistently with the treatment in the company's cash-flow testing, and the amounts should be adjusted to a pre-tax basis.
C3 Phase 1 (Interest rate risk capital)	RBC for fixed annuities and single premium life	IMR assets should be used for C3 modeling.

Additional IMR Safeguards

The IMR instructions do provide additional safeguards in situations where it would be appropriate to recognize interest-rate related gains and losses immediately rather than be included in the IMR.

They were established to prevent situations where the liability the IMR supports, no longer exists. Examples noted in the annual statement instructions include:

- Major book-value withdrawals or increases in policy loans occurring at a time of elevated interest rates.

- Major book value withdrawals resulting from a "run on the bank" due to adverse publicity.

As a result, the IMR instructions include an IMR Exclusion whereby all gains or losses which arise from the sale of investments related to "Excess Withdrawal Activity" are to be excluded from IMR and reflected in net income. In short, Excess Withdrawal Activity is defined as 150% of the product of the lower of the withdrawal rate in the preceding or in the next preceding year calendar year times the withdrawal reserves at the beginning of the year.

Summary

With a rising interest rate environment, it is important that the allowance of a negative IMR be addressed to fulfill its original purpose. In general, rising interest rates are favorable to the financial health of the insurance industry as well as for policyowners. Without a change, the rising interest rate environment will give the inappropriate perception of decreased financial strength through lower surplus and risk-based capital.

The inability to recognize negative IMR could also impact the rating agency view of the industry, or worse, incentivize companies to avoid prudent investment transactions that are necessary to avoid mismatches between assets and liabilities. Furthermore, there are adequate safeguards in place to ensure that allowing a negative IMR does not cause any unrecognized reserve or capital inadequacies or any overstatement of claims paying ability.

Current statutory accounting guidance creates two equally objectionable alternatives for insurers and their policyowners. Following the current statutory guidance will improperly reflect financial strength through understating surplus, so additional surplus may need to be retained. Alternatively, one could take steps to manage the current situation by limiting trading of fixed income investments and related hedging programs, which would diminish significant economic value for policyowners, as well as create a mismatch between assets and liabilities.

Both scenarios encourage short-term non-economic activity not in the best long-term interest of the insurance company's financial health or its policyowners. For insurers with diminishing IMR balances due to the rapid increase in interest rates, this dilemma is either here or fast approaching and can only be resolved now with certainty of the appropriate treatment of IMR by the NAIC.

The ACLI looks forward to urgently working with the NAIC toward fulfilling the original intent of IMR. It is imperative that insurers receive relief for year-end 2022.

If you have any questions regarding this letter, please do not hesitate to contact us.

Sincerely,

Mike Monahan
Senior Director, Accounting Policy

Paul Graham
Senior Vice President, Chief Actuary
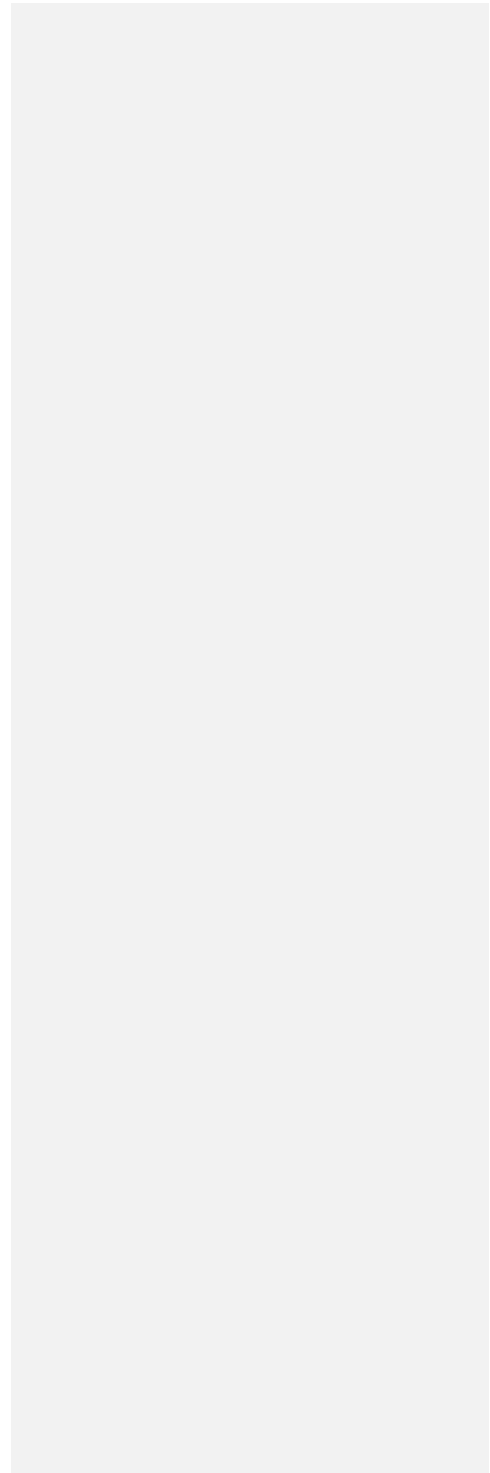
Attachment I

Simplified Example – Need for Reporting Assets, Liabilities, and Income on a Consistent Basis:
- This example shows the appropriate interrelationship of IMR on assets, reserve liabilities, and income.
- Assume a bond is held with the following characteristics:
  - Par Value: $1,000
  - Coupon: 3%
  - Term-to-maturity: 10 years
- Assume the bond is then sold at "time zero" and the proceeds are immediately reinvested in a bond with the same characteristics (e.g., term-to maturity, credit quality, coupon equivalent to market rate, etc.).
- Assume a simplified example with no existing IMR balance, where the bond supports a fixed insurance liability with the same duration as the original bond, as well as a present value of $1,000.

Table 1: Market Interest Rate Scenario			
	Same	**Lower**	**Higher**
Market interest rate	3%	2%	4%
Bond's market value	$1,000	$1,090	$919
Realized gain/(loss) if sold	$0	$90	($81)*

Realized gain/(loss) deferred to balance sheet IMR and amortized into income over remaining life of bond sold (i.e., 10 years).

Table 2: Statutory Investment Income			
IMR amortization	$0	$9	($8)
Interest income on new bond	$30	$21	$38
Total annual stat income	$30	$30	$30

On average, future income is approximately the same in each interest rate scenario as the IMR gets reduced through amortization to income.

Table 3: Statutory Balance Sheet			
Balance Sheet Bonds	$1,000	$1,090	$919
IMR	$0	($90)	$0*
Stat assets net of IMR	$1,000	$1,000	$919*
Reserves	$1,000	$1,000	$1,000
Surplus	$0	$0	($81)*

Even though the sale of the bond (and subsequent reinvestment) is non-economic, and the same income is being produced to support the liability, a negative surplus position makes it appear there is now a deficiency. Allowing the negative IMR appropriately would show no surplus impact, as is shown when a gain occurs, as there is no change in reported reserve liabilities.
Appropriately consistent financial results require the allowance of negative IMR

*The negative IMR balance is currently disallowed and directly reduces surplus. This treatment is not supported by theoretical rationale and gives a distorted view of solvency.

Attachment II

Pertinent Annual Statement Instructions

Line 6 –   Reserve as of December 31, Current Year

Record any positive or allowable negative balance in the liability line captioned "Interest Maintenance Reserve" on Page 3, Line 9.4 of the General Account Statement and Line 3 of the Separate Accounts Statement. A negative IMR balance may be recorded as a negative liability in either the General Account or the Separate Accounts Statement of a company only to the extent that it is covered or offset by a positive IMR liability in the other statement.

If there is any disallowed negative IMR balance in the General Account Statement, include the change in the disallowed portion in Page 4, Line 41 so that the change will be appropriately charged or credited to the Capital and Surplus Account on Page 4. If there is any disallowed negative IMR balance in the Separate Accounts Statement, determine the change in the disallowed portion (prior year less current year disallowed portions), and make a direct charge or credit to the surplus account for the "Change in Disallowed Interest Maintenance Reserve" in the write -in line, in the Surplus Account on Page 4 of the Separate Accounts Statement.

The following information is presented to assist in determining the proper accounting:

General Account IMR Balance	Separate Account IMR Balance	Net IMR Balance
Positive	Positive	Positive (see rule a)
Negative	Negative	Negative (see rule b)
Positive	Negative	Positive (see rule c)
Positive	Negative	Negative (see rule d)
Negative	Positive	Positive (see rule e)
Negative	Positive	Negative (see rule f)

Rules:

a.   If both balances are positive, then report each as aa liability in its respective statement.

b.   If both balances are negative, then no portion of the negative balances is allowable as a negative liability in either statement. Report a zero for the IMR liability in each statement and follow the above instructions for handling disallowed negative IMR balances in each statement.

c.   If the general account balance is positive, the separate accounts balance is negative and the combined net balance is positive, then all of the negative IMR balance is allowable as a negative liability in the Separate Accounts Statement.

d.   If the general account balance is positive, the separate account balance is negative, and the combined net balance is negative, then the negative amount not covered by the positive amount is not allowable. Report only the allowable portion as a negative liability in the Separate Accounts Statement and follow the above instructions for handling the disallowed portion of negative IMR balances in the Separate Accounts Statement.

e.   If the general account balance is negative, the separate account balance is positive, and the combined net balance is positive, then all of the negative IMR balance is allowable as a negative liability in the General Account Statement.

f.   If the general account balance is negative, the separate account balance is positive, and the combined net balance is negative, then the negative amount not covered by the positive amount is not allowable. Report only the allowable portion as a negative liability in the General Account Statement and follow the above instructions for handling the disallowed portion of negative IMR balances in the General Account Statement.

Attachment III

<u>IMR Illustration – Liquidity, Solvency and Claims Paying Ability</u>

Essentially, a negative IMR balance from an individual trade represents the present value of the future positive interest rate differential, from the new investment compared to the old investment, that puts one in the same economic position, when compared to before the trade, including total liquid assets available to pay claims.

This phenomenon can be illustrated in the following table where a 10-year bond is sold, one year after purchase, and immediately reinvested in another 10-year bond with equivalent credit quality in an interest rate environment where market interest rates increased from 2% to 4% in the intervening year.

	Coupon Rate of Bond	Market Interest Rate @ Purchase	Par Value of Bond	Fair Value @ Purchase	Fair Value @ Time of Sale	Loss on Sale	Claims Paying Liquidity
Old Bond	2%	2%	100	100	85.13	14.87	85.13
New Bond	4%	4%	85.13	85.13	85.13	N/A	85.13

The short-term acceleration of negative IMR to surplus (e.g., its disallowance) is strictly a timing issue and not a true loss of financial strength or claims paying liquidity, but it does present a temporary and inappropriate optics issue in surplus/financial strength until the IMR is fully amortized.

This phenomenon can further be illustrated by comparing two separate hypothetical companies. Assume Company A and B both have the exact same balance sheets. Then assume Company A keeps the old bond and Company B affects the trade mentioned above.

With the disallowance of a negative IMR balance, Company B now has a balance sheet that shows a relative decline of financial strength of $14.87. This weakened balance sheet contrasts with both the principle behind the development of IMR, the relative actual economic financial strength, and claims paying ability of the two entities.

There is no difference in balance sheet economics of the two entities. The negative IMR balance for Company B essentially represents the difference between cost and fair value of the investment sold, that is already embedded on Company A's balance sheet based on the existing interest rate environment. The negative IMR balance should be recognized as there is no change in economics pre and post trade (or in this instance between Company A and Company B) which is consistent with the overall principle behind IMR.

Attachment 2

Some actuaries test the option risk in assets (e.g., calls) by assuming an immediate drop in the discount rate used in the GPV. The drop test is often set as severe as needed to represent a drop in earned rate that would occur if all options were exercised.

Q22. The AOMR states that the interest maintenance reserve (IMR) should be used in asset adequacy analysis. Why?

The IMR is part of the total reported statutory reserves. The IMR typically defers recognition of the portion of realized capital gains and losses resulting from changes in the general level of interest rates. These gains and losses are amortized into investment income over the expected remaining life of the investments sold, rather than being recognized immediately. This amortization is after tax.

The purpose of the IMR usually is to maintain the original matching between assets and liabilities that might be weakened by the sale of an asset. Originally, it was anticipated that the IMR would be allowed to become negative, as long as the asset adequacy analysis showed that the total statutory reserves, including the negative IMR, were sufficient to cover the liabilities. However, a negative IMR is not an admitted asset in the annual statement. So, some actuaries do not reflect a negative value of IMR in the liabilities used for asset adequacy analysis.

In the 2012 survey of appointed actuaries, more than 80 percent of the respondents indicated they include the IMR in their testing. Some actuaries use a starting IMR of zero if IMR is negative. Other actuaries use negative IMR to adjust starting assets and therefore model future lower asset yields than if zero IMR were assumed. Half of the respondents who indicated they used IMR in testing also indicated they lower assets by the absolute value of a negative IMR balance; the other half indicated they use a value of zero for the starting IMR if it is negative at the beginning of the projection period. There is no prohibition regarding the use of negative IMR within asset adequacy analysis. So, a number of actuaries allow the IMR to fall below zero within the testing period. About 60 percent of actuaries responding to the survey indicated they do not have to deal with a negative IMR.

Q23. How does the actuary determine which portion of the IMR can be used to support certain products? How is the portion of the IMR used?

If the actuary allocates the assets and IMR by line, then one possible approach is line of business-level inclusion of starting assets in the amount of the unamortized portion of the IMR relating to those assets that were owned by the line prior to being sold. Another possible approach is the allocation of company-level IMR proportionately to starting assets. An advantage of this second approach is that it is generally simpler, while a disadvantage is that longer liabilities probably have longer assets, which usually produce higher capital gains when sold, after a given drop in interest rates, than shorter assets do,

Optional AOM and PBR Actuarial Report Template IMR
Supplemental IMR Reporting
(All dollar amounts in thousands.)

Company Name:
NAIC Company Code:
Valuation Year:

IMR and Relevant Annual Statement Reporting

1	2	3	4	5	6
General Account IMR	Separate Account IMR	RBC	General Account Capital and Surplus	Admitted net negative (disallowed) IMR	Comments

RBC Flag: Ok
Capital and Surplus Flag: Ok

IMR and Relevant 9/30 Statement Reporting (to be completed if 9/30 data is used for AAT)

1	2	3	4	5	6
General Account IMR	Separate Account IMR	RBC	General Account Capital and Surplus	Admitted net negative (disallowed) IMR	Comments

RBC Flag: Ok
Capital and Surplus Flag: Ok

Reflection of IMR in Asset Adequacy Testing and Principle-Based Reserving

1	2	3	4	5	6	7	8
Reporting Basis	As of Quarter	Amount of IMR Allocated	Amount of admitted net negative (disallowed) IMR Allocated	IMR Allocation Basis	Included in Starting Assets? (Y/N)	Does the allocated admitted net negative (disallowed) IMR included in the starting assets generate future income? (Y/N)	Comments
VM-30 (AAT)							
VM-21							
VM-20: Term Reserving Category							
VM-20: ULSG Reserving Category							
VM-20: All Other Reserving Category							

Automatic Verification

AAT IMR Flag: Ok

Discuss and support with Actual to Expected analysis the level of historical excess withdrawals and anticipated future excess withdrawals. This discussion may be supplemented by other analysis and A/E's, such as for lapse data.

(Enter summary here, and attach additional documentation as necessary.)

TO: John Robinson, FSA, MAAA, FCA, President, Society of Actuaries (SOA)

Gregory W. Heidrich, Chief Executive Officer, SOA

Stuart Klugman, FSA, CERA, PhD, Staff Fellow, SOA

FROM: Rachel Hemphill, Chair, Life Actuarial (A) Task Force

Craig Chupp, Vice-Chair, Life Actuarial (A) Task Force

CC: Bill Michalisin, Executive Director, American Academy of Actuaries (AAA)

Ken Kent, President, AAA

Lisa Slotznick, President-Elect, AAA

RE: Society of Actuaries (SOA) Planned US Regulatory Basic Education Changes

DATE: August XX, 2023

The Life Actuarial (A) Task Force is generally appreciative and supportive of the Society of Actuaries' educational efforts. We understand and can appreciate the desire to be more flexible for candidates and supportive of international students. However, we are very concerned by the movement of United States (US) regulatory material to an optional regulatory certificate course for US actuaries. We believe that US regulatory material must be a required educational component for all actuaries practicing in the US.

There has been a suggestion that US regulatory material could be an "as-needed" supplement, particularly noting that appointed actuaries may need the US regulatory certificate. As much as we value the work of appointed actuaries, no one supposes that they are a one-person shop. Moreover, US regulatory material is not just essential for appointed actuaries and qualified actuaries, but for:

- Valuation actuaries,
- Actuaries performing experience studies,
- Investment actuaries,
- Illustration actuaries,
- Product filing actuaries,
- … and regulatory actuaries!

In fact, there is no insurance industry actuarial role where it would be appropriate to remove the basic education on US laws and regulations for actuaries practicing in the US. Moreover, it is important to note that we do not think that an FSA would qualify you to meet the US Qualifications Standards (USQS) for signing general statements of opinion if the US regulatory material were removed. The USQS includes "US-specific knowledge", in addition to Basic Education. However, if the Basic Education were modified to no longer provide foundational knowledge in US regulatory requirements, we do not believe

that the "US-specific knowledge" component could be adequately satisfied through individual continuing education alone. While the SOA has noted that the basic education will include GAAP and IFRS, this does not address the concern. US statutory laws and regulations are not a tweak, variant, or refinement of GAAP or IFRS. Without being provided foundational US regulatory knowledge in their Basic Education, new actuaries would be left in a situation where they do not know what gaps in education they have and what additional study would be needed to be qualified to issue an opinion. We do not see how this differs from removing any other fundamental component of the actuarial education and leaving it to the individual to study on their own. If we believe that the actuarial education process is valuable (and we do), and we believe that a knowledge of US regulatory material is necessary to practice in the US (and we do), divorcing this essential material from the regular educational process is a disservice to the profession. For regulators, the most critical concern is that the lack of awareness would lead to a lack of compliance and an inability to rely on the professionalism of company actuaries. For example, we have observed that actuaries that had principle-based reserving (PBR) material as part of their Basic Education are more conversant in general PBR topics, more aware of the intricate details, and better able to comply with the requirements. An inability of regulators to rely on the professionalism of company actuaries would then lead to negative repercussions for insurance companies, as it would fundamentally undermine efforts that hinge on that reliance, such as efforts to make reserving and other areas more principles based. Moreover, thinking about the professionalism that actuaries are valued for, a key component of that professionalism is knowledge of and adherence to regulatory requirements.

US regulatory content is necessary to provide general statements of actuarial opinion in the US. Whether it is part of the FSA, a supplemental course offered by the SOA, or a supplemental course offered by the American Academy of Actuaries (AAA), it should be required of all actuaries practicing in the US. To ensure the continued strength and value of the US actuarial profession, we believe that the AAA would need to update the USQS to be consistent with the current comprehensive requirements if there were any change to what is covered by the SOA basic education component. We appreciate the SOA presenting on this topic to LATF and providing us an opportunity for input on such a critical issue. We look forward to continued dialogue with the SOA.

November 29, 2023

From: Fred Andersen, Chair
Indexed Universal Life (IUL) Illustration (A) Subgroup

To: Rachel Hemphill, Chair
The Life Actuarial (A) Task Force

Subject: <u>The Report of the Indexed Universal Life (IUL) Illustration (A) Subgroup (IUL Illustration SG) to
the Life Actuarial (A) Task Force</u>

The IUL Illustration SG has not met since the adoption of group's main work product, revisions to
Actuarial Guideline 49A, by the Life Actuarial (A) Task Force on December 11, 2022. The revisions to
Actuarial Guideline 49A were subsequently adopted by the NAIC's Executive (EX) Committee and
Plenary at the Spring National Meeting on March 25. Regulators are reviewing the impact of the
Guideline revisions on the market.

November 29th, 2023

From: Seong-min Eom, Chair
The Longevity Risk (E/A) Subgroup

To: Rachel Hemphill, Chair
The Life Actuarial (A) Task Force

Subject: The Report of the Longevity Risk (E/A) Subgroup to the Life Actuarial (A) Task Force

The Longevity Risk (E/A) Subgroup has not met since the Summer National Meeting. The subgroup will resume the meetings once the currently exposed VM-22 PBR methodology is finalized and adopted to develop and recommend longevity risk factor(s) for the product(s) that were excluded from the application of the current longevity risk factors.

November 29, 2023

From: Pete Weber, Chair
The Variable Annuities Capital and Reserve (E/A) Subgroup

To: Rachel Hemphill, Chair
The Life Actuarial (A) Task Force

Subject: <u>The Report of the Variable Annuities Capital and Reserve (E/A) Subgroup (VACR SG) to the Life
Actuarial (A) Task Force</u>

The VACR SG has not met since the Summer National Meeting. At the request of LATF, the Chair has
made a request to the Society of Actuaries to expand the work they are currently carrying out for the
VM-22 Standard Projection Amount Mortality DG to include variable annuities. More specifically, to
develop mortality rates to be used as prescribed assumptions within the VM-21 Standard Projection
Amount. Work continues on this project and a report and recommendations are expected after the 2023
Fall NAIC National Meeting.

November 29, 2023

From: Ben Slutsker, Chair
The VM-22 (A) Subgroup

To: Rachel Hemphill, Chair
The Life Actuarial (A) Task Force

Subject: The Report of the VM-22 (A) Subgroup to the Life Actuarial (A) Task Force

The NAIC VM-22 (A) Subgroup has been focusing on the Standard Projection Amount (SPA) methodology, liability assumptions, and VM-31 disclosure requirements over the past few months.

Comment letters for the SPA structure were received in late October and discussed during two calls in early November, with an additional upcoming call scheduled for December. The primary topics are aggregation, deterministic reserve, dynamic lapse formula, and limits on investment spread in the SPA calculation. In addition, the SOA will continue to present proposed mortality and policyholder behavior assumptions for the VM-22 SPA in early 2024, which will then be exposed for public comment.

VM-31 requirements for non-variable annuities was exposed for 90 days during the call on November 15. The VM-31 draft builds on the current variable annuity disclosure requirements, with the same VM-31 sections applying to both variable and non-variable annuities. Additions to the current annuity disclosure requirements include sections related to non-guaranteed elements, VM-22 exclusion testing, and riders/supplemental benefits. The exposure also included a VM-22 Supplement Blank for the NAIC Annual Statement, as well as edits to VM-G.

The project plan going forward is to target a VM-22 field test for July 2024, using the most up-to-date scenarios from the proposed NAIC generator. Companies are encouraged to begin implementation and project planning now if they would like to participate in the field test and influence the VM-22 PBR framework. The field test results would be presented by early February 2025, leaving five months to make remaining modifications for the VM-22 draft. The key outstanding items to resolve from the field test are the stochastic exclusion ratio test threshold, reinvestment guardrail mix, and impact of the proposed SPA assumptions. After addressing those items and any other modifications for unintended impacts observed during the field test, the Subgroup will vote on its final recommendation for LATF.

The target timing for adopting VM-22 is July 2025, with an effective date of 1/1/2026 for new business going forward. There would be a three year optional implementation period up until 1/1/2029, after which all prospective non-variable annuity business would be valued under VM-22 PBR going forward.

PBR VM-22 Project Draft Timeline

EFFECTIVE DATE GOALS

1/1/2026

#	DRAFT TIMELINE	11/23	12/23	1/24	2/24	3/24	4/24	5/24	6/24	7/24	8/24	9/24	10/24	11/24	12/24	1/24	2/24	3/25	4/25	5/25	6/25	7/25	8/25
11	Discuss Comments on SPA Structure Exposure	▓	▓																				
12	VM-31 Exposure			▓																			
13	Discuss Comments on VM-31 Structure Exposure					▓																	
14	ESG Field Test #2								▓														
15	ESG Field Test #2 Presentations										▓												
16	VM-22 and C3P1 Field Test											▓											
17	Compile/analyze Field Test results													▓	▓								
18	Discuss field test results on public calls															▓							
19	Resolve outstanding items and changes from field test																	▓					
20	LATF exposure and discussion																			▓			
21	LATF Adoption																				▓		
22	A Committee Adoption																					▓	
23	NAIC Exec & Plenary Adoption																						▓

Draft: 11/21/23

Valuation Manual (VM)-22 (A) Subgroup
Virtual Meeting
November 15, 2023

The VM-22 (A) Subgroup of the Life Actuarial (A) Task Force met Nov. 15, 2023. The following Subgroup members participated: Ben Slutsker, Chair (MN); Elaine Lam (CA); Lei Rao-Knight (CT); Mike Yanacheak (IA); Vincent Tsang (IL); Nicole Boyd (KS); William Leung (MO); Seong-min Eom (NJ); Bill Carmello (NY); Rachel Hemphill and Iris Huang (TX); Tomasz Serbinowski (UT); and Craig Chupp (VA).

1. <u>Consider Exposure of VM-31 for Non-Variable Annuities</u>

Slutsker began walking through draft revisions to VM-31, PBR Actuarial Report Requirements for Business Subject to a Principle-Based Valuation; VM-G, Appendix G – Corporate Governance Guidance for Principle-Based Reserves; and the Annual Statement Blank for edits related to VM-22, Requirements for Principle-Based Reserves for Non-Variable Annuities. After discussing the VM-22 Reserves Supplement addition to the Annual Statement Blank, Chupp asked why only individual payout annuities had a line and whether one would be needed for potential group payout annuities. Slutsker noted that it could be possible that an additional line for group payout annuities would need to be added and should be considered during the exposure period. Carmello asked where deferred income annuities would be included in the VM-22 Reserves Supplement and suggested that non-pension risk transfer (PRT) group annuities be added to the reporting line for PRT. The subgroup agreed to edit lines 1.3 and 1.5 of the VM-22 Reserves Supplement exposure draft to clarify the appropriate line to report this business.

Tsang made a motion, seconded by Chupp, to expose the draft revisions to VM-31 (Attachment Eleven-A), VM-G (Attachment Eleven-B), and the Annual Statement Blank (Attachment Eleven-C) for a 90-day public comment period ending Feb. 14, 2024. The motion passed unanimously.

2. <u>Discussed Comments Received on the VM-22 SPA Draft</u>

Slutsker then discussed a comment from the American Council of Life Insurers (ACLI) on how standard projection amount (SPA) requirements would be applied to products without cash surrender value or account value, such as payout annuities. Slutsker suggested reusing specific wording from another section that stated that the guarantee actuarial present value (APV) requirements are not applicable for contracts where there is no account value or surrender benefits to which the subgroup agreed.

Slutsker introduced the ACLI's comment that withdrawals for lifetime guaranteed living benefits do not seem to be appropriately addressed in the current VM-22 SPA language. The subgroup agreed to add the ACLI's suggested wording change to the next draft. Slutsker then walked through ACLI's next comment that questioned whether the crediting rate limit section (6.C.11.b) should apply to all products in the scope of VM-22 or just non-indexed products. The subgroup decided to add wording in the next draft that clarifies that this section applies to all contracts in the scope of VM-22 with crediting rates offered after the contract issue.

Slutsker discussed an exposure question regarding language that would allow exceptions to the prescription in the crediting rate limit section with approval from state insurance regulators in the company's state of domicile. Tsang noted that the provision was added in the case of specific product designs that included persistency bonuses. Carmello suggested removing the language to avoid non-uniformity. Hemphill also suggested removing the language since it does not have clear expectations for state insurance regulators about exactly when or what would qualify. Lam agreed and suggested removing the language because it is vague.

Lam made a motion, seconded by Tsang, to remove the language allowing for exemption from the crediting rate limit section and add an exposure question for commenters to discuss specific products where the draft language would be challenging. The motion passed unanimously.

Having no further business, the VM-22 (A) Subgroup adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/VM-22 Calls/11 15/Nov 15 Minutes.docx

**VM-31: PBR Actuarial Report Requirements for Business
Subject to a Principle-Based Valuation**

Table of Contents

Section 1: Purpose

The purpose of this section is to establish the minimum reporting requirements for policies or contracts subject to a principle-based valuation according to the methods defined in VM-20 and VM-21.

Section 2: General Requirements

A. Each year a company shall prepare, under the direction of one or more qualified actuaries, as assigned by the company under the provisions of VM-G, a PBR Actuarial Report if the company computes an exclusion test for any policy or contract as defined in VM-20 or VM-22, or computes a minimum reserve, as defined in VM-20, VM-21, or VM-22.

A company that does not compute any DR or SR under VM-20 or VM-22 for a group of policies or contracts as a result of passing the exclusion tests as defined in VM–20 Section 6 or VM-22 Section 7 must still develop a sub-report for that group of policies or contracts that addresses the relevant requirements of Section 3.

A company that computes reserves under the Alternative Methodology defined in VM-21 must still develop a sub-report with the applicable requirements to the Alternative Methodology for that group of policies that addresses the relevant requirements of Section 3.

The PBR Actuarial Report shall consist of an Executive Summary, a Life Summary, a Life Report, an Annuity Summary, and an Annuity Report, as applicable. The Life Report and the Annuity Report shall each contain one or more sub-reports, with each such sub-report covering one or more groups of policies, model segments or contracts. Each such sub-report shall be prepared by the qualified actuary assigned responsibility for such groups of policies or contracts under the provisions of VM-G. The PBR Actuarial Report must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work.

B. The PBR Actuarial Report must include descriptions of all material decisions made and information used by the company in complying with the minimum reserve requirements and must comply with the minimum documentation and reporting requirements set forth in Section 3.

C. The Executive Summary, Life Summary and Annuity Summary of the PBR Actuarial Report, as provided in Section 3.B, Section 3.C and Section 3.E, shall be submitted to the company's domiciliary commissioner no later than April 1 of the year following the year to which the PBR Actuarial Report applies. The entire PBR Actuarial Report, as provided by the entirety of Section 3, shall be submitted upon request to the company's domiciliary commissioner no later than April 1 of the year following the year to which the PBR Actuarial Report applies or within 30 days, if requested after April 1. Similarly, the company shall submit the entire PBR Actuarial Report or the Executive Summary, Life Summary and Annuity Summary upon request, to the commissioner of any other jurisdiction in which the company is licensed.

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D. The company shall retain on file, for at least seven years from the date of filing, sufficient documentation so that it will be possible to determine the procedures followed, the analyses performed, the bases for assumptions and the results obtained in a principle-based valuation.

E. The PBR Actuarial Report shall be submitted in searchable portable document format (PDF) form, in which the narrative uses a font size no smaller than 10 point. However:

  1. This requirement shall in no way preclude the use of graphs and charts.

  2. As needed, large arrays of data should be submitted alongside the PDF file in the form of spreadsheets. The PDF document shall make specific reference to such accompanying files. Such companion files shall be considered part of the PBR Actuarial Report for regulatory review purposes.

Section 3: PBR Actuarial Report Requirements

A. The PBR Actuarial Report shall contain a table of contents with associated page numbers. The PBR Actuarial Report shall retain and follow the order of the requirements listed herein. If only policies valued under VM-20 are included, then Section 3.E and Section 3.F are not applicable. If only contracts valued under VM-21 or VM-22 are included, then Section 3.C and Section 3.D are not applicable. The PBR Actuarial Report shall keep the corresponding headers for each requirement and include an explanatory statement for any requirement that is not applicable.

B. Executive Summary – The PBR Actuarial Report shall contain a single Executive Summary at the beginning of the report which addresses all sub-reports. The Executive Summary shall include the following:

  1. Qualified Actuary – An opening paragraph identifying the qualified actuary that has been assigned by the company to prepare each sub-report of the PBR Actuarial Report, the qualifications of the qualified actuary and the relationship of the qualified actuary to the company.

  2. Groups of Policies and/or Contracts – A listing of the groups of policies and contracts valued under VM-20, VM-21, and VM-22 covered by each sub-report.

  3. Policies – A summary of the base policies within each VM-20 Reserving Category. Include information necessary to fully describe the company's distribution of business. For direct business, use PBR Actuarial Report Template A located on the NAIC website (*https://www.naic.org/pbr_data.htm?tab_3*) to provide descriptions of each base policy product type and underwriting process (including a description of the process, the time period in which it was used, and the level of any additional margin), with a breakdown of policy count and face amount by base policy product type and underwriting process. Also include the target market, primary distribution system, and key product features that affect risk, including conversion privileges.

  4. Contracts – A description of the contracts valued under VM-21 and contracts valued within each VM-22 Reserving Category, including descriptions of the target market, primary distribution system, and key product features that affect risk, such as death benefit guarantees, living benefit guarantees, or any other guarantees.

  5. High-Level Results – Summarized separately for business valued under VM-20, VM-21, and VM-22 for the current and prior year, and on both a pre- and post-reinsurance-ceded basis, a table of the final reported reserve amounts, policy or contract counts, face amounts (for policies under VM-20) or in-force account values (for contracts under VM-21 and

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VM-22) and any other metrics helpful for the understanding of the company's overall level of reserves under a principle-based valuation. A template is provided below for reference.

	Post-Reinsurance-Ceded		Pre-Reinsurance-Ceded	
	Current Year (YYYY)	Prior Year (YYYY-1)	Current Year (YYYY)	Prior Year (YYYY-1)
Life Insurance valued under VM-20				
- Total VM-20 Reserve				
- Face Amount				
- Policy Count				
VA valued under VM-21				
- Total VM-21 Reserve				
- Account Value				
- Contract Count				
-				
- Annuities valued under VM-22				
- Total VM-22 Reserve				
- Account Value				
- Contract Count				

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Guidance Note: Since AG 43 references the reserve requirements of VM-21, any contracts within the scope of AG 43 are considered to be valued under VM-21, and they should be documented as such within this PBR Actuarial Report.

C. Life Summary –The PBR Actuarial Report shall contain a Life Summary of the critical elements of all sub-reports of the Life Report as detailed in Section 3.D. In particular, this Life Summary shall include:

1. VM-20 Materiality – The standard established by the company pursuant to VM-20 Section 2.H.

2. Monitored Risks and Findings or Concerns – A summary of:

    a. The material risks within the principle-based valuation under VM-20 and other risks that are subject to close monitoring by the board, the company, the qualified actuary, or any state insurance regulators in jurisdictions in which the company is licensed.

    b. Any significant unresolved issues regarding the principle-based valuation under VM-20 in accordance with VM-G Section 4.A.5.

Guidance Note: Risks that are subject to close monitoring include items pursuant to VM-G Section 3.A that necessitate a heightened degree of oversight for the implementation or ongoing operation of the principle-based valuation function under VM-20. These may include risks relating to a process, procedure, control or resource. An example might be that the company is closely monitoring the adequacy of resources and level of knowledge for PBR.

3. Changes in Reserve Amounts – A description of the changes in reserve amounts from the prior year to the current year and why the changes are reasonable.

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4. <u>Changes in Methods</u> – A description of any significant changes from the prior year in the methods used to model cash flows or other risks, or used to determine assumptions and margins, and the rationale for the changes.

5. <u>Assets and Risk Management</u> – A brief description of the asset portfolio, and the approach used to model risk management strategies, such as hedging, and other derivative programs, including a description of any future hedging strategies supporting the policies and any material changes to the hedging strategies from the prior year.

6. <u>Consistency between Life Sub-Reports</u> – A brief description of any material differences in methods, assumptions or risk management practices between groups of policies covered in separate Life sub-reports, to the extent that they are not explained by variations in product features, and the rationale for such differences.

7. <u>Governance</u> – A statement indicating that governance documentation, including that required by VM-G Section 2.A.5, VM-G Section 3.A.6 and VM-G Section 4.A.3, is available upon request.

8. <u>Closing Section</u> – A closing section with the signature, credentials, title, telephone number and e-mail address of the qualified actuary (or qualified actuaries) responsible for the Life Summary, the company name and address, and the date signed.

9. <u>Supplement Part 1</u> – A copy of Part 1 of the VM-20 Reserves Supplement from the annual statement blank.

10. <u>Supplement Part 2</u> – A copy of Part 2 of the VM-20 Reserves Supplement from the annual statement blank.

11. Reconciliation of Reported Values – A reconciliation of reported values and an explanation of differences, if any, between reported values in Section 3.B.5 (High-Level Results), in the VM-20 Reserves Supplement – Part 1A and Part 1B, and in the Annual Statement (Exhibit 3 for Separate Account values, Exhibit 5 for General Account values, and any other).

D. <u>Life Report</u> – This subsection establishes the Life Report requirements for individual life insurance policies valued under VM-20.

The company shall include in the Life Report and in any sub-report thereof:

1. <u>Assumptions and Margins</u> – Details on the valuation assumptions and margins, including:

    a. <u>Tables</u> – For each material risk, the anticipated experience assumptions, margins, and prudent estimate assumptions used in the model, provided in Excel format. A complete table of reinsurance premiums is not required. If applicable, provide upon request a sample calculation demonstrating the methodology used to determine future reinsurance premiums reflecting non-guaranteed reinsurance features, including margins and details of any simplifications and approximations used.

> **Guidance Note:** See VM-20 Section 9.B.1 for a discussion on material risks.
> There is a Sample Assumptions Summary for PBR Actuarial Report located on the NAIC website (https://www.naic.org/pbr_data.htm?tab_3), which may be a useful reference document when developing reporting in accordance with Section 3.D.1.a. For valuation dates prior to Dec. 31, 2022, the company's domiciliary commissioner may permit less than full compliance with the above Section 3.D.1.a, provided that the commissioner determines that the company has made a good

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faith attempt to comply.

    b.   <u>Changes</u> – A description of any changes in anticipated experience assumptions or margins since the last PBR Actuarial Report.

    c.   <u>Company Experience Studies</u> – The following information for each risk factor, provided using PBR Actuarial Report Template C provided on the NAIC website (*https://content.naic.org/pbr_data.htm*): the type(s) of policies included by VM-20 Reserving Category, the year the most recent experience study was performed, along with the observation calendar years, the policy issue years included, and the length of the lag time used to allow for events reported after the study period.

    d.   <u>Assumption and Margin Development</u> – The following information for each risk factor: description of the methods used to determine anticipated experience assumptions and margins, including the sources of experience (e.g., company experience, industry experience, or other data); how changes in such experience are monitored; any adjustments made to increase mortality margins above the prescribed margin (such as to reflect increased uncertainty due to newer underwriting approaches); and any other considerations, such as conversion features, helpful in or necessary to understanding the rationale behind the development of assumptions and margins, even if such considerations are not explicitly mentioned in the *Valuation Manual*.

2.   <u>Cash-Flow Models</u> – The following information regarding the cash-flow model(s) used by the company in performing a principle-based valuation under VM-20:

    a.   <u>Modeling Systems</u> – Description of the modeling system(s) used for both assets and liabilities. Each description should include identification of the model vendor when external, identification of the model version number, discussion of the degree of customization in the model, and discussion of the extent and function of supporting tools (e.g., pre-processing or post-processing in a spreadsheet or database software). If more than one modeling system is used, a description of how the modeling systems interact.

    b.   <u>Model Segments</u> – Description and rationale for the organization of the policies and assets into model segments, consistent with the guidance from VM-20 Section 7.A.1.b and VM-20 Section 7.D.2.

    c.   <u>Grouping within Model Segments (Deterministic)</u> – Description of the approach and rationale used to group assets and policies for the DR calculation within each model segment.

A clear indication shall be provided of how the company met the requirements of Section 2.G of VM-20 with respect to the grouping of policies. It shall be documented that, upon request, information may be obtained that is adequate to permit the audit of any subgroup of policies to ensure that the reserve amount calculated using a seriatim (policy-by-policy) liability model produces a reserve amount not materially higher than the reserve amount calculated using the grouped liability model.

    d.   <u>Grouping within Model Segments (Stochastic)</u> – Description of the approach and rationale used to group assets and policies for the SR calculation within each model segment if different from the approach used in paragraph 2.c.

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e. <u>Calculation and Model Validation</u> – Description of the approach used to validate model calculations for NPR, DR and SR, including:

    i. How the model was evaluated for appropriateness and applicability, including a thorough explanation of how the company became comfortable with the model (e.g., specific model controls, independent reviews performed, etc.).

    ii. How the model results compare with actual historical experience.

    iii. Tables showing numerical static and dynamic validation results, and commentary on these results.

    iv. Which risks, if any, are not included in the model.

    v. Any limitations of the model that could materially impact the NPR, DR or SR.

f. <u>Projection Period</u> – Disclosure of the length of projection period and comments addressing the conclusion that the projection of cash flows extends far enough into the future that no obligations remain for both the deterministic and stochastic models.

g. <u>Reinsurance Cash Flows</u> – Description of how reinsurance cash flows are modeled.

h. <u>Deterministic Reserve Method</u> – Identification of the DR method applied for each model segment, either the gross premium valuation method outlined in VM-20 Section 4.A or the direct iteration method outlined in VM-20 Section 4.B.

3. <u>Mortality</u> – The following information regarding the mortality assumptions used by the company in performing a principle-based valuation under VM-20:

a. <u>Mortality Segments</u> – Description of each mortality segment and the rationale for selecting the policies to include in each mortality segment.

b. <u>Company Experience</u> – If company experience is used, a description and summary of the company experience mortality rates for each mortality segment, including a summary of the company experience mortality rates for any aggregate class that mortality rates are based on pursuant to VM-20 Section 9.C.2.d.

c. <u>Industry Tables</u> – Description of the industry basic table used for each mortality segment, including:

    i. For mortality segments where industry basic tables are used in lieu of company experience at all durations, a discussion of why company experience data is limited or unavailable and the rationale for the choice of industry basic table to the extent not covered in Section 3.D.3.e and Section 3.D.3.f below.

    ii. For mortality segments where company experience with margins is graded to industry basic table with margins per VM-20 Section 9.C.7.b, the rationale for the choice of industry basic table to the extent not covered in Section 3.D.3.e and Section 3.D.3.f below.

d. <u>Aggregate Company Experience</u> – If the company bases mortality rates on more aggregate company experience pursuant to VM-20 Section 9.C.2.d:

    i. Documentation that when the mortality segments are weighted together,

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the total amount of expected claims is not less than the aggregate company experience data for the group.

    ii.   If underwriting processes are treated similar pursuant to VM-20 Section 9.C.2.d.iii, a description, summary and citation of the third-party proprietary experience studies or published medical, clinical or other published studies used to support the expectations regarding mortality. The full reports and analyses for any third-party proprietary experience studies shall be submitted upon request, considered part of the PBR Actuarial Report, and kept confidential to the same extent as is prescribed by law with respect the rest of the PBR Actuarial Report.

    iii.   If underwriting processes are treated similar pursuant to VM-20 Section 9.C.2.d.iv, a description, explanation and summary of results for the most recent retrospective demonstration.

e.   <u>Relative Risk Tool</u> – Description, rationale and results of applying the Relative Risk Tool to select the industry basic table(s), and a summary of the analysis performed to evaluate the relationship between the Relative Risk Tool and the anticipated mortality established for mortality segments where the mortality assumption is affected by the application of the Relative Risk Tool. If underwriting-based justification not involving the Relative Risk Tool is being applied, provide similar analysis applicable to the company's methods.

f.   <u>Alternative Data Sources</u> – If company experience mortality rates for any mortality segment are not based on the experience directly applicable to the mortality segment (whether or not the data source is from the company), a summary containing the following:

    i.   The source of data, including a detailed explanation of the appropriateness of the data, and the underlying source of data, including how the company experience mortality rates were developed, graduated and smoothed.

    ii.   Similarities or differences noted between policies in the mortality segment and the policies from the data source (e.g., type of underwriting, marketing channel, average policy size, etc.).

    iii.   Adjustments made to the experience mortality rates to account for differences between the mortality segment and the data source.

    iv.   The number of deaths and death claim amounts by major grouping and including: age, gender, risk class, policy duration and other relevant information.

g.   <u>Adjustments to Company Experience Mortality</u> – If the company makes adjustments to company experience mortality rates:

    i.   Rationale for the adjustments.

    ii.   For adjustments due to changes in risk selection and/or underwriting practices, a description, summary and citation of the published medical, clinical or other published studies used to support the adjustments, including rationale and support for use of the study (or studies).

    iii.   Documentation of the mathematics used to adjust the mortality.

iv. Summary of any other relevant information concerning adjustments to the experience mortality, including the removal of policies insuring impaired lives and those for which there is a reasonable expectation, due to conditions such as changes in premiums or other policy provisions, that policyholder behavior will lead to mortality results that vary significantly from those that would otherwise be expected.

h. Credibility – The following items related to credibility:

i. Identification of the method used to determine credibility percentage(s) for the company's mortality exposure period, including a listing of the credibility percentage that was used in VM-20 Section 9.C.7.b for each mortality segment, and an indication of whether each such credibility percentage was determined at the mortality segment level or at a higher level using aggregate mortality experience.

ii. A statement confirming that the credibility level was calculated using the data from the company's mortality experience study, based on uncapped amounts of insurance.

iii. For each credibility percentage that was used in VM-20 Section 9.C.6.b, the numerical values of all credibility formula inputs, along with calculation steps. For the Limited Fluctuation Method, this shall include r, z, m, σ, and the resulting value of Z. For the Bühlmann Empirical Bayesian Method, this shall include A, B, C, and the resulting value of Z.

i. Mortality Improvement – Description of and rationale for the mortality improvement assumptions applied up to the valuation date and the mortality improvement assumptions applied beyond the valuation date. Such a description shall include the assumed start and end dates of the improvements and a table of the annual improvement percentage(s) used, both without and with margin, separately for company experience and the industry basic table(s), along with a sample calculation of the adjustment (e.g., for a male preferred nonsmoker age 45).

j. Mortality for Converted Policies – Description of the treatment of mortality for policies issued under group or term conversion privileges including:

i. A description of the method(s) by which any excess conversion mortality was taken into account in the development of company experience mortality rates (e.g., through the use of separate mortality segments for policies issued upon conversion, through aggregation of claim experience, or through use of other methods), the rationale for the method(s) used, and any changes in the method(s) from those used in previous years.

ii. The source(s) of the data used in the method(s) employed.

k. Mortality for Impaired Lives or Policyholder Behavior – Disclosure of:

i. the percentage of business that is on impaired lives;

ii. whether impaired lives were included or excluded from the mortality study upon which company experience mortality was based; and

iii.   whether any adjustments to mortality assumptions for impaired lives or policyholder behavior were found to be necessary and, if so, the rationale for the adjustments that were used.

Item (iii) above is a required disclosure for post-level term mortality assumptions even if the company uses a 100% shock lapse assumption, since it pertains to the analysis demonstrating whether there are post-level term profits.

l.   <u>Setting Prudent Estimate Assumptions for Mortality</u> – If company experience is used, a summary of the approach used to determine the final set of prudent estimate assumptions for mortality, including:

     i.   The start and ending period of time used to grade company experience to the industry basic table, including the approach used to grade company experience mortality rates to the industry table for advanced ages (attained age 100 and up).

     ii.   Description and results of any smoothing technique used.

     iii.   Description of any adjustments that were made to ensure reasonable relationships are maintained between mortality segments that reflect the underwriting class or risk class of each mortality segment.

     iv.   Description and justification of the mortality rates the company actually expects to emerge, and a demonstration that the anticipated experience assumptions are no lower than the mortality rates that are actually expected to emerge. The description and demonstration should include the level of granularity at which the comparison is made (e.g., ordinary life, term only, preferred term, etc.). For the mortality rates that are actually expected to emerge, the description should include a forward-looking qualitative analysis which includes, but is not limited to, the discussion of any underwriting standard changes (or lack thereof), distribution channel changes (or lack thereof), any pandemic adjustments (or lack thereof), and the results of ongoing experience monitoring.

m.   <u>Actual to Expected Mortality Analysis</u> – Summary of the results of an actual to expected (without margins) analysis at least once every three years, or, for mortality segments for which mortality rates are based on more aggregate company experience pursuant to VM-20 Section 9.C.2.d.vi, at least annually for each individual mortality segment separately until such a time as the estimated change in expected mortality has been shown to be stable and unlikely to change based on further review. For the purposes of this analysis, the expected mortality shall be that last determined under VM-20 Section 9.C.2.e.

n.   <u>Adjustments to NPR Mortality</u> – Description and rationale of any adjustments made to the CSO mortality rates used in the NPR calculation to reflect the requirements of VM-20 Section 3.C.1.g.

o.   <u>Adjustments to Prescribed Margins - Description and rationale for any adjustments made to prescribed mortality margins pursuant to VM-20, Section 9.C.6.d or Section 9.C.6.e.</u>

4.   <u>Policyholder Behavior</u> – The following information regarding each policyholder behavior assumption used by the company in performing a principle-based valuation under VM-20:

a.   <u>Data Reliability</u> – Discussion of the reliability of the data and an explanation of why the data is reasonable and appropriate for this purpose.

b.   <u>Sparse Data</u> – Explanation of how assumptions were determined for periods that were based on less than fully credible or relevant data.

c.   <u>Actual to Expected Policyholder Behavior Analysis</u> – The results of the most recently available actual to expected (without margins) analysis, including:

    i.   Definitions of the expected basis used in all actual-to-expected ratios shown.

    ii.   Comments addressing the conclusions drawn from the analysis.

d.   <u>Margins and Sensitivity Tests</u> – Rationale for the particular margins used and a description of testing performed to determine the size and direction of the margins by duration, including how the results of sensitivity tests were used in connection with setting the margins.

e.   <u>Impact of Non-guaranteed Elements</u> – How changes in NGE affect the policyholder behavior assumptions.

f.   <u>Scenario-Dependent Dynamic Formulas</u> – Description of any scenario-dependent dynamic formula.

g.   <u>Changes from Prior Year</u> – Changes in anticipated experience assumptions and/or margins since the last PBR Actuarial Report.

h.   <u>Flexible Premiums</u> – For policies that give policyholders flexibility in timing and amount of premium payments, the results of sensitivity tests related to the following premium payment patterns: minimum premium payment, no further premium payment, pre-payment of premium assuming a single premium and pre-payment of premiums assuming level premiums.

i.   <u>Anti-Selective Lapses</u> – Specific to lapses, a description of and rationale regarding adjustments to lapse and mortality assumptions to account for potential anti-selection.

j.   <u>Competitor Rates</u> – Competitor rate definition and usage.

k.   <u>Post-Level Term Testing</u> – For products with a level term period:

    i.   Summary results of the seriatim comparison of the present value of post-level term cash inflows and outflows for the DR as required by VM-20 Section 9.D.6.

    ii.   If this comparison showed that there were post-level term profits, describe how anti-selection was handled in the post-level term period, including the prudent estimate premium, mortality and lapse assumptions used.

    iii.   If the comparison showed that there were post-level term losses, confirm that the prudent estimate premium, mortality and lapse assumptions for the post-level period were addressed in Section 3.D.1.a and were used in the reserve calculation.

l. Term Conversions – Description of how the company reflects the impact of any term conversion privilege contained in the policy.

m. Lapse Rates for Converted Policies – Description of and rationale for lapse rates used for policies issued under any group or term conversion privilege.

5. Expenses – The following information regarding the expense assumptions used by the company in performing a principle-based valuation under VM-20:

a. Allocating Expenses to PBR Policies – Methodology used to allocate expenses to the individual life insurance policies subject to a principle-based valuation under VM-20, and a statement confirming that expenses have been fully allocated in accordance with VM-20 Section 9.E.1.i.

b. Allocating Expenses to Model Segments – Methodology used to apply the allocated expenses to model segments or sub-segments within the cash-flow model.

c. Commissions and Acquisition Expenses – One of the following statements, as applicable, confirming the company's treatment of commissions and acquisition expenses pursuant to VM-20 Sections 7.B.1.e and 9.E.1.m:

   i. There are no future commissions or acquisition expenses associated with business in force as of the valuation date; therefore, none are included in the model.

   ii. There are future commissions and acquisition expenses associated with business in force as of the valuation date, and these have been provided in response to Section 3.D.1.a.

   iii. There are future commissions associated with business in force as of the valuation date, and these have been provided in response to Section 3.D.1.a. There are no future acquisition expenses associated with business in force as of the valuation date; therefore, none are included in the model.

   iv. There are future acquisition expenses associated with business in force as of the valuation date, and these have been provided in response to Section 3.D.1.a. There are no future commissions associated with business in force as of the valuation date; therefore, none are included in the model.

d. Spreading of Costs – Identification of types of costs that were spread, and for how many years, if any cost spreading was done pursuant to VM-20 Section 9.E.1.b.

e. Expense Margins – Methodology used to determine margins.

f. Inflation – Assumed rate(s) of inflation and the underlying rationale/derivation, including any consideration given to making distinctions between short term and long term inflation rates.

g. Actual to Expected Analysis – The results of the most recently available actual to expected (without margins) analysis, including:

   i. Definitions of the expected basis used in all actual-to-expected ratios shown.

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ii. Comments addressing the conclusions drawn from the analysis.

6.   <u>Assets</u> – The following information regarding the asset assumptions used by the company in performing a principle-based valuation under VM-20:

a.   <u>Starting Assets</u> – The amount of starting assets supporting the policies subject to a principle-based valuation under VM-20, and the method and rationale for determining such amount.

b.   <u>Asset Selection</u> – Method used and rationale for selecting the starting assets and apportioning the assets between the policies subject to a principle-based valuation under VM-20, and those policies not subject to principle-based valuation under VM-20.

c.   <u>Asset Segmentation</u> – Method used and rationale for allocating the total asset portfolio into multiple segments, if applicable.

d.   <u>Asset Description</u> – Description of the starting asset portfolio, including the types of assets, duration and their associated quality ratings.

e.   <u>Market Values</u> – Method used to determine projected market value of assets (if needed for assumed asset sales).

f.   <u>Risk Management</u> – Detailed description of model risk management strategies, such as hedging and other derivative programs, including any future hedging strategies supporting the policies and any adjustments to the SR pursuant to VM-20, Section 7.K3 and VM-20, Section 7.K.4, specific to the groups of policies covered in this sub-report and not discussed in the Life Summary Section 3.C.5. Documentation of any future hedging strategies should include documentation addressing each of the CDHS documentation attributes. The following should be included in the documentation:

   i.   Descriptions of basis risk, gap risk, price risk and assumption risk.

   ii.   Methods and criteria for estimating the a priori effectiveness of the strategy.

   iii.   Results of any reviews of actual historical hedging effectiveness.

   iv.   Strategy Changes – Discussion of any changes to the hedging strategy during the past 12 months, including identification of the change, reasons for the change, and the implementation date of the change.

   v.   Hedge Modeling – Description of how the hedge strategy was incorporated into modeling, including:
   • Differences in timing between model and actual strategy implementation.
   • For a company that does not have a future hedging strategy supporting the contracts, confirmation that currently held hedge assets were included in the starting assets.
   • Evaluations of the appropriateness of the assumptions on future trading, transaction costs, other elements of the model, the strategy, and other items that are likely to result in materially adverse results.
   • Discussion of the projection horizon for the future hedging strategy as modeled and a comparison to the timeline for any anticipated future

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changes in the company's hedging strategy.
• If residual risks and frictional costs are assumed to have a value of zero, a demonstration that a value of zero is an appropriate expectation.
• Any discontinuous hedging strategies modeled, and where such discontinuous hedging strategies contribute materially to a reduction in the SR, any evaluations of the interaction of future trigger definitions and the discontinuous hedging strategy, including any analyses of model assumptions that, when combined with the reliance on the discontinuous hedging strategy, may result in adverse results relative to those modeled.
• The approach and rationale used to reflect the hedge modeling error(s).

g. Foreign Currency Exposure – Analysis of exposure to foreign currency fluctuations.

h. Maximum Net Spread Adjustment Factor – Summary of the results of the steps for determining the maximum net spread adjustment factor for each model segment, including the method used to determine option adjusted spreads for each existing asset.

i. Net Asset Earned Rate – For each model segment's DR: If the gross premium valuation method outlined in VM-20 Section 4.A was used, a listing or graph of the path of calculated NAER for all years of the projection and an explanation of any abnormally high or low NAER values or unusual patterns over time.

j. Investment Expenses – Description of the investment expense assumptions.

k. Prepayment, Call and Put Functions – Description of any prepayment, call and put functions.

l. Asset Collar – If required under the criteria described in VM-20 Section 7.D.3, documentation that supports the conclusion that the modeled reserve is not materially understated as a result of the estimate of the amount of starting assets.

m. Residual Risks and Frictional Costs – With respect to modeling of derivative programs if a company assumes that residual risks and frictional costs have a value of zero, a demonstration that a value of zero is an appropriate expectation.

n. Policy Loans – Description of how policy loans are modeled, including documentation that if the company substitutes assets that are a proxy for policy loans, the modeled reserve produces reserves that are no less than those produced by modeling existing loan balances explicitly.

o. General Account Equity Investments – Description of an approach and rationale used to group general account equity investments, including an analysis of the proxy construction process that establishes the relationship between the investment return on the proxy and the specific equity investment category.

p. Separate Account Funds – Description of the approach and rationale used to group separate account funds and subaccounts, including analysis of the proxy construction process that establishes a firm relationship between the investment return on the proxy and the specific variable funds.

q. Mapping Stochastic Economic Paths to Fund Performance – Description of method to translate stochastic economic paths into fund performance.

r. <u>Modeled Company Investment Strategy and Reinvestment Assumptions</u> – Description of the modeled company investment strategy (before comparison to the alternative investment strategy), including asset reinvestment and disinvestment assumptions, and documentation supporting the appropriateness of the modeled company investment strategy compared to the actual investment policy of the company.

s. <u>Alternative Investment Strategy</u> – Documentation demonstrating compliance with VM-20 Section 7.E.1.g, showing that the modeled reserve is the higher of that produced using the modeled company investment strategy and the alternative investment strategy.

t. <u>Number of Scenarios</u> – Number of scenarios used for the SR and the rationale for that number.

u. <u>Scenario Reduction Techniques</u> – If a scenario reduction technique is used, a description of the technique and documentation of how the company determined that the technique meets the requirements of Section 2.G of VM-20.

7. <u>Revenue-Sharing Assumptions</u> – The following information regarding the revenue-sharing assumptions used by the company in performing a principle-based valuation under VM-20:

a. <u>Agreements and Guarantees</u> – Description of revenue-sharing agreements and the nature of any guarantees underlying the revenue-sharing income included in the projections, including: the terms and limitations of the agreements; relationship between the company and the entity providing the revenue-sharing income; benefits and risk to the company and the entity providing the revenue-sharing income of continuing the arrangement; the likelihood that the company will collect the revenue-sharing income during the term of the agreement; the ability of the company to replace the services provided by the entity providing the revenue-sharing income; and the ability of the entity providing the revenue-sharing income to replace the service provided by the company.

b. <u>Amounts Included</u> – The amount of revenue-sharing income and a description of the rationale for the amount of revenue-sharing income included in the projections, including any reduction for expenses.

c. <u>Revenue-Sharing Margins</u> – The level of margin in the prudent estimate assumptions for revenue-sharing income and description of the rationale for the margin for uncertainty. Also, a demonstration that the amounts of net revenue-sharing income, after reflecting margins, do not exceed the limits set forth in VM-20, Section 9.G.8.

8. <u>Reinsurance</u> – The following information regarding the reinsurance assumptions used by the company in performing a principle-based valuation under VM-20:

a. <u>Agreements</u> – For those reinsurance agreements included in the calculation of the minimum reserve as per VM-20 Section 8.A, a description of each reinsurance agreement, including, but not limited to, the type of agreement, the counterparty, the risks reinsured, any provisions related to converted policies, the portion of business reinsured, identification of both affiliated and non-affiliated, as well as captive and non-captive, or similar relationships, and whether the agreement complies with the requirements of the credit for reinsurance under the terms of the AP&P Manual.

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      b.   <u>Assumptions</u> – Description of reinsurance assumptions used to determine the cash flows included in the model.

      c.   <u>Separate Stochastic Analysis</u> – To the extent that a single deterministic valuation assumption for risk factors associated with certain provisions of reinsurance agreements will not adequately capture the risk of the company, a description of the separate stochastic analysis that was used outside the cash-flow model to quantify the impact on reinsurance cash flows to and from the company. The description should include which variables are modeled stochastically.

      d.   <u>Multiple Agreement Allocation Method</u> – If a policy is covered by more than one reinsurance agreement, description of the method to allocate reinsurance cash flows from each agreement.

      e.   <u>Counterparty Assets</u> – Pursuant to VM-20 Section 8.C.14, if the company concludes that modeling the assets supporting reserves held by a counterparty is not necessary, documentation of the testing and logic leading to that conclusion.

      f.   <u>Pre-Reinsurance-Ceded Minimum Reserve</u> – Description and rationale for methods and assumptions used in determining the pre-reinsurance-ceded minimum reserve that differ from methods and assumptions used in determining the minimum reserve (post-reinsurance-ceded), including support that such methods and assumptions are consistent with VM-20 Section 8.D.2.

      g.   <u>Phase-In</u>: If electing a phase-in period as described in VM-20 Section 8.C, documentation of the length of the phase-in approved by the company's domiciliary commissioner, the result of the current and prior methodologies, the weights applied to each result, and confirmation that reinsurance assumptions for the calculation of the prior methodology are discussed in Section 3.D.8.b above.

9.   <u>Non-guaranteed Elements</u> – The following information, where applicable, regarding the NGE assumptions used by the company in performing a principle-based valuation under VM-20:

      a.   <u>Modeling</u> – Description of the approach used to model NGEs, including a discussion of how future NGE amounts were adjusted in scenarios to reflect changes in experience and including how lag in timing of any change in NGE relative to date of recognition of change in experience was reflected in projected NGE amounts.

      b.   <u>NGE Margins</u> – Description of the approach to establish a margin for conservatism, if applicable.

      c.   <u>Past Practices and Policies</u> – Description of how the company's past NGE practices and established NGE policies were reflected in projected NGE amounts, including a discussion of the impact of interest rates or other market factors on past and projected premium scales, cost of insurance scales, and other NGEs.

      d.   <u>Consistency</u> – Description of the following: (i) whether and how projected levels of NGEs in the model are consistent with experience assumptions used in each scenario; and (ii) whether and how policyholder behavior assumptions are consistent with the NGE assumed in the model.

      e.   <u>Conditional Exclusion</u> – State if and how the provision in Section 7.C.5 of VM-20 allowing conditional exclusion of a portion of an NGE is used.

      i.   If used, discuss whether the provision is used for any purpose other than recognition of subsidies for participating business.

      ii.   If used, discuss how prevention of double counting of assets is ensured.

> **Guidance Note:** Examples of considerations include: (1) if the subsidy is provided by a downstream company, and the carrying value of the downstream company is reported as an asset on the company's books, where is the offsetting liability reported; or (2) if the subsidy is provided by another block of business within the company, is the subsidy included in cash-flow testing of the "other block."

    f.   <u>Interest Crediting Strategy</u> – Description of interest crediting strategy.

    g.   <u>Interest Bonus</u> – Description of any interest bonuses included in the model.

10.   <u>Exclusion Tests</u> – The following information regarding the deterministic and stochastic exclusion tests, if calculated:

    a.   <u>Exclusion Test Policies</u> – Identification and description of each group of policies using the deterministic and stochastic exclusion tests, including contract type and risk profile, and rationale for each grouping of policies.

    b.   <u>Type of Stochastic Exclusion Test</u> – Identification of each group of policies that the company elects to exclude from SR requirements and the SET used (passing the SERT or stochastic exclusion demonstration test, or certification that the group of policies does not contain material interest, tail or asset risk). For any group of policies for which a prior year's result is being invoked as to the passing of the stochastic exclusion demonstration test or the certification that policies are not subject to material interest rate risk, a statement indicating which prior year's result it was.

    c.   <u>Stochastic Exclusion Ratio Test</u> – For groups of policies for which the SERT is used, the following data on a post-reinsurance-ceded basis calculated in accordance with VM-20 Section 6.A.2 and on a pre-reinsurance-ceded basis calculated in accordance with VM-20 Section 8.D.2:

      i.   The adjusted DR for each of the 16 scenarios.

      ii.   The values of a, b and c.

      iii.   The value of the test ratio $(b – a)/c$.

    d.   <u>Stochastic Exclusion Demonstration Test</u> – For groups of policies for which the stochastic exclusion demonstration test is used, the rationale for using the demonstration test, identification of which acceptable demonstration method listed under VM-20 Section 6.A.3.b was applied or a statement that another method acceptable to the commissioner was applied, and the details of the demonstration supporting the exclusion in the initial exclusion year and at least once every three calendar years subsequent to the initial exclusion year.

    e.   <u>SET Certification Method</u> – For groups of policies for which the SET certification method is used, support for the certification including supporting analysis and tests.

     f.   <u>Fallback Results</u> – If the stochastic exclusion demonstration test or the certification method was successfully used for any group of policies for which the SERT was initially attempted but failed, the company shall so indicate and show the unsuccessful SERT results.

         Similarly, if the Stochastic Exclusion Ratio Test was successfully used for any group of policies for which the stochastic exclusion demonstration test under the method of VM-20 Section 6.A.3.b.iii or VM-20 Section 6.A.3.b.iv was initially attempted but failed, the company shall so indicate and show the results of the unsuccessful stochastic exclusion demonstration test.

     g.   <u>Deterministic Net Premium Test</u> – For groups of policies for which the Deterministic Net Premium Test is performed, the results of the Deterministic Net Premium Test for each group of policies.

     h.   <u>DET Certification Method</u> – For groups of policies for which the DET certification method is used, support for the certification, including policy counts, reserve amounts and their corresponding location in Exhibit 5 of the Annual Statement, methodology, supporting analysis, and tests.

11.   <u>Additional Information</u> – The following additional information:

     a.   <u>Impact of Margins for Each Risk Factor</u> –For each group of policies for which a separate DR is calculated, the impact of margins on the DR for each risk factor, or group of risk factors, that has a material impact on the DR, determined by subtracting (i) from (ii):

        i.   The DR for that group of policies, but with the reserve calculated based on the anticipated experience assumption for the risk factor and prudent estimate assumptions for all other risk factors.

        ii.   The DR for that group of policies as reported.

> **Guidance Note:** Pursuant to VM-20, margins must increase the reserve, so the impact of each margin, as calculated by subtracting (i) from (ii) above, must be positive.

     b.   <u>Aggregate Impact of Margins</u> – For each group of policies for which a separate DR is calculated, the aggregate impact of all margins on the DR for that group of policies determined by subtracting (i) from (ii):

        i.   The DR for that group of policies, but with the reserve calculated based on anticipated experience assumptions for all risk factors prior to the addition of any margins.

        ii.   The DR for that group of policies as reported.

     c.   <u>Impact of Implicit Margins</u> – For purposes of the disclosures required in 11.a and 11.b above:

        i.   If the company believes the method used to determine anticipated experience mortality assumptions includes an implicit margin, the company can adjust the anticipated experience assumptions to remove this implicit margin for this reporting purpose only. If any such adjustment is made, the company shall document the rationale and method used to

determine the anticipated experience assumption.

    ii. Since the company is not required to determine an anticipated experience assumption or a prudent estimate assumption for risk factors that are prescribed for the DR (i.e., interest rates movements, equity performance, default costs and net spreads on reinvestment assets), when determining the impact of margins, the prescribed assumption shall be deemed to be the prudent estimate assumption for the risk factor, and the company can elect to determine an anticipated experience assumption for the risk factor, based on the company's anticipated experience for the risk factor. If this is elected, the company shall document the rationale and method used to determine the anticipated experience assumption.

d. <u>Sensitivity Tests</u> – For each distinct product type for which margins were established:

    i. List the specific sensitivity tests performed for each risk factor or combination of risk factors.

    ii. Indicate whether the reserve was calculated based on the anticipated experience assumptions or prudent estimate assumptions for all other risk factors while performing the tests.

    iii. Provide the numerical results of the sensitivity tests.

    iv. Explain how the results of sensitivity tests were used or considered in developing assumptions.

> **Guidance Note:** If a model segment contains multiple distinct product types (e.g., ART, Level Term), (i) through (iv) should be done for each product type.

e. <u>Material Risks Not Fully Reflected</u> – A description of material risks not fully reflected in the cash-flow model used to calculate the SR, including:

    i. A description of each element of the cash-flow model for which this provision has been made in the SR (e.g., risk factors, policy benefits, asset classes, investment strategies, risk mitigation strategies, etc.).

    ii. A description of the approach used by the company to provide for these risks in the SR outside the cash-flow model, a summary of the rationale for selecting this approach and the key assumptions justifying the underlying approach.

    iii. If there is more than one model element included in this provision, clarifying whether a separate provision was determined for each element, or collectively for groups of two or more elements and explaining the methodology, supporting rationale and key assumptions for how separate provisions were combined.

f. <u>Allocation for DR</u> – For each group of policies for which a DR is calculated and an allocation is performed as described in VM-20 Section 4.C, disclosure of the ratio (i) to (ii), in which the respective components are:

    i. The DR for that group of policies as reported.

       ii.   The sum of the DR calculated separately for each VM-20 Reserving Category within that group of policies.

g.   <u>Impact of Aggregation for SR</u> – For each group of policies for which a SR is calculated, the impact of aggregation on the SR, including a discussion of material risk offsets across different product types within a VM-20 Reserving Category that were modeled together.

h.   <u>Calculations as of the Valuation Date</u> – The following information:

       i.   A statement confirming that the NPR was calculated based on policies in force as of the valuation date.

       ii.   If the DR and/or SR were calculated as of the valuation date, a statement confirming that the calculations were based on the following items: policies in force, starting assets, and the starting yield curve as of the valuation date, and the prescribed Table A and Tables F through J in effect on the valuation date.

i.   <u>Calculations as of a Date Preceding the Valuation Date</u> – If the DR and/or SR were calculated as of a date preceding the valuation date (i.e., if the dates of any of the items listed in Section 3.D.11.h.ii preceded the valuation date):

       i.   The dates used for each item listed in Section 3.D.11.h.ii, separately for the DR and/or SR.

       ii.   A description of the methodology used to determine the adjustment required by VM-20 Section 2.E, along with the adjustment amount and an explanation that justifies why it produces a reserve that is not materially less than a reserve calculated as of the valuation date.

j.   <u>Approximations, Simplifications, and Modeling Efficiency Techniques</u> – A description of each approximation, simplification or modeling efficiency technique used in reserve calculations, and a statement that the required VM-20 Section 2.G demonstration is available upon request and shows that: 1) the use of each approximation, simplification, or modeling efficiency technique does not understate the reserve by a material amount; and 2) the expected value of the reserve is not less than the expected value of the reserve calculated that does not use the approximation, simplification, or modeling efficiency technique.

k.   <u>Aggregate Impact of Approximations, Simplifications and Modeling Efficiency Techniques</u> – Support that the aggregate impact of approximations and simplifications does not result in a material understatement of the reserve. This should include consideration of not just the magnitude of the sum of the individual impacts when considered in isolation, but also consideration of any potential interaction of approximations, simplifications, and modeling efficiency techniques.

l.   <u>ULSG Detail</u> – Breakdown of ULSG reserve results (NPR, DR and SR) into Variable UL, Indexed UL and regular UL components, both pre- and post-reinsurance, along with case counts and face amounts.

Any given UL policy is to be classified in its entirety as either Variable UL, Indexed UL or regular UL. If a ULSG policy satisfies the definition of a variable

life insurance policy (even if it contains options for indexed funds or fixed funds), that policy should be classified as variable for this VM-31 reporting purpose. If it does not, but it satisfies the definition of an Indexed UL policy, it should be classified as Indexed.

    m.   <u>PIMR</u> – Description of the methodology used to derive the PIMR balance on the projection start date and allocate it among the model segments, and the dollar amount of each such portion of PIMR.

12.   <u>Riders and Supplemental Benefits</u> – The following information on the riders and supplemental benefits attached to the base policies is subject to VM-20:

    a.   A brief description of the coverage provided and a list of the products to which the rider or supplemental benefit is attached.

    b.   Whether the rider or supplemental benefit has a separate premium or charge.

    c.   For the NPR, DR, and SR separately, an indication of whether the rider or supplemental benefit was valued with the base policy or separately, and a brief description of the valuation methodology used.

    d.   For the NPR, DR, and SR separately, whether the rider or supplemental benefit had a non-zero reserve and whether the reserve amount was included in the respective column of Part 1 of the VM-20 Reserves Supplement.

    e.   Any other information necessary to fully describe the company's riders and supplemental benefits and the reserve methodology used.

13.   <u>Reliance Descriptions and Statements</u> – A description of those areas where the qualified actuary relied on others for data, assumptions, projections or analysis in performing the principle-based valuation under VM-20 and a reliance statement from each individual on whom the qualified actuary relied that includes:

    a.   <u>Reliance Listing</u> – The name, title, telephone number, e-mail address and qualifications of the individual, along with the individual's company name and address, and the information provided.

    b.   <u>Reliance Statements</u> – A statement as to the accuracy, completeness or reasonableness, as applicable, of the information provided, along with a signature and the date signed.

14.   <u>Certifications</u>

    a.   <u>Investment Officer on Investments</u> – A certification from a duly authorized investment officer that the modeled company investment strategy, including any future hedging strategies supporting the policies, is representative of and consistent with the company's investment policy and that documentation of the CDHS attributes for any future hedging strategies supporting the policies are accurate.

    b.   <u>Qualified Actuary on Investments</u> – A certification by a qualified actuary, not necessarily the same qualified actuary that has been assigned responsibility for the PBR Actuarial Report or this sub-report, that the modeling of any future hedging strategies supporting the policies is consistent with the company's actual future hedging strategies and was performed in accordance with VM-20 and in compliance with all applicable ASOPs, and the alternative investment strategy as

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defined in VM-20 Section 7.E.1.g reflects the prescribed mix of assets with the same WAL as the reinvestment assets in the company investment strategy.

c. <u>Senior Management on Internal Controls</u> – A certification from senior management, other than the qualified actuary, regarding the effectiveness of internal controls with respect to the principle-based valuation under VM-20, as provided in Section 12B(2) of Model #820.

d. <u>Qualified Actuary on Interest Rate and Volatility Risks</u> – Certification, by the qualified actuary assigned responsibility under VM-G for a group of policies that qualifies for exclusion from the requirement to calculate a SR under the provisions of VM-20, Section 6.A.1.a.iii, that this group of policies is not subject to material interest rate risk or asset return volatility risk.

e. <u>Qualified Actuary on Accordance with VM-20 and Model #820</u> – Certification by the qualified actuary, for the groups of policies for which responsibility was assigned, that the principle-based valuation was performed in accordance with the requirements outlined in VM-20 and the relevant sections of Model #820.

f. <u>Qualified Actuary on Assumptions and Margins</u> – Certification by the qualified actuary, for the groups of policies for which responsibility was assigned, that the assumptions used in the principle-based valuation under VM-20, other than assumptions used for risk factors that are prescribed or stochastically modeled, are prudent estimate assumptions and the margins applied therein are appropriate.

g. <u>Qualified Actuary on Conservatism of Converted Policies</u> – Certification by the qualified actuary assigned responsibility under VM-G for a group of policies that qualifies for exclusion from the requirement to calculate a DR under the provisions of VM-20 Section 6.B.2.b, that the total reserve for this group of policies includes a prudent provision for the additional mortality associated with the conversion and reasonably exceed the value of a DR which otherwise would have been calculated for this group of policies.

15. <u>Closing Paragraph</u> – A closing paragraph with the signature, credentials, title, telephone number and e-mail address of the qualified actuary, the company name and address, and the date signed.

E. <u>Annuity Summary</u> – The PBR Actuarial Report shall contain an Annuity Summary of the critical elements of all sub-reports of the Annuity Report as detailed in Section 3.F. In particular, this Annuity Summary shall include:

1. <u>Materiality</u> – The standard(s) established by the company pursuant to VM-21 Section 1.E and VM-22 Section 1.D.

2. <u>Material Risks</u> – A summary of the material risks within the principle-based valuation under VM-21 and VM-22 subject to close monitoring by the board, the company, the qualified actuary, or any state insurance regulators in jurisdictions in which the company is licensed. Include any summary metrics used to monitor the risk, such as the level of ITM by benefit type as of the valuation date. Also, include any significant information required to be provided to the board pursuant to VM-G, such as elements materially inconsistent with the company's overall risk assessment processes.

3. <u>Changes in Reserve Amounts</u> – A description of any material changes in reserve amounts from the prior year and an explanation for the changes, including the results of any supporting analysis such as an attribution analysis or waterfall chart. A table shall be

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attached to the summary, listing the aggregate reserve amount, reserve component amounts, and key statistics for the business valued under VM-21 and VM-22, including but not limited to the DR, SR, additional standard projection amount, alternative methodology reserve, account values, cash surrender value, and contract count. A template is provided below for reference.

	Post-Reinsurance-Ceded		Pre-Reinsurance-Ceded	
	Current Year (YYYY)	Prior Year (YYYY-1)	Current Year (YYYY)	Prior Year (YYYY-1)
Total VM-21 Reserve				
Stochastic Reserve (SR)				
- SR Amount				
- CTE 70 (best efforts)				
- CTE 70 (adjusted)				
- E Factor			N/A	N/A
Standard Projections				
- Additional Standard Projection Amount				
- Prescribed Projections Amount				
- Unbuffered Additional Standard Projection Amount				
- Unfloored CTE 70 (adjusted)				
- Unfloored CTE 65 (adjusted)				
Alternative Methodology (AM)				
- AM Reserve				
- AM Reserve (without floor)				
- Cash Surrender Value Floor				
- Reserve Floor under AG 33				
Phase-In Components				
R1			N/A	N/A
R2			N/A	N/A
A			N/A	N/A
B			N/A	N/A
C			N/A	N/A
D				
Summary Statistics				
- Separate Account Value			N/A	N/A
- General Account Value			N/A	N/A
- Total Account Value			N/A	N/A
- Cash Surrender Value			N/A	N/A
- Contract Count			N/A	N/A
RBC Amount				
- CTE 98 (pre-tax)			N/A	N/A
- CTE 98 (post-tax)			N/A	N/A
- Effect of Phase-In			N/A	N/A
- Effect of Smoothing			N/A	N/A

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	Post-Reinsurance-Ceded		Pre-Reinsurance-Ceded	
	Current Year (YYYY)	Prior Year (YYYY-1)	Current Year (YYYY)	Prior Year (YYYY-1)
Total VM-22 Reserve				
Modeled Reserve				
- DR Amount				
- SR Amount				
- CTE 70 (best efforts) for SR				
- CTE 70 (adjusted) for SR				
- E Factor for SR			N/A	N/A
Standard Projections				
- Additional Standard Projection Amount				
- Prescribed Projections Amount				
- Unbuffered Additional Standard Projection Amount				
- Unfloored CTE 70 (adjusted)				
- Unfloored CTE 65 (adjusted)				
Summary Statistics				
- Account Value				
- Cash Surrender Value				
- Contract Count				

4. Changes in Methods – A description of any significant changes from the prior year in the methods used to model cash flows or other risks, or used to determine assumptions and margins, and the rationale for the changes.

5. Assets and Risk Management – A brief description of the general account asset portfolio, and the approach used to model risk management strategies, such as hedging and other derivative programs, including a description of any future hedging strategies supporting the contracts and any material changes to the hedging strategies from the prior year.

6. Consistency between Annuity Sub-Reports – A brief description of any material differences in methods, assumptions, or risk management practices between groups of contracts covered in separate Annuity sub-reports, to the extent that they are not explained by variations in product features, and the rationale for such differences. Note that VM-21 and VM-22 must be contained in separate sub-reports.

7. Closing Section – A closing section with the signature, credentials, title, telephone number and e-mail address of the qualified actuary (or qualified actuaries) responsible for the Annuity Summary, the company name and address, and the date signed.

8. VA Supplement Part 1 – A copy of Part 1 of the VA Supplement from the annual statement blank.

9. VA Supplement Part 2 – A copy of Part 2 of the VA Supplement from the annual statement blank.

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10. VM-22 Supplement Part 1 – A copy of Part 1 of the VM-22 Supplement from the annual statement blank.

11. VM-22 Supplement Part 2 – A copy of Part 2 of the VM-22 Supplement from the annual statement blank.

F. Annuity Report – This subsection establishes the Annuity Report requirements for annuity contracts valued under VM-21 and VM-22.

The company shall include in the Annuity Report and in any sub-report thereof:

1. Liabilities – The following information regarding the liabilities included in the principle-based valuation under VM-21 and VM-22:

    a. Product Descriptions – Description of key product features that impact risk, including mortality and expense (M&E) charges, death benefit guarantees, living benefit guarantees, index parameters, interest credited features, target investment spreads, and any premium or persistency bonuses, to the extent not discussed in Section 3.B.4.

    b. Liability Data Source – Description of source(s) of liability data.

    c. Alternative Methodology Scope – Identification of products subject to VM-21 whose reserve was determined using the Alternative Methodology, including description of their key product features (e.g., whether they contain no guarantee living or death benefits, or contain GMDBs only), total account value, and contract count.

    d. Exclusion Testing Scope – Identification of products subject to VM-22 whose reserve was determined under VM-A, VM-C, and VM-V due to passing the exclusion test, including description of their key product features, total account value, and contract count.

2. Cash-Flow Models – The following information regarding the cash-flow model(s) used by the company in performing a principle-based valuation under VM-21 and VM-22:

    a. Modeling Systems – Description of the modeling system(s) used for both assets and liabilities. If more than one modeling system is used, a description of how the modeling systems interact and how the results from different modeling systems are combined to determine the aggregate reserve.

    b. Model Segments – Description and rationale for the organization of the contracts and assets into model segments, if any, as referenced in VM-21 Section 3.D and VM-22 Section 3.F.3.

    c. Model Validation – Description of the approach used to validate model calculations within each model segment for the models used to determine the DR and SR, including: how the models were evaluated for appropriateness and applicability; how the model results compare with actual historical experience; what, if any, risks are not included in the models; the extent to which the correlation of different risks is reflected in the margins; and any material limitations of the models.

    d. Projection Period – Disclosure of the length of projection period and comments addressing the conclusion that no material amount of business remains at the end

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of the projection period for the models used to determine the DR and SR.

e. Approximations, Simplifications, and Modeling Efficiency Techniques – A description of each approximation, simplification or modeling efficiency technique used in VM-21 reserve, VM-22 reserve, or variable annuity TAR calculations, and a statement that the required VM-21 Section 3.H demonstration and/or VM-22 Section 3.J demonstration shows that: 1) the use of each approximation, simplification, or modeling efficiency technique does not understate variable annuity TAR or VM-22 reserve by a material amount; and 2) the expected value of variable annuity TAR/VM-22 reserve is not less than the expected value of variable annuity TAR/VM-22 reserve calculated without using the approximation, simplification, or modeling efficiency technique.

f. Aggregate Impact of Approximations, Simplifications and Modeling Efficiency Techniques – Support that the aggregate impact of approximations and simplifications does not result in a material understatement of TAR for VM-21 or reserves for VM-22. This should include consideration of not just the magnitude of the sum of the individual impacts when considered in isolation, but also consideration of any potential interaction of approximations, simplifications, and modeling efficiency techniques.

g. Model Cells – If a compressed liability model is used, as allowed by VM-21 Section 4.A.3 or VM-22 Section 4.A.3, a statement that the assignment of contracts to model cells was not done in a manner that intentionally understates the resulting reserve. Also, upon request by the domiciliary commissioner, include information to permit the audit of any subgroup of contracts to ensure that the reserve amount calculated using a seriatim (contract-by-contract) liability model produces a reserve amount not materially higher than the reserve amount calculated using the compressed liability model.

h. Scenario Reserve Method – Identification of the method used to determine the scenario reserve, either (1) the method described in Section 4.B.2 and Section 4.B.3 of VM-21 or VM-22; or (2) the direct iteration method described in VM-21 Section 4.B.4 or VM-22 Section 4.B.1.b.

3. Liability Assumptions and Margins – A listing of the assumptions and margins used in the projections to determine the DR and SR, including a discussion of the source(s) and the rationale for each assumption:

a. Premiums and Subsequent Deposits – Description of premiums and subsequent deposits.

b. Interest Crediting Strategy – Description of the interest crediting strategy, including any elements related to index features such as the underlying reference index, indexing mechanism and term, caps, floors, spreads, participation rates, multipliers, index transfers, or bonuses.

c. Commissions – Description of commissions, including any commission chargebacks.

d. Expenses Other than Commissions – Description and listing of insurance company

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expenses other than commissions, such as overhead, including:

  i.   Method used to allocate expenses to the contracts included in a principle-based valuation under VM-21 and VM-22 and a statement confirming that expenses have been fully allocated in accordance with VM-21, Section 12.D.1.h or VM-22 Section 12.D.1.h, as applicable.

  ii. Method used to apply the allocated expenses to model segments or sub-segments within the cash-flow model.

  iii. Identification of the types of costs that were spread, and for how many years, if any cost spreading was done pursuant to VM-21, Section 12.D.1.a or VM-22,, Section 12.D.1.a as applicable.

  iv. Method used to determine margins.

e. Partial Withdrawals – Description and listing of partial withdrawal rates, including treatment of dollar-for-dollar offsets on GMDBs and Guaranteed Living Benefits, and required minimum distributions.

f. Lapses and Full Surrenders – Description and listing of lapse or full surrender rates, including:

  i.   For contracts with Guaranteed Living Benefits, two comparisons of actual to expected lapses where "expected" equals (1) anticipated experience assumptions used in the development of the DR or SR; and (2) the assumptions used in the development of the additional standard projection amount, and the "actual" is separated by logical blocks of business, duration (e.g., during and after surrender charge period), ITM (consistent with dynamic assumptions), and age (to the extent that age affects the election of benefits lapse). These data shall be separated by experience incurred in the past year, the past three years, and all years.

  ii. If experience for contracts without Guaranteed Living Benefits is used in setting lapse assumptions for contracts with in-the-money or at-the-money Guaranteed Living Benefits, then a detailed explanation of the appropriateness of the assumption and a demonstration of the relevance of the experience to the business.

  iii. Description of any assumption or formula used for dynamic lapses, whether it is one-sided or two-sided (i.e., can change up or down), and a tabular or graphic presentation of the final lapse assumption after applying dynamic lapses, across the varying values for the factors in the dynamic lapse assumption (either in aggregate or for a select sample cells).

g. Annuitization Benefits – Description of assumptions for the purposes of projecting annuitization benefits (excluding annuitizations stemming from the election of a GMIB and withdrawal amounts from GMWBs, which are addressed in Section 3.F.3.h below), including:

  i.   Description and listing of assumptions regarding rates of annuitization.

  ii. Description and listing of income purchase assumptions.

  iii. Disclosure of any parameters not determined in a formulaic fashion in the

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projection of statutory reserve of payout annuity benefits in the future.

h. <u>GMIB and GMWB Utilizations</u> – Description and listing of GMIB and GMWB utilization assumptions (such as rates and withdrawal/income amounts), including:

    i. Formulas used to set the assumptions.

    ii. Key parameters affecting the level of the assumption (e.g., age, duration, ITM, during and after the surrender charge period).

    iii. Summary of utilization rates from various combinations of key parameters.

    iv. Description of the experience data used to develop the assumptions, including the source, relevance and credibility of the experience data used.

    v. If relevant and credible data were not available, a discussion of how the assumption is consistent with the requirement that the assumption is to be on the conservative end of the plausible range of expected experience.

    vi. Discussion of the sensitivity tests performed to support the assumption.

    vii. Description of the method or approach adopted to model the assumptions, including a description of any simplifications applied to improve computational tractability, such as discarding developed cohorts.

i. <u>Mortality</u> – Description of the mortality assumptions and margins for all segments, including:

    i. Rationale for the grouping of contracts into different segments for the determination of mortality assumptions, and the type and quantity of business that constitutes each segment.

    ii. Description of how each segment was determined to be a plus/mortality or minus segment under VM-21, or a mortality or longevity segment under VM-22, and results of sensitivity tests performed, if any.

    iii. Summary of any mortality studies used to support mortality assumptions, including quantification of the exposures and corresponding deaths, description of the important characteristics of the exposures, and discussion of any unusual data points or trends.

    iv. Description of the age of the experience data used to determine expected mortality curves and the relevance of the data.

    v. Description of the credibility procedure, the statistical basis for the specific elements of the credibility procedure, and any material changes from prior credibility procedures.

    vi. Description of the mathematics used to adjust mortality based on credibility, and summary of the result of applying credibility to the mortality segments.

    vii. Discussion of any assumptions made on mortality improvements both for applying up to and beyond the valuation date (if applicable), the support for such assumptions, and how such assumptions adjusted the modeled

mortality. In a case where mortality improvement as discussed in VM-21 Section 11.C and Section 11.D or VM-22 Section 11.C. and Section 11.D has not been applied, confirmation that applying such improvement would not result in an increase in the SR.

viii. Description of how the expected mortality curves compare to recent historic experience, and discussion of any differences.

ix. Discussion of how the mortality assumptions are consistent with the goal of achieving the required CTE level over the joint distribution of all future outcomes, in keeping with Principle 3 of VM-21 or Principle 3 of VM-22.

x. If the study was done on a similar business segment, description of the differences in the business segment on which the data were gathered and the business segment on which the data were used to determine mortality assumptions for the principle-based valuation under VM-21 or VM-22, and how these differences were reflected in the mortality used in modeling.

xi. If mortality assumptions were based in part on reinsurance rates, description of how the rates were used to set expected mortality (e.g., assumptions made on loadings in the rates and/or whether the assuming company provided their expected mortality and the rationale for their assumptions).

xii. For a plus segment under VM-21, or a mortality segment under VM-22, discussion of the examination of the mortality data for the underreporting of deaths and experience by duration, and description of any adjustments made as a result of the examination.

xiii. For a minus segment under VM-21, or a longevity segment under VM-22, discussion of how the mortality deviations on minus segments (or longevity) compare to those on any plus (or mortality) segments. To the extent that the overall margin is reduced, include support for this assumption.

j. Contract Loans – Disclosure of whether contract loans are modeled, and if so, description of how they are modeled, including documentation that if the company substitutes assets that are a proxy for contract loans, the modeled reserve produces reserves that are no less than those produced by modeling existing loan balances explicitly.

k. Actual to Expected Analysis – Disclosure of the results of the most recently available actual to expected (without margins) analysis for the assumptions including Section 3.F.3.d Expenses Other than Commissions, Section 3.F.3.e Partial Withdrawals, Section 3.F.3.g Annuitization Benefits and Section 3.F.3.h GMIB and GMWB Utilizations, including:

i. Definitions of the expected basis used in all actual-to-expected ratios shown.

ii. Comments addressing the conclusions drawn from the analysis.

l. Other Considerations – Description of any considerations helpful in or necessary to understanding the rationale behind the development of assumptions and

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margins, even if such considerations are not explicitly mentioned in the *Valuation Manual*.

4.   Starting Assets – The following information regarding the starting assets used by the company in performing a principle-based valuation under VM-21 or VM-22, as it applies to the calculation of post-reinsurance-ceded amounts:

    a.   Amount – The amount of starting assets, listed separately as separate account assets and general account assets, supporting the contracts valued under VM-21 or VM-22 at the start of the projections, and the method and rationale for determining such amounts.

    b.   Asset Description – Description of the starting general account asset portfolio, including the types of assets, terms to maturity, duration, and associated quality ratings for fixed income assets.

    c.   Hedge Assets – The value of hedge assets in the general account asset portfolio, and a description of currently held hedge positions.

    d.   Asset Selection – Method used and rationale for selecting the starting assets and apportioning the assets between the contracts valued under VM-21 or VM-22 and those contracts not valued under VM-21 or VM-22.

    e.   Asset Data Source – Description of source(s) of asset data.

    f.   Asset Valuation Basis – Description of the asset valuation basis.

    g.   PIMR – Discussion of the treatment of all PIMR considered for the purposes of the principle-based valuation under VM-21 or VM-22 and rationale for the treatment.

> **Deleted:** , whether included or excluded,

5.   Separate Account Assets – The following information regarding the separate account asset assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

    a.   Investment / Fund Choice – Description of investment and/or fund choices, as well as fund fees.

    b.   Asset Allocation – Description of asset allocation, rebalancing and transfer assumptions, including any dollar cost averaging arrangements.

    c.   Grouping of Funds – Description of the approach and rationale used to group separate account funds and subaccounts.

6.   General Account Assets – The following information regarding the general account asset assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

    a.   Modeled Company Investment Strategy and Reinvestment Assumptions – Description of the modeled company investment strategy (before the comparison to the alternative investment strategy), including asset reinvestment and disinvestment assumptions, and documentation supporting the appropriateness of the modeled company investment strategy compared to the actual investment policy of the company.

    b.   Alternative Investment Strategy – Documentation demonstrating compliance with VM-21 Section 4.D.4.b or VM-22 Section 4.D.3.b showing that the SR is the higher of that produced using the modeled company investment strategy and the alternative investment strategy.

    c.   Grouping of Equity Investments – Description of the approach and rationale used to group general account equity investments.

    d.   Prepayment, Call and Put Functions – Description of any prepayment, call and put functions.

    e.   Investment Expenses – Description of the investment expense assumptions.

    f.   Market Values – Method used to determine projected market value of assets (if needed for assumed asset sales).

    g.   Foreign Currency Exposure – Analysis of exposure to foreign currency fluctuations.

    h.   Maximum Net Spread Adjustment Factor – Summary of the results of the steps for determining the maximum net spread adjustment factor, including the method used to determine option adjusted spreads for each existing asset.

    i.   Additional Assets – If the direct iteration method was not used, a summary of the amounts of additional assets needed to fund the present value of the accumulated deficiency, including a description of the calculation process and the types of assets included.

    j.   NAER – If the direct iteration method was not used, a description of the vectors of NAER, including graphs or tables of summary statistics helpful to the understanding of the NAER vectors produced for each scenario, with a statement that a complete listing of NAER will be made available in electronic spreadsheet format upon request.

    k.   Asset Risks Reflected – Discussion of any other asset risks reflected in the principle-based valuation under VM-21 or VM-22, as listed in VM-21 Section 1.C.2.a or VM-22 Section 1.C.2.a, not otherwise discussed in the Annuity Report.

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7.   Revenue-Sharing Assumptions – The following information regarding the revenue-sharing assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

    a.   Agreements and Guarantees – Description of revenue-sharing agreements and the nature of any guarantees underlying the revenue-sharing income included in the projections, including: the terms and limitations of the agreements; the relationship between the company and the entity providing the revenue-sharing income; the benefits and risk to the company and the entity providing the revenue-sharing income of continuing the arrangement; the likelihood that the company will collect the revenue-sharing income during the term of the agreement; the ability of the company to replace the services provided by the entity providing the revenue-sharing income; and the ability of the entity providing the revenue-sharing income to replace the service provided by the company.

    b.   Amounts Included – The amount of revenue-sharing income and a description of the rationale for the amount of revenue-sharing income included in the projections,

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including any reduction for expenses.

    c.   Revenue-Sharing Margins – The level of margin in the prudent estimate assumptions for revenue-sharing income and a description of the rationale for the margin for uncertainty. Also, a demonstration that the amounts of net revenue-sharing income, after reflecting margins, do not exceed the limits set forth in VM-21 Section 4.A.5.f (which are also applicable to contracts valued under VM-22, pursuant to VM-22 Section 4.A.5).

8.   Hedging and Risk Management – The following information regarding the hedging and risk management assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

    a.   Strategies – Detailed description of risk management strategies, such as hedging and other derivative programs, including any future hedging strategies supporting the contracts, specific to the groups of contracts covered in this sub-report.

        i.   Descriptions of basis risk, gap risk, price risk and assumption risk.

        ii.   Methods and criteria for estimating the a priori effectiveness of the strategy.

        iii.   Results of any reviews of actual historical hedging effectiveness.

    b.   CDHS – Documentation addressing each of the CDHS documentation attributes for any future hedging strategies supporting the contracts.

    c.   Strategy Changes – Discussion of any changes to the hedging strategy during the past 12 months, including identification of the change, reasons for the change, and the implementation date of the change.

    d.   Hedge Modeling – Description of how the hedge strategy was incorporated into modeling, including:

        i.   Differences in timing between model and actual strategy implementation.

        ii.   For a company that does not have a future hedging strategy supporting the contracts, confirmation that currently held hedge assets were included in the starting assets.

        iii.   Evaluations of the appropriateness of the assumptions on future trading, transaction costs, other elements of the model, the strategy, and other items that are likely to result in materially adverse results.

        iv.   Discussion of the projection horizon for the future hedging strategy as modeled and a comparison to the timeline for any anticipated future changes in the company's hedging strategy.

        v.   If residual risks and frictional costs are assumed to have a value of zero, a demonstration that a value of zero is an appropriate expectation.

        vi.   Any discontinuous hedging strategies modeled, and where such discontinuous hedging strategies contribute materially to a reduction in the SR, any evaluations of the interaction of future trigger definitions and the discontinuous hedging strategy, including any analyses of model assumptions that, when combined with the reliance on the discontinuous

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hedging strategy, may result in adverse results relative to those modeled.

vii. Disclosure of any situations where the modeled hedging strategies make money in some scenarios without losing a reasonable amount in some other scenarios, and an explanation of why the situations are not material for determining the CTE 70 (best efforts).

viii. Results of any testing of the method used to determine prices of financial instruments for trading in scenarios against actual initial market prices, including how the testing considered historical relationships. If there are substantial discrepancies, disclosure of the substantial discrepancies and documentation as to why the model-based prices are appropriate for determining the SR.

ix. Any model adjustments made when calculating CTE 70 (adjusted), in particular, any liquidation or substitution of assets for currently held hedges. If there is liquidation or a substitution of assets for currently held hedges, disclosure of the impact on the adjusted run.

x. Justification of the margin for any future hedging strategy that offsets index credits associated with index crediting strategies (index credits), including relevant experience, other relevant analysis, and an assessment of potential model error.

xi. Ten years of historical experience on hedge gains/losses as a percent of index credited for any future hedging strategy that offsets index credits associated with index crediting strategies.

xii. If there is less than five years of historical experience for the future hedging strategy that offsets index credits (or for hedging programs on similar products), an explanation of how the company considered increases in the error factor to account for limited historical experience.

e. Error Factor (*E*) and Back-Testing – Description of *E*, the error factor, and formal back-tests performed, including:

i. The value of *E*, and the approach and rationale for the value of *E* used in the reserve calculation.

ii. For companies that model hedge cash flows using the explicit method, as described in VM-21 Section 9.C.6.a or VM-22 Section 9.C.6.a, and have 12 months of experience, an analysis of at least the most recent 12 months of experience and the results of a back-test showing that the model is able to replicate the hedging results experienced in a way that justifies the value used for *E*. Include at least a ratio of the actual change in market value of the hedges to the modeled change in market value of the hedges at least quarterly.

iii. For companies that model hedge cash flows using the implicit method, and have 12 months of experience, as described in VM-21 Section 9.C.6.b or VM-22 Section 9.C.6.b, the results of a back-test in which (a) actual hedge asset gains and losses are compared against (b) proportional fair value movements in hedged liability, including:

a) Delta, rho and vega coverage ratios in each month over the back-

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testing period, which may be presented in a chart or graph.

> b) The implied volatility level used to quantify the fair value of the hedged item, as well as the methodology undertaken to determine the appropriate level used.

> iv. For companies that do not model hedge cash flows using either the explicit method or the implicit method, as described in VM-21 Section 9.C.6.c or VM-22 Section 9.C.6.c, and have 12 months of experience, the results of the formal back-test conducted to validate the appropriateness of the selected method and value used for E.

> v. For companies that do not have 12 months of experience, the basis for the value of *E* that is chosen based on the guidance provided in VM-21 Section 9.C.7 or VM-22 Section 9.C.7, considering the actual history available, mock testing performed, and the degree and nature of any changes made to the hedge strategy.

> vi. The basis for the magnitude of adjustment or lack of adjustment for the value of E chosen based on the robustness of the documentation outlining the future hedging strategy.

f. Safe Harbor for Future Hedging Strategies – If electing the safe harbor approach for a future hedging strategy supporting the contracts, as discussed in VM-21 Section 9.B.5 or VM-22 Section 9.B.5, a description of the linear instruments used to model the option portfolio.

g. Hedge Model Results – Disclosure of whether the calculated CTE 70 (best efforts) is below both the fair value and CTE 70 (adjusted), and if so, justification for why that result is reasonable, as discussed in VM-21 Section 9.D or VM-22 Section 9.D..

9. Non-guaranteed Elements – The following information, where applicable, regarding the NGE assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

a. NGE Table Summary – A table that lists all of the non-guaranteed elements in groups of policies under VM-21 and VM-22, along with a description of the element and any key values (e.g., values for guaranteed index caps, participation rates, etc.).

b. Modeling – Description of the approach used to model NGEs, including a discussion of how future NGE amounts were adjusted in scenarios to reflect changes in experience and including how lag in timing of any change in NGE relative to date of recognition of change in experience was reflected in projected NGE amounts.

c. NGE Margins – Description of the approach to establish a margin for conservatism, if applicable.

d. Past Practices and Policies – Description of how the company's past NGE practices and established NGE policies were reflected in projected NGE amounts, including a discussion of the impact of interest rates or other market factors on past and projected index parameters, charges, and other NGEs.

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     e.   Consistency – Description of the following: (i) whether and how projected levels of NGEs in the model are consistent with experience assumptions used in each scenario; and (ii) whether and how contractholder behavior assumptions are consistent with the NGE assumed in the model.

     f.   Interest Crediting Strategy – Description of assumptions and approach used to model interest crediting strategies, including determination of option budgets, return paths for reference indices, any dividend adjustments, allocation between index strategies, transfers between index strategies, any simplifications applied, etc.

     g.   Bonuses – Description of any interest, persistency, or other bonuses included in the model.

10.   Scenario Generation – The following information regarding the scenario generation for interest rates and equity returns used by the company in performing a principle-based valuation under VM-21, VM-22, and in determining the C-3 RBC amount under LR027 , as it applies to the calculation of the DR, SR, TAR and CTEPA:

     a.   Sources – Identification of the sources or generators used to produce the scenarios. Versions should be identified and parameters to the scenario generation shall be available upon request.

     b.   Number of Scenarios – Number of scenarios used, rationale for that number, methods used to determine the sampling error of the CTE 70 and CTE 98 statistic when using the selected number of scenarios, and documentation that any resulting understatement in reserve or TAR, as compared with that resulting from running additional scenarios, is not material, as discussed in VM-21 and VM-22.

     c.   Scenario Reduction Techniques – If a scenario reduction technique is used, a description of the technique and documentation of how the company determined that the technique does not lead to a material understatement of results.

     d.   Time-Step – Identification of the time-step of the model (e.g., monthly, quarterly, annual), and results of testing performed to determine that use of a more frequent time-step does not materially increase reserves, as discussed in VM-21 and VM-22.

     e.   Proxy Construction – Description of the proxy construction process that establishes a firm relationship between the investment return on the proxy and the grouped separate account funds, equity investments in the general account, or reference indices supporting index-linked products, as discussed in VM-21 Section 4.A.2 or VM-22 Section 4.A.2.

     f.   Mapping Stochastic Economic Paths to Fund Performance – Description of method to translate stochastic economic paths into fund performance.

     g.   Proxy Funds Not Within Scope of Prescribed Scenario Generator – For any proxy fund returns generated by a non-prescribed scenario generator (e.g., volatility control funds and any funds projected dynamically in the liability model), a description of:

         i.   The market price of risk implied in the projected fund returns.

         ii.   A correlation matrix that illustrates the average correlations across all

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scenarios and all time periods of the projected fund returns with the fund returns generated by the prescribed generator.

    iii. Any other information that provides assurance that the returns for proxy funds generated using a non-prescribed scenario generator do not consistently outperform over the long term if the company believes that the market price of risk and correlations described above are misleading or not relevant.

h. Implied Volatility – Whether using the prescribed scenario generator or a non-prescribed scenario generator, a description of the implied volatility including:

    i. Discussion of the modeling process used to generate implied volatility surfaces and how they meet the requirements defined in Section 8.D of VM-21 and VM-22.

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    ii. Documentation that the implied volatility scenarios generated do not result in a lower TAR than that obtained by assuming that the implied volatility – at all ITM levels – at a given time step in a given scenario is equal to the realized volatility of the underlying asset scenario over the same time period as required by VM-21, Section 8.D.3 VM-22, Section 8.D.3.

i. Non-Prescribed Scenario Generator – If using non-prescribed scenario generators in lieu of the prescribed generator, either in part or in full, a summary including:

    i. Description of the models used for interest rates, fixed income returns, equity returns, and/or volatility and discussion of model calibration.

> **Guidance Note:** Examples of models include, but are not limited to: (1) Vasicek, Hull-White, Cox-Ingersoll-Ross for interest rate models; (2) Merton, reduced-form, ratings-based for fixed income models; or (3) Black-Scholes, Heston, Bates for equity and/or volatility models. Model calibration refers to the process of reflecting the company's view of future market dynamics into their risk-modeling environment.

    ii. If vendor software is used, identification of vendor, software name, and version number.

    iii. Identification of whether the scenario generators were developed for VM-21 or VM-22 purposes, or adopted from another purpose such as pricing or asset adequacy testing. If the latter, discussion of any adjustments made for VM-21 or VM-22 purposes, and rationale for the adjustments.

    iv. A statement that the interest rate, equity, and implied volatility scenarios used to determine reserves are available upon request in an electronic spreadsheet format to facilitate any regulatory review.

    v. Documentation that scenarios generated do not result in a TAR that is materially lower than the TAR resulting from scenarios generated from the prescribed generator.

    vi. Discussion of any correlation that exists in the development of interest rate and equity scenarios.

11. Reinsurance – The following information regarding the reinsurance assumptions used by the company in performing a principle-based valuation under VM-21 or VM-22:

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a. <u>Agreements</u> – For those reinsurance agreements included in the calculation of the aggregate reserve as per VM-21 Section 5 or VM-22 Section 5, a description of each reinsurance agreement, including, but not limited to, the type of agreement, the counterparty, the risks reinsured, the portion of business reinsured, and whether the agreement complies with the requirements of the credit for reinsurance under the terms of the AP&P Manual. Include identification of both affiliated and non-affiliated, as well as captive and non-captive, relationships.

b. <u>Assumptions</u> – Description of reinsurance assumptions used to determine the cash flows included in the model.

c. <u>Modeling</u> – Description of how post-reinsurance-ceded reserves are modeled.

d. <u>Separate Stochastic Analysis</u> – Description of any separate stochastic analysis that was used outside the cash-flow model to quantify the impact on reinsurance cash flows to and from the company, include which variables are modeled stochastically.

e. <u>Multiple Agreements</u> – If contracts are covered by more than one reinsurance agreement, a description of how reinsurance cash flows from the multiple agreements interact and are reflected in the cash-flow model.

f. <u>Pre-Reinsurance-Ceded Aggregate Reserve</u> – Description and rationale for methods and assumptions (including liability assumptions, asset assumptions, and starting asset amounts) used in determining the pre-reinsurance-ceded aggregate reserve if they differ from methods and assumptions used in determining the aggregate reserve post-reinsurance-ceded.

12. <u>Alternative Methodology for VM-21</u> – The following information regarding the alternative methodology used by the company:

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a. <u>Grouping</u> – Statement that a seriatim approach was used, or a description of how contracts were grouped, if a seriatim approach was not used.

b. <u>Assumptions</u> – For contracts with GMDBs, disclosure of assumptions in the alternative methodology using published factors, including:

i. For component CA, the mapping to prescribed asset categories, lapse rates and withdrawal rates.

ii. For component FE, the determination of fixed dollar costs and revenues, lapse rates, withdrawal rates, and inflation rates.

iii. For component GC:

a) Description of contract features and disclosure of mapping contract-level attributes to alternative methodology factors, including product definition, partial withdrawal provision, fund class, attained age, contract duration, ratio of account value to guaranteed value, and annualized account charge differential from base assumption.

b) Derivation of equivalent account charges and margin offset.

c) Disclosure of interpolation procedures and confirmation of node

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determination.

c.   <u>Reinsurance</u> – For contracts with GMDBs, disclosure, if applicable, of reinsurance that exists and how it was handled in applying published factors (for some reinsurance, creation of company-specific factors or stochastic modeling may be required) and discussion of how reserves before reinsurance were determined.

d.   <u>Company-Specific Factors</u> – For contracts with GMDBs, if company-specific factors are used, documentation of the stochastic analysis supporting adjustments to the published factors. Adjustments may include contract design, risk mitigation strategy (excluding hedging), or reinsurance.

e.   <u>Impact of Floors</u> – For contracts with GMDBs, discussion of whether the alternative methodology reserve was impacted by the floors described in VM-21 Section 7.A.1, and disclosure of the alternative methodology reserve without regard to any floor, the cash surrender value, and the reserve under AG 33 in VM-C.

13.   <u>Exclusion Tests</u> – For VM-22, the following information regarding the deterministic certification option and stochastic exclusion tests, if calculated:

a.   <u>Policies</u> – Identification and description of each group of contracts using the deterministic certification option and stochastic exclusion tests, including contract type and risk profile, and rationale for each grouping of contracts.

b.   <u>Type of Stochastic Exclusion Test</u> – Identification of each group of contracts that the company elects to exclude from SR requirements and the SET used (passing the SERT or stochastic exclusion demonstration test, or certification that the group of contracts does not contain material interest, tail or asset risk). For any group of contracts for which a prior year's result is being invoked as to the passing of the stochastic exclusion demonstration test or the certification that contracts are not subject to material interest rate, asset, or tail risk, a statement indicating which prior year's result it was.

c.   <u>Stochastic Exclusion Ratio Test</u> – For groups of contracts for which the SERT is used, the following data on a post-reinsurance-ceded basis calculated in accordance with VM-22 Section 7.C and on a pre-reinsurance-ceded basis calculated in accordance with VM-22 Section 5.A.3:

i.   The adjusted scenario reserve for each of the scenarios.

ii.   The values of a, b and c.

iii.   The value of the test ratio (b – a)/c.

d.   <u>Stochastic Exclusion Demonstration Test</u> – For groups of contracts for which the stochastic exclusion demonstration test is used, the rationale for using the demonstration test, identification of which acceptable demonstration method listed under VM-22 Section 7.D was applied or a statement that another method acceptable to the commissioner was applied, and the details of the demonstration supporting the exclusion in the initial exclusion year and at least once every three calendar years subsequent to the initial exclusion year.

e. SET Certification Method – For groups of contracts for which the SET certification method is used, support for the certification including supporting analysis and tests.

f. Fallback Results – If the stochastic exclusion demonstration test or the certification method was successfully used for any group of contracts for which the SERT was initially attempted but failed, the company shall so indicate and show the unsuccessful SERT results.

Similarly, if the Stochastic Exclusion Ratio Test was successfully used for any group of contracts for which the stochastic exclusion demonstration test under the method of VM-22 Section 7.D.2.c or VM-22 Section 7.D.2.d was initially attempted but failed, the company shall so indicate and show the results of the unsuccessful stochastic exclusion demonstration test.

g. Automatic Exclusion from SR – A description of any groups of contracts that are automatically excluded from the SR following VM-22 Section 7.A.1.d, including a description of how the criteria in VM-22 Section 7.A.1.d are met.

h. Deterministic Certification Option – For groups of contracts for which the deterministic certification option is used, provide the following:

i. Certification and associated reasoning for why economic conditions do not materially influence anticipated contract holder behavior, including a description of the contracts and associated features.

ii. Certification that liabilities are not supported by a reinvestment strategy that includes future hedge purchases.

iii. The results of the stochastic exclusion ratio test, as described in VM-22 Section 7.C, considering only the 16 economic scenarios paired with a 100% mortality scenario.

14. Additional Standard Projection Amount – The following information regarding the calculations to determine the additional standard projection amount performed by the company:

a. Method – Disclosure of the method used for the additional standard scenario projection amount.

b. CTEPA – A summary of the CTEPA method including:

i. Disclosure (in tabular form) of the scenario reserves using the same method and assumptions as those used by the company to calculate CTE 70 (adjusted), as well as the corresponding scenarios reserves substituting the assumptions prescribed by Section 6.C of VM-21 or VM-22.

ii. Summary of results from a cumulative decrement projection along the scenario whose reserve value is closest to the CTE 70 (adjusted, under the assumptions outlined in Section 6.C or VM-22 Section 6.C. Such a cumulative decrement projection shall include, at the end of each projection year, the projected proportion (expressed as a percent of the total projected account value) of persisting contracts as well as the allocation of projected decrements across death, full surrender, account value depletion, elective annuitization, and other benefit election.

iii. Summary of results from a cumulative decrement projection, identical to

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i.   Disclosure (in tabular form) of all scenario reserves in the Company Standard Projection Set and the scenario reserves from Market Paths A and B from the Prescribed Standard Projection Set, as described in VM-21 Section 6.B.2. If available, include disclosure of all scenario reserves from the Prescribed Standard Projection Set.¶
ii. Summary of results from a cumulative decrement projection along Path A (where Path A is described in VM-21 Section 6.B.2.a), under the assumptions outlined in VM-21 Section 6.C. Such a cumulative decrement projection shall include, at the end of each projection year, the projected proportion (expressed as a percent of the total projected account value) of persisting contracts, as well as the allocation of projected decrements across death, full surrender, account value depletion, elective annuitization, and other benefit election.¶
iii. Summary of results from a cumulative decrement projection, identical to (ii) above, but replacing all assumptions outlined in VM-21 Section 6.C with the corresponding assumptions used in calculating Company Amount A.¶
iv. The data sources used to obtain the implied volatility term structure and spot exchange rates in effect as of the valuation date in the prescribed market paths defined in VM-21 Section 6.B.5.¶

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(ii) above, but replacing all assumptions outlined in Section 6.C of VM-21 or VM-22 with the corresponding assumptions used in calculating the SR.

c. Model Comparison – Discussion of any differences between the cash-flow models used to determine the additional standard projection amount and those used to determine the DR and SR, including any differences in the model validations performed and how the models were evaluated for appropriateness and applicability.

d. Benefits Not Described – Regarding the assumptions in Section 6.C of VM-21 or VM-22, discussion of any benefit type proxy chosen, or other approximations applied for benefit types not described in the aforementioned section, and the rationale for the chosen proxy or approximations.

e. Data Limitations – Regarding the partial withdrawal assumptions in VM-21 Section 6.C.4 or VM-22 Section 6.C.4, discussion of any proxy method used due to data limitations (e.g., with respect to policies that are not enrolled in an automatic withdrawal program but have exercised a non-excess withdrawal in the contract year immediately preceding the valuation date), with documentation that supports the conclusion that the proxy method does not result in a material understatement of the reserve.

f. Discarding Withdrawal Ages – Regarding the withdrawal delay cohort method in VM-21 Section 6.C.5, disclosure of whether certain withdrawal ages were discarded, or others used as representative as described in VM-21 Section 6.C.5.k, including discussion of the appropriateness of the chosen method.

g. Modifications – Discussion of any modifications in the application of the requirements to produce the additional standard projection amount.

h. Assumptions Not Prescribed – Discussion of any assumptions with judgments or procedures used to produce the additional standard projection amount that are not prescribed and not the same as used in the calculation of DR or SR.

i. Reinsurance – Description of any reinsurance treaties that have been excluded from the calculation of the additional standard projection amount along with an explanation of why the treaty was excluded, as well as a confirmation that none of the reinsurance treaties included serve solely to reduce the calculated additional standard projection amount without also reducing risk on scenarios similar to those used to determine the DR or SR.

j. Other Considerations – To the extent not discussed elsewhere in the Annuity Report, a description of any material assumptions, margins, and other considerations helpful in or necessary to understanding the rationale behind the development of assumptions and margins used in the calculation of the additional standard projection amount, as well as disclosure of any analysis that has been performed to highlight the major drivers of the result.

k. Impact of Aggregation – Disclosure of the impact of aggregation, that is, a comparison of seriatim calculations compared to aggregation permitted under VM-21 or VM-22, and discussion of the method used to determine the impact, pursuant to Section 6.A.1.a in VM-21 or VM-22.

15. Riders and Supplemental Benefits – The following information on the riders and

supplemental benefits attached to the base contracts subject to VM-21 or VM-22:

a.   A brief description of the benefit, option, or feature provided and a list of the products to which the rider or supplemental benefit is attached.

b.   An indication of whether the rider or supplemental benefit was valued with the base contract or separately, and a brief description of the valuation methodology used.

c.   Whether the rider or supplemental benefit had a non-zero reserve and whether the reserve amount was included in the respective column of the VA Supplement or Part 1 of the VM-22 Reserves Supplement.

d.   Any other information necessary to fully describe the company's riders and supplemental benefits and the reserve methodology used.

16.   Additional Information – The following additional information:

a.   Per-Contract Amounts – For groups of contracts valued under VM-21 requirements, a description of the basis for the allocation to per-contract amounts, in accordance with VM-21 Section 12.

b.   Sensitivity Tests – For each distinct product type for which margins were established:

   i.   List the specific sensitivity tests performed for each risk factor or combination of risk factors, other than those discussed in VM-21 Section 3.F.3.h.vi and Section 3.F.3.i.ii or VM-22 Section 3.F.3.h.vi and Section 3.F.3.i.ii.

   ii. Indicate whether the reserve was calculated based on the anticipated experience assumptions or prudent estimate assumptions for all other risk factors while performing the tests.

   iii. Provide the numerical results of the sensitivity tests for both reserves and capital.

   iv. Explain how the results of sensitivity tests were used or considered in developing assumptions.

c.   Impact of Margin

   i.   Company can perform the impact of margin analysis using off-cycle data. The analysis can be done less frequently than annually unless there is change or update in the margins, but not less frequently than every three years.

   ii. Impact of Margins for Each Risk Factor – The impact of margins on the DR or SR for each risk factor, or group of risk factors, that has a material impact on the DR or SR, determined by subtracting (i) from (ii), expressed in both dollar amounts and percentages. For the purposes of this analysis, calculate the CTE without requiring that the scenario reserve for any scenario be no less than the cash surrender value:

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Deleted: b. Phase-In – If electing a phase-in period, as described in VM-21 Section 2.B, discussion of the phase-in calculation including:¶
i.   Regarding the determination of R2—i.e., the reserve as of Jan. 1, 2020, following the VM-21 requirements in the 2019 NAIC *Valuation Manual*—disclosure of all changes from the Dec. 31, 2019, reserve reported and documented in the 2019 PBR Actuarial Report (or AG 43 actuarial memorandum). Such changes should include changes in reinsurance agreements (e.g., recaptures) and other significant changes in in-force policies.¶
ii. Regarding the determination of R1—i.e., the reserve as of the valuation date following the VM-21 requirements on or after Jan. 1, 2020—disclosure of deviations from R2 in areas such as in-force contracts, scenario generation, or other aspects that should parallel the R2 calculation. Also include disclosure of deviations from the methods and factors used for 2020 reserve and documented in the 2020 VA Summary and VA Report for those areas that should parallel those used for the Dec. 31, 2020, reserves.¶
iii. Disclosure of any scaling factors applied to the phase-in amount due to material changes in the book of business, as well as any other modifications of the remaining phase-in amount.…

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1. The CTE70 (best efforts) and DR, as outlined in VM-21, Section 9.C or VM-22, Section 9.C, but with the reserve calculated based on the anticipated experience assumption for the risk factor and prudent estimate assumptions for all other risk factors.

2. The CTE70 (best efforts) and DR, as outlined in VM-21, Section 9.C or VM-22, Section 9.C, for that group of contracts as reported.

3. For groups of contracts subject to C-3 Phase II RBC requirements, repeat the impact analysis using the same method on CTE98 levels.

iii. <u>Aggregate Impact of Margins</u> – The aggregate impact of all margins on the DR or SR for that group of contracts determined by subtracting (1) from (2), expressed in both dollar amounts and percentages. For the purposes of this analysis, calculate the CTE without requiring that the scenario reserve for any scenario be no less than the cash surrender value:

1. The CTE70 (best efforts) and DR, as outlined in VM-21, Section 9.C or VM-22, Section 9.C, for that group of contracts, but with the reserve calculated based on anticipated experience assumptions for all risk factors prior to the addition of any margins.

2. The CTE70 (best efforts) and DR, as outlined in VM-21, Section 9.C or VM-22,, Section 9.C for that group of contracts as reported.

3. For groups of contracts subject to C-3 Phase II RBC requirements, repeat the impact analysis using the same method on CTE98 levels.

iv. <u>Impact of Implicit Margins</u> – For the purposes of the disclosures required in Section 16.d.ii and Section 16.d.iii above:

1. If the company believes the method used to determine anticipated experience assumptions includes an implicit margin, the company can adjust the anticipated experience assumptions to remove this implicit margin for this reporting purpose only. If any such adjustment is made, the company shall document the rationale and method used to determine the anticipated experience assumption.

2. Since the company is not required to determine an anticipated experience assumption or a prudent estimate assumption for risk factors that are prescribed (i.e., interest rates movements, equity performance, default costs, and net spreads on reinvestment assets), when determining the impact of margins, the prescribed assumption shall be deemed to be the prudent estimate assumption for the risk factor, and the company can elect to determine an anticipated experience assumption for the risk factor, based on the company's anticipated experience for the risk factor. If this is elected, the company shall document the rationale and method used to determine the anticipated experience assumption.

3. For groups of contracts subject to VM-22 requirements, this section may be used to disclose the impact of aggregation across all non-variable annuity contracts in comparison to the required aggregation in VM-22 (i.e., by Reserving Category).

17. Calculations as of a Date Preceding the Valuation Date – If the DR, SR and/or the

additional standard projection amount were developed as of a date prior to the valuation date, disclosure of the prior date, the DR, SR and the additional standard projection amount of the in force on the prior date, and an explanation of why the use of such a date will not produce a material change in the results compared to if the results were based on the valuation date. Such an explanation shall describe the process that the qualified actuary used to determine the adjustment, the amount of the adjustment, and the rationale for why the adjustment is appropriate.

18. RBC – For groups of contracts subject to C-3 Phase II RBC requirements, if electing to include documentation of the RBC calculation in the PBR Actuarial Report, the following information regarding the risk-based capital, as described in the Life RBC instructions LR027:

    a. Documentation and discussion of assumptions or methods that differ from those used for the reserve calculations.

    b. Description of the results of the modeling and analysis, including a table displaying each of the seven steps of the RBC calculation.

    c. Description of the process to split the resulting RBC into interest and market components, and the results of that split.

    d. If the alternative methodology was used, documentation of any non-prescribed factors and the basis for those factors.

    e. State the method that the company used to recognize the impact of federal income tax. If the company used the specific tax recognition, disclosure of the result of the macro tax adjustment method.

18. Reliance Descriptions and Statements – A description of those areas where the qualified actuary relied on others for data, assumptions, projections or analysis in performing the principle-based valuation under VM-21 or VM-22, along with a reliance statement from each individual on whom the qualified actuary relied that includes:

    a. Reliance Listing – The name, title, telephone number, e-mail address and qualifications of the individual, along with the individual's company name and address, and the information provided.

    b. Reliance Statements – A statement as to the accuracy, completeness or reasonableness, as applicable, of the information provided, along with a signature and the date signed.

19. Certifications – The following certifications:

    a. Investment Officer on Investments – A certification from a duly authorized investment officer that the modeled asset investment strategy for VM-21 and VM-22, including any future hedging strategies supporting the contracts, is consistent with the company's current investment strategy except where the modeled reinvestment strategy may have been substituted with the alternative investment strategy, and that documentation of the CDHS attributes for any future hedging strategies supporting the contracts are accurate.

    b. Qualified Actuary on Investments – A certification by a qualified actuary, not necessarily the same qualified actuary that has been assigned responsibility for the PBR Actuarial Report or this sub-report, that the modeling of any future hedging

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strategies supporting the contracts is consistent with the company's actual future hedging strategies and was performed in accordance with VM-21 or VM-22, and in compliance with all applicable ASOPs.

c. <u>Senior Management on Internal Controls</u> – A certification from senior management, other than the qualified actuary, regarding the effectiveness of internal controls with respect to the principle-based valuation under VM-21 or VM-22, as provided in Section 12B(2) of Model #820.

d. <u>Qualified Actuary on Accordance with VM-21, VM-22, and Model #820</u> – Certification by the qualified actuary, for the groups of contracts for which responsibility was assigned, that the principle-based valuation was performed in accordance with the principles and requirements outlined in VM-21, VM-22, and the relevant sections of Model #820.

e. <u>Qualified Actuary on Assumptions and Margins</u> – Certification by the qualified actuary, for the groups of contracts for which responsibility was assigned, that the assumptions used in the principle-based valuation under VM-21 or VM-22 are prudent estimate assumptions for the products, scenarios, and purpose being tested.

20. <u>Closing Paragraph</u> – A closing paragraph with the signature, credentials, title, telephone number and e-mail address of the qualified actuary, the company name and address, and the date signed.

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VM-G: Appendix G – Corporate Governance Guidance for Principle-Based Reserves

Table of Contents

Section 1: Introduction, Definition and Scope

A.   A principle-based approach to the calculation of reserves places the responsibility for actuarial and financial assumptions with respect to the determination of sufficient reserves on individual companies, as compared with reserves determined strictly according to formulas prescribed by regulators. This responsibility requires that sufficient measures are established for oversight of the function related to principle-based reserves.

The corporate governance guidance provided in VM-G is applicable only to a principle-based valuation calculated according to methods defined in VM-20, VM-21, and VM-22, except for the following condition:

For a company that does not compute any DR or SR under VM-20 or VM-22 as a result of passing the exclusion tests as defined in VM–20 Section 6 or VM-22 Section 7, and all contracts subject to reserves under VM-21 are determined by application of the Alternative Methodology, VM-G Sections 2 and 3 below are generally not applicable; the requirements of Section 4 are still applicable. However, if the company calculated the SERT using the DR method outlined in VM-20 Section 6.A.2.b.i.a, the adjusted scenario reserve method outlined VM-22 Section 7.C.2.a.i, or the Stochastic Exclusion Demonstration Test outlined in VM-20 Section 6.A.3 or VM-22 Section 7.D, then VM-G Sections 2 and 3 are applicable.

> **Guidance Note:** Given requirements in AG 43 are intended to be the same as those in VM-21, if a company chooses to aggregate business subject to AG 43 with business subject to VM-21 in calculating the reserve, then the provisions in VM-G apply to this aggregate principle-based valuation.

B.   In carrying out the responsibility described in Section 1.A for each group of policies and contracts subject to Section 12 of Model #820, the company shall assign to one or more qualified actuaries the responsibilities indicated in Section 4.A.

C.   For the purposes of VM-G:

1.   The term "group of insurance companies" means a set of insurance companies in a holding company system (for purposes of applicable insurance holding company system acts) that is designated as a group of insurance companies by the senior management of any holding company that is a holding company of all the insurance companies in such set of insurance companies.

2.   The terms "board" and "board of directors" mean: (a) the board of an insurance company that has not been designated to be part of a group of insurance companies; or (b) the board of a single company within a group of insurance companies that is designated by the senior management of any holding company of all the insurance companies in such group of insurance companies, or a committee of such board, consisting of members of such board, duly appointed by such board and authorized by such board to perform functions substantially similar to those described in this section.

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> **Guidance Note:** The group of companies is a group of life insurers designated by senior management for purposes of managing the PBR process, and the board is the appropriate board responsible for those companies.

3.   The term "senior management" includes the highest ranking officers of an insurance company or group of insurance companies with responsibilities for operating results, risk assessment and financial reporting (e.g., the chief executive officer [CEO], chief financial officer [CFO], chief actuary and chief risk officer [CRO]) and such other senior officers as may be designated by the insurance company or group of insurance companies.

D.   Section 2 and Section 3 below, while not expanding the existing legal duties of a company's board of directors and senior management, provide guidance that focuses on their roles in the context of principle-based valuations. Section 2 and Section 3 are not applicable for companies meeting the requirements to be exempt from Section 2 and Section 3 as outlined in Section 1.A above.

While existing governance standards encompass adequate and appropriate standards for oversight of PBR, Section 2 and Section 3 below describe guidance for the roles of the board of directors and senior management, in light of their existing duties as applied in the context of PBR. It is not intended to create new duties but rather to emphasize and clarify how their duties apply to the PBR actuarial valuation function of an insurance company or group of insurance companies. To the extent that any law or regulation conflicts with the guidance described herein, such other law or regulation shall prevail, and the conflicting parts of this section VM-G shall not apply.

E.   The company shall retain governance documentation on file for at least seven years from the valuation date, including that required by VM-G Section 2.A.5, Section 3.A.6 and Section 4.A.3. This documentation shall be available upon request.

Section 2: Guidance for the Board

A.   Commensurate with the materiality of PBR in relationship to the overall risks borne by the insurance company and consistent with its oversight role, the board is responsible for:

1.   Overseeing the process undertaken by senior management to identify, and correct where needed, any material weakness in the internal controls of the insurance company or group of insurance companies with respect to a principle-based valuation.

2.   Overseeing the infrastructure (consisting of policies, procedures, controls and resources) in place to implement principle-based valuation processes.

3.   Receiving and reviewing the reports and certifications referenced in Section 3.A.6.

4.   Interacting with senior management to resolve questions and collect additional information as the board requests.

5.   Documenting the review and actions undertaken by the board, relating to the principle-based valuation function, in the minutes of all board meetings where such function is discussed.

Section 3: Guidance for Senior Management

A.   Senior management is responsible for directing the implementation and ongoing operation of the principle-based valuation function. This includes:

1. Ensuring that an adequate infrastructure (consisting of the policies, procedures, controls, and resources) has been established to implement the principle-based valuation function.

2. Reviewing the elements of the principle-based valuation (consisting of the assumptions, methods and models used to determine PBR of the insurance company or group of insurance companies) that have been put in place, and whether these elements of the principle-based valuation appear to be consistent with, but not necessarily identical to, those for other company risk assessment processes, while recognizing potential differences in financial reporting structures and any prescribed assumptions or methods.

3. Reviewing and addressing any significant and unusual issues and/or findings in light of the results of the principle-based valuation processes and applicable sensitivity tests of the insurance company or group of insurance companies.

4. Ensuring the adoption of internal controls with respect to the principle-based valuations of the insurance company or group of insurance companies that are designed to provide reasonable assurance that all material risks inherent in the liabilities and assets subject to such valuations are included, and that such valuations are made in accordance with the *Valuation Manual* and regulatory requirements and actuarial standards. Senior management is responsible for ensuring that an annual evaluation is made of such internal controls and for communicating the results of that evaluation to the board of directors.

5. Determining that:

   a. Resources are adequate to carry out the modeling function with skill and competence.

   b. A process exists that ensures that models and procedures produce the intended results relative to the principle-based valuation objectives as outlined in Section 12.A of Model #820.

   c. A process exists that validates data for determination of model input assumptions, other than input assumptions that are prescribed in law, regulation or the *Valuation Manual* for use in determining PBR.

   d. A process exists that is appropriately designed to ensure that model input is appropriate given the experience of the insurance company or group of insurance companies, other than model inputs that are prescribed in law, regulation or the *Valuation Manual* for use in determining PBR.

   e. A process exists that reviews principle-based valuations to find and limit material errors and material weaknesses (such process (a) to provide a credible ongoing effort to improve model performance where material errors and weaknesses exist, and (b) to include a regular cycle of model validation that includes monitoring of model performance and stability, review of model relationships, and testing of model outputs against outcomes).

   f. A review procedure and basis for reliance on principle-based valuation processes has been established that includes consideration of reporting on the adequacy of PBR, the implementation of policies, reporting and internal controls, and the work of the appointed actuary.

6. Facilitating the board's oversight role by reporting to the board, no less frequently than annually, regarding such matters as:

a.   The infrastructure (consisting of the policies, procedures, controls and resources) that senior management has established to support the PBR actuarial valuation function.

b.   The critical risk elements of the valuation as applicable—related to the assumptions, methods and models—and their relationship to those for other risk assessment processes, noting differences in financial reporting structures and any prescribed assumptions or methods.

c.   The level of knowledge and experience of senior management personnel responsible for monitoring, controlling and auditing PBR.

d.   Reports related to governance of PBR, including:

   i.   The certification of the effectiveness of internal controls with respect to the PBR, as provided in Section 12.B.(2) of Model #820.

   ii. The certifications from the Investment Officer on Investments and Qualified Actuary on Investments, as provided in VM-31 Sections 3.D.14.a and 3.D.14.b, and VM-31 Sections 3.F.16.a and 3.F.16.b.

Section 4: Responsibilities of Qualified Actuaries

A.   The responsibilities assigned by the company to one or more qualified actuaries with respect to a group of policies or contracts under Section 1.B are:

1.   The responsibility for overseeing the calculation of PBR for that group of policies or contracts;

2.   The responsibility for verifying that:

   a.   The assumptions, methods and models that are used in determining PBR; and

   b.   The company's documented internal standards used in the principle-based valuation processes, the company's documented internal controls and documentation used for such reserves,

   appropriately reflect the requirements of the *Valuation Manual* for that group of policies or contracts. In particular, the qualified actuaries are required to certify that the assumptions used in the principle-based valuation, other than assumptions that are prescribed in the *Valuation Manual* or by law or regulation, or that pertain to risk factors that are modeled stochastically, are prudent estimates, as defined in VM-01, with appropriate margins. The qualified actuaries are not required to verify the appropriateness of any prescribed assumptions, methods or models but are required to verify that they are being used as required.

3.   The responsibility for providing a summary report to the board and to senior management on the valuation processes used to determine and test PBR, the principle-based valuation results, the general level of conservatism incorporated into the company's PBR, the materiality of PBR in relationship to the overall liabilities of the company, and significant and unusual issues and/or findings.

   If Sections 2 and 3 are not applicable because the company met the requirements to be exempt from Section 2 and Section 3 as outlined in Section 1.A, this particular reporting to board and senior management is limited to:

a. For VM-20 and VM-22, notifying senior management if the company is at risk of failing either exclusion test, and if so, reporting on the company's readiness to calculate DR and/or SR ; and

b. For VM-21, notifying senior management if the company may not be able to use the Alternative Methodology for all business subject to VM-21, and if so, reporting on the company's readiness to calculate the SR and the additional standard projection amount.

4. The responsibility for preparing the PBR Actuarial Report with respect to that group of policies or contracts, as described in VM-31.

5. The responsibility for disclosing to the company's external auditors and regulators any significant unresolved issues regarding the company's PBR held with respect to that group of policies or contracts.

B. A qualified actuary assigned responsibilities under Section 1.B with respect to a group of policies or contracts may be required to make any certification required by the *Valuation Manual*, but is not required, except in regard to any responsibilities he or she may have as the appointed actuary under VM-30, to opine upon or certify the adequacy of the aggregate reserve for that group of policies or contracts, the company's surplus or the company's future financial condition.

C. The responsibilities of the appointed actuary are described in VM-30.

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ANNUAL STATEMENT BLANK – LIFE/FRATERNAL

VM-22 RESERVES SUPPLEMENT – PART 1A
Non-Variable Annuity Insurance Reserves Valued According to VM-22 by Product Type
For The Year Ended December 31, 20___
(To Be Filed by March 1)

	Prior Year	Current Year
	1	2
	Reported Reserve in Excess of Cash Surrender Value	Reported Reserve in Excess of Cash Surrender Value
1. Post-Reinsurance-Ceded Reserve		
1.1. Fixed Annuities Deferred without Guaranteed Living Benefit............	....	....
1.2. Indexed Annuities Deferred without Guaranteed Living Benefit............	....	....
1.3. Individual Payout Immediate Annuities and Annuitizations............	....	....
1.4. Structured Settlements............	....	....
1.5. Pension Risk Transfer............	....	....
1.6. Longevity Reinsurance............	....	....
1.7. Fixed Annuities Deferred – with Guaranteed Living Benefit............	....	....
1.8. Indexed Annuities Deferred – with Guaranteed Living Benefit............	....	....
1.9. Aggregate Write-Ins for Other Products		
2. Total Post-Reinsurance-Ceded Reserve (Sum of Lines 1.1 through 1.9)		
3. Pre-Reinsurance-Ceded Reserve		
3.1. Fixed Annuities Deferred without Guaranteed Living Benefit............	....	....
3.2. Indexed Annuities Deferred without Guaranteed Living Benefit............	....	....
3.3. Individual Payout Immediate Annuities and Annuitizations............	....	....
3.4. Structured Settlements............	....	....
3.5. Pension Risk Transfer............	....	....
3.6. Longevity Reinsurance............	....	....
3.7. Fixed Annuities Deferred – with Guaranteed Living Benefit............	....	....
3.8. Indexed Annuities Deferred – with Guaranteed Living Benefit............	....	....
3.9. Aggregate Write-Ins for Other Products		
4. Total Pre-Reinsurance-Ceded Reserve (Sum of Lines 3.1 through 3.9)		
5. Total Reserves Ceded (Line 4 minus Line 2)		
DETAILS OF WRITE-INS		
1.901.	....	....
1.902.	....	....
1.903.	....	....
1.998. Summary of remaining write-ins for Line 1.9 from overflow page..............	....	....
1.999 Totals (Lines 1.901 through 1.903 plus 1.998) (Line 1.9 above)		
3.901.	....	....
3.902.	....	....
3.903.	....	....
3.998. Summary of remaining write-ins for Line 3.9 from overflow page..............	....	....
3.999 Totals (Lines 3.901 through 3.903 plus 3.998) (Line 3.9 above)		

C. VM-22 PBR Supplement Blank 11 15 2023

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Deleted: Variable Universal Life Without Secondary Guarantee…

Deleted: Variable Life Without Secondary Guarantee

Deleted: Indexed Life Without Secondary Guarantee

Deleted: Term Life Insurance

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VM-22 RESERVES SUPPLEMENT – PART 1B
Non-Variable Annuity Reserves Valued According to VM-22 by Product Type
For The Year Ended December 31, 20___
(To Be Filed by March 1)

	SECTION A						SECTION B		
	1	2	3	4			67		
	Cash Surrender Value	Standard Projection Amount	Stochastic Reserve	Number of Contracts			Cash Surrender Value	Standard Projection Amount	Deterministic Reserve
1. Post-Reinsurance-Ceded Reserve									
1.1. Fixed Annuities Deferred without Guaranteed Living Benefit				XXX					
1.2. Indexed Annuities Deferred without Guaranteed Living Benefit				XXX					
1.3. Individual Payout Immediate Annuities and Annuitizations				XXX					
1.4. Structured Settlements				XXX					
1.5. Pension Risk Transfer				XXX					
1.6. Longevity Reinsurance				XXX					
1.7. Fixed Annuities Deferred – with Guaranteed Living Benefit				XXX					
1.8. Indexed Annuities Deferred – with Guaranteed Living Benefit				XXX					
1.9. Aggregate Write-Ins for Other Products				XXX					
2. Total Post-Reinsurance-Ceded Reserve (Sum of Lines 1.1 through 1.9)	XXX	XXX	XXX	XXX			XXX	XXX	
3. Pre-Reinsurance-Ceded Reserve									
3.1. Fixed Annuities Deferred without Guaranteed Living Benefit									
3.2. Indexed Annuities Deferred without Guaranteed Living Benefit									
3.3. Individual Payout Immediate Annuities and Annuitizations									
3.4. Structured Settlements									
3.5. Pension Risk Transfer									
3.6. Longevity Reinsurance									
3.7. Fixed Annuities Deferred – with Guaranteed Living Benefit									
3.8. Indexed Annuities Deferred – with Guaranteed Living Benefit									
3.9. Aggregate Write-Ins for Other Products									
4. Total Pre-Reinsurance-Ceded Reserve (Sum of Lines 3.1 through 3.9)	XXX	XXX	XXX	XXX			XXX	XXX	
5. Total Reserves Ceded (Line 4 minus Line 2)	XXX	XXX	XXX	XXX			XXX	XXX	

DETAILS OF WRITE-INS

1.901.					XXX					
1.902.					XXX					
1.903.					XXX					
1.998.	Summary of remaining write-ins for Line 1.9 from overflow page				XXX					
1.999.	Totals (Lines 1.901 through 1.903 plus 1.998) (Line 1.9 above)				XXX					
3.901.										
3.902.										
3.903.										
3.998.	Summary of remaining write-ins for Line 3.9 from overflow page									
3.999.	Totals (Lines 3.901 through 3.903 plus 3.998) (Line 3.9 above)									

VM-22 RESERVES SUPPLEMENT – PART 2
Non-Variable Annuity PBR Exemption
For The Year Ended December 31, 20__
(To Be Filed by March 1)

Non-Variable Annuity PBR Exemption as defined in the NAIC adopted Valuation Manual (VM)

1. Has the company filed and been granted a Non-Variable Annuity PBR Exemption from the reserve requirements of VM-23 of the Valuation Manual by their state of domicile? Yes [ ] No [ ]

2. If the response to Question 1 is "Yes", then check the source of the granted "Non-Variable Annuity PBR Exemption" definition? (Check either 2.1, 2.2 or 2.3)

    2.1   NAIC Adopted VM   [ ]

    2.2   State Statute (SVL)   [ ]   Complete items "a" and "b", as appropriate.

    a.   Is the criteria in the State Statute (SVL) different from the NAIC adopted VM?   Yes [ ] No [ ]

    b.   If the answer to "a" above is "Yes", provide the criteria the state has used to grant the Non-Variable Annuity PBR Exemption (e.g., Group/Legal Entity criteria) and the minimum reserve requirements that are required by the state of domicile (if the minimum reserve requirements are the same as the Adopted VM, write SAME AS NAIC VM:

    ....
    ....
    ....
    ....
    ....

    2.3   State Regulation   [ ]   Complete items "a" and "b", as appropriate.

    a.   Is the criteria in the State Regulation different from the NAIC adopted VM?   Yes [ ] No [ ]

    b.   If the answer to "a" above is "Yes", provide the criteria the state has used to grant the Non-Variable Annuity PBR Exemption (e.g., Group/Legal Entity criteria) and the minimum reserve requirements that are required by the state of domicile (if the minimum reserve requirements are the same as the Adopted VM, write SAME AS NAIC VM:

    ....
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VM-22 RESERVES SUPPLEMENT – PART 3
Other Exclusions from Non-Variable Annuity PBR
For The Year Ended December 31, 20__
(To Be Filed by March 1)

1A.	Has the company filed and been granted a Single State Exemption from the reserve requirements of VM-22 of the Valuation Manual by their state of domicile?	Yes [ ] No [ ]
1B.	If the answer to question 1A is "Yes" please discuss any business not covered under the Single State Exemption.	
	_____	
	_____	
2A.	If the answer to question 1A is "Yes", does the company have risks for policies issued outside its state of domicile?	Yes [ ] No [ ]
2B.	If the answer to question 2A is "Yes" please discuss the risks for policies issued outside the state of domicile, how those risks came to be a responsibility of the company, and why the company would still be considered a Single State Company with such risks.	
	_____	
	_____	
3.	Is all of the company's non-variable annuity business excluded from the requirements of VM-22 pursuant to Section II. Subsection 3 of the Valuation Manual?	Yes [ ] No [ ]

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Draft: 11/20/23

Valuation Manual (VM)-22 (A) Subgroup
Virtual Meeting
November 8, 2023

The VM-22 (A) Subgroup of the Life Actuarial (A) Task Force met Nov. 8, 2023. The following Subgroup members participated: Ben Slutsker, Chair (MN); Elaine Lam (CA); Lei Rao-Knight (CT); Nicole Boyd (KS); William Leung (MO); Seong-min Eom (NJ); Bill Carmello (NY); Rachel Hemphill and Iris Huang (TX); Tomasz Serbinowski (UT); and Craig Chupp (VA).

1. Discussed Comments Received on the VM-22 SPA Draft

Slutsker said that the Subgroup would be discussing comments received on the VM-22, Requirements for Principle-Based Reserves for Non-Variable Annuities, standard projection amount (SPA) draft. Brian Bayerle (American Council of Life Insurers—ACLI) spoke to the ACLI's comment questioning whether the SPA would be determined in aggregate for a block of business or if the calculation would need to be done at the reserving category level. Slutsker noted that the current intention of the language would have the SPA be calculated at the reserving category level. Hemphill noted that the SPA is currently envisioned to be a binding floor rather than a disclosure item consistent with VM-21, Requirements for Principle-Based Reserves for Variable Annuities, but that could be revisited after the field test. After Eom asked whether the ACLI's position on the level of aggregation for the SPA calculation would change depending on the decision of floor vs. disclosure, Bayerle replied that it would make sense to calculate the SPA in aggregate if it were disclosure only, but within a reserving category if it were a binding floor.

Bayerle then introduced the ACLI's next comment noting that the requirements were unclear on whether an SPA would need to be calculated for contracts that pass stochastic exclusion testing but still require a deterministic reserve (DR) to be calculated. Bayerle stated that it is not necessary to calculate the SPA for the DR, but if it was required, then additional specifications would be necessary to define the calculations. Hemphill asked Bayerle to explain why the ACLI thought it was not necessary for DR calculation. Bayerle commented that part of the rationale for the SPA in VM-21 is to identify outlier assumptions, which is far more complicated to do in a stochastic setting. Bayerle further stated that the behavior of the individual assumptions should be a lot more transparent to the state insurance regulators within the DR. After several state insurance regulators noted support for requiring an SPA to be determined for contracts only subject to a DR, the Subgroup decided to make clarifying enhancements to future VM-22 language to fully define the SPA calculation for a DR.

Slutsker then brought up an exposure question in the draft regarding the historical expense inflation assumption and whether to use a simple static annual rate or instead use the actual inflation that occurred. The Subgroup decided to leave this as a static rate but reserved the possibility of revisiting the assumption at a later discussion.

Slutsker then walked through the American Academy of Actuaries' (Academy's) comment that some of the prescription in the determination of the guarantee actuarial present value (GAPV) should be reduced as the current framework does not consider waiting for benefits to become more valuable before exercise. Andrew Jenkins (Academy) added that the GAPV was well defined for variable annuities (VAs) but could cause anomalous outcomes if left in there for fixed and index products with living benefits. After discussion, Slutsker asked for the Academy to draft language to improve the language for discussion during a future meeting.

Slutsker discussed the Academy's next comment, whicht noted that an integrated GAPV may produce more reasonable outcomes and be easier to calibrate when there are multiple benefits present. Jenkins added that the

comment is more intended for ease of maintenance of this regulation as there is innovation over time potentially if companies develop multiple living benefits and death benefits in non-variable annuity products. The Subgroup decided to include this integrated benefit edit.

Slutsker stated that the ACLI's next comment on GAPV asked whether they are only applicable to deferred annuities. Slutsker suggested a wording change regarding contracts for which there is no account value—such as those within the payout annuity reserving category or longevity reinsurance reserving category—that the GAPV requirements are not applicable. Jenkins noted that some payout annuity contracts do have optionality features that can be exercised with discretion by the policyholder even if they do not have account value. After discussion, the Subgroup decided to include language that says account value or surrender benefit or option to surrender for the next exposure.

Slutsker said that the Academy's next comment was that as a disclosure item, the SPA should not use the worst-case assumptions such as policyholders withdrawing 100% of the available amount as currently defined. Reedy commented that these assumptions are used to identify outliers and that the Academy has brought up some good points. The Subgroup decided to include the language suggested by the Academy and to request that the Academy look into any disclosure requirements that could help state insurance regulators understand some of the different assumption paths for the determination of the GAPV.

Having no further business, the VM-22 (A) Subgroup adjourned.

SharePoint/NAIC Support Staff Hub/Member Meetings/A CMTE/LATF/2023-3-Fall/VM-22 Calls/11 08/Nov 08 Minutes.docx

Standard Projection Amount

Base Surrender Rates for Fixed Indexed Annuities

Data Source: 2019/2020 LIMRA Fixed Indexed Annuity Study

Based surrender rates are developed the following types of FIA policies:

- FIA with no GLB
- FIA with exercised GLB
- FIA with not yet exercised GLB

Within each policy type, the base surrender rates are categorized by the following attributes:

- Attained Age Group (0-59, 60-64, 65-69, 70-74, 75-79, 80+)
- Qualified versus Non-Qualified
- Years before the end, at the end, and after the end of the surrender charge period
- In-the-moneyness (0-99%, 100-124%, 125%+)

As there are many possible combinations, we combine or graduate the base surrender rate for some cells with neighboring cells if there are no material differences among them or when the volumes are not credible.

All base surrender rates are rounded to the nearest 0.50%.

FIA, NO GLWB

	Under 60		60-69		70-79		80 and over	
	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV
5 or more yrs after expiry	6.5%	362,439,974	7.0%	872,825,158	6.0%	1,559,973,113	5.0%	2,340,007,393
4 yrs after expiry	8.0%	99,004,108	8.5%	246,956,865	6.5%	489,325,310	5.0%	860,771,030
3 yrs after expiry	8.5%	169,071,566	9.5%	411,626,455	7.0%	847,903,742	5.5%	1,457,596,664
2 yrs after expiry	11.0%	265,595,461	12.0%	631,722,030	9.0%	1,313,595,688	7.0%	2,104,219,836
1 yrs after expiry	15.0%	407,046,549	17.5%	978,416,104	13.5%	2,000,926,373	9.0%	2,641,343,425
Yr SC Expires	33.5%	759,132,968	41.5%	2,318,136,057	37.0%	4,162,997,269	23.5%	3,595,604,698
1 yrs to expiry	4.5%	995,033,715	3.5%	3,144,391,095	4.0%	5,080,691,511	4.0%	3,582,846,441
2 yrs to expiry	4.0%	1,265,675,665	3.5%	4,000,947,636	3.0%	5,882,400,721	3.0%	3,693,425,414
3 yrs to expiry	3.0%	1,879,265,259	3.0%	5,677,923,198	3.0%	7,485,708,831	2.5%	4,281,189,408
4 yrs to expiry	2.5%	2,729,096,608	2.5%	7,754,645,406	2.5%	8,934,521,480	2.0%	4,656,360,188
5 yrs or more to expiry	2.0%	23,241,306,391	2.0%	60,089,390,966	2.0%	46,626,860,517	2.0%	14,409,332,402

FIA, with GLWB, under Election, IMF (in the money factor)

	Under 60		60-69		70-79		80 and over	
	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV
yrs after SC expiry								
125% and over	1.5%	630,954,157	1.5%	402,890,394	1.0%	1,397,503,656	1.0%	3,392,933
100-124%	1.5%	152,641,122	1.5%	50,580,570	1.5%	284,074,292	1.5%	378,008
Under 100%	3.5%	275,861,301	3.5%	8,296,745	4.5%	208,761,127	4.5%	155,465
Yr SC Expires								
125% and over	1.5%	529,957,319	1.5%	434,899,984	1.0%	1,283,913,770	1.0%	4,702,281
100-124%	2.5%	89,181,339	2.5%	36,759,595	2.5%	199,885,926	2.5%	684,087
Under 100%	10.5%	105,236,356	10.5%	6,123,022	14.0%	98,356,102	14.0%	60,789
prior to expiry								
125% and over	1.0%	4,676,773,692	1.0%	6,149,528,447	1.0%	14,307,818,333	1.0%	61,005,062
100-124%	1.0%	1,730,600,030	1.0%	5,289,677,487	1.0%	8,335,076,617	1.0%	101,603,008
Under 100%	1.0%	501,720,201	1.0%	972,486,678	1.5%	1,417,061,147	1.5%	18,813,144

FIA, with GLWB, No Election, IMF (in the money factor)	Under 60		60-69		70-79		80 and over	
	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV	Surr Rate	XPO_AV
yrs after SC expiry								
125% and over	3.5%	276,875,423	3.5%	1,061,462,156	4.0%	1,367,627,485	4.0%	1,034,837,154
100-124%	8.5%	54,368,043	8.5%	195,923,250	6.0%	446,934,521	6.0%	467,164,213
Under 100%	68.5%	8,159,453	68.5%	34,971,531	50.5%	63,961,566	50.5%	84,575,510
Yr SC Expires								
125% and over	6.0%	403,489,838	6.0%	1,368,282,819	7.5%	1,549,590,971	7.5%	870,131,375
100-124%	16.5%	73,362,908	16.5%	201,431,286	13.5%	420,179,736	13.5%	385,710,160
Under 100%	92.0%	29,567,553	92.0%	108,047,465	86.5%	178,685,007	86.5%	113,832,010
prior to expiry								
125% and over	1.0%	7,472,524,670	1.0%	32,045,809,434	1.5%	25,853,378,194	1.5%	7,232,790,419
100-124%	1.5%	13,044,250,434	1.5%	44,064,092,199	1.5%	26,831,653,607	1.5%	7,470,127,280
Under 100%	1.5%	4,341,759,020	1.5%	11,099,461,190	4.0%	4,781,589,407	4.0%	837,554,667
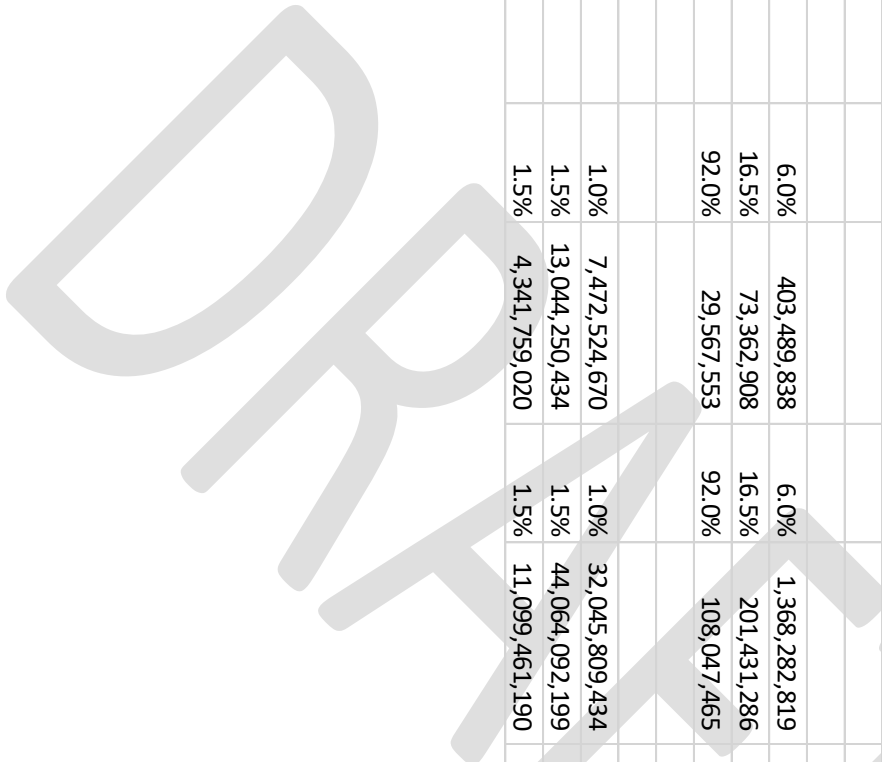
Withdrawal Rates for Fixed Indexed Annuities

Partial Withdrawal rates are developed the following types of FIA policies:

- FIA without GLB
- FIA with not yet exercised GLB

In addition, we are proposing to replace the Withdrawal Delay Cohort Method with an SPA guardrail around benefit election.

Data Source: 2019/2020 LIMRA Fixed Indexed Annuity Study

Experience data was reviewed based on available granularity, which included:

- Attained Age group (0-59, 60-64, 65-69, 70-74, 75-79, 80+)
- Qualified vs. Non-Qualified Tax Status
- Moneyness levels (for contracts with GLB)
- GLB utilization efficiency (withdrawal amount as %age of GLB limit)
- Calendar year, to make sure inclusion of 2020 data (pandemic era) did not unduly influence assumption

Methodology: Data was grouped for assumption setting when experience was clearly similar. Some rounding was applied based on magnitude of raw experience. (i.e., nearest 5 to 50bps)

Partial Withdrawal Rates for non-GLB FIA contracts, expressed as % of Account Value:

Qualified

ATT_AGE	Qualified
without GLB; % of AV	Qualified
Under 60	1.70%
60-64	2.05%
65-69	2.25%
70-74	3.40%
75-79	4.55%
80 and over	6.00%

Non - Qualified

ATT_AGE	Non - Qualified
All ages	1.65%

➥ While qualified rates are experience based, they broadly align to RMD rates although not set equal to RMD rates as RMD requirements are set at the taxpayer level, not individual contract level.

Partial Withdrawal Rates for FIA contracts with GLB, but GLB not yet elected (% of AV):

Qualified

ATT_AGE	Qualified
with GLB (GLB_Wd_Ind = 0)	Qualified
Under 60	0.95%
60-64	1.15%
65-69	1.40%
70-74	2.70%
75-79	4.30%
80 and over	5.80%

Non - Qualified

ATT_AGE	Non - Qualified
Under 70	1.15%
70 and over	1.65%

➜ Experience is similar to non-GLB, but slightly lower as presumably partial withdrawal utilization will pick-up upon GLB election.

Partial Withdrawal Rates for FIA contracts with GLB elected:

Similar to VM-21 SPA, for these contracts we assume clients will efficiently utilize the GLB and take 100% of allowable rate for lifetime GLB's (VM-21 used 90%) and 70% for non-lifetime GLB's (VM-21 used 70%) once withdrawals have commenced. We are open to feedback but do believe a high level of efficiency should be assumed.

For contracts not yet withdrawing, we utilized the LIMRA data to benchmark cumulative GLB benefit election rates, to serve as guardrails to the company assumption in place of a Withdrawal Delay Cohort Methodology type approach. The cumulative benefit utilization rates (% of total GLB contracts currently withdrawing) are proposed to be a floor applied to the Company utilization Assumption, and were drafted as follows:

Benefit utilization rate				
ATT_AGE	<= 125% ITM		> 125% ITM	
	Qualified	Non - Qualified	Qualified	Non - Qualified
Under 60	0.75%	1.00%	0.75%	1.25%
60-64	5.00%	5.25%	8.25%	9.25%
65-69	14.50%	13.25%	21.50%	20.50%
70-74	25.00%	20.00%	36.75%	28.75%
75 and over	29.50%	22.50%	43.50%	34.50%

Dynamic Lapse Rates for Fixed Indexed Annuities

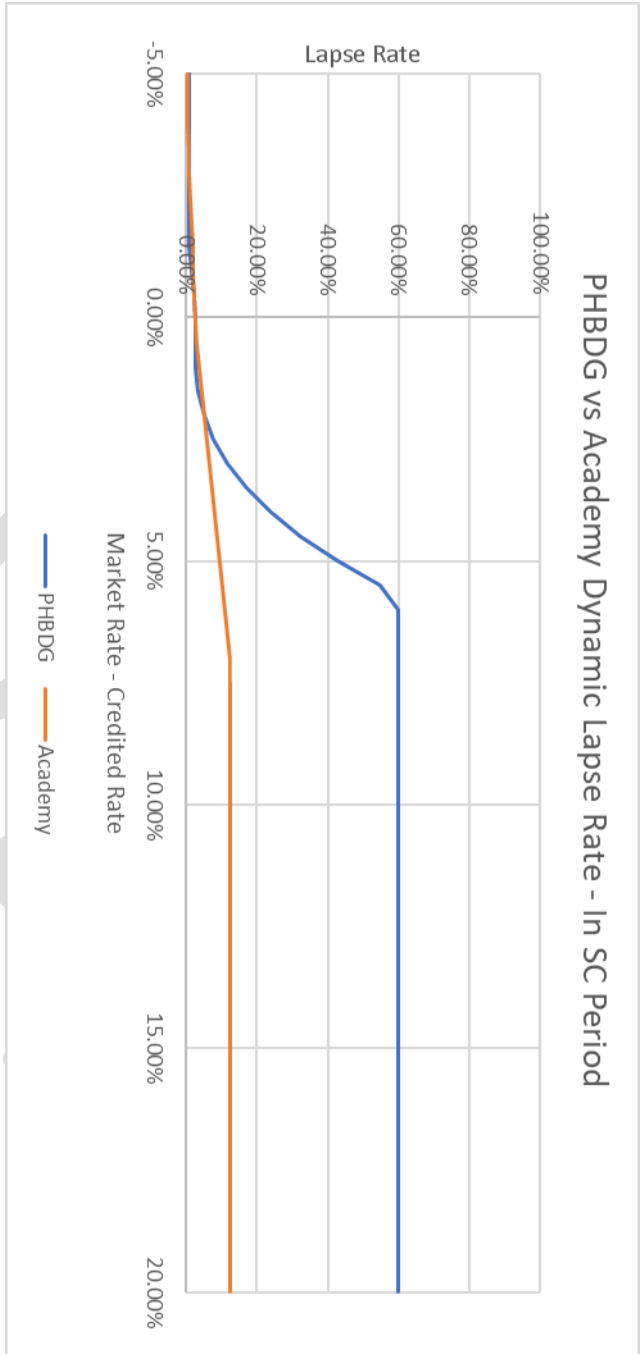Dynamic Lapse rates are developed the following types of FIA policies:

- FIA without GLB
- FIA with GLB

The PHBDG originally proposed the framework in the left column, which featured a multiple of 1.25 and exponent of 2.5 for the Credited Rate – Market Rate adjustment. The Academy responded to the proposal and recommended using a linear formula (exponent 1), with multiples varying by In SC Period/Shock/Post-Shock. The Academy also recommended changes to market rate, minimum/maximum lapse rates, and the buffer factor (the buffer factor defines the minimum difference in rates before dynamic lapse occurs). The Academy also recommended a factor for the ratio of the contract GMIR to the current SNFL rate, but further clarification is needed on how this is intended to function.

PHBDG		Academy	
Total Lapse = (Base Lapse + Rate Factor) * ITM Factor		Total Lapse = (Base Lapse + Rate Factor) * ITM Factor	
ITM = PVGMWB/AV		ITM = PVGMWB/AV	
ITM Factor = 1	if ITM=<1.25	ITM Factor = 1	if ITM=<1.25
$= (1.25/ITM)^2$	if ITM>1.25	$= (1.25/ITM)^2$	if ITM>1.25
		= 0	if AV = 0
Rate Factor = Market Factor × Max [0, 1–5*(SC percentage - MVA)]/100		Rate Factor = Market Factor × Max [0,1–10*(1- CSV/AV)]*GMIR/SNFL Era Factor	
Market Factor = -1.25 * (CR-MR)$^{2.5}$	if CR>=MR	Market Factor = X * (CR-MR)	if CR>=MR
= 0	if MR>CR>=(MR-BF)	= 0	if MR>CR>=(MR-BF)
= 1.25 * (MR-BF-CR)$^{2.5}$	if CR<= (MR-BF)	= Y * (MR-BF-CR)	if CR<= (MR-BF)

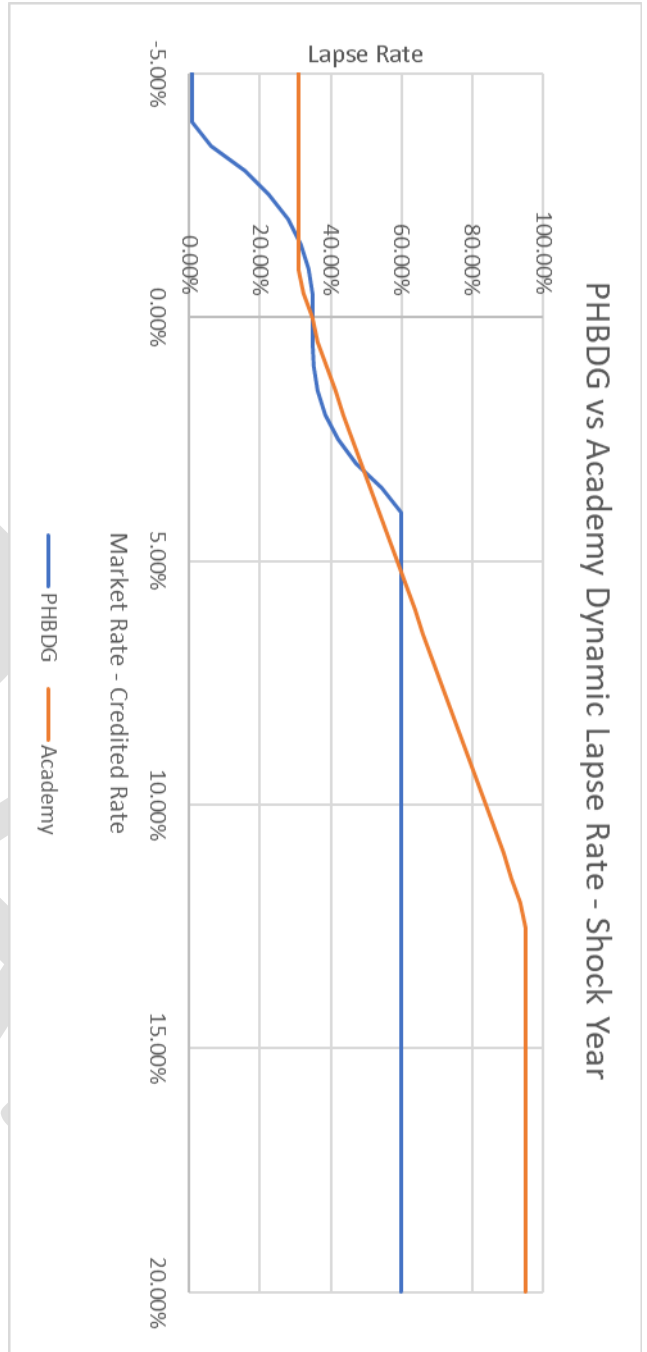|	
MVA = $[(A/B)^t - 1]$ A = [1 + the closing effective yield of the "MVA Index" on the issue date] B = [1 + the closing effective yield of the "MVA Index" two days before the withdrawal, *surrender*, or annuitization] t = the number of days from the date of withdrawal, *surrender*, or annuitization to the next contract anniversary divided by 365, plus the number of whole years from the next anniversary to the end of the surrender charge period.	MVA = Embedded in CSV X = 1 during the SC period; 5 at shock; 3 thereafter Y = 3 during the SC period; 5 at shock; 6 thereafter
CR = crediting rate at the time of projection	CR = crediting rate, or the option budget, at the time of projection
MR = market rate at the time of projection	MR = 10 Year UST + 60%BBB/40% A spread
Min Total Lapse = 1%	Min Rate Factor = -2%; -4% at shock
Max Total Lapse = 60%	Max Rate Factor = 10% during SC period, 60% at shock; 35% thereafter
GMIR/SNFL Era Factor = None; N/A	GMIR/SNFL Era Factor = TBD
Buffer (BF) = 0.50%	Buffer (BF) = 0.25%

Examples:

PHBDG vs Academy Dynamic Lapse Rate - In SC Period

Assumes 2.5% base lapse rate, 5% surrender charge.

PHBDG vs Academy Dynamic Lapse Rate - Shock Year

Assumes 35% base lapse rate.

ORLANDO

NAIC
2023 FALL NATIONAL MEETING

Update on Mortality Experience Data Collection

Pat Allison, FSA, MAAA

November 29, 2023

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS   1

2023 FALL NATIONAL MEETING   **NAIC**

Agenda

- Participating Companies Trend
- Valuation Manual Changes
- Status of Reporting Year 2021 (Observation Years 2018 & 2019)
- Status of Reporting Year 2022 (Observation Year 2020)
- Challenges
- Status of Reporting Year 2023 (Observation Year 2021)

Participating Companies

Reporting Year	Observation Year	Number of Companies*	Record Count (approx.)
2021	2018	108	95 million
2021	2019	108	97 million
2022	2020	105	98 million
2023	2021	103	TBD

The number of companies has decreased over the years, but this is due to mergers and companies falling below VM-51's $10 million premium threshold for exemption.

* Two companies involved in a novation are counted separately (these are combined in the aggregated data file provided to the SOA).

Valuation Manual Changes

Reporting Year 2022 (Observation Year 2020)
- Added additional field to allow for reporting of data by a reinsurer or third-party administrator
- Introduced new plan codes for Paid-Up Additions and One-Year Term purchased with dividends (voluntary for 2020 observation year)
- Introduced Death due to Covid-19 termination cause (voluntary for 2020 observation year)

Reporting Year 2023 (Observation Year 2021)
- Plan codes for PUAs and One-year Term purchased with dividends became mandatory
- Death due to Covid-19 termination cause became mandatory
- Final deadline for submissions was officially changed to 2/28/2024

Reporting Year 2024 (Observation Years 2022 & 2023)
- Reporting lag was removed
- One-time collection of 2 Observation Years to catch up

NAIC

Status of Reporting Year 2021
(Observation Years 2018 & 2019)

- Each company received a spreadsheet from the NAIC showing Actual to Expected (A/E) mortality ratios calculated based on their data. Sign-offs were requested on the reasonableness of the A/Es.
  - This exercise identified data exceptions for a number of companies that required resubmissions.
  - As of 10/31/23 all but 1 small company had approved their A/E ratios. The decision was made to include their data in the final aggregated data file delivered to the Society of Actuaries.

- Currently the Individual Life Experience Committee (ILEC) is working with the NAIC to review and analyze the final aggregated data file.

- Now that company data submissions are final, reports for regulators can be prepared as desired.

NAIC

Status of Reporting Year 2022
(Observation Year 2020)

- The NAIC is continuing to work with companies whose data is not yet acceptable. We expect this to be resolved with data resubmissions.

- The A/E analysis has been sent to most companies and many have responded. The NAIC will be reaching out to those not responding to determine if additional information is needed.

- Although reporting of COVID-19 deaths was optional, many companies used the new code on a voluntary basis.

Challenges

- There has been a significant amount of turnover of company contacts preparing the data submissions.
  - This has resulted in confusion regarding the requirements and the process.
  - In some cases, it has required new training of company personnel.

- There have been inconsistencies regarding the data quality from year to year.
  - Companies that had clean data one year may have numerous data exceptions the next year.
  - There have been inconsistencies with the coding of certain fields.

Status of Reporting Year 2023
(Observation Year 2021)

- The NAIC has received data submissions from approximately 68 companies.
  - In the near future, the NAIC will be reaching out to those companies that have not submitted an initial data file.

- In addition to the feedback provided in prior years, the NAIC will be providing a 4-year trend of key data fields.

- A/E spreadsheets will be provided for each data submission.

- Field Distribution PowerPoint slides will be provided with the initial data validation review.

![American Academy of Actuaries logo]

November 20, 2023

Ms. Rachel Hemphill, Chair, Life Actuarial (A) Task Force (LATF)
Mr. Philip Barlow, Chair, Life Risk-Based Capital (E) Working Group (Life RBC)
Mr. Mike Yanacheak, Chair, Generator of Economic Scenarios (E/A) Subgroup (GOES Subgroup)
National Association of Insurance Commissioners (NAIC)

Dear Ms. Hemphill, Mr. Barlow, and Mr. Yanacheak,

On behalf of the Economic Scenario Generator Subcommittee (ESGS) of the American Academy of
Actuaries,[1] I appreciate the opportunity to comment on the Generator of Economic Scenarios (GOES)
Corporate Model Decision[2] as it relates to the prescribed economic scenario generator for the purpose of
determining statutory reserves and capital on long duration life and annuity products.

Summary Comments

The ESGS supports the use of the Academy's Alternative Corporate Model presented to LATF on 10/27/22.
The Model is fully and publicly documented and meets the proposed stylized facts and acceptance criteria.
Publicly available model documentation enables public analyses and transparent discussion and feedback,
which can strengthen model governance. Public documentation also supports small companies with limited
resources, as it allows them to leverage the public analyses performed by academia and the broader
profession.

The ESGS would not support GEMS™ Corporate Model for this particular purpose because its
documentation is intentionally and knowingly largely incomplete due to its proprietary nature. The lack of
documentation fails to comply with the NAIC's original request for proposal (RFP) for this project[3] and
would require actuaries to deviate from best practice, since the model's internal workings cannot be
understood, nor can its results be reasonably reproduced or independently tested. Without adequate
documentation, it is impossible to know if the model is appropriate for the intended purpose, as it is unclear
if the model's behavior will change as economic conditions evolve. Acceptance criteria alone won't be

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[1] The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S.
actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership,
objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and
professionalism standards for actuaries in the United States.

[2] Life Actuarial (A) Task Force and Life RBC (E) Working Group Exposure 10/18/23: GOES Corporate Model Decision.

[3] Deliverable I in the NAIC's RFP is "Full documentation on the ESG specifications, calibration, and tools."

1

enough to evaluate the model and its calibration when so little is known about it.[4]

It is not necessary that model documentation allows knowledgeable actuaries to exactly replicate the model's parameters and scenario sets. However, it should allow actuaries to have sufficient understanding of the model and its behavior under different, initial conditions to recover the essence of the statistical distribution the model is designed to produce (e.g., percentiles and other statistical metrics) and opine on that distribution, its dynamics, and fitness for purpose. [5]

Detailed Comments

Should an assumption be important enough to be prescribed in PBR, it follows that the relevant actuarial standards of practice (ASOPs) and best practices be followed in the assumption's development, documentation, and application. Assumed stochastic returns on corporate bond funds may be prescribed and/or produced with commercially available software, but many PBR actuaries would still consider whether the prescribed assumption is reasonable or has material limitations that could understate reserves. At the risk of losing credibility, the framework for PBR should allow for PBR actuaries to be able to explain to a company's Board, rating agencies, and others exactly how and why the PBR corporate assumptions behave differently from the assumptions the company used in its own economic views, risk management analysis, etc. This is especially true should those assumptions drive materially different results. Both situations require underlying model information beyond what's available for GEMS™.

While we believe the GEMS™ corporate model documentation provided to date is inadequate for evaluating whether the model is fit for the purpose at hand, it does suggest more broadly that the model may be overly complex. Models can require considerable work by actuaries to understand and could complicate future efforts by the NAIC to rationalize and establish consistent treatment of credit spreads and default costs through statutory regulation (e.g., general account vs. separate account, reserves vs. capital vs. asset adequacy testing). Using such a sophisticated model to simulate returns on a few corporate bond funds (e.g., one that models a universe of individual bonds migrating over dozens of credit ratings) is akin to using a multi-state long-term care model to simulate deaths on traditional life insurance policies. As we continue to work towards a solution, it is important to keep in mind that some solutions may lead us towards an answer, but they may not be the most efficient means to get there. A compounding factor in this scenario rests on the idea that the model employs overly sophisticated components to simulate returns for a few corporate bond funds, while those same sophisticated components are also most likely to be considered proprietary and not publicly documented.

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[4] The documentation provided for GEMS™ Treasury and Equity models, while not enabling exact replication of results, does provide enough information on formulas, parameters, etc., that when combined with other Conning statements gives us enough to understand the model's dynamics, strengths, and limitations so that we can implement an approximate replication and evaluate fit for purpose.

[5] For example, Actuarial Standard of Practice (ASOP) No. 56, Modeling, provides guidance to actuaries when performing actuarial services with respect to using, reviewing, or evaluating models. Section 3.1.2 of ASOP No. 56 states actuaries "evaluating the model … should confirm that, in the actuary's professional judgment, the model reasonably meets the intended purpose." Section 3.1.3 of ASOP No. 56 states that "[w]hen using the model, the actuary should make reasonable efforts to confirm that the model structure, data, assumptions, governance and controls, and model testing and output validation are consistent with the intended purpose."

The limited documentation provided on the GEMS™ Corporate Model reflects a stochastic spread process that allows for spreads to blow out, correlations between corporate spreads and equity returns, and a stochastic process involving a transition matrix for ratings migration. It also conceptually describes how long-term spread targets are set. What is missing are equations for any of the stochastic processes, including the spread jump process, information on the form or parameters of the statistical distributions, the strength and direction of relationships underlying the spreads and transition probabilities, and a description of how migrations, spreads, defaults, recoveries, transaction costs, and bond returns are calculated. The appendix includes a list of sample documentation components for a corporate bond ESG model, the majority of which are currently not publicly available for the GEMS™ Corporate Model.

The NAIC adopted Actuarial Guideline (AG) 53 last year, which raised expectations for company actuaries and regulators in terms of how they understand asset risk/return relationships in Asset Adequacy Testing (AAT). A limited, one-sided discussion of spreads, without an understanding of corresponding migration/default costs, would be concerning for both AAT and PBR. Without understanding how the model works, including its formulaic relationships and calibration, evaluating the risk/reward relationships as well as the reasonableness and fit for purpose of model/calibration is impossible.

As a liability analogy, a VM-31 PBR report would likely be considered inadequate if it stated a dynamic lapse assumption that varies by in-the-money (ITM) was used and only provided a high-level description of how base at-the-money (ATM) ultimate lapse rates are set, with no information about the form of the dynamic function (e.g., linear vs. S-curve) or its parameters, the definition of ITM used (nominal guarantee amount vs. present value, any rate definition), the other drivers of the assumption (e.g., if it varies by withdrawals or not), and the base ATM rates (and how they're set) prior to the ultimate period.

While we can compare a few excess return statistics between the GEMS™ and Academy corporate models, or between the GEMS™ model and the acceptance criteria, the utility of this is limited without an adequate understanding of the GEMS™ model structure, relationships, and calibration. For example, without such understanding we cannot properly determine (e.g., for risk management and/or pricing purposes) how model performance, scenarios, and reserve and capital levels will change from one period to the next as the market environment changes, e.g., whether differences are due to the model's structure and relationships or its calibration. If under certain market environments the two models produce similar excess returns, there is not enough known to determine if excess returns will remain similar under different market environments, e.g., different equity levels, equity volatilities, interest rate levels, interest rate volatilities, or any other factors that could be part of the undocumented stochastic processes.

From the limited scenario sets and comparisons we have seen, the GEMS™ High Yield excess returns seem overly optimistic. The possibility of spreads blowing out further in adverse, but short of worst-in-history, credit markets appears potentially understated. However, there is no way to determine if this is due to the underlying model or the calibration of the spread jump process, migration probabilities, loss given default assumptions, or something else.[6]

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[6] Although some limited information has been provided for the spread component of the model, we cannot analyze the distribution of spreads because only total returns (i.e., not spreads) are provided in the basic data set.

The formulas and relationships in the Academy corporate model for spreads and migration/default/transaction costs are fully documented and all implementation details are available in both a spreadsheet and in Python code. The relatively simple model structure is not overly complex, facilitates understanding, meets the stylized facts proposed for the purpose at hand, and can be calibrated to meet the acceptance criteria. With inadequate model documentation, it is not clear that the GEMS™ corporate model can meet the same threshold. Without such documentation we support the use of the Academy's Alternative Corporate Model.

Closing Remarks

The ESGS appreciates the opportunity to comment on the proposals and looks forward to our continued collaborative efforts with regulators on this important issue. Please direct any questions to Amanda Barry-Moilanen, life policy analyst at barrymoilanen@academy.org.

Sincerely,

Jason Kehrberg
Chair, Economic Scenario Generator Subcommittee

Appendix—Sample documentation components for a corporate bond ESG model

1. Model overview

2. Comparison to other model forms (e.g., trade-offs)

3. Model limitations and risks

4. Stochastic process equations (e.g., stochastic modulator, jump process, information on how volatility decays over time, volatility clustering process under low vs. high spreads, functional definitions, relationships between market variables)

5. Credit migration/transition process

6. Default and recovery rate assumptions/behavior

7. Correlation assumptions (e.g., correlations between spread targets, applicability of non-consistent correlation matrices for producing real-world scenarios)

8. Calibration targets (e.g., benchmarks and time periods used, sources and use of historical data, derivation approach)

9. Calibration process (e.g., for spreads, for defaults, role of judgment)

10. Tail calibration

11. Parameter values, bounds, and estimation process

12. Frequency of parameter updates

13. Fitting/estimation process (e.g., to initial term structure, to time-varying targets)

14. Spread initialization process (e.g., fitted vs. interpolated tenors)

15. Total return calculation (e.g., yield curves/bond universe used, Treasury tenors used, process for which bonds remain in the fund)

16. Validation methodology/results (e.g., performance vs. targets and acceptance criteria)

17. Distribution statistics (e.g., volatility, dispersion, skew)

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November 13, 2023

Rachel Hemphill,
Chair, National Association of Insurance Commissioners (NAIC) Life Actuarial (A) Task Force (LATF)

Craig Chupp
Vice-Chair, NAIC LATF

Philip Barlow,
Chair, NAIC Life Risk-Based (E) Capital Working Group (LRBC)

Re: Generator of Economic Scenarios Corporate Model Decision

Dear Chair Hemphill, Vice-Chair Chupp, and Chair Barlow:

The American Council of Life Insurers (ACLI) appreciates the opportunity to submit comments on the Generator of Economic Scenarios (Generator) Corporate Model Decision document, which was exposed on October 18.

Based on the documentation currently available for the generator, ACLI supports the use of the American Academy of Actuaries corporate model (Academy Model) over the use of the GEMS corporate model (GEMS Model). The Academy Model is technically comparable to the GEMS Model and provides significantly more documentation to understand the behavior of the model in various market conditions, which is necessary for robust and accurate risk management. The complexity of the GEMS Model creates additional challenges that necessitate a greater level of documentation than is currently available.

ACLI appreciates that significant time and resources have been spent to develop the new Generator. The Generator is critically important to support key life insurance industry practices

acli.com

including financial reporting requirements and internal company capital planning. The Generator needs to be robust, subject to a measurable, quantifiable, and transparent set of acceptance criteria, and fully transparent with respect to model features and operation.

The Generator has far-reaching implications for companies. In addition to impacting the level of reserves and capital, understanding the level and volatility of statutory reserves and capital is critical for sound risk management and capital planning, setting RBC targets, hedging, new business pricing, and dividend decisions.

We believe the Generator should be as transparent as possible so practitioners can understand its various features and implications. The absence of full transparency increases uncertainty and risk for the life insurance industry, which serves to diminish the capacity for effective risk management.

While the corporate model is typically not the largest driver of reserves or capital, it could still have material impacts if actual results are significantly different from expectations. Industry wants to be able to reliably predict how the scenarios for the corporate model will respond in different market conditions, just as we would expect for the equity returns and interest rates models.

However, should adequate documentation as previously requested by ACLI be provided for the GEMS Model and an appropriate level of understanding be attained via further review, we will revisit our position.

Detailed technical comments and a supporting example are presented in Appendix A.

Thank you once again for your consideration of our comments. We look forward to discussing our feedback at a future session of LATF.

Sincerely,

B Banferli   *Colin Masterson*

cc: Scott O'Neal, NAIC

Appendix A: Technical Comments and Questions

GEMS Model complexity:

The GEMS Model models the fundamental risk factors (credit transition densities with six credit ratings and recovery at default) and translates those risk factors into the resulting credit spreads and bond funds, which is a theoretically sound and flexible approach to model spreads with any combination of rating/tenor.

- The challenge with this approach is that the model may be too complex for this purpose without adding enough corresponding value. If only criteria on the four spread indices are utilized, we believe the model will overfit which diminishes the value of the model as an effective financial risk management tool.
- Specifically, the overfit may allow the resulting scenarios to meet the criteria at the specified terms/tails/starting market conditions but may show unreasonable statistics outside those given terms/tails/starting market conditions.
- The Academy Model directly targets observable risk factors (credit spreads and bond fund returns for four rating/tenor combinations), This targeting makes it easier to calibrate, understand and interpret the results, without the concern of the overfit.

Availability of documentation:
The absence of additional documentation for the GEMS models prevents a practitioner from assessing how the model was calibrated and interpreting the results.

- Lack of transparency into the GEMS Model makes it challenging to get comfortable with the results of the model and accurately predict credit impact on the level and volatility of reserves and capital.
- Funds covered by the corporate model comprise a meaningful portion of separate account assets for products in scope for the new Generator. The first field test suggests approximately 28% of separate account assets for VM-21 / C-3, Phase II are under scope, so the impacts of the uncertainty could be material.
- While some perspective has been provided on the GEMS model, the absence of comprehensive documentation results in a lack of transparency necessary to support appropriately effective risk management.
  - Comprehensive documentation (e.g., stochastic process equations and parameters) is needed to obtain the level of visibility into model dynamics and predict how credit scenarios will evolve over time. This level of documentation will likely be challenging to provide for GEMS due to the proprietary nature of the model.
  - The Academy Model provides transparent documentation to understand these dynamics.
- We do not yet fully understand how much results can differ from the Academy Model over longer time horizons. A recalibrated version of the GEMS Model to have long-term targets to be consistent with the Academy Model has not been shared at this time.
- The Academy Interest Rate Generator is public, so modeling software vendors have been able to integrate it into their software. Thus, scenarios can be generated within insurers' modeling platforms. This integration with modeling software allows companies to 'add on' to the Generator in a customized manner if the default Generator does not meet the company's needs. For instance, a company could integrate separate dividend rates and

implied volatilities models to calculate index option costs for VM-21 calculations. A lack of public documentation may limit software vendors achieving this level of integration. This could create operational challenges for insurers, such as forcing insurers to navigate how to add these assumptions for each scenario.

Example:

A summary of key comparisons between the Academy Model and the GEMS Model is in the graphs below. A high-level observation is that the difference over the short term (1-Year) horizon is driven by different form in the spread process, whereby the GEMS Model projects lower potential spread widening relative to 3/2020 spreads which results in higher tail outcomes in excess return. Thus, 1% of the excess distribution under the GEMS Model would produce no loss for IG 1-5, compared to 5% loss under the Academy Model (red A in graph below). For HY there appears to be a tangible difference in implied frictional cost relative to elevated rate levels, such that in 2008 even the worst 1yr HY return under GEMS is +27% at 1% severity, compared to a 14% loss from the Academy Model (red B in graph below).

Given the lack of transparency regarding the GEMS Model, it is not possible to make an appropriate comparison.

GWF Comparison: 1% severity over 1 year
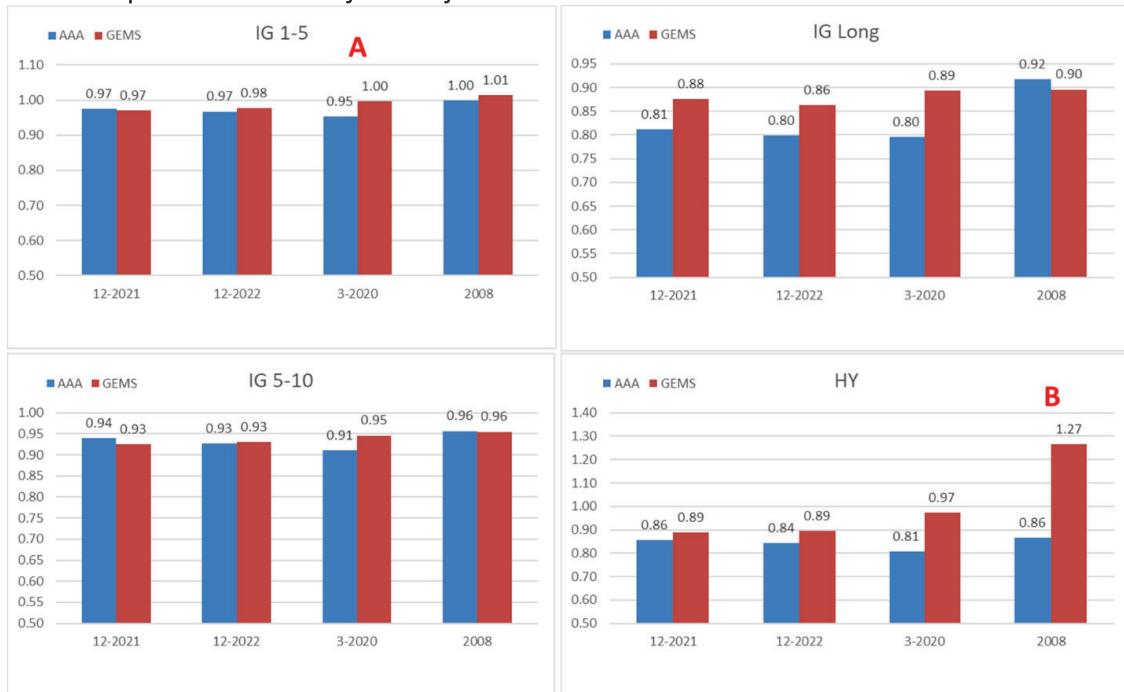
The difference continues to be an issue at the 30-Year horizon. Looking at the comparison, in 2008 even the worst 30-Year IG Long cumulative return under GEMS Model is +227% compared against +174% for the Academy Model (red C in graph below). HY has even more severe differences, with +373% cumulative return under GEMS Model compared to 228% in Academy Model (red D in graph below).

GWF Comparison: Median over 30 years

IG 1-5

	12-2021	12-2022	3-2020	2008
AAA	1.25	1.28	1.37	1.51
GEMS	1.22	1.26	1.39	1.57

IG Long — C

	12-2021	12-2022	3-2020	2008
AAA	1.20	1.26	1.49	1.74
GEMS	1.41	1.47	1.81	2.22

IG 5-10

	12-2021	12-2022	3-2020	2008
AAA	1.25	1.30	1.40	1.56
GEMS	1.30	1.37	1.57	1.85

HY — D

	12-2021	12-2022	3-2020	2008
AAA	1.85	1.96	2.33	3.28
GEMS	2.28	2.41	3.05	4.73
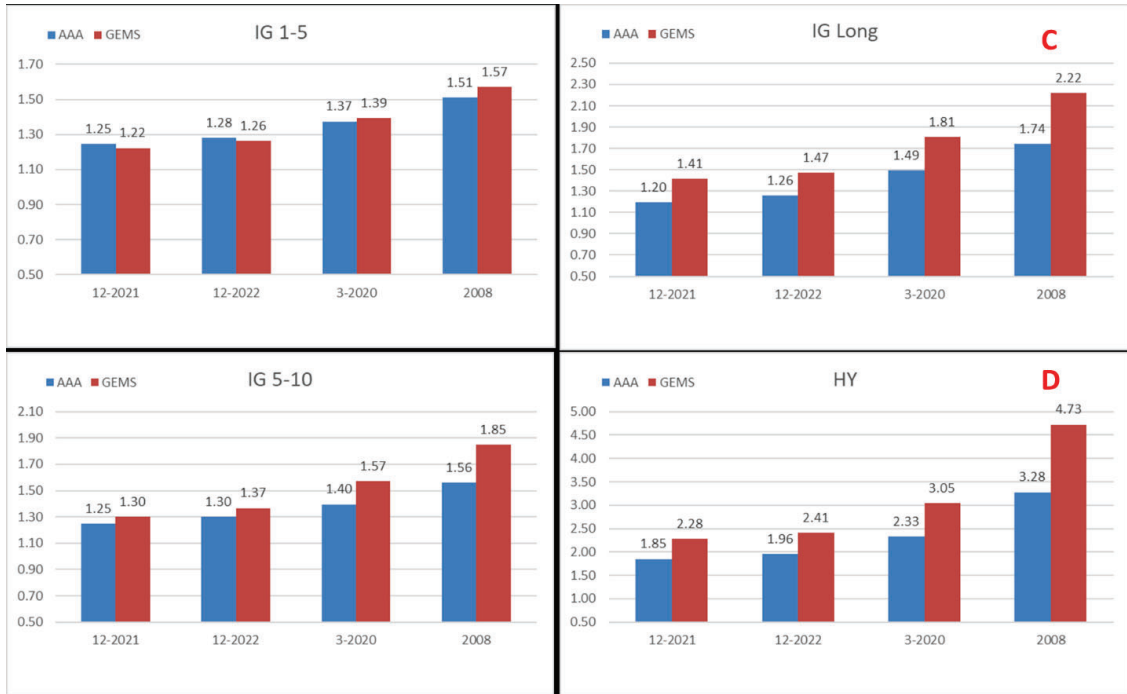
November 7, 2023

To: Scott O'Neal

From: Jack Cheyne, Senior Director - Scenario Generator Product Management

Subject: Comments and Feedback on the "GOES Corporate Model Decision"

Moody's Analytics appreciates the opportunity to provide comments on the questions regarding the GOES corporate model "GOES Corporate Model Decision Exposure 101823.pdf".

This note directly addresses the questions set out by the NAIC below:

» Bearing in mind that there will be updated quantitative comparisons of the corporate models, please indicate whether you are currently supportive of utilizing the Conning GEMS® corporate model, the American Academy of Actuaries Economic Scenario Subcommittee's corporate model (see Attachment A), and/or believe either model may be appropriate. Please provide a rationale, including what you see as the relative strengths and weaknesses of each of the models

» Please note and explain any material deficiencies in the current documentation provided for the Conning GEMS® corporate model see (Attachments B and C). Straightforward, specific illustrations of the practical impact of any deficiencies are encouraged.

Background on Corporate Bond Asset Return Modeling

At Moody's Analytics, we possess extensive experience in supporting a variety of modeling and calibration approaches. These approaches are used for the stochastic projections of credit-risky asset returns, corporate spreads, defaults, and transitions at both broad market and individual issuer levels. It is important to note that credit modeling is one of the more complex risk factors to model comprehensively. It is generally viewed as requiring more scrutiny than nominal rates or equity return modeling due to the fact there can be a variety of components contributing to the asset returns. For users to be comfortable and confident in using these models they require transparency and clarity on the model and its calibration. Furthermore, an understanding of the known limitations of the model and its outputs is key.

When selecting a model, the use-case should be a primary consideration. It is important to choose an appropriate level of model-complexity, granularity (e.g. broad market versus issuer-level dynamics), and robustness of methodology. While more complex models can offer some advantages, they can also, in certain instances, lead to a lack of visibility or understanding when applied to simpler use-cases.

In the fields of insurance (both Life and P&C), pensions, and asset management, the need for stochastic projections can span a variety of use-cases. We could consider categorizing these into the following high-level descriptions:

» **Asset returns only:** Projection of portfolios (on an asset-class level) for a range of risk and return analysis. The focus is generally on portfolio level metrics of expected return and risk (vol, VaR, cVaR, etc…).

» **Asset and Liabilities**: This is similar to the use-case above but also includes a stochastic projection of liabilities. Focus is generally on portfolio level metrics of expected return and risk (vol, VaR, cVaR, etc…) both on an absolute basis and relative to liabilities. This also entails analysis of capital and reserving metrics. Here a focus on the correlation of asset returns with liability risk factors is important, and also the joint behavior of these variables in the tails of the distribution. **This level of analysis is aligned with the typical requirements for the regulatory Principles Based Reserves and capital calculations.**

» **Asset and Liabilities with credit-sensitive liabilities:** This use-case requires the projection of an asset portfolio in conjunction with liabilities that are sensitive to either credit defaults or credit spreads. The focus is generally on portfolio level metrics of expected return and risk (vol, VaR, cVaR, etc…) both on an absolute basis and relative to liabilities. It is necessary to have the coherent modeling of liabilities and assets on a trial-by-trial basis with granular control of spreads, defaults and transitions. In this use-case the direct interaction between the credit risky asset returns, credit spreads and default/transition risk factors are critical to the risk analysis.

» **Advanced investment strategy design:** This use-case looks at a range of investment strategies that incorporate assets with credit risk (and their alignment with liabilities e.g. duration matching). As part of this analysis, consideration can be given for long/short portfolios, variation in credit risk/rating and dynamic rebalancing strategies. The aim here is to identify beneficial risk and return trade-offs across different credit quality and durations of assets. This can involve going beyond asset-class or index level analysis to focus on dynamic and time varying strategies. Furthermore, this can include the investigation and development of these strategies to align with liability portfolios and key liability risk drivers.

» **Credit portfolio management**: This use-case focuses on the selection of securities or the understanding of credit and market risk within an asset portfolio. Here understanding individual issuer risk and correlation across issuers is absolutely critical. Alignment and correlation with equity (and other risky assets) and the ability to model these alongside the liability risk factors such as yield curves is also a key requirement.

For these use-cases, insurers typically consider three types of models to tackle these problems:

» **Simple models focused on asset returns**: These are similar to the AAA type model or variation of model proposed by the American Academy of Actuaries Economic Scenario Subcommittee. The focus is on having a direct relationship between the model parameters and the asset returns that are produced. These models do not typically model explicit spread curves (by maturity and rating), defaults or transition dynamics but may have stochastic processes that capture a credit spread type risk driver.

» **Reduced Form Models**: These are similar models to the NAIC proposed model from Conning. These models generally capture credit spreads, transitions and defaults. They are used in pricing assets and can be coupled with asset rebalancing strategies to produce credit risky asset returns.

» **Issuer Based Models**: These models capture granular correlation dynamics between issuer defaults and asset price changes. These models can be considered "bottom-up" in the sense that individual holdings/issuers are modeled and are grouped into an asset portfolio for the purpose of asset projections. These models track market values and the credit quality/status of all issuers thus allowing very granular risk analysis. For example, this can provide details of which holdings are contributing to the key risk and capital metrics of the portfolio.

A summary of the typical choice of model for each use-case is shown below. This mapping is not exhaustive, but provides some insight into the typical approaches insurers, pension firms and asset managers consider in practice.

Model to Use-Case Mapping	Asset Returns Only	Assets and Liabilities	Assets and Liabilities with credit sensitive liabilities:	Advanced investment strategy design	Credit portfolio management
Simple Asset Return Model	✔	✔	✘	✘	✘
Reduced Form Model	✘	✔	✔	✔	✘
Issuer Based Model	✘	✘	✔	✔	✔

It is important to note that the choice of model is typically driven by three key areas of focus:

» The strengths and weakness of the model in relation to the use-case

» The importance of accurate and granular credit risk models to the key metrics that the use-case considers. For some risk analysis the dominant dynamics will be interest rate and equity risk. In these instances, the choice of credit modeling approach could have minimal impact on key risk metrics.

» The ability of the users and key stakeholders (internal and external) to understand the models and key model dynamics. Users of these models have to invest significant time to understand the models and communicate them. In many instances the investment to understand credit risk modeling can exceed that of the other less complex risk factors, e.g. interest rate and equity risk. If the importance of this risk factor on the overall results is not high enough, then users can feel they are spending a disproportionate amount of time in understanding, educating and communicating these models to their stakeholders. This generally leads to users balancing model complexity with its importance in the use-case. For use-cases that are less "credit-sensitive", users will generally opt for simpler modeling approaches.

In the next section we highlight the strengths and weaknesses of some of the modeling approaches that are considered when choosing an appropriate model. The Issuer Based Modeling approach (popular in credit portfolio management applications) goes beyond the requirements discussed by the NAIC, so we exclude this from the following discussion.

Strengths & Weaknesses of the Proposed Modeling Approaches

The following table provides some insight into the relative strengths and weaknesses of the types of models suggested by the NAIC. **It is important to note that we are not able to comment directly on the Conning model as the NAIC has not provided detailed documentation on this model.** There are many parameters, model dynamics and calibration methods that have not yet been disclosed.

Our summary below is not meant as a model to model comparison, but instead compares the types of models that we have implemented at Moodys Analytics and have supported with hundreds of insurers for a wide range of use-cases.

Model Relative Strengths and Weaknesses	Simple Asset Return Model	Reduced Form Model
Direct link of the model parameter to asset return outputs	✔	✘
Model has a small number of parameters and is relatively concisely documented	✔	✘
Model is straightforward to recalibrate to simple alternative views on asset returns	✔	✘
Calibration of the model involves a focus on historical asset return behavior	✔	✘
Model can produce non-zero correlations between different corporate bond fund asset returns and different risk factors	✔	✔
Model can capture initial market spread levels (and links this to asset returns)	✔	✔
Model can capture appropriate long term spread level (and links these to asset returns)	✔	✔
Model can be configured to be arbitrage free w.r.t asset prices	✘	✔
Model can capture a term structure of credit spreads by rating and maturity	✘	✔
Model can capture explicit default and transition dynamics (and links these to asset returns)	✘	✔
Model can capture different recovery rate assumptions (and links these to asset returns)	✘	✔
The model has many parameters covering credit spreads, recovery rates, transition, default that can provide different views on each of these dimensions of credit risk	✘	✔
Model capture tail risk between equity returns and credit defaults	✘	✔
Direct modeling of defaults and credit rating changes for issuers	✘	✔
Ability to model a wide range of asset rebalancing strategies	✘	✔
Model can be easily reconfigured to model funds of different credit ratings and maturities or rebalancing strategies	✘	✔

Ability to capture cashflows related to defaults and different assumptions for recovery rates on default	✕	✔
Ability to correlate default risk between issuers. This can have a big impact on tail risk in credit-risky asset portfolios.	✕	✔
The model can separate returns into capital returns (price changes) and income returns (coupon/cashflow payments).	✕	✔

As can be seen above, both models have strengths and weaknesses. Our conclusion regarding the support of NAIC adopting these modeling approaches is as follows:

» Either model type could potentially provide an appropriate choice for the NAICs stated requirements. However, this is based on the assumption that the models and, most importantly, the calibration of the models, is sufficiently well documented and justified.

» The NAIC has not provided sufficient documentation on the reduced form model from Conning to assess how the model is implemented (i.e. if it can align with the strengths/weaknesses highlighted in the table above). In addition, there is not enough information on how the model is calibrated for each of the key components – spreads, transitions, defaults, recovery rates, asset pricing and asset strategy (fund index) rebalancing.

» The limitations of the calibration and model dynamics need to be transparent and well documented. The American Academy of Actuaries Economic Scenario Subcommittee have provided some detail on this with their simplified model, but unfortunately this information is not currently available for the alternative reduced form model from Conning.

» The reduced form model from Conning has potentially many advantages over the American Academy of Actuaries Economic Scenario Subcommittee simplified model, as highlighted in the table above. This reduced form model can be more widely used for a larger set of use-cases and the additional modeling complexity allows it to capture more accurately and granularly different areas of credit risk. We have seen this type of model used very successfully by insurers globally when this model and calibration are supported by clear documentation.

» We would encourage the NAIC to focus on a model choice that meets their stated requirements and is transparently documented. This may mean the model may not be appropriate for more complex modeling use-cases for insurers, but it will meet the needs of regulatory reserves and capital calculations. With this in mind we would encourage the NAIC to significantly increase the level of detail of documentation related to the reduced form model including its limitations. In the absence of any additional information on the reduced form models and their calibration, the American Academy of Actuaries Economic Scenario Subcommittee's corporate model may be the relevant choice.

In the next section, we discuss the additional documentation that could be useful in supporting insurers understanding the reduced form type models.

Documentation Extensions

The level of documentation published by the NAIC on the Conning credit model is at a high level. The documentation published by the NAIC regarding the modeling of nominal rates and equity returns has significantly more detail on the nature of the model and how it is calibrated.

It is important to note that the reduced form model that the NAIC has proposed appears similar in nature to other credit models adopted by Moody's Analytics (and other modeling providers). These types of models are significantly more complex than the nominal interest rate or equity models. The interest rate and equity models benefit from a relatively close alignment between the stochastic models and key outputs that users are consuming in their reserve and capital calculations, e.g. yield curves or equity asset returns.

In the reduced form credit model, there are several components that play a role in the generation of asset returns:

» Underlying transition matrix and default assumptions

» Choice of the number of credit rating buckets to be modeled

» Stochastic process for spreads

» Stochastic process for defaults and upgrades/downgrades

» Recovery rates or assumptions on what happens when a bond defaults.

» Correlation of spreads with other risk factors

» Correlation of defaults with other risk factors

» Correlation of default/downgrade/upgrade of different issuers in an index/portfolio/fund

» The rebalancing strategy for the buying and selling of bonds in the portfolio over each timestep

In addition we are aware from the documentation published by the NAIC on the nominal interest rate model that there are references to adjustments to the classical implementation of the CIR process. These enable the outputs of the model to better fit the initial yield curve. These adjustments can lead to arbitrage in the model or other unexpected consequences, and it is important they are clearly documented and understood.

With the implementation of the reduced form models, it is important that documentation cover these model overlays or adjustments to the model dynamics. A few examples of such adjustments are mentioned below:

» Adjustment of the model to better fit the initial spreads curves

» Adjustment of the model to stabilize long term distributions

» Adjustment of the model to better fit historical default or transition levels

We are not aware if any of these are relevant in the Conning model the NAIC is considering, but these are the kinds of adjustments and variations we have seen in our own experience of developing and using the reduced form credit models.

In our experience of working with insurers, they will request and require documentation on all of the points above.

Below we provide some explicit examples of the level of documentation that has been requested of us by our users for these types of credit model:

» Model documentation covering the mathematics behind the stochastic processes driving the model e.g. the stochastic equations. These need to cover the spread and the transition/default dynamics of the model.

» Pricing formula covering how the stochastic models are used in pricing assets. In addition, details on how the risk-premia in the models are related to the model parameters and key asset return outcomes.

» Details on how the model is calibrated, including:

  o The data, assumptions and methods used to set the transition matrix and default assumptions of the model

  o The data, assumptions and methods used to set the recovery rates of the model

  o The data, assumptions and methods used to set the long term spread dynamics – level, volatility etc… of credit spreads of different rating and maturities

  o The data, assumptions and methods used to set correlations between spreads and other risk factors

  o The data, assumptions and methods used to set correlations between transition/defaults and other risk factors

  o The data, assumptions and methods used to set correlations between the upgrade/downgrade/default of different issuers

  o The data, assumptions and methods used to set the initial spread levels from the model

  o The data, assumptions and methods used to set the initial level of defaults from the model

» Detail on how asset rebalancing or fund/index level modeling is achieved through the re-pricing of assets or asset portfolios throughout the stochastic projection

» Validation of the model outcomes including

  o Stability of the model and calibrations under different initial conditions and market environments

  o Alignment of the models spreads, defaults rates and asset returns with reasonable historical behavior

- o Alignment of the models spreads, defaults rates and asset returns with any stylized-facts or expert judgement assumptions

- o Validation of the asset returns produced by the model for a wide range of investment strategy e.g. different rebalancing strategies and an assessment of asset returns relative to other asset classes e.g. cash, treasury returns, equity returns etc.…

- o Back testing and stress testing of the model under a variety of economic conditions

» Details on how the input model parameters relate to asset return outputs.

» Insight into how quarter-on-quarter changes in spreads can affect asset prices and hence fund returns from the model.

In our experience this has involved hundreds of pages of documentation and analysis that is updated and maintained to support these models across a wide range of use-cases.

In the next section, we highlight the practical impacts of choosing a model with limited documentation and transparency with regard to its methods, calibration and assumptions.

Practical Impacts of Corporate Bond Modeling with Documentation Deficiencies

This section provides some examples of challenges that insurers may face if the NAIC proceeds with a corporate bond model with limited documentation.

» As the market conditions change (e.g. spreads levels change, equity volatility changes, etc…) the corporate bond fund returns will change and adapt. If there is insufficient documentation on the model and calibration, then users will not be able to understand why bond returns are increasing/decreasing in level or in risk/variability from one valuation date to the next. The level of insight into the model will be very limited, and this will prevent users from fully communicating why their results are changing from one valuation date to the next.

» A static set of real world scenarios published on the NAIC website might be sufficient for official valuation purposes, but it is insufficient for projecting how these scenarios would change in the future under different economic conditions. The ability to dynamically regenerate scenarios under any starting conditions is extremely important for pricing, planning, and calculating risk sensitivities under the Principle-Based Reserving (PBR) framework. These types of analysis are possible under the currently prescribed and publicly available Academy Interest Rate Generator (AIRG), and we have observed an expectation in the industry that this will continue under the new economic scenario generator. This situation would remain unchanged under the Academy's proposed simplified corporate model, which is also fully documented and reproducible. However, if a "black box" proprietary model were prescribed, it would limit insurers' ability to perform this important analysis. The likely result would be potentially less accurate pricing and less robust risk management practices, reducing the clarity and insight the industry has regarding its financial performance.

» Although we are aware that Conning has an Application Programming Interface (API) that has been suggested as a potential solution to the previous concern, we are generally concerned about its flexibility, speed, and ease of integration. Many of our questions about the API from the initial exposure period in early 2021 were never fully answered, so we do not have full details. However, we appreciate there are still open questions on some of the fundamental modeling topics that have yet to be clarified. From a runtime perspective, we can generally comment that models tend to be much faster when scenarios are generated natively (as is currently possible under the fully documented and easily replicated AIRG) than when calls to an external API are required. This raises the possibility that the API may be too slow to be practically useful to the increasingly demanding needs of the life insurance industry. Finally, reliance on API's are notoriously troublesome from a software licensing and installation perspective, especially when distributing large runs to an internal grid or the cloud. A fully documented model would allow insurers to implement appropriate models natively in their solutions. This provides them with flexibility on the technology and integration approach of the models into their workflows and calculation frameworks. This can be particularly important when optimizing runtime in the cloud, as firms will generally be paying directly for the computational cost. Inefficiencies in these processes can have a direct financial impact on their cloud budgets if these runs are significant in scale and runtime. We are aware when firms are constrained on runtime and budget, then they will likely reduce the level of sensitivity analysis. This limits the insights and understanding they have in relation to these key reserve and capital metrics.

» In the absence of complete and detailed documentation, for any products with significant sensitivities to corporate bond funds, companies might feel compelled to license Conning's API for accurate PBR analysis for any purpose that extends beyond current period valuations. This is in contrast to the current landscape, where parties are free to implement or replicate the fully public AIRG model as needed. By publishing full documentation this allows companies to optimize the model implementation to align with their existing models, workflows and technology/integration requirements.

» Insurers apply a range of credit modeling approaches in different use-cases. With lack of documentation on the corporate model used in the reserves and capital calculation, insurers will have difficulty in identifying where their credit risk assumptions and models are aligned or mis-aligned across their different use-cases.

» The value and effectiveness of a regulatory reporting model is limited if the model is not well aligned with the company's internal risk management and pricing practices. If the model is not well documented, understood, and accepted by the industry, companies may develop other models for pricing and managing their business which will create a disconnect between how the regulators view the financial position of a company and how management sees it.

These examples are not meant to be comprehensive but highlight where we have seen insurers raise questions on the practical limitations they may face if only limited documentation and knowledge of the model dynamics and calibrations are provided.

Summary

In conclusion, robust documentation is critical to the use of any corporate bond return or credit model. Both the models considered appear to be potentially appropriate for the NAIC's desired application. However, in the absence of any additional detailed documentation, a simple asset return model, that is comprehensively documented, such as the corporate model proposed by the American Academy of Actuaries Economic Scenario Subcommittee, could be well suited for the purpose at hand within a Principles-Based Reserving framework. While the Conning corporate model may have greater flexibility and granularity due to its more complex dynamics for analyzing credit risk, the level of documentation is currently insufficient to provide a conclusion regarding its appropriateness.

If regulators decide to proceed with the Conning corporate model despite this extra complexity, then we highly recommend for additional documentation to be released that addresses the deficiencies listed in this letter. If this does not occur, then the impact of the limited documentation could cause significant practical challenges to the U.S. life insurance industry.

Sincerely,

Jack Cheyne PhD
Senior Director - Scenario Generator Product Management,
Moody's Analytics

Dear Mr. O'Neal:

Here are my comments on the Life Actuarial (A) Task Force and Life RBC (E) Working Group Exposure 10/18/23: GOES Corporate Model Decision.

1. I favor use of the American Academy of Actuaries Subcommittee's corporate model. Not only is it a good model, it is completely documented and reproducible. It is no more complex than necessary. Conning's model may or may not be a reasonable model, but it's reasonableness does not even come into consideration because it is not fully documented and reproducible, as required under the original RFP of the NAIC. As was understood when the RFP was prepared, It is not in the interest of regulators or the public to mandate use of a black box model that is not fully documented and independently reproducible.

2. The practical impact of Conning's unwillingness to provide full documentation is that their model cannot be independently tested and verified. It cannot be independently evaluated on a theoretical level, and the many professional judgments made in its design and implementation and calibration cannot be discussed or debated in detail nor can sensitivity to alternatives be determined. Because of this, use of the model does not meet the standards of practice adopted by the Actuarial Standards Board and currently binding on the actuaries that would be required to use the model.

There is no need to even consider use of an undocumented model because the Academy of Actuaries Subcommittee has provided a good model for the purpose that is fully documented, reproducible, and not unnecessarily complex.

If, by chance, Conning were to provide full documentation of their model, I would still prefer the Academy of Actuaries model because the class of models Conning has said they are using are in my view much more complex than needed for the purpose. Mandating the use of such a complex model places an unnecessary burden on actuaries that use it because they must understand and evaluate every part of it. There are contexts where the complexity of Conning's model may be useful, but those contexts are inside individual companies. In the GOES project we are using the same generated results (scenarios) across companies. The GOES project is therefore a different use case and a different (simpler) model is appropriate and preferred.

Regards,

Stephen J. Strommen FSA, CERA, MAAA

Follow up Question from a Regulator to Steve Strommen: I would like more details on what seems to be his pivotal view here, which is how complex of a model is "needed" for statutory purposes. Why is a given degree of complexity in the corporate model not necessary for statutory reserving?

Steve Strommen Response to Follow-up Question:

The complexity of Conning's corporate model is due to the level of detail in the information it uses and the level of detail in the simulation used to generate scenarios. This level of detail may be appropriate in the context of an individual company where that detailed level of information is available and might make a difference. When generating a single set of scenarios to be used by all companies, we do not have such detailed information, we have only a general description of the kind of portfolio to be simulated. A simpler model that deals only with information at that level of detail is sufficient and preferred to avoid unnecessary complexity.

The unnecessary complexity in Conning's model is in two forms.

1. The model works with a detailed list of securities to be simulated. In the NAIC context there is only a general description of the portfolio, so the model generates a detailed list based on that description. Details of how this is done are undocumented.
2. To simulate the effect of downgrades and defaults, the model uses a detailed model for credit migration, default, and recovery of each security in the list it is simulating. Details of the model and assumptions used for migration, default, and recovery are undocumented.

The Academy model is simpler in both aspects. Since the portfolios to be simulated are described by credit quality and duration, the model uses a portfolio consisting of a single security having the desired quality and duration. That security is simulated as purchased at the beginning of each month and sold at the end of the month. Then to simulate the costs of credit downgrades and defaults, it uses a simple stochastic process for "frictional costs" in the aggregate rather than simulating credit migration, defaults, and recoveries separately. The "frictional costs" are calibrated to reproduce both the normal level and the volatility of costs due to credit downgrades and defaults at the portfolio level.

The Academy model works with information at the level of detail we have when given only a general description of the portfolio to be simulated. Conning's model implicitly creates more detailed information and then deals with it in a more detailed way, but all those details are undocumented and unnecessary in this context.

Note – my comments on the Academy model are based on reviewing it several months ago. I am not aware of any significant changes since then.

Regards,
Steve Strommen

Mathematical Finance Company
QTSM CIR Green's Function Multifactor CIR and Affine Options SIRP ESG RS-ESG DMRP RS-DMRP

Nov 6, 2023

Honorable Rachel Hemphill
Chair, Life Actuarial (A) Task Force (LATF)
Re: Generator of Economic Scenarios (GOES) Corporate Model Decision

Dear Ms. Rachel Hemphill,

Please accept this comment on the Generator of Economic Scenarios (GOES) Corporate Model Decision.

Sincerely yours,

Mark S. Tenney

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(703) 799-0581 • Fax: (703) 799-4964 • marktenneymfc@gmail.com • mfcesg.com

1   Choice of model

The Academy corporate model is preferable to the GEMS Corporate model for use by LATF. The Academy model explicitly handles and documents correlation. See page 53 of the Academy handout.

GEMS is built on the 3 factor Cox, Ingersoll, and Ross treasury model. Because of the square root process on each factor, they are uncorrelated. This makes correlation a problem within treasuries as well as between treasuries and corporates. How the choices made for treasures carry over into corporates has to be considered carefully. Correlation includes yield to maturity as a dimension.

GEMS has not disclosed sufficiently how it handles this correlation problem. This is a very critical problem in the entire GEMS based system. It is important to document correlation for spreads, whole yields, bond prices, and bond portfolio returns among themselves and other asset classes.

The GEMS corporate model has some elements addressed to systemic risk and perhaps others more to bond trading in calm markets. The relative merits of these are difficult to ascertain from the disclosed documentation. GEMS could provide value to customers if it helped pick bonds in calm markets. This could justify use of GEMS by customers even if its systemic risk part was weak. For regulators, the reverse would be true.

2   Documentation

The GEMS corporate spread model documentation is very limited. This is true both in absolute terms as well as relative to the documentation of the Academy model. Academy documentation is 58 pages. GEMS documentation in the exposure is 17 pages.

The 3 state variables of the Cox, Ingersoll, and Ross model are not correlated. It is therefore important to disclose how correlation is handled in the corporate model. How is correlation to treasuries handled? Are corporates correlated among themselves but not correlated to treasuries?

It is important to distinguish the type of correlation. The correlation of the levels of the yields and their differences are to be distinguished, as well as the logs and differences of logs. The same applies to spreads and price changes and changes in logs of prices.

Each of the documents, GEMS and Academy, would benefit from a section in which the complete model is written using standard mathematical notation for these types of models.

The evidence based regulation trend in regulation is one factor to consider in documentation. This trend achieved a step in progress in 2018 with the "Foundations for Evidence-Based Policymaking Act of 2018". Support for evidence based regulation can be found in different groups. Some states may adopt some type of evidence based statute themselves. Over time, courts may recognize a trend and adopt it as required under due process of law. Federal courts might impose a due process requirement on states for evidence based regulation. Some states might construe a lapse in evidence based regulation as a taking.

Some states have voter initiated referendums, which could pass a broad rule on evidence based regulation as well. An example is as follows.

> Regulations of this state shall be evidence based. Evidence based shall be whatever the rules of evidence are in the courts of this state.

In the case of the compact, the Colorado Supreme Court has ruled that where Colorado state law is explicit, it overrides the compact. This was in the case of Amica Life Insurance Company v. Wertz where Colorado specifies a one year exclusion for suicide and the compact specifies two years.

In the area of the corporate model, the GEMS public disclosure is weak. The two standards in evidence law are Daubert and Frye. GEMS public disclosure are not adequate for either of these two evidence standards.

What obligation is Conning under to disclose known weaknesses or limitations in GEMS? This may be or become important to evidence based regulation and the related issues of due process of law or regulatory takings. These matters are brought up in the spirit of issue spotting and not of attempting to determine the current or future state of the law on these matters.

AMERICAN ACADEMY
of ACTUARIES

November 21, 2023

Ms. Rachel Hemphill, Chair, Life Actuarial (A) Task Force (LATF)
Mr. Philip Barlow, Chair, Life Risk-Based Capital (E) Working Group (Life RBC)
Mr. Mike Yanacheak, Chair, Generator of Economic Scenarios (E/A) Subgroup (GOES Subgroup)
National Association of Insurance Commissioners (NAIC)

Dear Ms. Hemphill, Mr. Barlow, and Mr. Yanacheak,

The American Academy of Actuaries'[1] Economic Scenario Generator Subcommittee (ESGS) appreciates the opportunity to offer our comments on the GOES Stylized Facts and Acceptance Criteria exposed on 10/5/23 (exposure) with the NAIC. The continued open and collaborative dialogue is greatly appreciated, particularly as you move forward with selecting an economic scenario model, stylized facts, and acceptance criteria. While we support the exposed stylized facts, we do have significant concerns with the exposed acceptance criteria and strongly encourage regulators to consider exposing a more comprehensive set of actionable criteria.

Summary

Establishing stylized facts and acceptance criteria are key steps in the traditional economic scenario modeling process. While they are necessary steps in the process, they are not the only factors that should be considered. Rather, they should be combined with a rigorous model selection step that evaluates the strengths and limitations of available models based on the intended purpose of the scenario generator. This is because model forms vary in their ability to reflect key stylized facts and meet acceptance criteria without creating other concerns, such as missing on other factors or requiring excessive overrides, like flooring.

Since no model is perfect, ideally both model selection and the establishment of stylized facts and acceptance criteria are rigorous and comprehensive exercises. This would then result in a model and calibration that is suitable for the intended purpose of the scenario generator and whose limitations are understood. On the other hand, ad hoc model selection paired with heavy use of a floor and a limited set of acceptance criteria risks producing unrealistic and unforeseen results. A more robust set of criteria can help avoid unintended consequences associated with heavy use of a floor, just as a more robust model selection process may avoid model forms that require excessive flooring.

Well-designed model office or field testing can be useful in evaluating aggregate impacts on reserve and

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[1] The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

capital levels, but do not represent adequate substitutes for rigorous and comprehensive model selection, stylized fact and acceptance criteria processes, and full documentation of the model and its calibration. Just as we would not support a mortality assumption that produced higher mortality in females than in males, even with appropriate levels of reserves and capital produced by model office or field testing, we would support a mortality assumption based on relevant and credible experience data, reasonable future expectations, and a conceptual understanding of theoretical relationships.

The ESGS supports the exposed stylized facts for interest rates, equity returns, and corporate bond fund returns. We note that the exposed stylized facts for equity returns and corporate bond fund returns are identical to those previously proposed by the ESGS. The exposed stylized facts for interest rates have been slightly modified from those previously proposed by the ESGS, but the changes are relatively modest.

The ESGS has significant concerns about the exposed acceptance criteria for interest rates, equity returns, and corporate bond fund returns. A primary concern is the lack of robust criteria around key stylized facts. In the exposure, key stylized facts have no actionable criteria associated with them to ensure they are adequately reflected in the scenarios. This seems especially important given the need to increase volatility to hit low for long targets under the selected model form, as well as the heavy and frequent flooring used to override the extremely negative rates often simulated under such increased volatility.

A stylized fact may state that certain behavior in the scenarios should be consistent with and plausibly more extreme than history, but it would be challenging to ensure such consistency without actionable criteria supporting the stylized fact. Exposed stylized facts for interest rate volatility and slope state that scenarios should generally be consistent with history given the level of interest rates, but there are no actionable criteria in the exposure for ensuring that is the case. This is also true for the distribution of point-in-time interest rates (both initial period and steady state) and median reversion time.

Rather than moving forward with a model or scenario generator that engenders such concern, we strongly encourage regulators to expose a more comprehensive set of actionable criteria, which would ensure the model is capable of producing scenarios that adequately reflect the stylized facts under a variety of initial conditions. The ESGS has previously proposed several categories of acceptance criteria to this end, which are included as Appendices to this letter.

Be assured that it is not our intent to suggest that a model or calibration must meet every single possible criterion to be accepted, although passing all criteria would likely increase the probability of that happening. In practice, multiple pieces of criteria may not be met. However, the model or calibration may still be accepted, given satisfactory explanations, prioritizations between criteria, and further expert review. All criteria may be met, especially if the set of criteria is rather limited in scope, and the model form or calibration may not be accepted after a full review by subject matter experts for specific rationales, such as issues related to excessive amounts of flooring. The governance process should include a report on the results of applying the individual criteria to the model or calibration, which would be reviewed by subject matter experts, along with other useful charts, statistics, and holistic judgment prior to accepting or rejecting the model or calibration. The governance process should also periodically review the acceptance criteria themselves, allowing for necessary updates, the removal of criteria that are no longer useful, or the addition of criteria for new areas of concern.

Interest Rates

The ESGS proposed eight categories of acceptance criteria for interest rates, listed below. Of those, three were included in the exposed interest rate acceptance criteria, Low-for-Long and High-for-Long, Min/Max Bounds, and Tail Frequency. No quantitative actionable criteria were exposed for the remaining categories. We strongly recommend adding the latter group of interest rate criteria to the next version of the exposure, which will help ensure the stylized facts are properly reflected in the model and its scenario sets. For example, actionable criteria can help ensure higher interest rates are indeed, on average, more volatile than lower interest rates.[2]

Table in Appendix	Categories of Proposed Criteria for Interest Rates
1.1	Level Criteria – Steady State Period
1.2	Level Criteria – Initial Period
1.3	Low-for-Long and High-for-Long
1.4	Volatility
1.5	Slope
1.6	Min/Max Bounds
1.7	Tail Frequencies
1.8	Median Reversion

Low-for-Long and High-for-Long—Exposed criteria for this category are identical to previously proposed criteria by the ESGS, but only include previously proposed criteria for the initial period. The exposure omitted previously proposed criteria for the steady state period. While such criteria for the initial period is key, the ESGS also supports having criteria to evaluate the steady state low-for-long and high-for-long behavior underlying the model. Note that the exposure also includes criteria specific to starting with 12/31/20 yields at less severe percentiles (5% and 15% instead of 1%), which was not part of but is consistent with the proposal by the ESGS. Since it is critical to understand how the model or calibration performs under a variety of initial conditions,[3] the ESGS supports including criteria that can likewise be applied under a variety of initial conditions. The ESGS believes criteria for the 1st percentile is adequate. At the request of regulators, the ESGS could consider expanding its criteria, which functions under a variety of initial conditions, to include less severe percentiles.

Min/Max Bounds—The ESGS's previously proposed criteria for Min/Max Bounds are not part of the exposure. However, the exposure does include some related criteria. In its current form, rates (all tenors)

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[2] This turned out to be a shortcoming with the AIRG. Having explicit volatility criteria in place and monitored over time could have helped identify that sooner. Unrealistic pathwise volatility dynamics in the scenarios can result in distorted cash flow projections that may influence the cost of guarantees modeled, unwarranted hedge breakage, .etc.

[3] Although statutory reserve and capital calculations are based on scenarios / conditions as of the valuation date, actuarial pricing and risk management analyses generally involve forecasting reserves and capital into the future under a variety of economic conditions. Interpreting the results of pricing and risk management analyses requires an understanding of how the distribution of scenarios behaves differently when starting from different sets of initial conditions. A solid understanding (based on a robust set of criteria) of how the model performs under a wide variety of initial conditions can also help with understanding how robust the model's calibration is and under what conditions a recalibration may be warranted.

should generally not be lower than -1.5% and that 99th percentiles of 3M and 10Y rates should not exceed 20% in the first 30 years. The ESGS believes that a minimum bound of -1.5% for all tenors is too extreme, given history, and would recommend min/max bounds that vary by tenor. A 99th percentile of 20% may also be extreme, especially for longer tenors like the 20-year, where the maximum monthly rate in U.S. history is only 15.78%. There are also concerns related to the lack of min/max bounds for slope. The ESGS's previously proposed criteria has separate criteria for the 1Y rate and the 20Y rate, as well as the 20Y-1Y slope (e.g., min/max 1Y bound of -1% to -0.5% / 20% to 24%, min/max 20Y rate of 0% to 0.5% / 17% to 20%).

Tail Frequencies—The ESGS previously proposed Tail Frequencies criteria which are not included in the current exposure. However, the current iteration does include some related criteria, stating that no more than 5% of scenarios should have 3M or 10Y rates that exceed 20% in the first 30 years. The ESGS supports having tail frequency criteria for both low and high rates, with thresholds that vary by tenor. The ESGS's previously proposed tail frequency criteria apply to both low and high rates with thresholds set to historical minimums and maximums that vary by tenor, reflecting the idea that rates which are more extreme than historical rates should be simulated approximately 1 to 3% of the time (0.5% to 1.5% on for each tail, left and right). Similarly, slopes that are more extreme than historical slopes should be simulated approximately 1 to 4% of the time (0.5% to 2% for each tail, left and right). We would note that the ESGS criteria are for individual monthly rates; regulators would be able to request the ESGS develop additional similar criteria for individual scenario paths (i.e., multiple consecutive monthly rates). It is also important to keep in mind that criteria for Min/Max Bounds and other severe rate levels are not that useful without associated frequency criteria, such as the frequency of extremely low/high rates close to the Min/Max Bounds. As exposed, the criteria would not preclude a scenario set where rates are negative half the time.

A note on flooring—There is academic literature on the limitations of the 3-factor affine model structures used to simulate interest rates. Depending on the intended purpose, such model limitations may not be relevant. However, some of those limitations may hamper the model's ability to adequately reflect the stylized facts exposed for this model's intended purpose, determining statutory reserves and capital for long duration life and annuity products. This could result in overly frequent and severe negative rates and distorted volatility and yield curve / term structure relationships, requiring overly excessive post-model overrides such as too much flooring.[4] Some flooring/capping of outlier edge cases due to random noise is reasonable in stochastic models, but any stochastic model should be called into question if it requires overriding a large percentage of rates in a large percentage of scenarios to properly reflect the stylized facts and reasonably satisfy the acceptance criteria developed for the purpose at hand.[5] A rigorous and comprehensive model selection step, based on the stylized facts, can help avoid such a situation. Appendix 4 includes illustrative charts that offer examples of potentially excessive flooring of simulated Treasury yields.

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[4] For example, excessive post-model flooring of rates can break some of the desired relationships (e.g., smooth yield curves, minimal arbitrage opportunities) inherent in the model form and the pre-floored rates it produces.

[5] Model forms that may be able to satisfy low for long criteria with significantly less flooring include shadow rate models and certain types of dynamic Nelson Siegel models.

Equity Returns

We will be sharing the results of our updates to and expansion of the 2005 C3P2 Gross Wealth Factors (GWFs) for S&P500 total returns with LATF imminently. Our updated criteria are largely consistent with the 2005 C3P2 GWF criteria when equity reference models have means constrained to 8.75% (as was the case for the 2005 GWFs). The updated GWFs do go further into the tails (include 1st and 99th percentiles), as well as further into the future (30 and 50-year horizons) given the changes to VM-21 (more extreme CTE level of 98%) and expansion of scope to VM-20 (longer duration products). We would strongly recommend regulators use the largely consistent and expanded set of updated GWFs in place of the 2005 GWFs.

We also note that the exposure only contains criteria for the S&P 500 index. This is concerning, as it means the exposure contains no criteria for indices other than the S&P 500, nor does it include criteria for the joint distribution of equity returns and interest rates. Prior NAIC boundary guidance included criteria reflecting the need for other equity indices to include Sharpe ratios (i.e., market price of risk) within 5% of the S&P 500's Sharpe ratio. The ESGS intends to develop criteria for the joint distribution of equity returns and interest rates, such as criteria for quadrants of low interest rates and low equity returns, and low interest rates and high equity returns.

Corporate Bond Fund Returns

The ESGS proposed four categories of acceptance criteria for corporate bond fund returns, listed below. The exposed corporate bond fund return criteria only include Average Excess Return. No quantitative actionable criteria were exposed for the remaining categories. We strongly recommend incorporating the additional three categories of corporate bond fund return criteria into the next exposure, in order to ensure the stylized facts are properly reflected in the model and its scenario sets.

Table in Appendix	Categories of Proposed Criteria for Corporate Bond Fund Returns
3.1	Average Excess Return
3.2	Maximum Excess Return
3.3	Correlations
3.4	Median Reversion

Average Excess Return—The exposed criteria are very similar to the ESGS's previously proposed criteria, with the primary difference related to the use of conservative one-way rather than two-way buffers (average excess returns can only be less than target excess returns). For example, instead of a desired range of 70 to 90 bps (i.e., 80 +/- 10 bps) for the average excess return on 1 to 5-year investment grade corporate bond funds, the exposure uses a desired range 70 to 80 bps. While we understand the desire to be conservative, our recommendation is to leave the scenarios centered economically and apply conservatism via another lever, such as the CTE level.

Closing Remarks

The ESGS appreciates the opportunity to review the exposure. We are confident that the NAIC's collaborative strategy to incorporate public feedback and recommendations will ensure criteria that is beneficial to regulators and industry. We look forward to the discussion at the Fall National Meeting and to

continuing to work with you to develop a comprehensive set of acceptance criteria that ensures an economic scenario generator that properly reflects stylized facts and is fit for purpose. Please direct any questions to Amanda Barry-Moilanen, life policy analyst at barrymoilanen@academy.org.

Sincerely,

Jason Kehrberg
Chair, Economic Scenario Generator Subcommittee

Appendix 1—Interest Rate Acceptance Criteria Proposed by AAA

Table 1.1—Level Criteria – Steady State Period

Rate	Statistic (Percentile)	Desired Range
1Y	1st	-0.84% to 0.06%
	5th	-0.70% to 0.10%
	15th	-0.54% to 0.16%
	30th	-0.11% to 0.49%
	Median	1.31% to 3.35%
	70th	4.88% to 6.88%
	85th	6.22% to 8.47%
	95th	9.02% to 11.52%
	99th	13.85% to 16.60%
20Y	1st	0.22% to 1.12%
	5th	0.98% to 1.78%
	15th	1.61% to 2.31%
	30th	2.23% to 2.83%
	Median	3.35% to 4.89%
	70th	5.77% to 7.77%
	85th	7.56% to 9.81%
	95th	9.50% to 12.00%
	99th	13.44% to 16.19%

Notes:
1. Non-Median criteria is based on historical Percentiles Exponentially Weighted (PEWs) using a half-life of 15 years and a data period of 1953.05 to 2021.12, plus or minus a buffer depending on whether the percentile is in the left or right tail respectively.
2. Median criteria are based on historical 40th and 50th PEWs.
3. Steady state statistics can be measured over a single steady state month or multiple consecutive steady state months, e.g., over 240 months (20 years). One option for a 20-year steady state period over which steady state statistics can be measured is months 961-1200, e.g., the last 20 years of a 100-year projection. Another option would be to start the model under steady state conditions and then use the first 20 years.

Table 1.2—Level Criteria – Initial Period

| Initial Level of 20Y Rate | Statistic: Percentiles of 20Y Rate | | | | | |
| | End of year 1 | | End of year 5 | | End of year 10 | |
	1%-tile should be less than	99%-tile should be greater than	1%-tile should be less than	99%-tile should be greater than	1%-tile should be less than	99%-tile should be greater than
1%	0.54%	1.92%	0.60%	3.89%	0.72%	6.05%
2%	1.22%	3.30%	0.79%	5.75%	0.81%	8.10%
3%	1.92%	4.66%	1.20%	7.48%	0.95%	9.62%
4%	2.62%	6.01%	1.62%	8.83%	1.23%	10.77%
5%	3.31%	7.22%	2.03%	10.03%	1.50%	11.87%
6%	3.99%	8.38%	2.43%	11.21%	1.75%	12.93%
7%	4.68%	9.52%	2.81%	12.35%	2.00%	13.95%
8%	5.46%	10.64%	3.18%	13.46%	2.23%	14.92%
9%	6.26%	11.76%	3.58%	14.56%	2.45%	15.78%
10%	7.06%	12.86%	4.09%	15.62%	2.66%	16.48%

Notes:
1. Due to the lack of historical data for percentiles of the 20Y rate when starting at a multitude of initial rate levels, criteria were developed by taking the least binding statistic from 3 different reference models (CIR, Black Karasinski, and Brennan Schwartz) calibrated to steady state criteria over 3 different mean reversion speeds (half-lives of 10, 12, and 15 years).
2. These criteria ensure sufficient dispersion in 20Y rate levels at specific points in time during the initial period. The end of years 1, 5, and 10 were selected as round points-in-time to test during the initial period when simulated rates are still materially impacted by starting levels. Other points-in-time could also be considered.
3. 1st and 99th percentiles were selected as the tail severities (reasonably extreme given the purpose). Other percentiles could also be considered.
4. When evaluating an initial calibration of an ESG model, it would be prudent to test the model at a variety of starting 20Y rate levels, e.g., 2%, 5%, and 8%. When evaluating a single candidate scenario set for production, these criteria can be applied by interpolating based on the starting level of the 20Y rate.
5. These criteria were developed for the 20Y rate given its central role in the AIRG and use in other criteria. Similar criteria could also be developed and considered for the 1Y rate.

Table 1.3—Low-for-Long and High-for-Long Criteria

Period	Initial Level of 20Y Rate	Statistic: Percentiles of Geometric Average of 20Y Rate			
		10-year horizon		30-year horizon	
		1%-tile should be less than	99%-tile should be greater than	1%-tile should be less than	99%-tile should be greater than
Initial (from year 0)	1%	0.94%	3.43%	1.50%	6.25%
	2%	1.23%	5.05%	1.68%	7.71%
	3%	1.62%	6.55%	1.86%	8.72%
	4%	2.15%	7.74%	2.06%	9.62%
	5%	2.66%	8.87%	2.26%	10.46%
	6%	3.15%	9.96%	2.50%	11.16%
	7%	3.63%	11.03%	2.78%	11.61%
	8%	4.10%	12.07%	3.06%	11.99%
	9%	4.64%	13.08%	3.34%	12.33%
	10%	5.21%	14.01%	3.65%	12.63%
Steady State (e.g., from year 70)	Any	1.34%	13.57%	1.94%	11.45%

Notes:
1. Due to the lack of historical data for percentiles of the geometric average of the 20Y rate when starting at a multitude of initial rate levels, criteria were developed by taking the least binding statistic from 3 different reference models (CIR, Black Karasinski, and Brennan Schwartz) calibrated to steady state criteria over 3 different mean reversion speeds (half-lives of 10, 12, and 15 years).
2. These criteria ensure sufficient dispersion in geometric average 20Y rate levels over specific horizons during the initial and steady state periods. Horizons of 10 and 30 years are consistent with the NAIC's preliminary low-for-long boundary guidance. Other horizons could also be considered.
3. 1st and 99th percentiles were selected as the tail severities (reasonably extreme given the purpose). Other percentiles could also be considered.
4. When evaluating an initial calibration of an ESG model, it would be prudent to test the model at a variety of starting 20Y rate levels, e.g., 2%, 5%, and 8%. When evaluating a single candidate scenario set for production, these criteria can be applied by interpolating based on the starting level of the 20Y rate.
5. These criteria were developed for the 20Y rate given its central role in the AIRG and use in other criteria. Similar criteria could also be developed and considered for the 1Y rate.

Table 1.4—Volatility Criteria

Statistic	Bucket (beginning of month rate is…)	Desired Range
Annualized standard deviation of monthly changes in the 1Y rate under three different rate level buckets	<= 3%	0.30% to 0.89%
	> 3% to <= 8%	0.58% to 1.73%
	> 8%	1.67% to 5.02%
Annualized standard deviation of monthly changes in the 20Y rate under three different rate level buckets	<= 3%	0.31% to 0.92%
	> 3% to <= 8%	0.37% to 1.12%
	> 8%	0.78% to 2.33%

Notes:
1. Desired range is based on a 50% margin around the historical statistic using a data period of 1953.05 to 2021.12. E.g., the historical annualized standard deviation of monthly changes in the 1Y rate when the beginning of month rate is <= 3% is 0.59%, half of 0.59% is 0.295%, and 0.59% +/- 0.295% results in a desired range of 0.30% to 0.89%.
2. The scenario set statistic can be measured over a single month or multiple consecutive months, e.g., over years 1-10 to evaluate the initial period and years 80-100 to evaluate the steady state period (or could start the model under steady state conditions and then use the first 20 years). Expect more variation for initial period statistics due to the impacts of starting rate and/or volatility levels (e.g., clustering).

Table 1.5—Slope Criteria

Statistic (Percentiles of 20Y-1Y under three different buckets for the 20Y rate level)		Desired Range
1st	<= 3%	-0.32% to 0.18%
	> 3% to <= 8%	-1.73% to -1.23%
	> 8%	-3.43% to -2.93%
5th	<= 3%	-0.23% to 0.27%
	> 3% to <= 8%	-0.97% to -0.47%
	> 8%	-2.06% to -1.56%
10th	<= 3%	-0.11% to 0.39%
	> 3% to <= 8%	-0.71% to -0.21%
	> 8%	-1.79% to -1.29%
15th	<= 3%	-0.01% to 0.49%
	> 3% to <= 8%	-0.56% to -0.06%
	> 8%	-1.46% to -0.96%
85th	<= 3%	2.28% to 2.78%
	> 3% to <= 8%	3.23% to 3.73%
	> 8%	1.94% to 2.44%
90th	<= 3%	2.52% to 3.02%
	> 3% to <= 8%	3.44% to 3.94%
	> 8%	2.05% to 2.55%
95th	<= 3%	2.64% to 3.14%
	> 3% to <= 8%	3.71% to 4.21%
	> 8%	2.41% to 2.91%
99th	<= 3%	2.81% to 3.31%
	> 3% to <= 8%	4.06% to 4.56%
	> 8%	2.76% to 3.26%

Notes:
1. Desired range is based on historical slope percentiles and a data period of 1953.05 to 2021.12, plus or minus a 50 basis point buffer depending on whether the percentile is in the left or right tail respectively. E.g., the historical 1st slope percentile when the 20Y rate is <= 3% is 0.18%, 0.18% less 50 basis points is -0.32%, resulting in a desired range of -0.32% to 0.18%.
2. The scenario set statistic can be measured over a single month or multiple consecutive months, e.g., over years 1-10 to evaluate the initial period and years 80-100 to evaluate the steady state period (or could start the model under steady state conditions and then use the first 20 years). Expect more variation for initial period statistics due to the impacts of starting rate and/or volatility levels (e.g., clustering).

Table 1.6—Min/Max Bounds Criteria

Statistic (over entire projection period)	History (for reference)	Desired Range
1Y Min	0.05%	-1% to -0.5%
1Y Max	16.97%	20% to 24%
20Y Min	0.95%	0% to 0.5%
20Y Max	15.78%	17% to 20%
20Y-1Y Min (when 20Y <= 3%)	0.02%	-1.5% to -0.5%
20Y-1Y Min (when 20Y > 3% to <=8%)	-1.38%	-3.5% to -2%
20Y-1Y Min (when 20Y > 8%)	-3.36%	-5% to -4%
20Y-1Y Max (when 20Y <= 3%)	2.85%	3% to 4%
20Y-1Y Max (when 20Y > 3% to <=8%)	4.15%	4.5% to 6%
20Y-1Y Max (when 20Y > 8%)	2.90%	3.5% to 5.5%

Notes:
1. Historical statistics are based on a data period of 1953.05 to 2021.12.

Table 1.7—Tail Frequencies Criteria

Statistic (Worse-Than-History frequencies during steady state period)	Desired Range
Freq of 1Y < 0.05%	0.5% to 1.5%
Freq of 1Y > 16.97%	0.5% to 1.5%
Freq of 20Y < 0.95%	0.5% to 1.5%
Freq of 20Y > 15.78%	0.5% to 1.5%
Freq of 20Y-1Y (when 20Y <= 3%) < 0.02%	0.5% to 2.0%
Freq of 20Y-1Y (when 20Y > 3% to <=8%) < -1.38%	0.5% to 2.0%
Freq of 20Y-1Y (when 20Y > 8%) < -3.36%	0.5% to 2.0%
Freq of 20Y-1Y (when 20Y <= 3%) > 2.85%	0.5% to 2.0%
Freq of 20Y-1Y (when 20Y > 3% to <=8%) > 4.15%	0.5% to 2.0%
Freq of 20Y-1Y (when 20Y > 8%) > 2.90%	0.5% to 2.0%

Notes:
1. Historical statistics are based on a data period of 1953.05 to 2021.12.
2. Steady state statistics can be measured over a single steady state month or multiple consecutive steady state months, e.g., over 240 months (20 years). One option for a 20-year steady state period over which steady state statistics can be measured is months 961-1200, e.g., the last 20 years of a 100-year projection. Another option would be to start the model under steady state conditions and then use the first 20 years.

Table 1.8—Median Reversion Criteria

Statistic (Year median rate/slope reaches midpoint between initial and ultimate levels)	Desired Range
1Y rate	10 to 20 years
20Y rate	10 to 20 years
20Y-1Y slope	2 to 8 years

Notes:
1. The midpoint can be determined as the average of the starting (beginning of year 0) level and the median ultimate (e.g., end of year 100) level.
2. Criteria may not perform well if the median path is materially nonmonotonic.

Appendix 2—Equity Return Acceptance Criteria Proposed by AAA

Table 2.1—Gross Wealth Factor (GWF) Criteria

GWF Percentiles	Horizon					
	1 year	5 years	10 years	20 years	30 years	50 years
Min	0.48	0.28	0.33	0.32	0.56	0.85
1st	0.71	0.64	0.71	0.99	1.55	4.15
5th	0.83	0.84	1.02	1.62	2.73	8.63
10th	0.89	0.98	1.22	2.10	3.74	12.78
15th	0.93	1.07	1.38	2.46	4.55	16.49
30th	1.02	1.28	1.76	3.41	6.84	27.56
70th	1.17	1.73	2.70	6.14	13.50	62.71
85th	1.24	1.97	3.27	8.41	20.39	112.78
90th	1.28	2.09	3.58	9.59	23.93	142.63
95th	1.33	2.28	4.08	11.43	30.68	195.72
99th	1.42	2.67	5.10	15.83	45.17	333.02
Max	1.67	3.75	8.01	29.20	99.48	1019.62

Notes:
1. These criteria are based on reference models fit to S&P 500 total returns from 1957.03 through 2022.12 with the mean total return constrained to be 8.75%. Unconstrained mean total returns ranged from 11.37% to 11.94% across the reference models.
2. To ensure sufficient dispersion in the distribution, left tail percentiles should be less than their respective criteria, and right tail percentiles should be greater than their respective criteria.

Table 2.2—Relationship to Interest Rates (Joint/Quadrant) Criteria

TBD

Table 2.3—Relationship to S&P 500 Criteria

TBD

As a placeholder, we suggest using as criteria that Sharpe ratios for total returns on other indices be within 5% of the Sharpe Ratio for the S&P 500.

Appendix 3—Corporate Bond Fund Return Acceptance Criteria Proposed by AAA

Table 3.1—Average Excess Return Criteria

Corporate Bond Fund	Desired Range for Average Steady State Excess Return
IG 1-5	70 to 90 bps
IG 5-10	69 to 89 bps
IG Long	56 to 76 bps
High Yield	220 to 260 bps

Notes:
1. Excess return equals total return on corporate bond fund less total return on government bond fund of similar duration.
2. Criteria is based on prescribed VM-20 ultimate spreads as of 12/31/21 and Bloomberg bond fund data from 1991 to 2021.
3. Suggested period for determining average steady state excess returns is years 20-30 (months 241-360). Alternatively, the first 10 years of the projection can be used if the model is started with initial conditions equal to steady state.

Table 3.2—Maximum Excess Return Criteria

Corporate Bond Fund	Maximum excess return should be less than
IG 1-5	157 bps
IG 5-10	241 bps
IG Long	263 bps
High Yield	548 bps

Notes:
1. Excess return equals total return on corporate bond fund less total return on government bond fund of similar duration.
2. Criteria determined by adding 50 bps to average prescribed VM-20 ultimate spreads as of 12/31/21.
3. Criteria can be applied over the entire projection (i.e., applies to both initial and steady state periods).

Table 3.3—Correlations Criteria

	Corp Bond Fund	SPX Variance	SPX Return	Spread			Excess Return		
				IG 1-5	IG 5-10	IG Long	IG 1-5	IG 5-10	IG Long
Spread	IG 1-5	0.5 to 0.7	-0.5 to -0.7						
	IG 5-10	0.5 to 0.7	-0.5 to -0.7	>0.8					
	IG Long	0.5 to 0.7	-0.5 to -0.7	>0.8	>0.8				
	High Yield	0.5 to 0.7	-0.5 to -0.7	>0.8	>0.8	>0.8			
Excess Return	IG 1-5	-0.5 to -0.7	0.5 to 0.7						
	IG 5-10	-0.5 to -0.7	0.5 to 0.7				>0.8		
	IG Long	-0.5 to -0.7	0.5 to 0.7				>0.8	>0.8	
	High Yield	-0.5 to -0.7	0.5 to 0.7				>0.8	>0.8	>0.8

Notes:
1. Criteria based on Bloomberg bond fund data from 1991 to 2021.
2. Criteria can be applied over the entire projection (i.e., applies to both initial and steady state periods).

Table 3.4—Median Reversion Criteria

Statistic (Year median spread reaches midpoint between initial and ultimate levels)	Desired Range
IG 1-5	22 to 26 months
IG 5-10	22 to 26 months
IG Long	22 to 26 months
High Yield	22 to 26 months

Notes:
1. The midpoint can be determined as the average of the starting (beginning of year 0) level and the median ultimate (e.g., end of year 100) level.
2. Criteria based on VM-20, which prescribes a 4-year grading period for general account fixed income credit spreads (i.e., midpoint at 24 months).
3. Criteria may not perform well if the median path is materially nonmonotonic.

Appendix 4—Charts illustrating examples of potentially excessive flooring of simulated Treasury yields

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Financial Security for Life
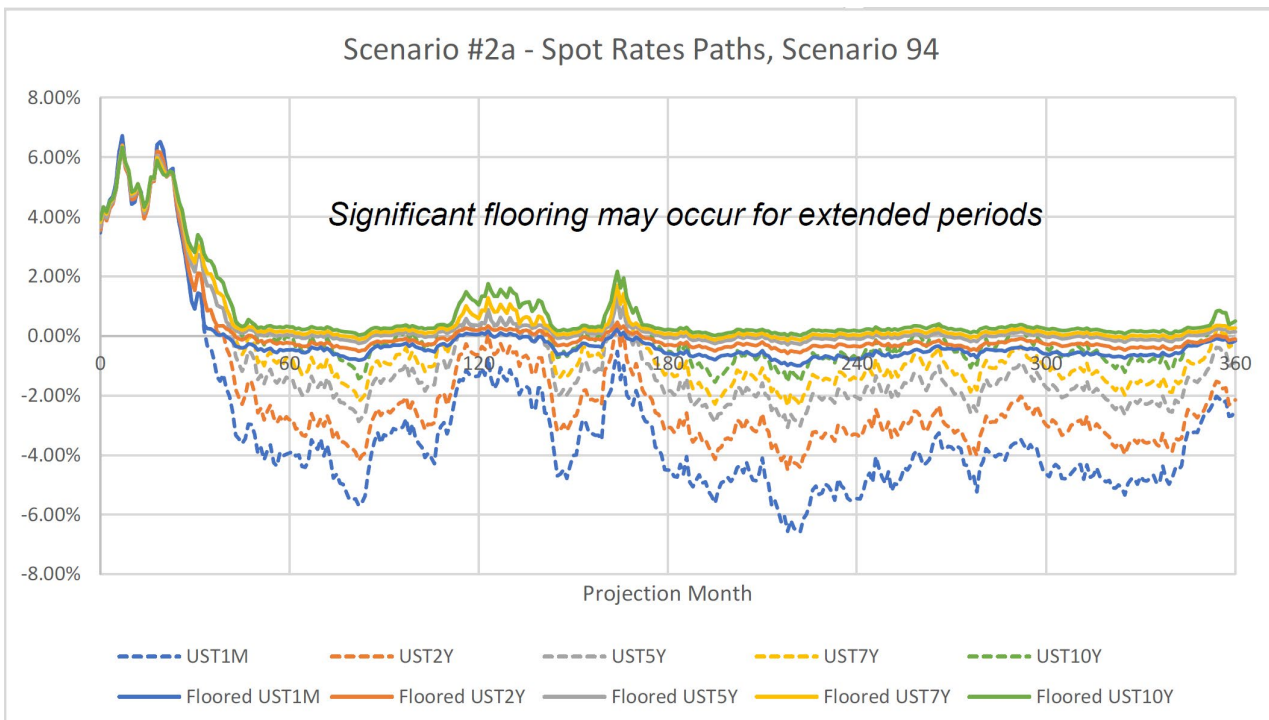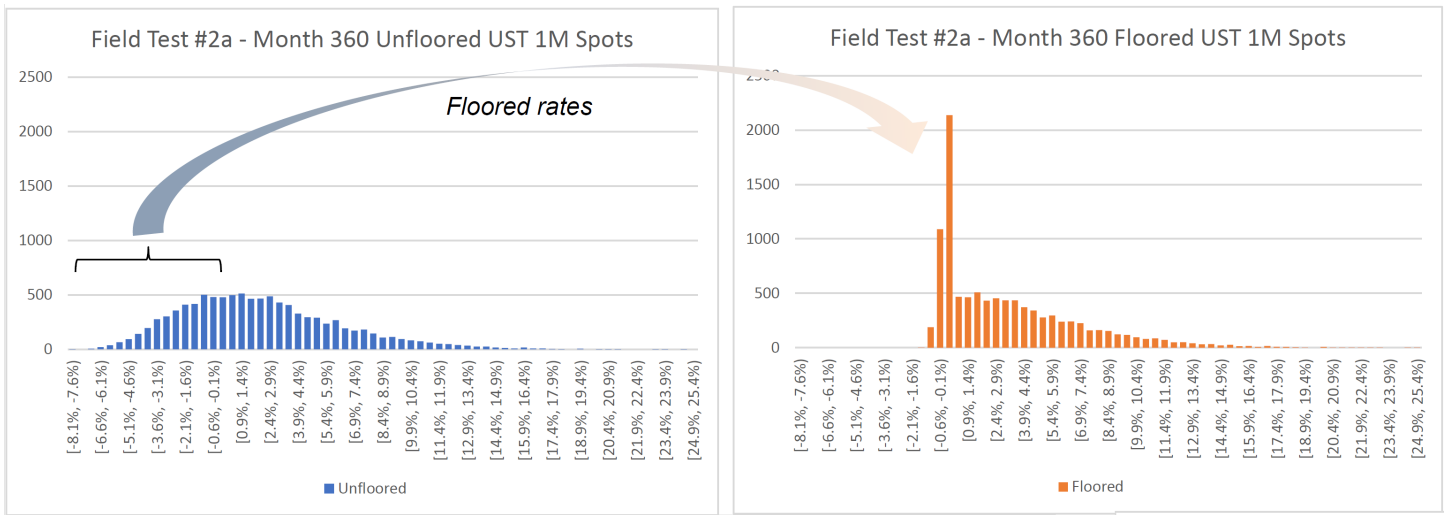
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November 20, 2023

Rachel Hemphill,
Chair, National Association of Insurance Commissioners (NAIC) Life Actuarial (A) Task Force (LATF)

Craig Chupp
Vice Chair, NAIC LATF

Philip Barlow,
Chair, NAIC Life Risk-Based (E) Capital Working Group (LRBC)

　　Re: Generator of Economic Scenarios (Generator) Acceptance Criteria and Stylized Facts

Dear Chair Hemphill, Vice-Chair Chupp, and Chair Barlow:

The American Council of Life Insurers (ACLI) appreciates the opportunity to comment on the exposed stylized facts and acceptance criteria to support the Generator. We appreciate the dedication and hard work of LATF and LRBC on the development of a Generator to replace the existing American Academy of Actuaries (Academy) Interest Rate Generator. We recognize the countless hours that regulators have spent on this effort. We are committed to this project and look forward to continuing to work with the regulators to achieve implementation of the replacement Generator by January 1, 2026.

The Generator will affect the reserves and/or capital levels for virtually all life products, including variable and fixed annuity products. The finalized Generator will have a significant impact on both the level and volatility of reserves and capital, as well as internal company practices. Movements in reserves and capital should be intuitive based on current economic conditions and suitable for agreed upon long-term targets. Material changes in reserves and capital need to be well understood by practitioners and company senior management. Setting reasonable and appropriate parameters for the Generator is critical as it reduces the risk of unnecessary costs and complexities in company capital planning, risk management frameworks, hedging programs, and new business processes.

Paramount to the development of the Generator is the selection of reasonable and appropriate acceptance criteria and stylized facts. Stylized facts, the qualitative view of the desired behaviors of the Generator, are a critical foundation as they describe key characteristics of the scenarios produced by the Generator.

Acceptance criteria, which are measurable, quantifiable, and transparent, are necessary to ensure the Generator produces reasonable scenarios over a wide range of plausible economic conditions. A minimal yet comprehensive set of acceptance criteria provides a clear gauge of outcomes relative to the desired properties of the Generator. There will need to be a balance in the acceptance criteria: too constrictive and the Generator be more difficult to maintain and likely to fail to meet enough of the criteria on a consistent basis; too broad and the Generator could always pass, regardless of the validity of the scenario sets.

ACLI proposes modifying the acceptance criteria set exposed by regulators. We attempted to balance a minimal but comprehensive set of criteria over a wide range of economic conditions. Our recommendations were developed using the expertise of our member companies with the support of data analysis and perspective on the criteria provided by our actuarial consultant, Milliman, Inc. ACLI recommends inclusion of all our proposed changes to acceptance criteria in order to produce scenarios that are sound and practical. Absence of some of these criteria could lead to undesirable behaviors of the generator under certain economic conditions.

We have aggregated our suggested changes in the following categories below. The specific recommended changes (if any) for each of the exposed criteria can be found in Appendix A. The technical rationale behind our recommendations can be found in Appendix B.

Categories:
1. Severity and frequency of worse-than-history interest rate events (applicable to the exposed acceptance criteria T1, T2, T3, T4, T5)
2. Equity returns and relationship to interest rates (applicable to the exposed acceptance criterion E1)
3. Mean reversion and volatility (applicable to ACLI proposed acceptance criteria T6, T7, C2)

1. Severity and frequency of worse-than-history interest rate events.

ACLI proposes bounding the absolute limits and likelihood of extremely low and high interest rates and the duration of time rates could remain there (T1, T2).

ACLI agrees with regulators it is appropriate for worse-than-history events to be reflected by the Generator; however, scenarios produced need to be reasonably related to historical dynamics and economic expectations and any worse-than-history events should not be excessive. Extremely low

or high rates occurring for an extended period of time would not only have a significant impact on life insurers, but it would also have potentially catastrophic consequences for the economy.

ACLI proposes retaining the Academy yield curve inversion criterion (T3).

The generator should produce yield curves that are plausible even in worse-than-history conditions. The absence of reasonable curve shapes has several potential consequences: introduction of arbitrage opportunities, inappropriate incentives for hedge behavior, among other issues.

ACLI proposes removing the low-for-long and high-for-long varying starting conditions criterion (T4) and expanding the general low-for-long criterion (T5).

ACLI supports regulators have prioritized "low-for-long" and "high-for-long" criteria in the Generator, but caution on the criteria being overly extreme. ACLI is concerned that forcing excessive low-for-long could challenge the model meeting the other important acceptance criteria, impair the Generator's ability to produce reasonable scenarios, and lead to significant changes to the model (such as higher than reasonable volatility or excessive reliance on a floor creating unreasonable curve shapes).

Regulators have exposed two criteria to address these situations. "Low- and High-For-Long at Varying Starting Conditions" (T5) is an extremely robust criterion, and we directionally support it. In addition to addressing the extreme rates, the Generator should also produce an appropriate number of "moderate" scenarios; we proposed modifying T5 criteria to account for this consideration. We would suggest removal of "Low For Long: 12/31/20 Starting Conditions" (T4) as an acceptance criterion as it does not provide significant incremental value beyond that provided by the T5 criterion.

2. Equity returns and relationship to interest rates:

We believe the interest-equity linkage assumption should be set to zero.

ACLI is concerned about the equity returns currently being produced by the Generator. First and foremost, interest-equity linkages, namely the equity risk premium and the interest-equity correlation assumptions, should only be implemented when there is statistically significant historical evidence that supports such modeling assumptions. We believe the historical data suggests such linkages are not statistically significant. The inclusion of interest-equity linkage serves to increase the complexity of the model without any corresponding benefit. Further, we believe that robust low rate and low equity scenarios may be achieved without modeled linkage. Adjusting equity parameters to stabilize long-term equity return in a changing rate environment is not an appropriate solution.

Second, inappropriate relationships in the Generator could lead to counterintuitive results: the interest-equity linkage could potentially lead to an excess requirement for capital in an extreme conditions or down markets; the capital the insurer had built up to that point should be the necessary cushion rather than requiring the company to inject additional capital. Additionally, inappropriate relationships could lead to significant variance in reserves and capital, which impairs a company's ability to practice sound asset liability management and other risk management activities and for regulators to adequately assess the strength of the companies under their authority.

3. Mean reversion and volatility

ACLI proposes expanding the list of acceptance criteria by retaining the Academy criteria for rate mean reversion (new T6) and volatility (new T7), and credit spread mean reversion (new C2).

ACLI proposes reinstating several additional Academy criteria. Acceptance criteria which serve to evaluate mean reversion are necessary to define and support realistic interest rates and a realistic credit spread process. Not effectively modeling the mean reversion dynamics of credit spreads can generate multiple large negative returns within a short duration which would result in unrealistic outcomes. Similarly, having effective criteria to address an appropriate level of rate volatility is of critical importance as realized volatility is a key driver of the cost of hedging, which impacts liability valuation and risk capital for certain products.

ACLI would recommend establishing mean reversion targets for the interest rate model (new T6) and the corporate model (new C2). We would also propose reinstituting an interest rate volatility target (T7).

Future considerations:

As part of the governance process after adoption of the Generator, the stylized facts and acceptance criteria will need to be reviewed for appropriateness in evolving economic environments. Some of the criteria, such as the interest rate mean reversion point and corporate model excess return, would be appropriate to review and update on a frequent basis. Other parameters should be reviewed and updated as appropriate as part of a broader review of the model calibration. Part of the governance should be developing a process to determine what criteria to assess and evaluate.

Once again, ACLI very much appreciates the opportunity to submit comments on this exposure and looks forward to future discussions with regulators as we work towards creating and implementing a new, robust, and impactful Generator.

Sincerely,

cc: Scott O'Neal, NAIC

Appendix A: ACLI recommended changes to acceptance criteria compared to NAIC exposed acceptance criteria

I.   Treasury Rates

Item	Category	Criteria

T1.	Prevalence of High Rates, Upper Bound on Treasury Rates	*NAIC Exposed Criteria* –
		
		a) The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments
		
		b) Upper Bound:
		
		    i. [20%] is >= [99%]-tile on the 3M yield fan chart, and no more than [5%] of scenarios have 3M yields that go above [20%] in the first 30 years
		
		    ii. [20%] is >= [99%]-tile on the 10Y yield fan chart, and no more than [5%] of scenarios have 10Y yields that go above [20%] in the first 30 years
		
		ACLI Proposed Criteria -
		
		a) The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments
		
		b) Upper Bound:
		
		    i. 1Y rates should not exceed 20.3%
		    ii. 20Y rates should not exceed 17.3%
		
		c) Frequency of high rates:
		
		    i. The 99th percentile in the steady state[1] is <= 17.0% for 1Y rate
		    ii. The 99th percentile in the steady state is <= 15.8% for 20Y rate
		
		d) Maximum sojourn length for high interest rates (> 17%) <= 4 years

T2.	Lower bound on negative interest rates, arbitrage free considerations	*NAIC Exposed Criteria*
		
		Apply the following guidance for negative rates:
		
		a) All maturities could experience negative interest rates
		
		b) Interest rates may remain negative for multi-year time periods
		
		c) Rates should generally not be lower than -1.5%
		
		ACLI Recommendation
		
		Apply the following guidance for negative interest rates:
		
		a) Maturities less than 20 years could experience negative interest rates
		
		b) Interest rates may remain negative for multi-year time periods
		
		c) 1Y rates should not be lower than -1.0%
		
		d) 20Y rates should not be lower than 0.0%
		
		e) Frequency of low rates:
		
		    i. The 99th percentile on the steady state is >= 0.0% for 1Y rate
		    ii. The 99th percentile in the steady state is >= 1.0% for 20Y rate
		
		f) Maximum sojourn length for low interest rates (< 0%) <= [4] years

T3.	Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape	*NAIC Exposed Criteria* a) Review initial actual vs. fitted spot curve differences for a sampling of 5 dates representing different shapes and rate levels for the entire curve and review fitted curves qualitatively to confirm they stylistically mimic the different actual yield curve shapes b) The frequency of different yield curve shapes in early durations should be reasonable considering the shape of the starting yield curve (e.g., a flatter yield curve leads to more inversions). c) The steady state curve has normal shape (not inverted for short maturities, longer vs shorter maturities, or between long maturities)

ACLI Recommendation: the above criteria, plus

d) Retain yield curve inversion criteria from Academy proposal: (Lower Bound and Frequency columns under Slopes):

Bucket		Lower Bound	Upper Bound	Historical Min and Max (for reference)[1]	Worse-Than-History Frequencies[2]
Slopes:					
20Y-1Y	20Y <= 3%	-0.5% to -1.5%	3% to 4%	0.02% & 2.85%	0.5% to 2%
20Y-1Y	3% < 20Y <= 8%	-2% to -3.5%	4.5% to 6%	-1.38% & 4.15%	0.5% to 2%
20Y-1Y	8% < 20Y	-4% to -5%	3.5% to 5.5%	-3.36% & 2.90%	0.5% to 2%

T4. Low For Long: 12/31/20 Starting Conditions

NAIC Exposed Criteria (relevant for 12/31/2020 yield)

a) At least 10% of scenarios need a 10-year geometric average of the 20-year UST below 1.45%

b) At least 5% of scenarios need a 30-year geometric average of the 20-year UST below 1.95%

ACLI Recommendation: Remove criteria (covered by more comprehensive T5)

T5. Low- and High-For-Long at Varying Starting Conditions

NAIC Exposed Criteria

a) For each scenario, calculate the geometric average of the [20-year] UST yield over the first [10] and [30] years of the projection.

b) Calculate the [1st] and [99th] percentiles of the distribution of geometric average rates (for both the 10 and 30-year horizons).

c) Look up criteria based on the starting level of the 20-year UST yield (interpolate if necessary).

ACLI Recommendation: the above criteria, plus

d) Use the Academy approach to determine parameters for 15th and 85th percentiles to expand the criteria table to also include conditions on moderate rate scenarios (placeholders shown in blue).

20yr Rate Initial Condition	10-Year Geometry Average				30-Year Geometry Average			
	1%ile ∨	15%ile ∧	85%ile ∨	99%ile ∧	1%ile ∨	15%ile ∧	85%ile ∨	99%ile ∧
1%	0.94%	#.##%	#.##%	3.43%	1.50%	#.##%	#.##%	6.25%
2%	1.23%	#.##%	#.##%	5.05%	1.68%	#.##%	#.##%	7.71%
3%	1.62%	#.##%	#.##%	6.55%	1.86%	#.##%	#.##%	8.72%
4%	2.15%	#.##%	#.##%	7.74%	2.06%	#.##%	#.##%	9.62%
5%	2.66%	#.##%	#.##%	8.87%	2.26%	#.##%	#.##%	10.46%
6%	3.15%	#.##%	#.##%	9.96%	2.50%	#.##%	#.##%	11.16%
7%	3.63%	#.##%	#.##%	11.03%	2.78%	#.##%	#.##%	11.61%
8%	4.10%	#.##%	#.##%	12.07%	3.06%	#.##%	#.##%	11.99%
9%	4.64%	#.##%	#.##%	13.08%	3.34%	#.##%	#.##%	12.33%
10%	5.21%	#.##%	#.##%	14.01%	3.65%	#.##%	#.##%	12.63%
Rate Control	Low Rate	Moderate Rate	Moderate Rate	High Rate	Low Rate	Moderate Rate	Moderate Rate	High Rate

T6.	Rate Mean Reversion (retain Academy criteria)	*ACLI Recommendation*
		 a) Mean reversion target:
		     i. 50th percentile 2.0% < 1Y rate < 3.5%
		     ii. 50th percentile 4.0% < 20Y rate < 5.5%
		 b) Retain Academy Rate median reversion criteria with half-life of 10-20 years

T7.	Rate volatility (retain Academy criteria; supplement SF T2.d)	*ACLI Recommendation* a) Retain Academy criteria (various by rate level):

Rate	Bucket (BOM)	Historical Stat	Desired Range		
[Chg1Y]	<= [3%]	0.59%	0.30%	to	0.89%
	> [3%] to <= [8%]	1.16%	0.58%	to	1.73%

		> [8%]	3.35%	1.67%	to	5.02%
[Chg20Y]	<= [3%]	0.61%	0.31%	to	0.92%
	> [3%] to <= [8%]	0.75%	0.37%	to	1.12%
	> [8%]	1.56%	0.78%	to	2.33%

II. Equity Rates

Item	Category	Criteria
E1.	Low and High Accumulated Equity Returns	*NAIC Exposed Criteria* a) Use the former C3 Phase II equity model Calibration Criteria as a rough placeholder benchmark when evaluating equity scenarios. **Large Cap (S&P 500) Gross Wealth Factors** *(table below)* *ACLI Recommendation: the above criteria, plus* b) Add criteria for 0.5th percentile > [0.54/0.58/0.62] for 1/5/10-year WF

Large Cap (S&P 500) Gross Wealth Factors

Percentile	1 year	5 years	10 years	20 years
2.5%	0.78	0.72	0.79	
5.0%	0.84	0.81	0.94	1.51
10.0%	0.9	0.94	1.16	2.1
90.0%	1.28	2.17	3.63	9.02
95.0%	1.35	2.45	4.36	11.7
97.5%	1.42	2.72	5.12	

	The relationship between the 0.5th (no less than) and 2.5th (no greater than) percentile criteria needs to be rational. (Need to be revisited with the updated Academy proposal that is being developed)

III. Corporate Rates

Item	Category	Criteria
C1.	Target Steady State Excess Returns and Average Annualized Excess Returns in Years 20-30	*NAIC Exposed Criteria* a) Set steady state excess return targets for each bond fund according to the criteria below. **Criteria** b) Average annualized excess returns for each bond fund in years 20 through 30 of the projection should be no greater than the steady state excess returns, but no less than the steady state excess returns minus a buffer *ACLI Recommendation: No changes*

Criteria

Steady state targets (bps)	IG 1-5	IG 5-10	IG Long	HY
Target OAS (avg. VM-20 ult. spread at [12/31/21])	107	141	163	448
Target Excess Return (Target OAS * Excess Return % of OAS)	80	79	66	240
Criteria for avg. annualized Excess Return in years [20-30]	80 -[10]	79 -[10]	66 -[10]	240 -[20]

C2. Credit spread mean reversion speed (new criteria; supplements SF C1.b)

ACLI Recommendation

a) Retain Academy criteria (half-life of 22-26 months)

Bond Fund	Median			Midpoint month
	Month [0]	Month [1200]	Midpoint	Desired Range
IG 1-5	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22] to [26]
IG 5-10	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22] to [26]
IG Long	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22] to [26]
HY	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22] to [26]

Appendix B: Technical Rational by Model

1. <u>Treasury Rates Acceptance Criteria</u>

T1. Prevalence of High Rates, Upper Bound on Treasury Rates

ACLI Proposed Acceptance Criteria:

d) The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments.

e) Upper Bound:

   i. 1Y rates should not exceed 20.3% .
   ii. 20Y rates should not exceed 17.3%.

f) Frequency of high rates:

   i. The 99th percentile in the steady state[2] is <= 17.0% for 1Y rate.
   ii. The 99th percentile in the steady state is <= 15.8% for 20Y rate.

g) Maximum sojourn length for high interest rates (> 17%) <= 4 years.

Rationale:

While the current criteria set a minimum threshold for extremely low or high rates, they do not control how frequently this could occur. Therefore, we could have a generator that has a high frequency of extreme low rates, extreme high rates, low-for-long rates, or high-for-long rates that could be unduly severe but still pass the criteria. We think it would be reasonable to set targets around the maximum frequency of these tail scenarios, as well as the minimum and maximum scenario rates to put plausible limits on the severity of low and high rates.

A sojourn length is also important to include as a criterion as the generator could easily have excessively low or high rates for extended periods of time, which is incongruent with observed history and monetary policy by the Federal Reserve.

Supporting Data:

T1.a)   Guidance Based on relevant US historical rates with allowance for worse than history scenarios.

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[2] Steady state as defined by the Academy is months 961 through 1200 (years 80 through 100) of the projected scenarios.

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T1.b)
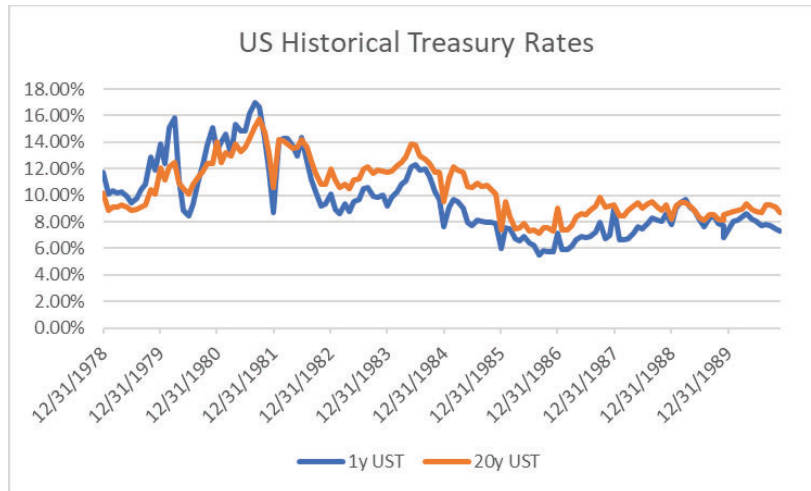
Guidance Based on relevant US Historical Rates plus one standard deviation for volatilities when rates are high (3.35% and 1.56% for the 1Y and 20Y UST, respectively). A specific boundary limits the severity of the deep tail compared to the 99th percentile. The 99th percentile would be unbounded above that level in the exposed criteria and could produce implausibly high rates.

T1.c)   Guidance Based on maximum relevant US Historical Rates. This criterion is necessary to limit the frequency of severe rates.

T1.d)   Reviewed relevant US and Non-US Historical Events. Based on this analysis, a maximum sojourn length of 8 years was determined. However, based on the assumption that high interest rate persistence could cause the US government to take action and Federal Reserve to adjust rates to alleviate negative economic impacts, a reasonable maximum sojourn length of 4 years was determined. Any longer sojourn length, compounded with a worse-than-history rate level criteria, will most likely lead to undue extreme stress scenarios.

T2. Lower bound on negative interest rates, arbitrage free considerations

ACLI Proposed Acceptance Criteria

Apply the following guidance for negative interest rates:

g) Maturities less than 20 years could experience negative interest rates.

h) Interest rates may remain negative for multi-year time periods.

i) 1Y rates should not be lower than -1.0%.

j) 20Y rates should not be lower than 0.0%.

k) Frequency of low rates:

      i. The 99th percentile on the steady state is >= 0.0% for 1Y rate.
     ii. The 99th percentile in the steady state is >= 1.0% for 20Y rate.

l)   Maximum sojourn length for low interest rates (< 0%) <= [4] years.

Rationale:
Same rationale as T1 above.

We think it is critical to set a different minimum for the shorter end and longer end of the yield curve as short rates are more likely to experience negative interest rates. Similar to high rates, it is critical to set a maximum frequency of extreme low rates and low-for-long rates which were not specified in the exposed criteria. Lastly, interest rates remaining negative for multi-year time periods criterion was expanded to have a quantitative measure of the duration for such circumstances under the maximum sojourn length criteria.

Supporting Data:
We considered international experience in our recommendations. Given significant differences in economies, we would caution looking at the world's worst case as being on par with US expectations; rather, it should be used to guide absolute limits for the criteria.

Japan: Rates were slightly negative from late-2015 to present, with the lowest point at -0.37% in July 2016.

Switzerland: Negative rates from 2015 to mid-2022; first introduced to weaken the Swiss franc.

While the negative rate events in several European countries are useful for studying such extreme rate actions, there are questions of applicability to the US as US is a major borrower with different economy policy and has additional tools to manage strength of currency.

T2.a)   Use information on rates from developed economies including Switzerland which has experienced prolonged periods of negative rates.

T2.b)   Use information on rates from developed economies including Switzerland which has experienced prolonged periods of negative rates.

T2.c):   Use information on rates from developed economies including Switzerland which has experienced prolonged periods of negative rates.

T2.d):   Same as T2.c) above. Historical minimum differences between 1Y and 20Y rates are approximately 1.0%, so propose setting 20Y minimum 1.0% higher than the 1Y minimum.

T2.e):   Use information on rates from developed economies including Switzerland which has experienced prolonged periods of negative rates.

T2.f):   Reviewed relevant US and Non-US Historical Events. Based on this analysis, a maximum sojourn length of 8 years was determined. However, based on the

assumption that low interest rate persistence could cause the US government to take action and Federal Reserve to adjust rates to alleviate negative economic impacts, a reasonable maximum sojourn length of 4 years was determined. Any longer sojourn length, compounded with a worse-than-history rate level criteria, will most likely lead to undue extreme stress scenarios.

T3. Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape

ACLI Proposed Acceptance Criteria:

a) Frequency of inversions overall years between 3.6% and 7.6%.

b) Max inversion sojourn length <= 24 months.

c) Retain maximum of yield curve inversion criteria from Academy proposal:

Max Inversion -0.5%/-2.0%/-4.0% where 20Y Rate <=3%/3-8%/>8%.

Rationale:
We believe the criteria exposed should include quantitative measures such as those suggested above.

Supporting Data:
T3.a)   Guidance based on relevant US historical rates.

T3.b)   Guidance based on relevant US historical rates.

T3.c)   Guidance based on relevant US historical rates.

Frequency of Inversion	5.6%
Maximum Length of Inversion	56 weeks*
Average Length of Inversion	7.4 weeks
Average Slope when Inverted	-0.44%
Max Inverted Slope	-1.25%

Based on post-August 1987 data
*As of Nov 3, 2023

1. Standard deviation of frequency of inversion based on rolling 10-year periods is around 2%, supporting a range of 3.6-7.6% for frequency of inverted yield curves.

2. We are currently in the longest period of inverted yield curve (56 weeks as of 2023/11/3). As an element of conservatism, we propose a 2-year maximum Sojourn length for inverted yield curves.

3. To define worse-than-history slope inversion, we included data pre-1987 consistent with the Academy proposal, and added a -0.5% buffer to the historical max as the lower bound for rate slope.

T4. Low For Long: 12/31/20 Starting Conditions

ACLI Proposed Acceptance Criteria:

a) ACLI Recommendation: Remove criteria

Rationale:

T4.a)   This Criterion is covered under T5 which is more comprehensive guidance based a review of criteria T4 and T5. Additionally, the T4 criterion is not defined for other starting conditions.

T5. Low- and High-For-Long at Varying Starting Conditions

ACLI Proposed Acceptance Criteria (a through c same as NAIC):

a)   For each scenario, calculate the geometric average of the [20-year] UST yield over the first [10] and [30] years of the projection.

b)   Calculate the [1st] and [99th] percentiles of the distribution of geometric average rates (for both the 10 and 30-year horizons).

c)   Look up criteria based on the starting level of the 20-year UST yield (interpolate if necessary).

d)   Use the Academy approach to determine parameters for 15th and 85th percentiles.

Rationale:

T5.a-c)   Support NAIC and Academy justification for inclusion.

T5.d)   Same approach should be used to evaluate additional percentiles that allows for Incorporation of Criteria on Boundary Conditions on Moderate Scenarios.

The 99th and 1st percentile criteria well define minimum and maximum thresholds for high-rate scenarios (i.e., extreme high or high-for-long) and low-rate scenarios (I.e., extreme low or low-for-long), respectively. The criteria do not constrain how much such tail scenarios can be included (i.e., criteria uses less than threshold for low rates and greater than for high rates).). To avoid excessive amounts of high or low-rate scenarios (at the cost of inadequate number of moderate scenarios), it is critical and necessary to include 15th and 85th percentiles to ensure an appropriate level of moderate scenarios to enable adequate reserve calculations (with proper mid-range rate scenarios) and capital valuations (without excessive tail scenarios).

T6. Rate Mean Reversion (additional criteria)

ACLI Proposed Acceptance Criteria

a) Mean reversion target:
    i. 50th percentile 2.0% < 1Y rate < 3.5%.
    ii. 50th percentile 4.0% < 20Y rate < 5.5%.

b) Retain Academy Rate median reversion criteria with half-life of 10-20 years.

Rationale:

Acceptance criteria which serve to evaluate mean reversion are necessary to define and support realistic interest rates.

Supporting Data:

T6.a)   Specific acceptance criteria around rate mean reversion rate and speed are critical for appropriate behaviors of the interest rate generator. Recommendation is based on:

- Range of 50th percentile 2.0% < 1Y rate < 3.5% is based on inflation target of 2%, plus real interest rates between 0% and 1.5%;
- Range of 50th percentile 4.0% < 20Y rate < 5.5% is based on 1Y range above, adjusted for relevant historical average rate slope of 2%.

T6.b)   Retain Academy criteria for reversion speed, i.e., a half-life of 10-20 years, which is within the range of mean reversion speeds implied in pricing of market swaptions. Market swaptions are generally priced with a mean reversion speed of approximately 5% (i.e., half-life of 13-14 years), largely consistent with the Academy proposal. As such, the Academy proposal seems reasonable and should be retained.

T7. Rate Volatility (additional criteria)

ACLI Proposed Acceptance Criteria

a)   Retain Academy criteria (various by rate level):

Rate	Bucket (BOM)	Historical Stat	Desired Range		
	<= [3%]	0.59%	0.30%	to	0.89%
[Chg1Y]	> [3%] to <= [8%]	1.16%	0.58%	to	1.73%
	> [8%]	3.35%	1.67%	to	5.02%
	<= [3%]	0.61%	0.31%	to	0.92%
[Chg20Y]	> [3%] to <= [8%]	0.75%	0.37%	to	1.12%
	> [8%]	1.56%	0.78%	to	2.33%

Rationale:

T7.a)   ACLI supports retaining the Academy rate volatility criteria. Specific targets are important beyond the underlying stylized facts. Lack of specific volatility targets could lead to excess volatility in scenarios; insufficient volatility is unlikely given the other acceptance criteria. Excess volatility could create disconnects from typical and expected real-world economic behavior and can impact performance of hedges and sound risk management practices in the reserve and capital projections.

Supporting Data: Academy Proposal.

2.   Equity Model Acceptance Criteria

General. The interest-equity linkage assumption should be set to zero

Rationale:

See charts below for comparisons of scenario sets 1A, 2A, and 6 from the Field Test. Sets 1A and 2A feature a linkage between equity returns and interest rates where the long term expected mean return varies as interest rates change (lower when rates are lower and vice versa as interest rates increase). Set 6 models equity and interest rates movements as independent and uncorrelated processes consistent with the historical approach used in the prescribed generator for US Statutory reserves and capital where relevant. Low/high interest rate scenarios referenced below were defined by dividing the scenario sets into quartiles based on the geometric average of the 20Y rate in the first 10 years (Low = 1st quartile and High = 4th quartile). Cumulative equity returns (wealth factors) were calculated over the same time horizon.

Field Test Scenarios Joint Equity-Rate Statistics - Low Equity Returns (2.5% Percentile)

Field Test Scenarios Joint Equity-Rate Statistics - High Equity Returns (97.5% Percentile)
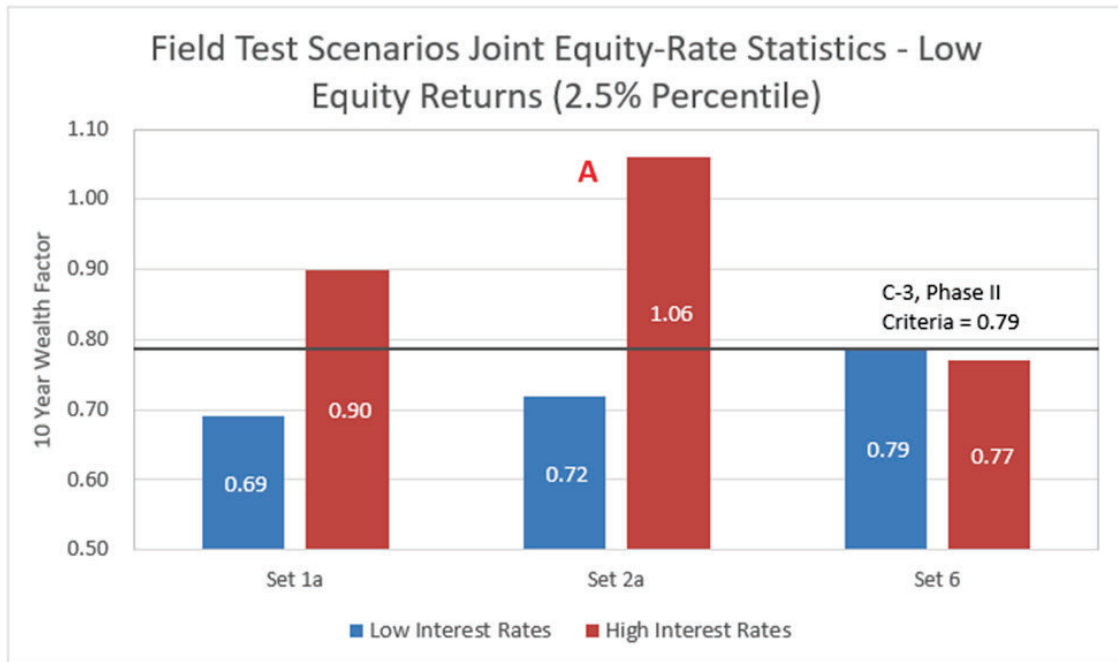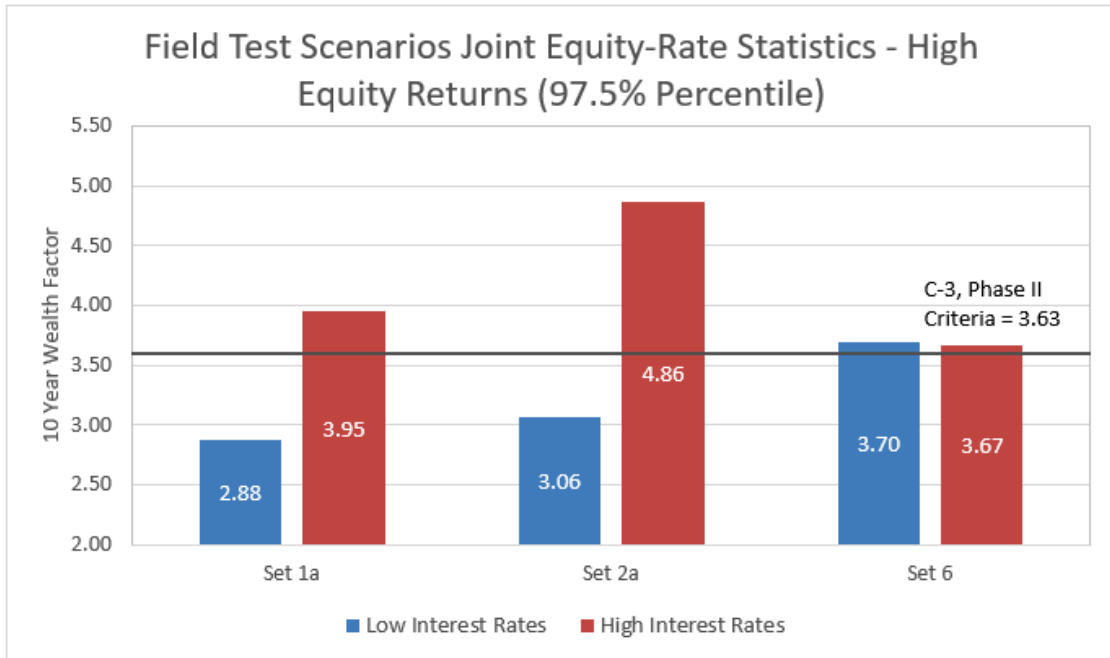
As long as a scenario set meets the wealth factor (WF) criteria in the low and high interest rate scenarios (e.g., the lowest and highest quartiles), we would view the set as having sufficient joint equity-rate severe scenarios. Looking at low equity returns (2.5th percentile), Scenario Set 6 (no equity-rate linkage) basically meets the C3P2 Equity WF criteria for all quartiles including those not shown in graph above, while sets 1a and 2a fail to meet the criteria in the highest quartiles and have returns notably below the criteria in lowest quartiles, e.g., there is an approximately 10 percentage point difference compared to the C3P2 criteria in the lowest quartile for scenario set 1a. This exhibit illustrates that the presence of an equity-rate linkage may 1) produce significantly lower equity scenarios relative to the WF criteria, particularly in low-rate scenarios, to compensate for the higher average equity returns in high interest rate scenarios, and 2) fail to generate sufficiently severe equity scenarios in a high interest rate environment. For example, in Set 2a, which was based on 12/31/2021 +200bps initial market conditions, the 2.5th percentile equity returns in the highest quartile reflect a 27% difference between the C3P2 criteria over the first 10 years (6% gain versus a 21% loss, respectively; shown as "A" in the 2.5th chart above).

When looking at high equity returns (97.5th percentile), most scenario sets with an equity-rate linkage in the Field Test struggled to meet the WF criteria. Set 2a is able to meet the C3P2 criteria on an aggregate basis at year 10 but does not meet them for specific quartiles due to the higher starting interest rates coupled with the equity-rate linkage. Set 6 has the least variation in WF across the quartiles and the returns align closely with the C3P2 WF criteria, while the other sets exhibit notable differences between the returns in the 1st and 4th quartiles.

In summary, sufficiently robust amounts low rate/low equity, or high rate/low equity scenarios can be achieved without modeling an equity/rate linkage. Modeling equity

and interest rate movements as independent and uncorrelated processes enables a more uniform level of prudence across interest rate levels, allows greater certainty of scenario sets satisfying the WF criteria over time and reduces implementation complexity (less risk of recalibration to meet criteria as market conditions change).). Furthermore, historical results indicate that an equity-rate linkage does not provide a statistically significant increase in the realism of the capital markets model (would see notably lower standard deviation in excess return vs. S&P 500 (SPX) return if equity-rate linkage did significantly increase realism of the model (see table below; difference between 5.1% vs 5.2%). Finally, the significant volatility resulting from introducing an equity-rate linkage makes it much more difficult for companies to appropriately manage future capital planning, hedging, and new business pricing.

Metric	Cash Return	SPX Return	Excess Return (above 3m rate)
Average Return	2.6%	9.8%	7.2%
Standard Deviation	1.7%	5.2%	5.1%

- Returns are measured based on rolling 10-year periods.

- Standard deviation is comparable between equity return and excess return (above 3-month rate), suggesting **the equity-rate linkage does not provide a significant increase in explanatory value.**
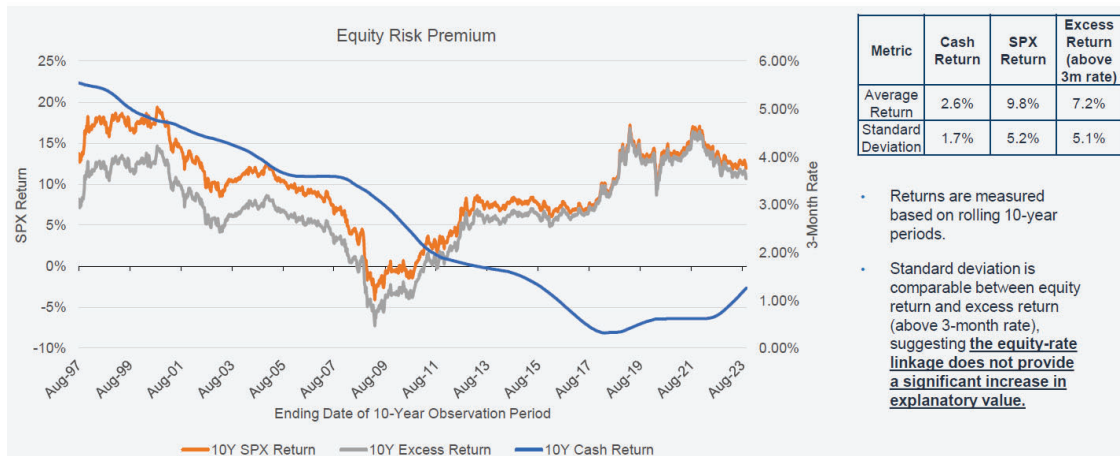
E1. Low and High Accumulated Equity Returns

ACLI Proposed Acceptance Criteria:

a) Use the former C3 Phase II equity model Calibration Criteria as a rough placeholder when evaluating equity scenarios (and updating when additional data is available).

Large Cap (S&P 500) Gross Wealth Factors

Percentile	1 year	5 years	10 years	20 years
2.5%	0.78	0.72	0.79	
5.0%	0.84	0.81	0.94	1.51
10.0%	0.9	0.94	1.16	2.1
90.0%	1.28	2.17	3.63	9.02
95.0%	1.35	2.45	4.36	11.7
97.5%	1.42	2.72	5.12	

b)   Add criteria for 0.5th percentile > [0.54/0.58/0.62] for 1/5/10-year WF.

The relationship between the 0.5th (no less than) and 2.5th (no greater than) percentile criteria needs to be rational. (Need to be revisited with the updated Academy proposal that is being developed).

Rationale:

E1.a)   It is appropriate to have a specific quantitative criterion for all components of the model, which includes equity returns. It would be beneficial to update the prior C3 Phase II equity model Calibration Criteria when additional information is available.

E1.b)   Given the importance of tail behavior for the determination of capital, it would be appropriate to include criteria for the 0.5th percentile to control the frequency and severity of the tail. It is important that once such criteria are developed, the relationships in the tails should make sense; the relationship of the 0.5th percentile to the 2.5th percentile should be logical (there is not any severe or unexplainable jumps between these percentiles).

While criteria could also be developed for the 99.5th percentile, such scenarios would likely not be included in either the reserve or capital calculations (e.g., scenarios expected to sit outside of CTE (70)).

Supporting Data:

The following table is based on S&P 500 and Dow Jones Industrial Total Return (1950-2023). As a placeholder, we would propose developing criteria for the minimum values in years 1, 5, and 10 based on the historical minimums for years 1 and 10 and average of those years for year 5 for a smoother distribution (resulting in wealth factors of 0.54/0.58/0.62 for years 1/5/10). These targets would allow for a reasonable frequency and severity of "worse than history" scenarios in the extreme tail (aligns with stylized fact E.7). In the absence of such criteria, it can allow the scenario sets to have much lower returns than would be appropriate.

| | Historical Equity Wealth Factors | | | | | | | | | | | | | | | |
| | S&P 500 | | | | Dow Jones | | | | AIRG US Index | | | | C3P2 Requirement | | | |
Percentile	1-Year	5-Year	10-Year	20-Year	1-Year	5-Year	10-Year	20-Year	1-Year	5-Year	10-Year	20-Year	1-Year	5-Year	10-Year	20-Year
Min	0.54	0.67	0.62	2.51	0.57	0.73	0.83	2.20	0.40	0.37	0.36	0.40				
0.50%	0.64	0.83	0.79	2.98	0.66	0.90	0.97	2.46	0.67	0.56	0.58	0.75	>0.54	>0.67	>0.62	
1.00%	0.68	0.86	0.86	3.10	0.72	0.93	1.04	2.53	0.72	0.61	0.66	0.89				
2.50%	0.78	0.89	0.95	3.29	0.82	0.99	1.17	2.64	0.78	0.71	0.79	1.12	0.78	0.72	0.79	
5.00%	0.84	0.95	1.29	3.57	0.86	1.04	1.31	2.81	0.83	0.80	0.92	1.41	0.84	0.81	0.94	1.51
10.00%	0.91	1.04	1.46	3.93	0.92	1.12	1.46	3.16	0.88	0.93	1.12	1.80	0.90	0.94	1.16	2.10
25.00%	1.03	1.35	2.01	4.54	1.01	1.28	1.83	4.19	0.98	1.16	1.51	2.77				
50.00%	1.13	1.74	2.81	6.37	1.11	1.61	2.43	6.07	1.08	1.45	2.11	4.37				
75.00%	1.23	2.08	3.96	9.71	1.21	1.99	3.77	10.26	1.19	1.81	2.87	6.82				
90.00%	1.33	2.51	4.79	16.13	1.32	2.38	4.78	17.35	1.30	2.19	3.82	10.30	1.28	2.17	3.63	9.02
95.00%	1.39	2.84	5.17	21.85	1.38	2.71	5.30	22.86	1.36	2.48	4.48	12.99	1.35	2.45	4.36	11.70
97.50%	1.43	3.08	5.45	24.53	1.43	2.96	5.61	24.66	1.42	2.74	5.21	16.03	1.42	2.72	5.12	
99.00%	1.48	3.27	5.66	25.83	1.49	3.32	5.90	27.05	1.52	3.06	6.25	20.16				
99.50%	1.53	3.42	5.78	26.58	1.52	3.55	6.08	27.52	1.57	3.32	6.90	23.33				
Max	1.73	3.83	6.04	29.57	1.74	4.10	6.49	29.74	1.85	5.28	12.24	40.39				

We note that the 5Y in the table above would be inconsistent with the 10Y, so we suggest smoothing the value to be the average of the 1Y and 10Y (so 0.58).

3. Corporate Model Acceptance Criteria

C1. Target Steady State Excess Returns and Average Annualized Excess Returns in Years 20-30

NAIC Exposed Criteria (no proposed changes):

a) Set steady state excess return targets for each bond fund according to the criteria below.

Criteria

Steady state targets *(bps)*	IG 1-5	IG 5-10	IG Long	HY
Target OAS *(avg. VM-20 ult. spread at [12/31/21])*	107	141	163	448
Target Excess Return *(Target OAS * Excess Return % of OAS)*	80	79	66	240
Criteria for avg. annualized Excess Return in years [20-30]	80 -[10]	79 -[10]	66 -[10]	240 -[20]

b) Average annualized excess returns for each bond fund in years 20 through 30 of the projection should be no greater than the steady state excess returns, but no less than the steady state excess returns minus a buffer

Rationale: Criteria is sufficiently robust to capture excess returns associated with the corporate model.

C2. Low and High Accumulated Equity Returns (additional criteria)

ACLI Proposed Acceptance Criteria:

a) Retain Academy criteria (half-life of 22-26 months)

Bond Fund	Month [0]	Month [1200]	Midpoint	Midpoint month Desired Range		
			Median			
IG 1-5	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22]	to	[26]
IG 5-10	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22]	to	[26]
IG Long	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22]	to	[26]
HY	$Median_{[0]}$	$Median_{[1200]}$	$Avg(Median_{[0]}, Median_{[1200]})$	[22]	to	[26]

Rationale:

C2.a) Consistent with VM-20: VM-20 prescribes a 4-year grading period for general account fixed income spreads. A midpoint around 24 months is reasonable. The Academy suggested a range of 22 to 26 months, which we think is a reasonable band around the midpoint.

Supporting Data:

Academy proposal

Historical events may suggest slightly faster mean reversion but decoupling the impact of volatility and mean reversion involves judgement.

November 10, 2023

Rachel Hemphill, PhD, FSA, FCAS, MAAA
Chair, NAIC Life Actuarial Task Force

Re: GOES Stylized Facts and Acceptance Criteria Comment Letter

Dear Rachel:

Nationwide appreciates the opportunity to comment on GOES Stylized Facts and Acceptance Criteria. We are in favor of the approach of defining Stylized Facts and Acceptance Criteria followed by robust testing in both model office and industry models. While a robust set of acceptance criteria are a vital ingredient in choosing candidate models, a model that meets all acceptance criteria may not be fit for use for all applications. Similarly, a model that does not meet all acceptance criteria is not necessarily unfit for use (though it does suggest potential limitations for awareness).

We offer the following specific comments on the exposure:

Stylized Facts: The stylized facts are well defined in establishing the qualitative behaviors that should be captured in the generator, and we applaud the NAIC and Academy in establishing these definitions. Expert judgment will be necessary in determining if a given model satisfies these stylized facts.

Lower Bound on Negative Interest Rates: *Rates should generally be above -1.5%*
While this is a reasonable criterion, if this is accomplished via a flooring mechanism rather than more complete calibration of the model it may introduce unrealistic behavior. For instance, an outsized portion of the distribution may be concentrated near the floor level where it is more realistic for there to be very little weight around this lower bound.

Low For Long Criteria (12/31/20 initial conditions):
a) At least 10% of scenarios need a 10-year geometric average of the 20-year UST below 1.45%
b) At least 5% of scenarios need a 30-year geometric average of the 20-year UST below 1.95%

Both the criteria for the 10-year and 30-year geometric averages are more extreme than any path observed in history, where the lowest are 2.00% and 2.68% respectively[1]. While it is desirable to include paths more extreme than history, it is too restrictive to target (at least) 10% of scenarios to be materially more extreme than history. While we recognize the modification to this criteria proposed by LATF, we believe that this criteria is still too restrictive. Additionally, we feel that this will result in the same issues uncovered in the first field test relating to interest rates being implausibly low in many scenarios.

Equity Criteria
We would like to reiterate that no material deficiencies have been identified with the current Academy equity model. As such, maintaining consistency with the current equity model would be beneficial in

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[1] Based on historical long interest rates (10-year treasury as proxy) 1871-Present:
Shiller, R., U.S.Stock Price Data, Annual, with consumption, both short and long rates, and present value calculations. An Update of Data shown in Chapter 26 of Market Volatility, R. Shiller, MIT Press, 1989, and Irrational Exuberance, Princeton 2015. http://www.econ.yale.edu/~shiller/data.htm

understanding impacts to reserve and capital and avoiding unjustified movements. We are in favor of more complete equity acceptance criteria being defined with consistency to the current equity model along with satisfying the stylized facts defined.

We appreciate your consideration of our comments.

Sincerely,

Alex Hookway, FSA, MAAA
Sr. AVP, NF Quantitative Risk Management
Nationwide Financial

Philip Wunderlich, FSA, MAAA
Associate Vice President, Appointed Actuary
Nationwide Financial

cc   Scott O'Neal, NAIC
        Pete Weber, Ohio Department of Insurance

EQUITABLE

DATE: November 10, 2023

FROM: Aaron Sarfatti, Chief Risk and Strategy Officer
            Steve Tizzoni, Head of Actuarial Regulatory Affairs

SUBJECT: Generator of Economic Scenarios (GOES) Exposure

Executive Summary
Equitable appreciates the opportunity to comment on the GOES acceptance criteria and offers the following initial observations. More detail on each is below.

1. Treasury Model: Lower calibration percentiles in low starting interest rate conditions: A key tenet of an appropriately calibrated treasury model is its ability to produce a wide range of plausible interest rates. To that end, we suggest modifications to the criteria to achieve an appropriate distribution of low and high interest rate scenarios, but particularly to maintain the potential for sustained low interest rates when starting interest rates are low.

2. Equity Model: Introduce the equity and interest rate linkage: The robustness of current criteria is limited by the lack of a linkage between equity returns and interest rates, which is a critical property of an economic scenario generator in its promotion of hedging and sound risk management in all interest rate environments, and to align with historical data.

3. CTE Standard for Capital: Shift C3 Phase 2 capital to CTE 95 from CTE98: Equitable suggests CTE95 as the measure to set C3 Phase 2 capital requirement instead of CTE98, as GOES reform (including the elements outlined above) introduces the more robust set of scenario outcomes necessary to assure regulators to adopt the original Oliver Wyman suggestion of CTE 95.

Treasury Model: A key tenet of the economic scenario generator is its ability to produce a wide variety of plausible interest rates. To achieve this goal, Equitable suggests the following acceptance criteria modifications:

- *Modify Low-and High-for-Long Criteria (T.5):* Equitable supports the intent of the chart in criteria T.5 but believes the values should be calibrated to reflect more low-for-long scenarios. The criteria set the 1st and 99th percentiles of the 10-year and 30-year geometric average of the 20-year UST. While basing criteria on an initial treasury rate and geometric average, rather than a point in time, is appropriate, we believe the distribution is not varied enough, especially at the low end.

  It is crucial that the generator consider the possibility that interest rates remain low (such as in a Japan scenario), as that is currently lacking in the Academy Interest Rate

Generator ("AIRG"). This appears somewhat lost in the T.5 requirements, as the chart assumes that when rates are at 1%, the first percentile of the 10-year average is less than .94% and the 30-year average is less than 1.5%. Equitable believes these values should be lower to account for situations where interest rates are below the starting point on average over time.

- *Removal of Criteria as of 12/31/20 (T.4)*: Equitable believes that having separate acceptance criteria for 12/31/20 starting conditions is redundant and confusing. For example, it is unclear if these criteria will be developed for starting conditions other than 12/31/20 and what the relationship is (if any) between these criteria and the criteria in T.5. Additionally, if criteria T.5 is appropriately calibrated as noted above, separate criteria for 12/31/20 starting conditions should not be required.

Equity Model:
- *Equity / interest rate linkage*: Equitable supports a structural linkage between interest rates and equity returns via an equity risk premium.

  Conceptually, the constant equity risk premium (ERP) approach, as utilized in the GEMS model, reflects the fact that a rational investor would demand expected equity returns in excess of those offered by risk-free assets to compensate for bearing such risk. A phenomenon where variations in risk free interest rates create highly varied, and at times even negative, equity risk premia. This result is a "real world" model that inarguably fails "real world" common-sense investor principles.

  Historically, we analyzed the relationship between interest rate and equity returns based on the 20-year UST rate and the S&P 500 index return, and the analysis indicated a positive relationship between the two. Exhibit A below shows the historical 20-year US treasury rates and the annualized 20-year return of the S&P index *in the following 20-year period*. We note that, in performing analysis regarding the relationship of interest rates and equities, it is important to look at the relationship between interest rates and *future* equity returns, not short-term relationships, as the valuation of insurance liabilities requires long-term projections. The data clearly evidences a high correlation between current interest rates and future equity returns. This is strongly supportive of a positive relationship between interest rates and equities as in the proposed Conning scenarios, as evidenced in Exhibit B, which shows a positive correlation between the average UST 20-year rates and 20-year projected cumulative Large Cap returns based on field test Scenario 1A (orange line). This is not existent under current AIRG model (black line).

Exhibit A: Correlation between historical Treasury Rates and Future Equity Returns (20yr UST 20 rates unavailable for '87-'89)
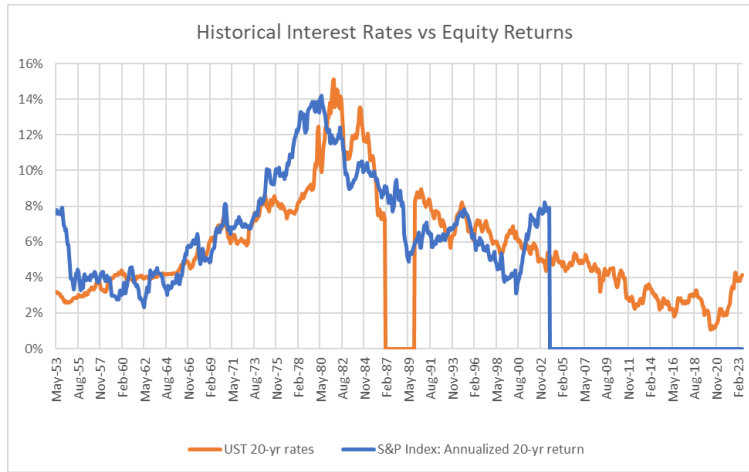
Exhibit B: GEMS vs current AIRG
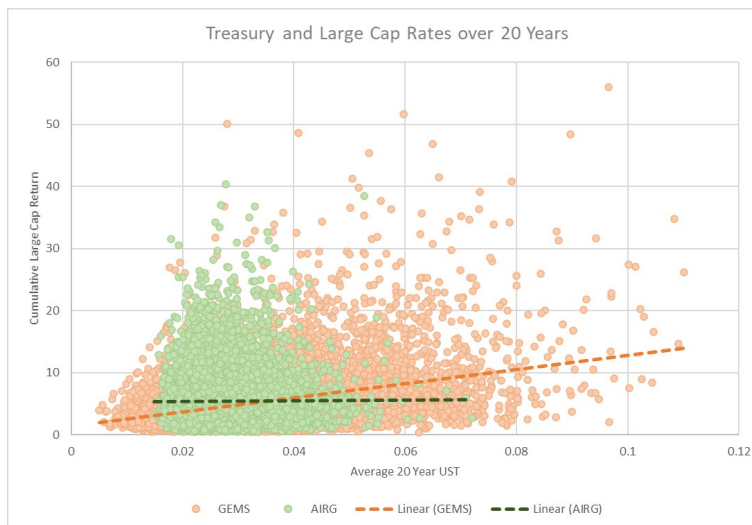
Further, the rise in interest rates over the past several months has also demonstrated a clear effect of interest rates on equity valuations. The rise in interest rates depressed the value of many equity market sectors, as higher interest rates increased investor return requirements and expected future returns to justify investment in risky investments.

Lastly, and critically, a positive equity and interest rate linkage provides appropriate incentives for risk management. This linkage is consistent with industry fair value principles and promotes hedging by aligning the valuation of liabilities with that of instruments used to hedge liabilities.

- *Additional Gross Wealth Factors (GWF):* Equitable believes appropriately calibrated equity returns are critical to the generator. While we appreciate having GWF for the S&P 500, there was a lack of GWF for other indices, so Equitable would recommend acceptance criteria for other key equity indices, such as Russell 2000 (small cap), EAFE (international) and NASDAQ.

Corporate Bond Model: While Equitable did not perform a detailed review of the GEMS Corporate Bond Model, we believe the outcomes should be rendered consistent with General Account returns elsewhere in the Valuation Manual. The long-run high yield excess returns seemed beyond a rate we would consider prudent and may incentivize companies to increase separate account allocations to these risky sectors.

CTE 95 vs. CTE 98 for setting Risk Based Capital for Variable Annuities: Equitable proposes to shift to a CTE 95 measure for setting C3 Phase 2 capital for variable annuities instead of the CTE 98 together with the new GOES reform. During the development of the VM-21 framework, Oliver Wyman's original recommendation was to use CTE 95, the average of the worst 50 out of 1,000 scenarios. This recommendation was further noted that, to maintain sufficient prudence, the scenario generator must be enhanced to produce a broader range of financial outcomes.

This is addressed in the GOES reform as all scenario sets in the field test produced a much broader range of interest rates with equity scenarios being at least as prudent as AIRG. To illustrate that, we calculated the CTE 95 and CTE 98 for (1) the average 20-year UST rates over 20 years, (2) equity gross wealth factors over 20 years and (3) the value of a 20-year equity futures contract. Please see Exhibit C below for more details.
- *Interest rates*: the CTE 95 for the two primary scenario sets field tested (1a and 1b) are significantly lower than the CTE 98 from the AIRG, demonstrating the additional prudence in the GOES generator.
- *Equity Gross Wealth Factors*: the CTE 95 of the equity GWF under scenario sets 1a and 1b is lower than the CTE 95 of the AIRG GWF distribution, as expected, but remains higher than the CTE 98 under the AIRG.
- *Value of a 20-year Futures Contract:* Equitable calculated the CTE 95 and 98 of the value of a $1 at-the-money 20-year equity futures contract under both generators. As expected, given the more robust interest rate distribution and interest rate / equity linkage, the PV of the futures contract payoff is lower in the new GOES scenarios which reflects a higher cost of writing a long-term equity future contract or guarantee.

While the gross equity returns in the tested scenarios 1a and 1b *alone* are not significantly strengthened from the AIRG, given the much broader set of interest rate scenarios combined with the interest rate and equity linkage that ensures low-for-long rate scenarios are tested in tandem with poor equity returns, we believe that the CTE 95 of the GOES Scenarios would be more indicative of fair value and sufficiently prudent to serve as the C3 Phase 2 capital requirement as originally proposed by Oliver Wyman in lieu of the current CTE 98.

Exhibit C: CTE 98 vs. CTE 95 for tested scenarios

Avg. 20yr UST rate	GOES Scenario 1a	GOES Scenario 1b	AIRG
CTE 95	1.1%	1.2%	1.7%
CTE 98	0.9%	1.0%	1.6%

Equity GWF	GOES Scenario 1a	GOES Scenario 1b	AIRG
CTE 95	1.02	1.02	1.09
CTE 98	0.79	0.80	0.85

PV of Equity Futures Contract	GOES Scenario 1a	GOES Scenario 1b	AIRG
CTE 95	0.01	0.01	0.06
CTE 98	(0.18)	(0.18)	(0.11)

In addition, as Oliver Wyman noted and to which we agree, CTE 98 is challenged in that it is comprised of only 20 scenarios of the 1,000 scenarios typically analyzed. This small sample size makes it a less reliable measure of tail capital requirements and significantly more volatile compared to CTE 95. Equitable believes that, together with the new GOES, a CTE 95 measure for C3 Phase 2 capital requirements would result in a prudent framework that is meaningfully improved relative to the current standard.

* * * * * * * * *

Equitable appreciates the opportunity to comment on this exposed proposal, and we look forward to testing scenarios in a second field test. We are available to discuss our comments further as desired.

Sincerely,

Aaron Sarfatti, ASA

Chief Risk Officer & Strategy Officer, Equitable

Stephen M. Tizzoni, FSA, MAAA

Head of Actuarial Methodology and Regulatory Affairs, Equitable

November 8, 2023

Ms. Rachel Hemphill, Chair, Life Actuarial (A) Task Force (LATF)
Mr. Philip Barlow, Chair, Life Risk-Based Capital (E) Working Group (Life RBC)
Mr. Mike Yanacheak, Chair, Generator of Economic Scenarios (E/A) Subgroup (GOES Subgroup)
National Association of Insurance Commissioners (NAIC)

Dear Ms. Hemphill, Mr. Barlow, and Mr. Yanacheak,

I wish to offer these comments on GOES Stylized Facts and Acceptance Criteria exposed on 10/5/23 (the "exposure").

General comment

The role of stylized facts in forming acceptance criteria appears to be completely misunderstood. The acceptance criteria that are proposed are calibration criteria only, and do not include reference to many of the stylized facts, making it unclear why the stylized facts are included at all.

Stylized facts are important and play a central role in evaluating whether a generator is appropriate for the purpose at hand. The first and most important acceptance criteria should be that the generator's stochastic process is capable of reproducing behavior consistent with the stylized facts. Only after that first and most important acceptance criteria has been met do calibration criteria come into play. The exposure completely fails to mention the first and most important acceptance criteria.

Stylized facts describe historical behavior, and the purpose of a real-world generator is to produce scenarios that simulate real-world behavior. A generator whose stochastic process is incapable of simulating important aspects of historical behavior is unacceptable no matter how it is calibrated. Evaluating a stochastic process against stylized facts is a very technical endeavor and is easily skipped over by those without the needed technical background in stochastic processes. I say this because last year I documented several reasons why Conning's real-world interest rate generator fails to be consistent with historical behavior and should be rejected on that basis alone. Those comments have had no effect on this discussion, perhaps due to their technical nature. You can download those comments here.

Stylized facts can be used to guide the design of a generator's stochastic process. I have written a short book illustrating how that can be done for an interest rate model. Chapter 3 of this book explains step-by-step how stylized facts can guide the design of the stochastic process for an interest rate model.

Specific comments on each sub-model

Interest rate model

The Treasury model acceptance criteria for low interest rates are far more extreme than anything that has ever been historically experienced and, if enacted, will undoubtedly change the insurance market to make products with interest rate guarantees less available and less affordable than they are today.

- "All maturities could experience negative interest rates". The lowest long-term rates ever experienced were in July 2020 when the 20-year rate was 0.98% and the 30-year rate was 1.20%. Since market prices for long term fixed-income maturities are based on expectations of future interest rates, a price consistent with a zero 30-year spot rate implies an expectation that interest rates will not exceed zero at any point in the next 30 years. I believe that is an unreasonable expectation and an unreasonable scenario. Zero or negative interest rates for long term fixed income securities are unreasonable and should not be required as an acceptance criteria.

- The low-for-long criteria based on the 12/31/20 starting yield curve requires a model calibration that deviates very far from historical behavior. I am not aware of any analysis supporting a 10-year geometric average rate in the future that is below the lowest single year-end rate ever recorded 10% of the time. It appears that such a requirement was simply pulled out of the blue based on some sort of intuition.

Conservatism in the principle-based approach comes from the choice of CTE level at which reserves and capital are set. The CTE level only has meaning if the underlying generator is calibrated in a realistic fashion, based on history, without adding intentional conservatism. It appears to me that these acceptance criteria are a clear attempt to add intentional conservatism to the calibration, thereby weakening the theoretical foundation of the whole principle-based regime.

Equity return model

I applaud continued use of the existing calibration criteria.

I would note that the criteria do not depend on starting conditions such as the starting level of interest rates. This is an important decision, because the model Conning put forward does produce scenario sets that depend very strongly on the starting level of interest rates.

Corporate model

Stylized fact 1a says "Credit markets tend to be cyclical with elevated defaults and migrations at the end of credit cycles. Credit-related losses tend to be "lumpy" or episodic."

I consider this stylized fact to be important because the lumpy nature of credit losses presents an elevated risk to insurers when such lumps of losses occur in a short period. Yet there is no reference to this stylized fact in the acceptance criteria.

Thank you for the opportunity to provide these comments.

Regards,

Stephen J. Strommen FSA, CERA, MAAA

Nov 9, 2023

Honorable Rachel Hemphill
Chair, Life Actuarial (A) Task Force (LATF)
Re: Generator of Economic Scenarios (GOES) Acceptance Criteria

Dear Ms. Rachel Hemphill,

Please accept this comment on the Generator of Economic Scenarios (GOES) Acceptance Criteria. Insurance regulators have made a major step forward in management of interest rate and equity risk with this generator. The inclusion of negative interest rates is a particularly valuable step for American financial risk regulation. Many groups and individuals have contributed a great deal over the years to get to this point.

Sincerely yours,

Mark S. Tenney

1   Treasury Acceptance

1.1   Proposed T6 Arbitrage

Arbitrage among treasury bonds should not exist. If it is permitted in the model, then riskless arbitrage should be eliminated by introducing sufficient transaction costs in the portfolio system. The model must still be examined for allowing excessive return on risk. If that is still the case, then some sort of charge should be added to limit this. This can become quite complicated, but is important to the entire behavior of the system. This will have consequences for other parts of the system, equities and corporate spreads or returns.

The Generalized Fractional Floor is already a violation of arbitrage. But it also means a break in return on risk. The implications for corporate bonds and possibly equities need to be investigated and appropriate modifications or charges made in expected returns and returns on risk.

2   Equity Acceptance

2.1   Proposed E2 Correlation of equity classes

For equity classes with positive correlation, the requirement is as follows.

If the model allows for a changing correlation, then during a crisis, the correlation should be higher.

If there is a single fixed correlation between two assets that is normally positive, then it shall be at least its historical value, but it could be between its typical value and its value during a crisis.

3   Corporate Model Acceptance

3.1   Proposed C2

The same correlation criteria shall apply within corporate model bond classes and between them and equity asset classes.

4   Underlying economics

4.1   Inflation

Inflation is not explicitly taken into account. The Federal Reserve has a target inflation of 2 percent. This is a typical number for advanced countries. Are statistics from higher inflation eras in the past being used? Will that throw off the statistics if the 2 percent inflation target is kept? Or will statistics based on the 2 percent inflation era be off if inflation is higher in the future?

How strong is the commitment to the two percent target? Could the inflation target vary in the future leading to shifts in quantitative stylized facts or quantitative acceptance criteria? Or to quantitative calibration criteria?

Greg Mankiw thinks inflation may be closer to 3 percent for a while. Olivier Blanchard talked about the possible desirability of a higher inflation target at Brookings this year. However, he indicated that around 4 percent inflation instability sets in which makes a target that high undesirable.

4.2 Total Factor Productivity Growth

The total factor productivity growth rate is a key risk variable for the economy. This was 2 percent or higher before 1973. Since then it might be one percent. It is somewhat controversial as to what it really is. Greg Mankiw indicated to me earlier in the year that this has a wide margin of uncertainty. This might include a period of negative growth rate.

A shift in total factor productivity might change the growth rate of earnings. It could change the return on investment. That might change equity returns. It could shift the long run short term real interest rate.

4.3 Expected returns or risk premia may be lower

Risk premia may be lower. This could explain higher P/E ratios.

Expected returns could be lower because there are more elderly. They have a higher demand for investing and this results in a lower expected return on investments. This is often referred to as a demographic explanation of higher P/E.

5 Treasury Stylized Facts

5.1 1b Negative Rates

5.1.1 Taylor Rule and its variants

The Taylor Rule and other rules for central banks to set interest rates have been widely taught for many years. They are now taught even in introductory economics courses. They will become part of certification tests in banking, financial planning, to sell securities and possibly to sell insurance. These rules can produce negative interest rates as the desired interest rate.

The Taylor rule can be stated as follows.

https://www.federalreserve.gov/monetarypolicy/policy-rules-and-how-policymakers-use-them.htm

> The short-term rate is set as equal to the sum of a base rate, inflation, half of unwanted inflation plus half of the output gap.

The overall multiplier on inflation is 1.5. The Taylor Principle is the requirement that this multiplier be greater than one. The idea is that if the central bank rate goes up faster than inflation it is stabilizing.

The Fed's balanced rule can be stated as follows.

> The short-term rate is set as equal to the sum of a base rate, inflation, half of unwanted inflation plus the output gap.

A variant of this that is more intuitive to the man in the street is in terms of the unemployment gap.

> The short-term rate is set as equal to the sum of a base rate, inflation, half of unwanted inflation minus unwanted unemployment.

Another variant would be to use a multiplier of 1.5 on unemployment. Perhaps this has a stabilizing rationale on the downside similar to the Taylor Principle.

These rules can easily produce negative rates. For example, if the base rate is 1 percent, inflation is 2 percent, the inflation target is 2 percent, and unwanted unemployment is 5 percent, then unwanted inflation is zero, and the sum of 1, 2, 0, and -5 is -2 percent.

If the base rate is 1 percent, the inflation target is 2, actual inflation is zero, then the inflation gap is -2. Added to the base rate of 1 percent, this gives zero. For one version of the policy rule, unwanted unemployment is passed on one for one to reduce the central bank rate below zero. So unemployment 5 percentage points too high would result in a negative five percent central bank rate.

For 1932, the inflation rate was -10 percent and the unemployment rate 24 percent. Assume the inflation target and base rates were zero to make the math easier. Then the 1.5 multiplier on inflation gives -15 percent. Assuming the unemployment rate target was 4 percent, we then have an additional 20 percent of unemployment for a total of -35 percent as the central bank rate.

If every macroeconomics course teaches the Taylor Rule, and the Taylor Rule teaches negative interest rates, at some point, people will expect negative interest rates in a recession as standard and optimal. The unemployed and businesses will think they have a right to negative rates to get out of the recession. They will think they are cheated not to get them.

At some point, we may need the variables in the Taylor Rule in the economic scenario generator. So the generator may need inflation, output gap, unemployment, and possibly output and potential output. This will make it easier to interface with macroeconomic models and programs such as the Fed's FRBUS model of the US economy. It will also make it easier to talk to federal regulators in a crisis. If insurance companies want to borrow directly from the Fed when interest rates are negative, this might help in the discussions.

There is no viable competing rule to the Taylor Rule and its variants in economics classes. The Taylor Rule has become the orthodoxy that economics classes have been waiting for. It is easy to teach and to grade tests even in intro courses. Other simple rules have dropped by the wayside. A constant monetary growth rate was once bandied about but that did not stand up very well to reality. Real business cycle models don't do very well as practical guides and are seldom referenced for specific values of interest rates even in conservative venues.

There is much opposition to the Taylor Rule and to the New Keynesian Economic models that make explicit use of it. However, there is nothing to take its place for the lowest level of economics instruction. DSGE models sometimes use some variant of it or derive some rule to take its place.

Fed economists often use an inertial version of the policy rule where it takes time for a shift in one of the driver variables to manifest in a change in interest rates. In this case, the target of the policy rule is often the value from the Taylor Rule or the balanced rule or some variant.

The use of some type of Taylor Rule in DSGE models is discussed by Beaudry, Portier and Preston.

https://fportier.files.wordpress.com/2023/03/taylor-rule.v2.3-1.pdf

5.1.2 "structural and market differences"

The following is stated in the proposed stylized facts. It is proposed here that this be dropped. The Taylor Rule and the variants discussed above are used in the U.S., Europe, Asia and elsewhere. There is no structural difference in these rules, although different groups may choose different parameters.

> Negative interest rates are possible (have been observed outside the U.S.) but unlikely due to structural and market differences between the U.S. and other economies.

The same models and methods are used in economics for the U.S. and for Europe or Asia. Meetings of academic or central bank economists do not indicate any such structural or market differences between the U.S. and other developed countries. The IMF has a statistics seminar for national economics statistics agencies. This has not discussed any such structural or market difference at the times I have gone. Nor have meetings of the IMF and World Bank that I have attended or economics meetings.

I have attended or watched many think tank sessions in Washington D.C. Different economists or current or former government officials from different countries have talked there but not indicated a structural or market difference of the type indicated. Many of the leading economists in the US or DC were foreign born, such as Olivier Blanchard, who presents frequently and is a leading economist.

One exception to this is that some economists or government officials from the developing world prefer an inflation target of 5 percent so that there is enough room below the target to avoid negative interest rates. Such a target is not supported in the developed countries.

DSGE model papers also do not make any such structural distinction. The work on DSGE models by the Fed and US economists do not have any such different structural elements between the U.S. and other developed countries as a general rule, although specific papers might discuss such.

5.1.3 Exchange rate between paper money and bank accounts

In order to prevent arbitrage, the central bank can impose an exchange rate between paper money and bank accounts. This rate varies so that the return on paper money and bank accounts stops the arbitrage from working. An ideal version is that paper money and bank electronic reserves at the central bank earn the same rate.

Some version of the above could be added as a stylized fact.

> Arbitrage between paper money and bank accounts during periods of negative interest rates can be prevented by the central bank. This can be done by imposing a varying exchange rate between paper money and bank accounts so that the arbitrage is eliminated. In the ideal case, the rate earned on paper money and electronic reserves at the central bank are equal.

5.1.4 A global recession can lead to a migration crisis

If there is a global recession, the less developed countries may respond by sending people instead of goods. The IMF and World Bank might try to coordinate deep negative interest rates in the developed countries to head this off or stop it after it starts. The goal being that negative rates in developed countries would stimulate the developed economies and thus they would buy more goods from developing countries. This could lead to extended periods of deep negative rates such as -5 percent.

The World Bank and IMF were set up in 1944 during the Bretton Woods Conference. This was because it was believed that if the economic mistakes between World War One and World War 2 had been avoided, it would have avoided World War 2. This includes the hyper-inflations of the 1920s and the Great Depression. The Taylor Rule would have prevented both episodes.

Avoiding a deep depression and a resulting migration crisis would be of substantial magnitude and importance. That might be the 21st century equivalent of the Great Depression and World War 2. In this case, the Taylor rule and its variants would indicate the use of deep negative rates for several years in some scenarios.

6 Equity Stylized Facts

6.1 9. Correlation

> Returns between different equity indices are generally positively correlated over long time horizons. This correlation may increase sharply in bear markets, but it tends to revert to normative levels in a short period of time.

This correlation stylized fact is very important to a risk management system. This is particularly important for liquidity risk, i.e. withdrawals by customers during a crisis.

The 3 factor Cox, Ingersoll, and Ross model has 3 factors that are not correlated with each other because they follow a square root process that makes it difficult to manage correlation. Moreover, if correlation is added between these factors in some manner, then the closed form solutions for zero coupon yields and bond prices are lost. It would be possible to adjust for this as well as for the generalized fractional floor also causing the closed form solutions to no longer apply.

The documentation of the system needs to be sufficient to evaluate the correlation stylized facts as well as all the others. This is particularly true for the joint analysis of correlation, expected returns, risk premia, any stochastic volatility in the system, and any spikes or sustained increases in spreads or default rates. This applies to the joint analysis of bond and stock returns.

6.2 High P/E Controversy

The recent era of high price earnings ratios has created a debate on what it implies. One explanation of high P/E is that future returns will be lower. In one version of this, the equity risk premium is considered to be lower. If this is correct, then a regulator's generator of economic scenarios (GOES) should use lower equity risk premia and thus lower total returns.

The research of Campbell and Shiller on price earnings ratio is embodied to some extent in the CAPE or cyclically adjusted price to earnings ratio. Some observers think this is an indicator of over-valued markets. Over valued markets and future lower expected return are to some extent related.

6.2.1   High P/E High Return Paradox

P/E has been high for a number of years. But stock returns have also been high during this era. If high P/E and thus low E/P indicates lower future returns, then this should have started already. But stock market returns don't seem to have become lower. This might be considered a paradox.

Paradoxes are not good for ordinary investors or regulators. Although they may be an opportunity for speculative investors and finance professors.

6.2.2   Lower expected returns, more negative returns

If the high values of P/E indicate lower expected returns in the future, then we would likely get more negative returns in the future. We would also get longer subperiods of zero or negative growth. This can be critical for many products. It can also trigger higher lapses for some products. Correlation with bond returns and default rates also may need to be coordinated with this in the system.

Updates on Actuarial Guideline 53

Fred Andersen, FSA, MAAA

11/29/2023

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11/29/2023

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Notice Regarding Confidentiality

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- Asset information shown in the slides that follow rely on data submitted by companies in their AG 53 templates. The NAIC took steps to review the data for reasonableness. However, the accuracy and reliability of the results are ultimately dependent on the quality of participant submissions.
- Some of the submitted data was adjusted to make it useable and help ensure greater consistency of reporting across companies. For example: 1) units were changed from dollars to millions where necessary; 2) asset types were mapped to those listed in the standard AG 53 template for companies that substituted different asset descriptions; 3) aggregated initial asset summary templates were created for companies that provided templates by segment but not in total; 4) templates submitted as PDFs were converted to Excel.
- Some companies did not submit AG 53 templates or did not complete all of the AG 53 template tabs.

Today's presentation

- Describe process for various interactions between NAIC VAWG, companies, and their domestic regulators

- Summarize aggregate findings from those interactions

- Explain recent and upcoming review aspects

Process for interactions re: companies' AG 53 filings

- If significant amount of assets with outlying high net yield assumptions

  - Interaction between VAWG and the domestic regulator

  - Domestic regulator either handles with the company or invites VAWG to correspond directly with the company

5

Net Yield Assumptions Reviews

- Aiming to reduce cases of understated asset risk
- If asset adequacy analysis projections are too optimistic and assets underperform:
  - Reserves will turn out to be inadequate to support future claims payments
  - Previously released money (including dividends) may have been needed to support future claims payments
- VAWG interaction with domestic regulators regarding their life insurers with outlier assumptions is concluding
  - Additional conservatism in their asset adequacy analysis is expected for year-end 2023

6

Results of interactions re: companies' outlying net yield assumptions

- Categories of companies with YE 2022 outlying high net yield assumptions, after interaction with VAWG / domestic regulator

    1. Commitment to add recommended conservatism for YE 2023

        - Company removed from outlier list

    2. Commitment to add significant conservatism for YE 2023 but not amount recommended

        - ok for YE 2023 but company will remain on outlier list, be subject to further prioritized review

    3. Resisting adding significant conservatism

        - Communication of concerns with regulatory financial groups, continued discussions and highly prioritized analysis

7

AG 53 Reviews – other aspects

- Reinsurance collectability - reviewing responses from targeted companies that received inquiries

- Investment expenses - analyzing assumptions

- Attribution analysis – analysis related to assumed excess net yield assumptions

- Guidance Document – additional details and clarifications for year-end 2023

8

Reinsurance Collectability Reviews

- In cases of non-traditional reinsurance (including cross border), help ensure:
    - There are enough quality assets at the reinsurer to pay reinsurance claims in moderately adverse conditions
    - Significant risks associated with reinsurance ceded are appropriately addressed in asset adequacy analysis projections, which will help ensure the ceding insurer's balance sheet is accurate.
    - A ceding company does not act like they've wiped their hands and balance sheet of the risk if the assuming company will be some combination of:
        - Weakly capitalized,
        - Under-reserved, or
        - With risky assets supporting reserves

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Reinsurance Collectability Reviews

- Targeted cases include:
    - Cross-border, not following US reserve and capital standards
    - Affiliated investments involved
- In targeted cases, inquiring on:
    - How ceding companies are analyzing this risk
        - Modeling the risk directly?
    - What metrics are being relied on to provide the ceding company comfort?
- Additional questions:
    - What are differences between US and non-US reserve and capital standards?
    - What are differences in assumptions underlying modeling of US and non-US standards?
        - e.g., mortality, index rider utilization, alternative asset returns

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Investment Expenses

- Investment expenses – analyzing two aspects:
  - <u>Accuracy of Assumption</u>: are investment expenses sufficiently modeled in asset adequacy analysis?
    - If trending towards more complex assets with more attention and expertise needed, future investment expenses will likely be higher and should be modeled that way
  - <u>Reasonableness of Expense Amount</u>: is the amount of investment expenses leaving the insurer reasonable?
    - Is there appropriate value being returned?
    - Arms-length?
    - Coordinating with other NAIC groups on this aspect of the review

- Assumptions were analyzed from AG 53 filings

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Investment Expenses – for Initial Assets, Non-Affiliated

Overall Average Portfolio* Investment Expense Assumption = 17 bps

Count of Companies by Portfolio* Investment Expense Assumption

<=10 bps	>10 bps, <=20 bps	>20 bps, <=30 bps	>30 bps, <=40 bps	>40 bps
71	85	25	12	14
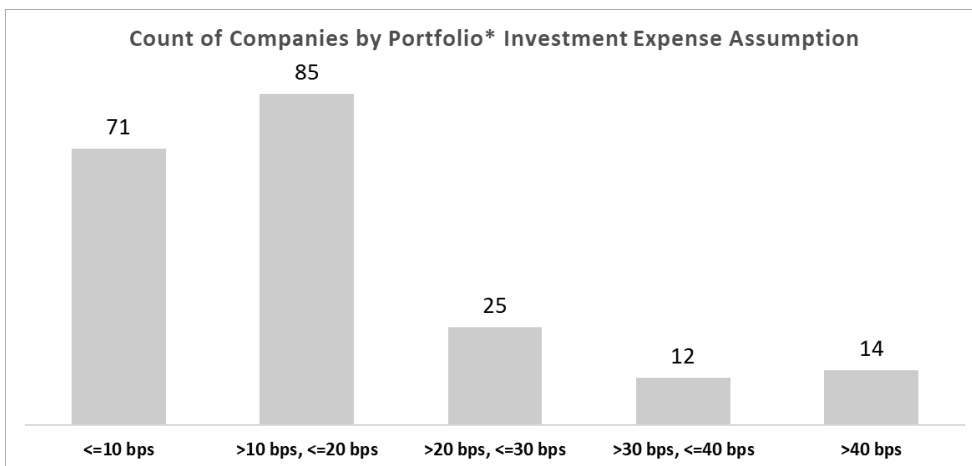
- For assumptions in the lower range, are the assumptions accurate?

- For assumptions in the higher range, are the expense amounts reasonable?

*Portfolio assumptions calculated as a weighted average across asset types, by amount of initial assets.

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Overall Average Investment Expense Assumptions by Asset Type Groupings

Asset Types as shown in the AG 53 Templates:

Box	Asset Type	Overall Average* of Investment Expense Assumption
1	Public Non-Callable, Non-Convertible Corporate Bonds	0.14%
	Callable Bonds	
	Convertible Securities	
	Floating Rate Corporate Notes	
	Municipal Bonds	
	Other Private Bonds	
	Non-Convertible Preferred Stock	
2	Agency Mortgage Backed Securities	0.18%
	Non-Agency Commercial Mortgage Backed Securities	
	Non-Agency Residential Mortgage Backed Securities	
	Collateralized Loan Obligations	
	Other Asset Backed Securities	
3	Equities or Equity-Like Instruments	0.23%
	Real Estate	
	Mortgage Loans	
	Schedule BA Assets – Equity-Like Instruments	
	Schedule BA Assets – Non-Equity-Like Instruments	
	Derivative Instruments	
	Other – Not Covered Above	

*Overall average across all companies with investment expense assumptions for non-affiliated initial assets, calculated as a weighted average by amount of initial assets for the box of asset types.

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Distribution of assumptions by sample asset types

Distribution of Investment Expense by Asset Type
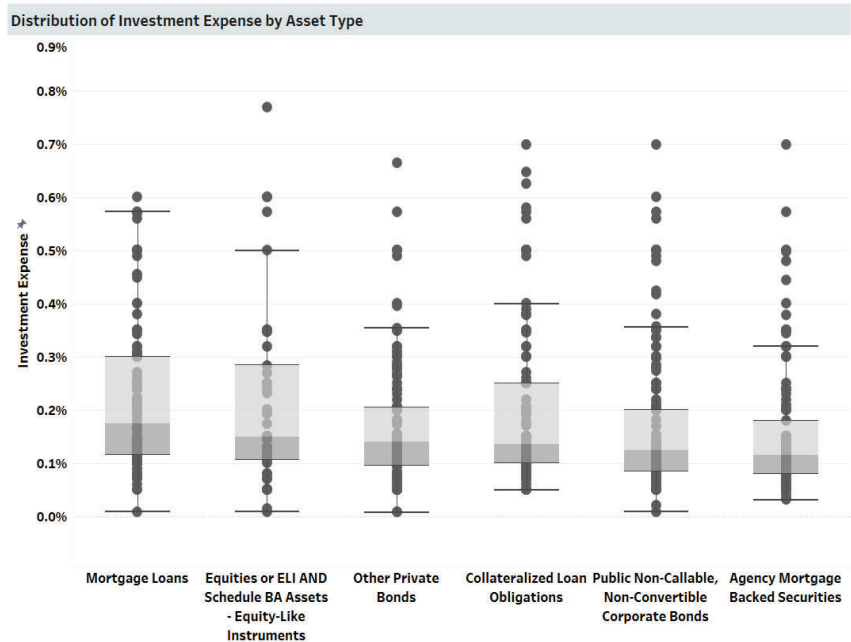
All the asset types tend to have a wide range of investment expense assumptions by company

Generally, the assumptions tend to align with the complexity of the assets

Notes:
Shows distribution of company assumptions for each asset type.
Excludes 0 and Null Investment Expenses.
Some extreme outliers removed.

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Companies took two general approaches for setting their investment expense assumptions

Approaches by Company Count

Different
Investment expense assumptions were not the same across all asset types

Same
Investment expense assumptions were the same across all asset types
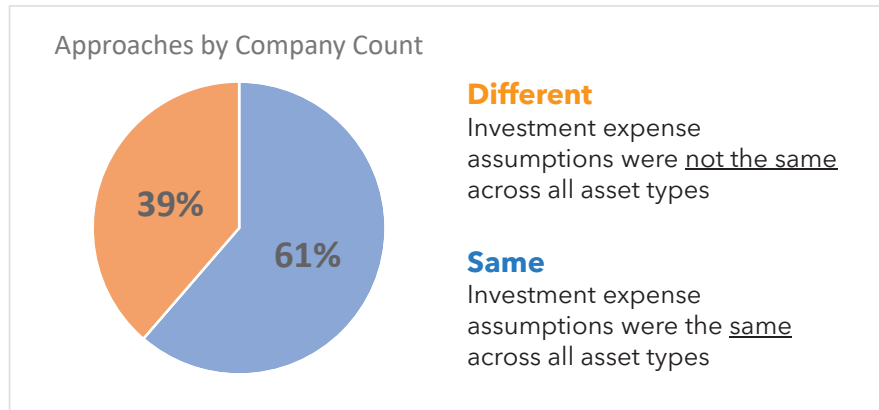
- What are reasons for selecting the approach used?

- Are the assumptions appropriately updated when the company uses the same assumption across all asset types as the asset allocation changes?

15

Company portfolio average can generate questions

Count of Companies by Portfolio* Investment Expense Assumption
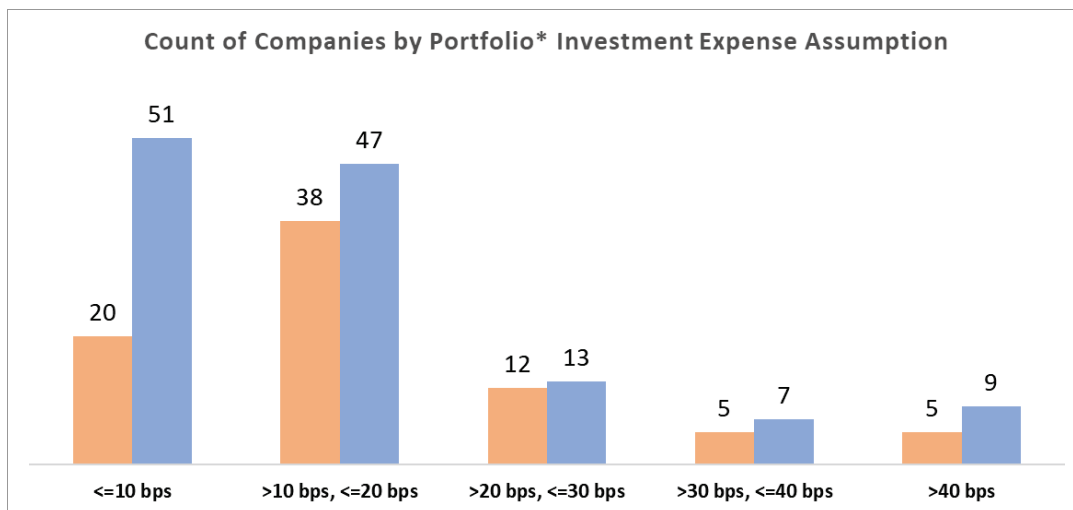
Are some companies using the "same" approach understating their investment expense assumptions?

Different: Investment expense assumptions were not the same across all asset types

Same: Investment expense assumptions were the same across all asset types

*Portfolio investment expense assumptions for non-affiliated initial assets calculated as a weighted average across asset types, by amount of initial assets.

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What are regulators looking for in the AG 53 filings regarding Investment Expense Assumptions?

- Commentary on how investment expense assumptions are commensurate with the expected expenses in light of the complexity of the assets

- Where relevant, explanation of why complex assets are not leading to higher investment expenses than less complex assets

Attribution Analysis

- Examination of excess net yield being assigned to credit risk or illiquidity risk with no modeled potential losses
- Reasons?
  - Some companies say they have advantages in expertise or connections that can be expected to last through the projections (30+ years)
  - Some companies use corporate bond default experience for their high-yielding complex assets
    - Relevance and recognition of additional risk?
  - Perhaps "beyond moderately adverse" is an explanation
    - However, if there is tail risk that occurs beyond a certain percentile:
      - The full distribution of risk should still be considered
        - Modeling advancements may be needed or additional conservatism
      - Similar to CTE with variable annuity guarantees, tail risk should not be ignored
- Opportunity for the company actuary to demonstrate they understand the asset and the risk

Attribution Analysis
for Initial Assets

The attribution analysis starts with the Guideline Excess Spread for each invested asset type

Guideline Excess Spread = Net Market Spread - Investment Grade Net Spread Benchmark
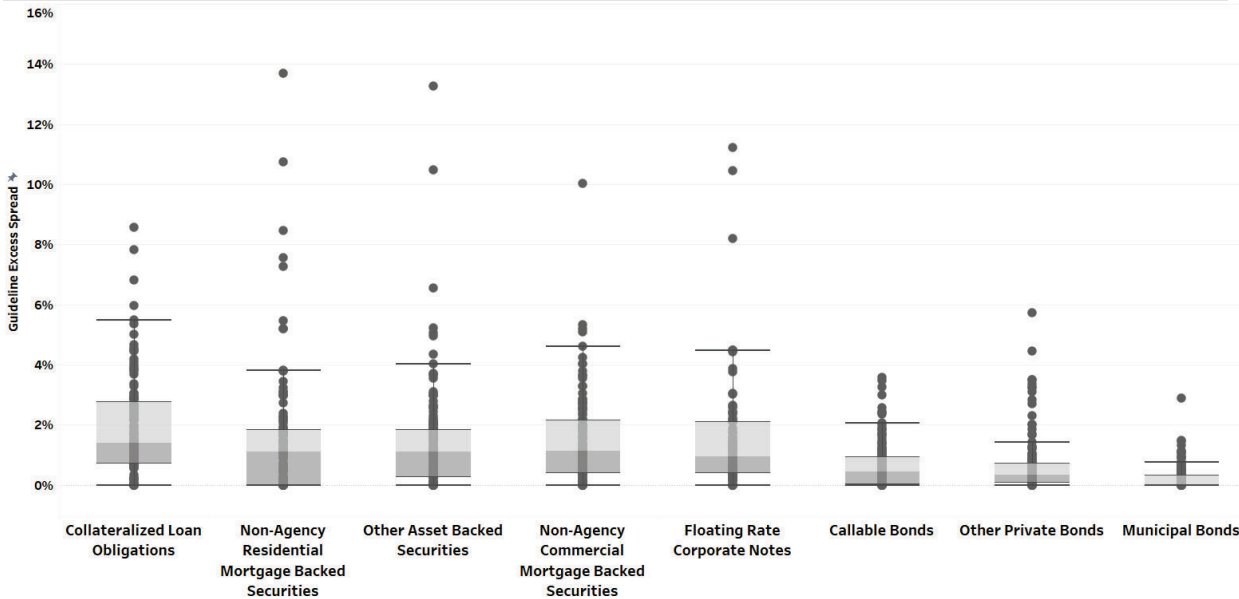
Notes: Shows distribution of company results for a sample of asset types. Some extreme outliers removed.

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Attribution Analysis
for Initial Assets

Another component of the attribution analysis was to attribute the Guideline Excess Spread to components for Credit Risk, Illiquidity Risk, and Other Risk

Completion Status by Asset Type

Asset Type	%
Other - Not Covered Above	86%
Convertible Securities	87%
Non-Convertible Preferred Stock	90%
Non-Agency Residential Mortgage Backed Securities	90%
Mortgage Loans	91%
Agency Mortgage Backed Securities	93%
Floating Rate Corporate Notes	94%
Other Asset Backed Securities	95%
Municipal Bonds	95%
Non-Agency Commercial Mortgage Backed Securities	95%
Collateralized Loan Obligations	96%
Callable Bonds	96%
Other Private Bonds	97%

- For year-end 2022, companies were asked to provide a "best efforts" submission for this

- For year-end 2023, where applicable, improved methods explaining high net spread assumptions may be expected

Using the Attribution Template for Initial Assets:

Complete: All applicable columns were filled in and reconciled

Partial: Some applicable columns were not filled in or did not reconcile

Incomplete: No applicable columns were filled in as expected

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What are regulators looking for in the AG 53 filings regarding Attribution Analysis?

- An explanation of the source that the company actuary believes drives any excess spreads beyond the benchmark

- Reflection of considerable thought in the attribution regarding the range of risks, especially to the extent assumed excess spreads are higher
    - Otherwise it may appear the company actuary does not understand the complex asset and related risk

- Model rigor that captures the specific risks of complex assets, or additional conservatism in assumptions

AG 53 Guidance Document

- Finalized in September with a goal is to reduce follow-up inquiries
- Highlights:
    - Sensitivity test for initial equities
        - Addresses reinvestment focus of sensitivity tests not picking up assets without maturities
    - Allocation of higher-yielding assets over the projection
        - Addresses small allocations of higher yielding asset types becoming substantial over time
    - Structured asset information by tranche
        - Addresses different risk of senior and junior tranches
    - Payment in kind asset information
        - Addresses potential cash flow issues
    - Reinsurance collectability
        - Clarification that relevant ASOP 11 should be included in the AG 53 filing

AG 53 Reviews – upcoming activities

- Continue current interactions with companies and their regulators
  - Add conservatism to outlier net yield assumptions
  - Better understand reinsurance collectability areas of comfort and vulnerability
- Coordinated review of investment expense assumptions and reasonability
- Issue handed to Life Actuarial Task Force
  - Difference in common practice between modeling fixed income security risk and equity risk

NAIC NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

11/29/2023

AG 53 provides uniform guidance for the asset adequacy testing applied to life insurers and is effective for reserves reported with respect to the Dec. 31, 2022, and subsequent annual statutory financial statements. A statement of actuarial opinion on the adequacy of the reserves and assets supporting reserves after the operative date of the Valuation Manual is required under Section 3B of the NAIC Standard Valuation Law (#820) and VM-30 of the Valuation Manual. Section 14A of Model #820 provides that actuarial opinions and related documents, including an asset adequacy analysis, are confidential information, while Section 14B provides that such confidential information may be shared with other state regulatory agencies and the NAIC. The asset adequacy analyses required under AG 53 reviewed in the preparation of this report were shared with the Valuation Analysis (E) Working Group and the NAIC in accordance with these requirements and continue to remain confidential in nature.

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Agenda

1. Review of Treasury Scenarios vs Acceptance Criteria
2. Review of Equity Scenarios vs Acceptance Criteria

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

1

Review of New Treasury Calibration Against Acceptance Criteria

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS 2

Treasury Calibration Approach

| Field Test 1A	Fall National Meeting (FNM) Calibration

• In the NAIC's 2022 GOES Field Test, the 1A scenario set utilized the Conning calibration with a generalized fractional floor and a starting date of 12/31/21.
• 1A was designed to meet the regulator acceptance criteria, including the constraining low for long criteria based on the 10- and 30-year geometric averages and level of interest rates at 12/31/20.
• Field test participants and other commenters noted several issues with scenario set 1A, including:
  • UST rates in excess of 25%
  • High frequency, severity, and duration of inversions
  • High frequency and severity of negative interest rates
	• For the 10/5/23 exposure of acceptance criteria, regulators relaxed the NAIC 30-year low for long criteria. Additional low for long and high for long criteria recommended by the Academy were also included.
	• With the relaxed NAIC low for long criteria, Conning performed testing using the parameters and flooring from the 1A calibration, then varied the mean reversion speed parameter to allow the model to revert more quickly and address some of the issues noted with 1A.

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS

Item	Category	Criteria
T1.	Prevalence of High Rates, Upper Bound on Treasury Rates	a) **The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments** b) Upper Bound: i. [20%] is >= [99%]-tile on the 3M yield fan chart, and no more than [5%] of scenarios have 3M yields that go above [20%] in the first 30 years ii. [20%] is >= [99%]-tile on the 10Y yield fan chart, and no more than [5%] of scenarios have 10Y yields that go above [20%] in the first 30 years

10,000 1Y UST Scenarios as of 12/31/21 Fan Charts

Field Test 1A

FNM Calibration

Legend: Min, 1%, 5%, 10%, 25%, 50%, 75%, 90%, 95%, 99%, Max
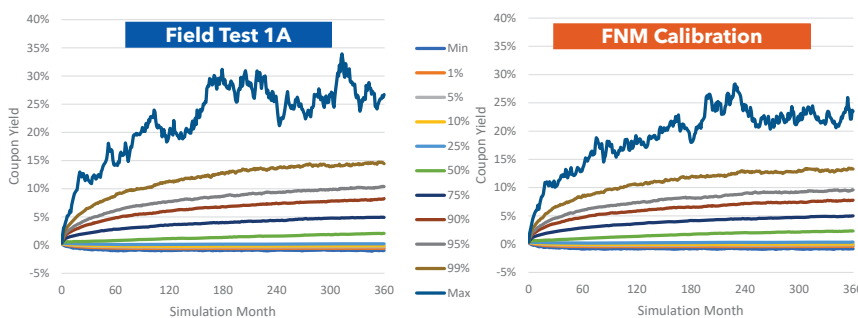
10,000 20Y UST Scenarios as of 12/31/21 :
Max and 99th Percentiles for 1A and FNM vs Actual

1A / FNM — Max · · · 99th %tile — Actual
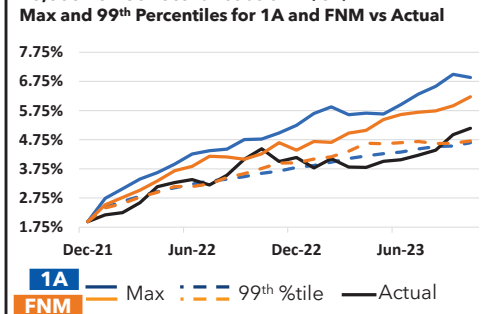
There is some subjectivity in the T1a criterion, and a broader discussion is needed to evaluate fully. Looking at maximum rates over the first 30 years, the 1Y UST is moderated in the FNM Calibration with a high of ~28% compared to ~34% for 1A. The historical max 1Y UST was ~17%. However, there was a slight miss for the FNM Calibration with a 12/31/21 start date for the 20Y UST compared to the actual in October of 2022. 1A was able to produce 20Y rates as high as the actual with a 12/31/21 start date.

Item	Category	Criteria
T1.	Prevalence of High Rates, Upper Bound on Treasury Rates	a) The scenario set should reasonably reflect history, with some allowance for more extreme high and low interest rate environments **b) Upper Bound:** **i. [20%] is >= [99%]-tile on the 3M yield fan chart, and no more than [5%] of scenarios have 3M yields that go above [20%] in the first 30 years** **ii. [20%] is >= [99%]-tile on the 10Y yield fan chart, and no more than [5%] of scenarios have 10Y yields that go above [20%] in the first 30 years**

	2022 Field Test 1A			NAIC Fall National Meeting Calibration		
	99th Percentile	% Scenarios >20%	Pass/Fail Criteria	99th Percentile	% Scenarios >20%	Pass/Fail Criteria
b.i	15.12%	0.1% <5%	✓Pass	13.98%	0.0% <5%	✓Pass
b.ii	13.87%	0.0% <5%	✓Pass	13.56%	0.0% <5%	✓Pass

10,000 10Y and 3M UST Scenarios as of 12/31/21 : 99th Percentiles for 1A and FNM

Legend: 1A, 3M — 1A, 10Y — FNM, 3M — FNM, 10Y

Both the 1A and FNM Calibrations pass the objective T1b criteria for both the 3M UST and the 10Y UST.

Item	Category	Criteria
T2.	Lower Bound on Negative Interest Rates, Arbitrage Free Considerations	Apply the following guidance for negative rates: **a) All maturities could experience negative interest rates** b) Interest rates may remain negative for multi-year time periods c) Rates should generally not be lower than -1.5%

Frequency of Negative Rates, 12/31/21 Scenario Sets

Field Test 1A

Legend: 3-Month — 1-Year — 20-Year

FNM Calibration

Legend: 3-Month — 1-Year — 20-Year
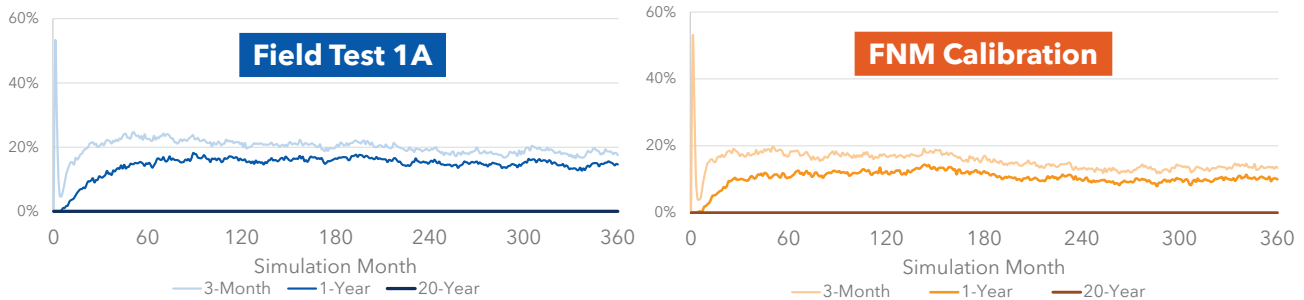
While the T2a criterion allows for all maturities to experience negative interest rates, there are no negative rates for the 20Y UST in the first thirty years in either 1A or the FNM Calibration. The FNM calibration has materially fewer negative interest rates than 1A (e.g. 9.2% of negative 1Y UST rates at year 30, vs 14% for 1A)

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Item	Category	Criteria
T2.	Lower Bound on Negative Interest Rates, Arbitrage Free Considerations	Apply the following guidance for negative rates: a) All maturities could experience negative interest rates b) Interest rates may remain negative for multi-year time periods **c) Rates should generally not be lower than -1.5%**

360 Month Minimum Rates

■ 2022 Field Test 1A (12/31/2021)   ■ NAIC Fall National Meeting Calibration

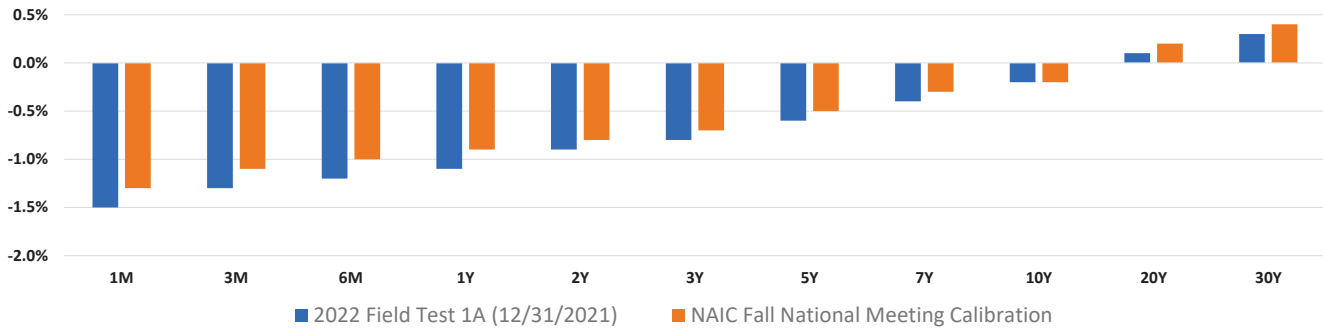Both the 1A and Fall National Meeting Calibrations pass the objective T2c criteria, with minimums for the first 30 years of the projection never going below -1.5% for all maturities. The FNM Calibration has minimums that are less negative (or more positive) compared to 1A.

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Item	Category	Criteria
T3.	Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape	a) Review initial actual vs. fitted spot curve differences for a sampling of 5 dates representing different shapes and rate levels for the entire curve and review fitted curves qualitatively to confirm they stylistically mimic the different actual yield curve shapes **b) The frequency of different yield curve shapes in early durations should be reasonable considering the shape of the starting yield curve (e.g. a flatter yield curve leads to more inversions).** c) The steady state curve has normal shape (not inverted for short maturities, longer vs shorter maturities, or between long maturities)

Inversion Frequencies, 12/31/21 Scenario Sets
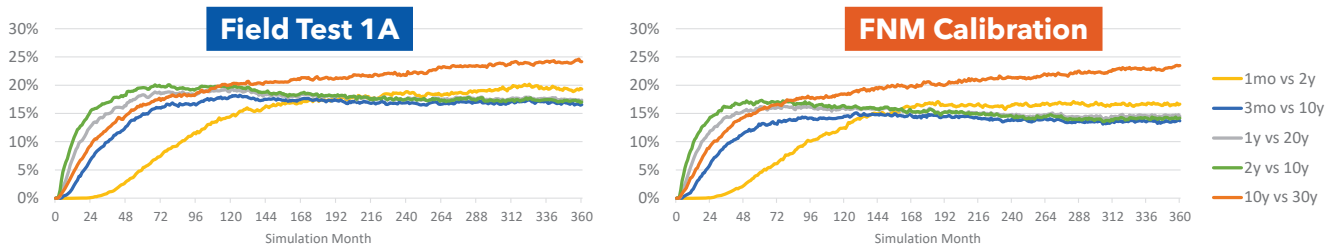
Historical Inversion Data	1m > 2y	3m > 10y	2y > 10y	10y > 30y	1y > 20y
% Inversions, 4/1953 to 3/2021*	10%	10%	19%	22%	16%
% Inversions, 12/31/21 to 11/21/23**	42%	57%	74%	6%	63%

12/31/21 had a typical normal yield curve shape, so starting from zero inversions and moving to higher ultimate levels fits the T3b criteria. The frequency of inversions at the end of 30 years is less in the FNM calibration compared to 1A.

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| Item	Category	Criteria
T3.	Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape	a) Review initial actual vs. fitted spot curve differences for a sampling of 5 dates representing different shapes and rate levels for the entire curve and review fitted curves qualitatively to confirm they stylistically mimic the different actual yield curve shapes **b) The frequency of different yield curve shapes in early durations should be reasonable considering the shape of the starting yield curve (e.g. a flatter yield curve leads to more inversions).** c) The steady state curve has normal shape (not inverted for short maturities, longer vs shorter maturities, or between long maturities)

Average Level of Inversion, 12/31/21 Scenario Sets
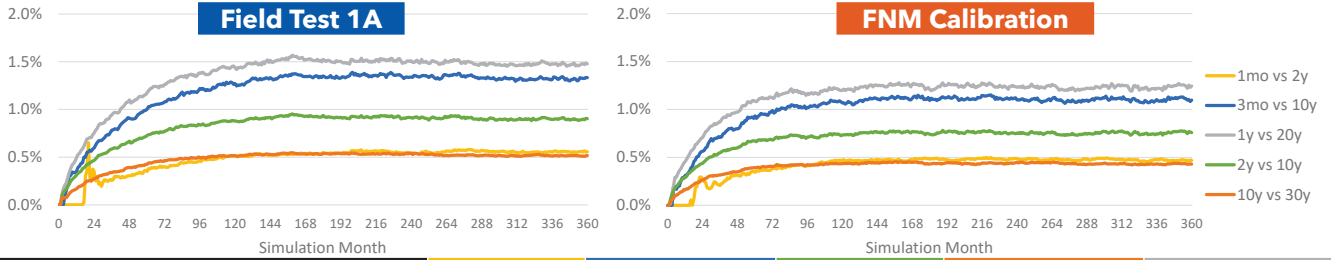
Historical Inversion Data	1m > 2y	3m > 10y	2y > 10y	10y > 30y	1y > 20y
Average Inversion, 4/1953 to 3/2021*	0.33%	0.54%	0.38%	0.22%	0.63%
Average Inversion, 12/31/21 to 11/21/23**	0.59%	1.18%	0.56%	0.05%	0.74%

The average level of inversion (when looking only at scenarios that are inverted) at the end of 30 years is higher for the FNM and 1A calibrations compared to the average historical level from 1953 to 2021. The FNM calibration has lower levels of inversion than 1A.

NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS   *Based on month-end data   **Based on daily data   9

2023 FALL NATIONAL MEETING **NAIC**

Item	Category	Criteria
T3.	Initial Yield Curve Fit, Yield Curve Shapes in Projection, and Steady State Yield Curve Shape	a) Review initial actual vs. fitted spot curve differences for a sampling of 5 dates representing different shapes and rate levels for the entire curve and review fitted curves qualitatively to confirm they stylistically mimic the different actual yield curve shapes b) The frequency of different yield curve shapes in early durations should be reasonable considering the shape of the starting yield curve (e.g. a flatter yield curve leads to more inversions). **c) The steady state curve has normal shape (not inverted for short maturities, longer vs shorter maturities, or between long maturities)**

Median Yields at Selected Projection Months, 12/31/21 Scenario Sets
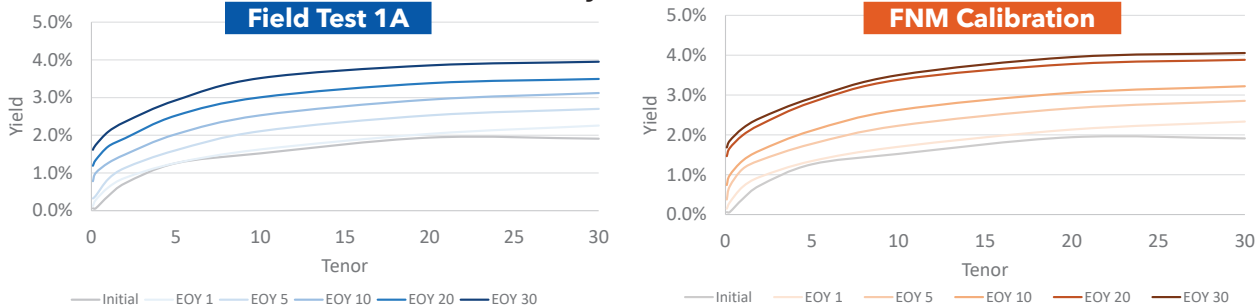
For both the 1A and FNM calibrations with a start date of 12/31/21, the median yield curve at the end of 30 years was normal, meeting the T3c criteria.

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Item	Category	Criteria
T4.	Low For Long: 12/31/20 Starting Conditions	a) At least 10% of scenarios need a 10-year geometric average of the 20-year UST below **1.45%** b) At least 5% of scenarios need a 30-year geometric average of the 20-year UST below **1.95%** **Note: As part of the model acceptance process, a given calibration of the GOES will be tested at multiple starting dates. This criteria is relevant for the 12/31/20 starting yield curve.**

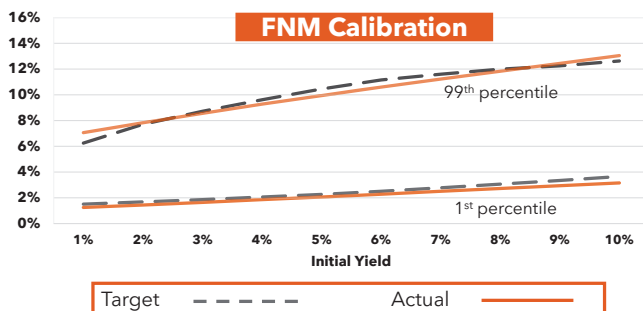|	A			B		
	90th Percentile of 10Y Geometric Average	**Criteria**	**Pass / Fail**	**95th Percentile of 30Y Geometric Average**	**Criteria**	**Pass / Fail**
Field Test 1A	1.37%*	1.45%	✓Pass	1.51%*	1.95%	✓Pass
NAIC Fall National Meeting Calibration	1.35%	1.45%	✓Pass	1.75%	1.95%	✓Pass

Both the 1A and Fall National Meeting Calibrations pass the objective T4 criteria calculated as of 12/31/20. Note that the 1A calibration was determined using more stringent 30-year geometric average targets.

Item	Category	Criteria
T5.	Low- and High-For-Long at Varying Starting Conditions	a) For each scenario, calculate the geometric average of the [20-year] UST yield over the first [10] and [30] years of the projection. b) Calculate the [1st] and [99th] percentiles of the distribution of geometric average rates (for both the 10 and 30-year horizons). c) Look up criteria based on the starting level of the 20-year UST yield (interpolate if necessary).

Geometric Average of 20Y UST over 30 years

FNM Calibration

	10-Year				30-Year			
	1st Percentile		**99th Percentile**		**1st Percentile**		**99th Percentile**	
Starting Yield of 20Y UST	*Target*	Actual	*Target*	Actual	*Target*	Actual	*Target*	Actual
1%	*0.94%*	0.68%	*3.43%*	4.65%	*1.50%*	1.24%	*6.25%*	7.06%
2%	*1.23%*	1.01%	*5.05%*	5.87%	*1.68%*	1.44%	*7.71%*	7.83%
3%	*1.62%*	1.37%	*6.55%*	7.02%	*1.86%*	1.64%	*8.72%*	8.57%
4%	*2.15%*	1.76%	*7.74%*	8.09%	*2.06%*	1.85%	*9.62%*	9.28%
5%	*2.66%*	2.18%	*8.87%*	9.12%	*2.26%*	2.06%	*10.46%*	9.94%
6%	*3.15%*	2.59%	*9.96%*	10.14%	*2.50%*	2.27%	*11.16%*	10.60%
7%	*3.63%*	3.03%	*11.03%*	11.14%	*2.78%*	2.50%	*11.61%*	11.22%
8%	*4.10%*	3.46%	*12.07%*	12.12%	*3.06%*	2.72%	*11.99%*	11.83%
9%	*4.64%*	3.92%	*13.08%*	13.08%	*3.34%*	2.94%	*12.25%*	12.45%
10%	*5.21%*	4.36%	*14.01%*	14.03%	*3.65%*	3.16%	*12.63%*	13.05%

The FNM calibration meets all of the 10-year geometric average low for long and high for long criteria for varying starting levels. However, there are some misses for the 3% to 8% starting environments on the high for long criteria. In order to meet all of these criteria, Conning could slow down the mean reversion speed or make other potential changes - leading to other tradeoffs.

Equity Model Acceptance Criteria

Equity Model Acceptance Criteria

Item	Category	Criteria
E1.	Low and High Accumulated Equity Returns	Use the former C3 Phase II equity model Calibration Criteria as a rough placeholder benchmark when evaluating equity scenarios.

Large Cap (S&P 500) C3 Phase II Calibration Criteria

Percentile	1 year	5 years	10 years	20 years
2.5%	0.78	0.72	0.79	
5.0%	0.84	0.81	0.94	1.51
10.0%	0.9	0.94	1.16	2.1
90.0%	1.28	2.17	3.63	9.02
95.0%	1.35	2.45	4.36	11.7
97.5%	1.42	2.72	5.12	

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Equity Model Acceptance Criteria – Large Cap

Criteria are incomplete for Large Cap

a) GEMS links to Treasury
  - Need to know starting level
  - Need to know which calibration

b) GEMS model has stochastic volatility
  - Need to know starting volatility level

Conning's approach

a) Set initial level to long-term values
  - Treasury Yields based on long-term State Values
  - Equity Volatility set to long-term value

b) Use proposed Treasury calibration: 25% Speed Reduction

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Equity Model Acceptance Criteria – Large Cap

Targets

Percentiles	1-year	5-year	10-year	20-year	
2.5%	0.78	0.72	0.79		
5%	0.84	0.81	0.94	1.51	
10%	0.90	0.94	1.16	2.10	<= cumulative returns should be < this
90%	1.28	2.17	3.63	9.02	<= cumulative returns should be > this
95%	1.35	2.45	4.36	11.70	
97.5%	1.42	2.72	5.12		

S&P – returns in USD:
FNM Calibration as of 12/31/21

Percentiles	1-year	5-year	10-year	20-year
2.5%	**0.78**	0.72	0.74	
5%	0.83	0.80	0.89	1.19
10%	0.89	0.93	1.07	1.55
90%	**1.27**	**2.08**	**3.58**	10.01
95%	**1.32**	**2.31**	**4.24**	13.52
97.5%	**1.37**	**2.55**	**5.03**	

Red bold cells are those where the S&P cumulative return is above (below) the applicable target

Proposed Parameters	
Fixed Return	0.005137
Fixed Jump Intensity	3.595725
Initial Variance	0.0125
Alpha	0.005774
Beta	0.462695
Sigma	0.07468

Comparison to targets
- Slight miss on 1-Year 2.5%: 6 bps too high
- Bigger miss on the upside: GEMS Model produces negative skew in-line with history; Targets are based on model with positive skew

Equity Model Acceptance Criteria – Other Equity Indices

Proposed Targets are only for Large Cap

a) Need targets for the other 5 indices

b) Used 95%/105% Sharpe Ratio range that was utilized in original Field Test

- Started with 3 native indices: Mid Cap, Small Cap and Aggressive US with same 70/30 weighting
- Adjusted Means to get within the range

	Actual		Excess			
Investment	Mean	St Dev	Mean	St Dev	Sharpe Ratio	Pass?
1m Treasury	3.22%	3.46%	0.00%	0.00%		
Large Cap	8.46%	16.91%	5.09%	16.00%	31.82%	
Mid Cap	8.70%	18.18%	5.32%	17.27%	30.79%	TRUE
Small Cap	9.35%	19.94%	5.95%	19.00%	31.33%	TRUE
Aggressive US Equity	11.18%	24.88%	7.73%	23.85%	32.43%	TRUE
International Equity	8.87%	19.00%	5.51%	18.21%	30.24%	TRUE
Aggressive Foreign Equity	12.29%	29.13%	8.77%	27.81%	31.52%	TRUE

Equity Model Acceptance Criteria – GWF Distribution

Original Field Test used GWF Targets

a) Included here for completeness even though they weren't targeted

	AIRG					Fall National Meeting Calibration			
	US	INT	SMALL	AGGR		Large	International	Small	Aggr US Equity
Mean	1258.66%	1441.19%	1823.15%	2572.98%		1287.33%	1416.16%	1527.09%	2397.33%
St Dev	1204.05%	1591.29%	2844.95%	5305.59%		2044.07%	2001.52%	2748.97%	5258.72%
Wealth CV	95.66%	110.42%	156.05%	206.20%		158.78%	141.33%	180.01%	219.36%
Percentile									
1%	122.79%	101.89%	62.77%	40.14%		89.45%	87.16%	66.44%	52.36%
5%	229.86%	210.67%	154.37%	104.14%		167.89%	159.67%	145.67%	126.83%
25%	523.88%	508.42%	467.63%	426.47%		400.92%	420.05%	407.99%	440.54%
50%	896.98%	952.52%	992.93%	1066.49%		741.18%	812.91%	809.11%	1051.94%
75%	1570.65%	1763.08%	2120.32%	2662.99%		1438.25%	1617.85%	1671.67%	2461.83%
95%	3480.18%	4304.80%	6124.85%	9576.36%		3923.31%	4533.45%	4953.90%	8409.61%
99%	5852.07%	7702.80%	11770.24%	24555.24%		8419.26%	9831.84%	11462.97%	20224.77%

NAIC

Timeline for Testing and Major Milestones

Timing	Milestone	On Track?
5-Oct	Expose Interest Rate, Equity, and Corporate Model Stylized Facts and Acceptance Criteria until 11/10.	
10/12 or 10/19	Expose Corporate Model Quantitative and Transparency/Documentation Comparisons until 11/10.	
Oct-Early Nov	Conning Recalibrate Models based on exposed Stylized Facts and Acceptance Criteria.	
	NAIC Model Office Improvements.	
29-Nov	Review Stylized Facts and Acceptance Criteria Comments, Conning Scenarios after re-calibration in Orlando. Potentially Adopt Final Stylized Facts and Acceptance Criteria. Review Corporate Model Comparisons. Potentially select Corporate Model.	
	NAIC Model Office Testing.	
Nov-Feb	Circulate any promising scenario sets. Individual Companies with capacity that wish to do so are encouraged to test using their own models and share results with regulators.	
	GOES Subgroup calls to review scenario statistics against acceptance criteria, review model office results.	
	Adopt Final Stylized Facts and Acceptance Criteria if regulators have substantial edits. Conning recalibrations, if so.	
3/14/2024	Present Model Office Results, Expose Scenario Set(s).	
March-June	Unaggregated GOES Field Test (VM-20, VM-21/C3P2, and C3P1), If Needed	
June-July	Reg-Only Company Presentations of Unaggregated GOES Field Test (VM-20, VM-21/C3P2, and C3P1) Results, If Needed	
July-Sept	VM-22 Field Test	

Note: Timeline is subject to change

1

AMERICAN ACADEMY
of **ACTUARIES**

November 22, 2023

Ms. Rachel Hemphill, Chair, Life Actuarial (A) Task Force (LATF)
Mr. Philip Barlow, Chair, Life Risk-Based Capital (E) Working Group (Life RBC)
Mr. Mike Yanacheak, Chair, Generator of Economic Scenarios (E/A) Subgroup (GOES Subgroup)
National Association of Insurance Commissioners (NAIC)

Dear Ms. Hemphill, Mr. Barlow, and Mr. Yanacheak,

The Economic Scenario Generator Subcommittee (ESGS) of the American Academy of Actuaries'[1] (the
Academy) appreciates the ongoing opportunity to present proposals for stylized facts and acceptance criteria
related to LATF's Generator of Economic Scenarios (GOES) project. These comments offer feedback and
potential criteria related to Gross Wealth Factors (GWF) for equity index returns.

Executive Summary

In response to LATF's request, the ESGS has analyzed the forward-looking GWFs for S&P 500 total
returns were previously developed by the Academy and proposed to LATF in 2005 and, using more recent
historical data on S&P 500 total returns, developed the following updates.

In the course of this work, the ESGS found that equity returns can be effectively modeled using a constant
mean, with the excess of that constant mean over the long-term target for interest rates representing a
premium in exchange for the risk of holding an equity index over Treasuries. This is an equity risk premium
(ERP. It is important to understand the differences and advantages of using a constant mean equity return
rather than a constant mean equity risk premium to model returns on equity indices. While using a constant
mean ERP is suitable for some purposes, we did not find it suitable for purposes with longer horizons that
rely on realistic tail distributions, such as statutory reserves and capital for long duration, market-sensitive
life and annuity products.

The methodology used to update GWFs and the updated GWFs themselves is addressed below. While the
ESGS did not achieve consensus around a single target level for long-term equity returns, we offer three
different sets of updated GWFs for consideration: one where the mean equity return was left unconstrained
(straight fit to historical data resulting in a mean of 11.64%); one where the mean equity returns was
constrained to 8.75% (the level used for the 2005 GWFs); and one where the mean equity return was
constrained to 10.00% (roughly in the middle of the other two).

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[1] The American Academy of Actuaries is a 19,500-member professional association whose mission is to serve the
public and the U.S. actuarial profession. For more than 50 years, the Academy has assisted public policymakers on all
levels by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The
Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

The relationship between equity returns and interest rates

After reviewing historical data and economic theory, the ESGS believes a suitable method for modeling equity returns is to use a constant mean. Such a method produces a moderately inverse relationship between equity returns and interest rates, which is supported by history. It results in a higher ERP when simulated interest rates are low and vice versa, as well as an average ERP over the long term that is the positive excess of the constant mean for equity returns over the long-term target for interest rates. We have included theoretical and empirical rationale for the above statement, discussing the differences and advantages of using a method that employs a constant mean equity return rather than a constant mean ERP.

In 2005, the Academy proposed a set of GWF for validating equity scenarios used to determine capital for variable annuity products under C-3 Phase II. The ESGS has reviewed and updated those factors considering subsequent equity market performance and our previously proposed stylized facts for equity returns (see Appendix 1), which feature the concepts that:

- Cumulative equity returns tend to exceed the compounded risk-free rate (positive observed equity risk premium) over long time horizons, but over short time horizons the observed equity risk premium fluctuates due to several factors and can be negative." (Stylized Fact #2)[2]
- "Cumulative equity returns over long time horizons are not materially impacted by initial market conditions." (Stylized Fact #4)[3]

As discussed in academic, investment industry, and other papers, economic theory and empirical data suggest an ERP which is not constant over time[4] but instead one which varies over time in a countercyclical (inverse) manner,[5] expanding and contracting with business cycles. It may be higher in a recession[6] and when interest rates are low[7], and it may depend on other factors such as investor risk aversion and consumption preferences, inflation, quality and availability of earnings information, and government and monetary policy[8] (see figure 1).

Note that while the capital asset pricing model (CAPM) assumes a constant ERP, leading ERP research[5,6,7] indicates an ERP that changes over time. As a practical matter, market users of CAPM regularly update

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[2] For example, the Dividend Discount Model implies that equity valuations (i.e., present value of projected earnings) decrease when risk-free interest rates increase (i.e., an inverse relationship due to increased discounting when rates are high and vice versa). However, this inverse relationship can be magnified if the increase in interest rates is due to Fed policy to slow the economy, which will presumably also have a negative effect on projected earnings).

[3] This stylized fact is implicitly in the current AIRG as well as the 2005 C-3 Phase II GWF calibration standard.

[4] Expansionism: The Impact of the Fed's Monetary Regime on the Equity Risk Premium (Global Financial Data White Paper)

[5] The Equity Risk Premium: A Contextual Literature Review (CFA Institute Research Institute)

[6] Kroll Recommended U.S. Equity Risk Premium and Corresponding Risk-Free Rates to be Used in Computing Cost of Capital: January 2008 – Present

[7] The Equity Risk Premium: A Review of Models (Federal Reserve Bank of New York Staff Report No. 714)

[8] Equity Risk Premiums (ERP): Determinants, Estimation, and Implications—The 2021 Edition, with annual updates also available at Professor Damodaran's website

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ERPs as a key input to the model[3], effectively treating the ERP as constant for the time horizon of interest. As such, the ERP is kept constant for the duration of the current period's cash flow projection and updated from one period to the next to reflect changes in the ERP over time.

Figure 1: Factors considered in Kroll's December 9, 2020, U.S. ERP Recommendation[9]
(relative change from March to November 2020)

| FACTOR	CHANGE	EFFECT ON ERP
U.S. Equity Markets	▲	▼
Implied Equity Volatility	▼	▼
Corporate Spreads	▼	▼
Economic Policy Uncertainty (EPU) and Equity Uncertainty Indices	▼	▼
Historical Real GDP Growth and Forecasts	▼	▲
Unemployment Environment	▼	▲
Consumer Confidence	▼	▲
Business Confidence	▲	▼
Sovereign Credit Ratings	◄►	◄►
Damodaran Implied ERP Model	▼	▼
Default Spread Model	▼	▼

Under quantitative equity valuation models such as the discounted cash flow (DCF) or dividend discount model (DDM), the price of a stock is the present value of future dividends. All else being equal, a stock's price is expected to fall as interest rates increase. In addition, Federal Reserve monetary policy, which increases rates to slow the economy in the near-term while maintaining stability in the longer-term, may also reduce projected earnings and dividend growth (e.g., lower revenues, higher capital / borrowing costs), further adversely affecting stock prices in the near-term.

Changes in investor risk appetites as interest rates increase may also decrease the relative attractiveness of equities, such as the There Is No Alternative (TINA) effect widely cited in industry publications. TINA describes the preference for stocks and other risky assets during periods of near-zero interest rates, compared to a preference for Treasuries when risk-free rates on Treasuries are high and close to the risky returns on stocks.[8]

In addition to economic theory, it's also useful to consider empirical data and see how well a single-regime[9] or regime-switching model can be fit to empirical data. Exploratory graphical analysis of empirical data (see Figure 2) suggests an ERP that tends to be higher when interest rates are low and lower when interest rates

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[9] Duff & Phelps Recommended U.S. Equity Risk Premium Decreased as COVID-19 Impact Recedes

are high (vs. randomly dispersed around a constant level).

Figure 2: 60-month rolling average: S&P 500 ERP vs. 3M UST
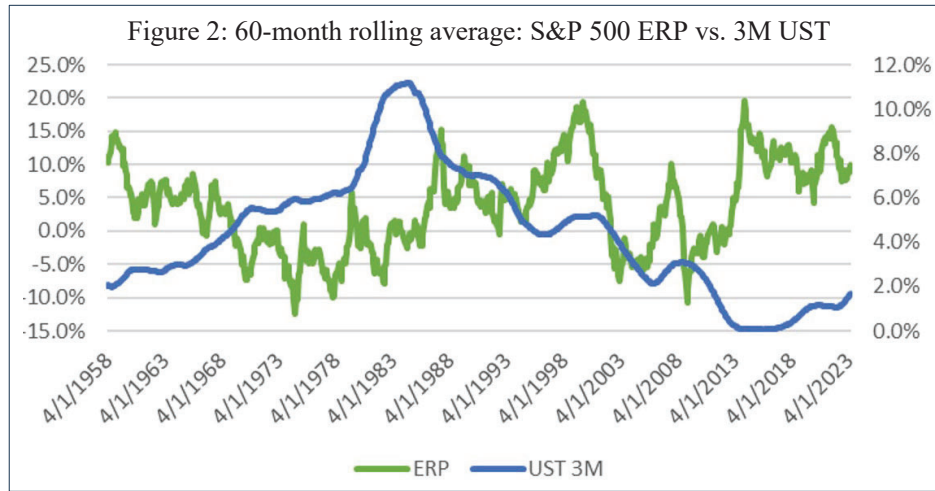
Statistical tests based on simple regression (i.e., a single regime) models, such as the 2022 Blitz paper[10], also tend to reject the hypothesis that a higher risk-free return implies higher total average stock returns. Rather, they show expected stock returns appear to be inversely related to the level of the risk-free return.

In addition to using single regime models, historical data may also be analyzed using more complex models that allow for the possibility of three types of regimes:

- Expected equity returns increase 1-for-1 as interest rates increase (expected ERP is constant)
- Expected equity returns remain constant as interest rates increase (expected ERP varies inversely with rates)
- Expected equity returns decrease 1-for-1 as interest rates increase (expected ERP has a strongly inverse relationship with rates).

In all three regimes, random variations result in a distribution of ERPs and returns around the expected values.

The ESGS's maximum likelihood estimation of such a model using historical S&P 500 total returns suggests the S&P 500 tends to move in the same direction as interest rates (a constant ERP relationship where equity returns increase as interest rates increase) about 10% of the time and in the opposite direction as interest rates (a strongly inverse ERP relationship where equity returns decrease as interest rates increase) about 30% of the time. However, we also found that 60% of the time equity returns tend not to move with interest rates but stay centered around a *constant* mean equity return, albeit a mean that is higher than average interest rate levels. This reflects an ERP that varies moderately inversely with interest rates, especially when interest rates are less volatile (see Figures 2 and 3). As with the 2022 Blitz paper, these findings suggest rejecting a constant mean ERP relationship where equity returns increase as interest rates increase and vice versa.

Hypothesis testing of different relationships between interest rates and equity returns based on monthly

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[10] Expected Stock Returns When Interest Rates Are Low (Blitz, 2022)

historical data from April 1953 to December 2020 indicates neither a constant mean ERP relationship nor a constant mean equity return relationship can be rejected in the middle eight deciles of the distribution of risk-free interest rates (see Table 1). However, at the top and bottom deciles, i.e., 3M UST yield below 15bps and above 8.33%, the constant mean ERP relationship ought to be rejected with p-values at a 0.3% and 1.6% significance level respectively. Note that this analysis accounts for the underlying volatility of the equity returns. Alternatively, unconstrained regression of the ERP relationship in the data produces a much higher significance level of 8.2% and 35.7% in the bottom and top deciles, pointing to an inverse relationship between risk free rates and equity returns, a similar conclusion in the 2022 Blitz paper. Given the purpose at hand, modeling cash flows for the determination of statutory capital, it is important to reflect a plausible relationship between interest rates and equity returns in low and high tails which are likely to drive the total asset requirement (TAR) upon which capital is based (see Appendix 4 for additional details on this analysis).

Figure 3: Historical frequency of degree of relationship between monthly S&P price index returns and short-term interest rates observed from 1953.04 to 2020.12

Equity returns move in opposite direction of interest rates about 30% of the time (strong *inverse* relationship)

Equity returns centered around a constant mean most of the time (moderate *inverse* relationship)

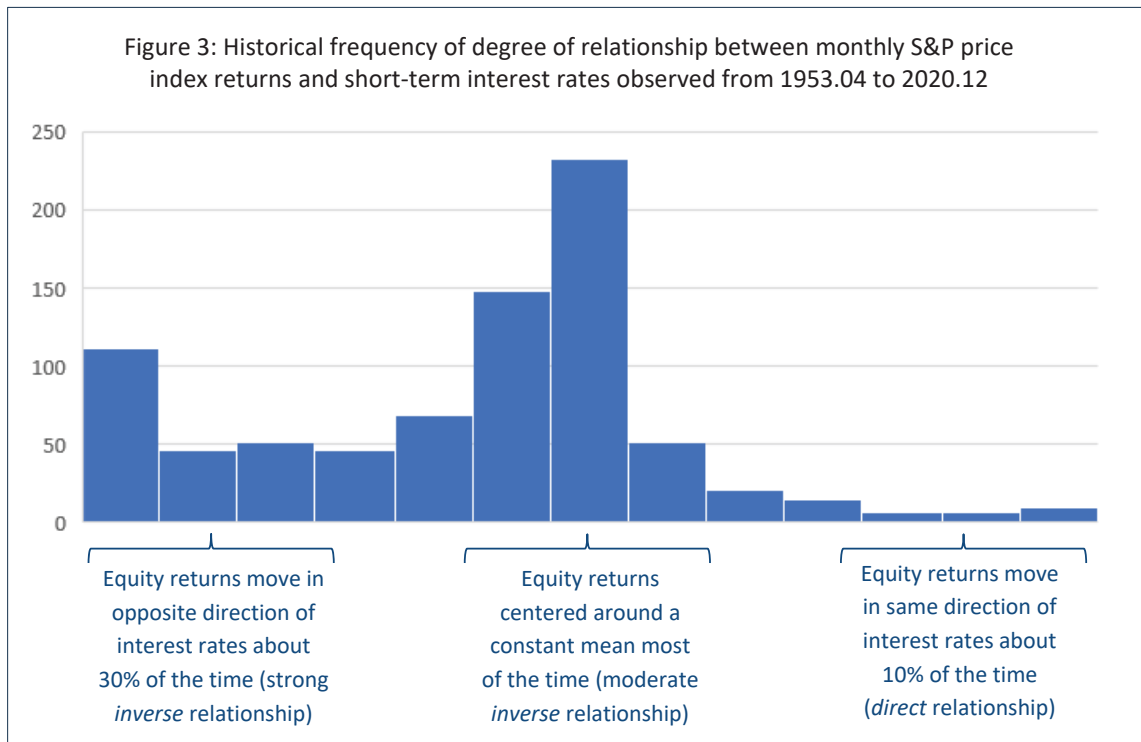Equity returns move in same direction of interest rates about 10% of the time (*direct* relationship)

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Table 1: p-values from constrained and unconstrained regression fits to monthly historical S&P 500 data from 1953.04 to 2020.12.				
Deciles of 3M UST Yield	Average 3M UST Yield	Regression constrained to constant mean ERP	Regression constrained to constant mean Equity Return	Regression unconstrained
0-10	0.1%	0.3%	2.4%	8.2%
10-20	0.8%	29.5%	50.0%	34.6%
20-30	1.9%	40.1%	42.5%	30.5%
30-40	2.8%	29.6%	20.8%	15.5%
40-50	3.7%	20.5%	16.1%	13.5%
50-60	4.6%	43.9%	46.2%	48.1%
60-70	5.2%	21.6%	17.1%	14.1%
70-80	6.0%	35.9%	45.6%	46.8%
80-90	7.5%	39.9%	41.7%	28.8%
90-100	10.7%	1.6%	12.6%	35.7%
Mean ERP =		*Constant*	*Constant - (1.00 × Risk Free Rate)*	*Constant - (1.74 × Risk Free Rate)*
Mean Equity Return =		*Risk Free Rate + Constant*	*Constant*	*Constant - (0.74 × Risk Free Rate)*

After reviewing historical data and economic theory, a suitable way to model an ERP that exhibits a moderately inverse relationship with interest rates uses a constant mean for simulated equity returns, resulting in a higher ERP when simulated interest rates are low and vice versa. It also uses an average ERP over the long term that is the positive excess of the long-term target for equity returns over the long-term target for interest rates. Under such an approach, the mean equity return not only stays constant throughout the projection, but also generally stays constant from one period to the next.[11] However, initial ERP levels would change from one period to the next as interest rates move. Under such an approach, steady state equity return targets should align with steady state interest rate levels, reflecting an appropriate long-term equity risk premium and sufficient dispersion of equity returns to allow for appropriate joint probabilities of low/high equity returns and low/high interest rates.

While some applications model the ERP as varying around a constant expected mean, such as GEMS where equity returns increase with interest rates and vice versa, this modeling simplification is less aligned with economic theory and historical data. It is more commonly and appropriately used for shorter-term projections of real-world scenarios, particularly when the computationally efficient generation of "nested" risk neutral scenarios is a priority (Solvency II), strategic asset allocation where the focus is on the middle of the distribution, or non-equity sensitive liabilities (short-duration property and casualty liabilities). It is not suitable for purposes with longer horizons that rely on realistic tail distributions, such as statutory reserves and capital for long duration or market-sensitive life and annuity products. An increasing return / constant expected ERP approach is more likely to distort reserve and capital levels by inadequately reflecting historically observed tail dynamics. It will also cause a distribution of equity returns that shifts from one period to the next in an unintuitive manner as interest rates move, potentially resulting in artificial and unintuitive volatility and/or distorting hedging and risk management decisions and costs. Workarounds that maintain this relationship in the ESG

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[11] For example, major and long-lasting changes in fed policy or market dynamics may warrant a review and potential change to long term targets for equity returns.

model, but adjust the model's parameters whenever initial conditions change, may partially mitigate some of these impacts. It may also introduce other unintuitive dynamics, adding additional unnecessary operational and governance-type complexities.

In summary, the 4th stylized fact proposed for equity returns supports continued use of a static set of GWFs as criteria for equity returns, such as the set of GWFs proposed by the Academy in 2005 for validating equity scenarios used to determine capital for variable annuity products under C-3 Phase II. Although such criteria generally would not be expected to change over time, it is prudent to review them periodically, consider interim equity market experience, and determine if any deviations are material enough to warrant a change to the criteria. Under a constant mean equity return approach, there is still a relationship between interest rates and equity returns, but it is implicit in the long-term targets set for equity returns and interest rates. It is important to consider the reasonableness of the implied long-term ERP when reviewing and resetting those long-term targets.

Methodology and updates to criteria for equity GWFs

As in 2005, our updated analysis of equity GWFs was based on taking several model forms, consistent with our equity stylized facts and commonly used to model equity returns, and fitting them to monthly S&P 500 total returns from March 1957 through December 2022, including twenty additional years of relevant and credible data than the original 2005 analysis. This parallels the 2005 analysis done by the Academy to develop the first C-3 Phase II GWF criteria for equity returns. In that work, several similar equity model forms were used to inform what realistic equity return behavior could look like given the lack of historical data and limited availability of non-overlapping multi-year periods in the historical data set[12]. Appendix 2 details the model forms considered, fitted, and used to inform realistic equity market behavior and develop criteria for GWFs, such as Heston, SLV2, RSLN2, and Heston with Jump[13]. Tables at the end of Appendix 2 show annualized equity returns across the reference models for 1-year and 20-year horizons, compared to similar statistics for the AIRG and the GEMS Field Test (FT) #1a scenario sets, as well as to the distribution of rolling 1-year returns observed in history.

We initially fit reference models to history without constraining the mean equity return. Table 2 below shows the resulting unconstrained means for the various reference models are about 11.50%, or 2.75% higher than the constrained mean of 8.75% used in the Academy's 2005 analysis.

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[12] As in 2005, the data period begins in the mid-1950s, when the Fed, securities regulation, and the S&P 500 began to resemble their modern-day counterparts (before the mid-1950s the S&P 500 was less of a broad large cap index, and securities regulation and fed/monetary policy functioned in a markedly different manner, e.g., lack of trade limits, significantly less national debt as a percentage of GDP). Note that reference models appropriately calibrated to this data period, which doesn't include the 1930s great depression, are still able to simulate large drops and sustained losses that are even worse than those experienced during the great depression.

[13] Heston with Jump is similar to GEMS, but without the constant expected ERP (increasing return) relationship.

Table 2:	30-year mean and median from unconstrained fits to 1957.03 to 2022.12	
Model	Unconstrained mean	Unconstrained median
Heston*	11.47%	10.39%
SLV1	10.34%	9.13%
SLV2*	11.37%	10.53%
SLV3	11.61%	10.81%
RSLN2*	11.94%	10.48%
RSDD2	11.22%	10.34%
LN	11.68%	10.43%
Jump*	11.80%	10.79%
AIRG†	8.81%	7.59%

GWF tables below are based on the least binding percentile across these four selected reference models. The average mean across those four selected reference models is 11.64%.

† The AIRG's constrained mean and median are provided for reference.

While the ESGS did not achieve consensus around a single target level for long-term equity returns, the group recommends the use of a *best-estimate* target, with appropriately disperse tails, rather than a target that is purposely set low or high. Since some products and risk management strategies perform worse when equity returns are low while others perform better, our recommendation is a distribution for stochastically modeled risk factors that is best estimate, with the CTE level used as the source of prescribed conservatism in statutory reserve and capital calculations. Although a long-term, best-estimate mean equity return target of 11.64% based on a pure fit to history may be too high, some felt a target of 8.75% (a 2.89% haircut to the historical fit of 11.64%) may be too low, indicating something in the middle may be more appropriate[14]. Regardless of the long-term target used for equity returns, it is important to periodically review the long term mean ERP implied by the long-term targets used for equity returns and interest rates for reasonableness. For purposes of this illustration, Tables 3.1, 3.2, and 3.3 below show the least binding GWF[15] across the four reference models using a constrained mean of 8.75%, a constrained mean of 10.00%, and an unconstrained mean of 11.64% (see Appendix 3 for a graphical representation of Table 3.2). We found that the least binding reference model was largely the same regardless of whether the mean was left unconstrained or constrained to 8.75% or 10%.

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[14] Best-estimate forward-looking views on equity returns are often based on more than just historically observed equity returns, and also incorporate things such as expectations around real GDP growth, inflation, fed/monetary policy, industry surveys, etc.

[15] The least binding GWF across the four selected reference models is the maximum for low-return (left) tail percentiles and the minimum for high-return (right) tail percentiles (means and medians are shown for informational purposes and are *averages* across reference models).

Table 3.1:	Updated GWFs using a constrained mean return of 8.75%						Least binding reference model					
	Horizon (years)						*Horizon (years)*					
Percentile	*1*	*5*	*10*	*20*	*30*	*50*	*1*	*5*	*10*	*20*	*30*	*50*
Min	0.48	0.28	0.33	0.32	0.56	0.85	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
1%	0.71	0.64	0.71	0.99	1.55	4.15	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
5%	0.83	0.84	1.02	1.62	2.73	8.63	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
10%	0.89	0.98	1.22	2.10	3.74	12.78	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
15%	0.93	1.07	1.38	2.46	4.55	16.49	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
30%	1.02	1.28	1.76	3.41	6.84	27.56	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
Median	1.09	1.48	2.15	4.47	9.23	39.98	n/a	n/a	n/a	n/a	n/a	n/a
70%	1.17	1.73	2.70	6.14	13.50	62.71	Heston	SLV2	RSLN2	RSLN2	RSLN2	RSLN2
85%	1.24	1.97	3.27	8.41	20.39	112.78	SLV2	SLV2	RSLN2	SLV2	SLV2	RSLN2
90%	1.28	2.09	3.58	9.59	23.93	142.63	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
95%	1.33	2.28	4.08	11.43	30.68	195.72	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
99%	1.42	2.67	5.10	15.83	45.17	333.02	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
Max	1.67	3.75	8.01	29.20	99.48	1019.62	SLV2	Jump	SLV2	SLV2	SLV2	SLV2
Mean	1.09	1.52	2.31	5.38	12.38	65.77	n/a	n/a	n/a	n/a	n/a	n/a

Table 3.2:	Updated GWFs using a constrained mean return of 10.00%						Least binding reference model					
	Horizon (years)						*Horizon (years)*					
Percentile	*1*	*5*	*10*	*20*	*30*	*50*	*1*	*5*	*10*	*20*	*30*	*50*
Min	0.49	0.29	0.36	0.40	0.80	1.51	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
1%	0.72	0.68	0.79	1.25	2.18	7.36	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
5%	0.84	0.89	1.15	2.03	3.84	15.27	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
10%	0.90	1.04	1.37	2.64	5.27	22.62	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
15%	0.94	1.14	1.55	3.09	6.41	29.20	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
30%	1.03	1.36	1.97	4.29	9.64	48.80	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
Median	1.11	1.57	2.41	5.62	13.00	70.81	n/a	n/a	n/a	n/a	n/a	n/a
70%	1.18	1.83	3.03	7.72	19.03	111.04	Heston	SLV2	RSLN2	RSLN2	RSLN2	RSLN2
85%	1.26	2.08	3.67	10.57	28.73	199.71	SLV2	SLV2	SLV2	SLV2	SLV2	RSLN2
90%	1.29	2.21	4.02	12.05	33.72	252.57	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
95%	1.34	2.42	4.57	14.37	43.23	346.58	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
99%	1.44	2.83	5.71	19.90	63.64	589.72	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
Max	1.69	3.97	8.98	36.70	140.17	1805.56	SLV2	Jump	SLV2	SLV2	SLV2	SLV2
Mean	1.10	1.61	2.59	6.76	17.45	116.46	n/a	n/a	n/a	n/a	n/a	n/a

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Table 3.3:	Update GWFs using an unconstrained mean return of 11.64%						Least binding reference model					
	Horizon (years)						Horizon (years)					
Percentile	1	5	10	20	30	50	1	5	10	20	30	50
Min	0.49	0.31	0.41	0.51	1.15	2.80	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
1%	0.73	0.72	0.90	1.60	3.15	13.63	Heston	SLV2	SLV2	SLV2	SLV2	SLV2
5%	0.85	0.95	1.30	2.60	5.56	28.30	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
10%	0.92	1.11	1.55	3.37	7.63	41.92	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
15%	0.95	1.21	1.75	3.96	9.28	54.11	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
30%	1.04	1.44	2.23	5.52	13.96	90.53	SLV2	SLV2	SLV2	Jump	SLV2	Jump
Median	1.12	1.69	2.79	7.56	20.27	148.11	n/a	n/a	n/a	n/a	n/a	n/a
70%	1.20	1.95	3.43	10.18	29.42	238.65	Heston	SLV2	SLV2	SLV2	SLV2	Heston
85%	1.27	2.22	4.15	13.53	41.60	377.39	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
90%	1.31	2.35	4.55	15.42	48.82	468.01	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
95%	1.36	2.57	5.17	18.39	62.60	642.20	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
99%	1.46	3.01	6.46	25.47	92.14	1092.72	SLV2	SLV2	SLV2	SLV2	SLV2	SLV2
Max	1.71	4.31	10.16	46.96	202.94	3345.63	SLV2	Jump	SLV2	SLV2	SLV2	SLV2
Mean	1.12	1.73	3.01	9.10	27.28	245.63	n/a	n/a	n/a	n/a	n/a	n/a

Tables 4.0, 4.1, 4.2, and 4.3 compare the updated GWFs to the prior set of C-3 Phase II GWFs[16]. Table 4.1 shows that when using the same constrained mean equity return of 8.75%, considering 20 years of additional data does not result in significantly different GWFs[17]. However, the updated GWFs in the above tables are now available for longer horizons and additional percentiles than the prior set of C-3 Phase II GWFs, given the expanded use of economic scenarios to for reserves, longer duration life insurance liabilities (e.g., VM-20 liabilities tend to be of longer duration than VM-21 liabilities), and the adoption of more extreme tail CTE levels in capital requirements (e.g., CTE98 vs. CTE90).

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[16] The 2005 C-3 Phase II GWF calibration standard was based on an SLV model fit to S&P 500 total returns from 1955.12 to 2003.12, with the mean constrained to 8.75%, and further adjustments made to accommodate a wider range of reasonably fit ESG model forms (i.e., LN, RSLN). Note that the 2005 standard had criteria for percentiles of 2.5% and 97.5%, whereas updated GWFs have criteria for percentiles further in the tail at 1% and 99%.

[17] This is consistent with the last 20 years having both the 2008-2009 financial crisis as well as periods of very favorable returns. Note that the Academy's 2012 analysis suggested that the 2005 set of C-3 Phase II GWF criteria allowed the volatility and returns seen during the 2008-2009 financial crisis and did not warrant an update at that time.

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Tables 4.0, 4.1, 4.2, and 4.3: Updated gross wealth factors compared to prior C3P2 calibration standard

Table 4.0:	Prior C3P2 GWF calibration standard (mean return constrained to 8.75%)			
	Horizon (years)			
Percentile	1	5	10	20
2.5%	0.78	0.72	0.79	n/a
5%	0.84	0.81	0.94	1.51
10%	0.90	0.94	1.16	2.10
90%	1.28	2.17	3.63	9.02
95%	1.35	2.45	4.36	11.70
97.5%	1.42	2.72	5.12	n/a

Note: The tables below only show the subset of updated GWFs that can be compared to the prior C3P2 calibration standard.

Table 4.1:	Proposed update to GWFs using constrained mean return of 8.75%				As a percentage of prior C3P2 calibration standard			
	Horizon (years)				Horizon (years)			
Percentile	1	5	10	20	1	5	10	20
5%	0.83	0.84	1.02	1.62	99%	104%	109%	107%
10%	0.89	0.98	1.22	2.10	99%	105%	105%	100%
90%	1.28	2.09	3.58	9.59	100%	96%	99%	106%
95%	1.33	2.28	4.08	11.43	98%	93%	94%	98%

Table 4.2:	Proposed update to GWFs using constrained mean return of 10.00%				As a percentage of prior C3P2 calibration standard			
	Horizon (years)				Horizon (years)			
Percentile	1	5	10	20	1	5	10	20
5%	0.84	0.89	1.15	2.03	100%	110%	122%	135%
10%	0.90	1.04	1.37	2.64	100%	111%	118%	126%
90%	1.29	2.21	4.02	12.05	101%	102%	111%	134%
95%	1.34	2.42	4.57	14.37	100%	99%	105%	123%

Table 4.3:	Proposed update to GWFs using unconstrained mean return (11.64%)				As a percentage of prior C3P2 calibration standard			
	Horizon (years)				Horizon (years)			
Percentile	1	5	10	20	1	5	10	20
5%	0.85	0.95	1.30	2.60	101%	117%	138%	172%
10%	0.92	1.11	1.55	3.37	102%	118%	134%	161%
90%	1.31	2.35	4.55	15.42	102%	108%	125%	171%
95%	1.36	2.57	5.17	18.39	101%	105%	119%	157%

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Depending on the desired long-term mean equity return target, tables 3.1, 3.2, or 3.3 can be considered as a potential update to the 2005 set of C-3 Phase II GWF criteria[18]. Such criteria are applied to a scenario set by checking if the corresponding percentiles from the scenario set are more extreme than the criteria. Although such a one-way check helps ensure the distribution of GWFs is plausibly more extreme than history, when applying the criteria, it may also be useful to note the magnitude of the differences between criteria and the corresponding percentiles from the scenarios set. Differences that are too large may indicate a distribution of GWFs that is unreasonably more extreme than history.

In summary, after reviewing economic theory and a data period that includes 20 additional years of experience, the Academy supports a modeled ERP that is implicit in the long-term best-estimate targets (i.e., means) used for interest rates and long-term equity returns, resulting in a distribution of equity returns that does not change from period to period, instead changing returns only when long-term targets are revised. GWFs reflecting the additional 20 years of experience (more extreme percentiles of 1% and 99%, and longer horizons of 30 and 50 years) have been illustrated using a constrained mean of 8.75%, a constrained mean of 10.00%, and an unconstrained mean of 11.64%.

The Academy looks forward to our continued collaboration with regulators on the GWFs illustrated, including reasonable "best-estimate" ranges for long-term targets on interest rates, equity returns, and ERP. We look forward to providing additional comments on the overall application of a complete set of stylized facts and acceptance criteria, as well as proposal for "quadrant" criteria related to the tails of the joint distribution of equity returns and interest rates, such as the prevalence of low interest rates and low equity returns, and high interest rates and low equity returns[19]. Please direct any questions to Amanda Barry-Moilanen, life policy analyst at barrymoilanen@academy.org.

Sincerely,

Jason Kehrberg
Chair, Economic Scenario Generator Subcommittee

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[18] The Min, Max, Median and Mean, as well as the Least binding reference model, are shown for reference and not specifically for inclusion in an updated set of GWF criteria for equity returns. If a smaller set of GWF criteria is desired, the Academy would recommend keeping the more extreme percentiles of 1%, 5%, 95%, and 99%, along with the somewhat less extreme percentiles of 15% and 85% (i.e., dropping percentiles of 10%, 30%, 70%, and 90%). Note that these updated GWF criteria were developed for use on sets of 10,000 scenarios but could be considered for use on sets with fewer scenarios. Also note that these updated GWF criteria have been expressed in terms of gross wealth factors ("GWFs") but can also be expressed in terms of geometric average returns ("GAVGs") by using the formula: $GAVG = GWF^{\wedge}(1/horizon) - 1$, where *horizon* is in years.

[19] LATF has previously requested the ESGS develop a proposal for such "quadrant" criteria.

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Appendix 1—Stylized facts for Equity Returns (presented by Academy to LATF on 9/29/22)

1. Equity indices (indeed, all asset classes) tend to exhibit **consistent risk/reward relationships** over **long** time horizons.

2. Cumulative equity returns tend to exceed the compounded risk-free rate (positive observed **equity risk premium**) over long time horizons, but over short time horizons the observed equity risk premium fluctuates due to several factors and can be negative.

3. Equities **fluctuate between bull and bear markets** (bubbles tend to burst)—markets can experience significant losses but eventually tend to **move back into positive territory** (negative cumulative equity returns become less likely over longer time horizons).

4. Cumulative equity returns *over long time horizons* **are not materially impacted by initial market conditions**.

5. The **volatility of equity returns varies over time but has a strong tendency to revert to normative levels**. This allows for both extreme gains and extreme losses over short time periods (i.e., the distribution has fat tails, or **positive kurtosis**). Furthermore, the **volatility of equity returns is higher in bear markets**. This increases the probability of extreme losses relative to extreme gains (i.e., the distribution has a longer left tail, or **negative skewness**).

6. Equity markets contain **pathwise dynamics** over long time horizons that aren't present in the distribution of single-period returns. Future equity scenarios should have reasonable distributions of cumulative equity returns over long time horizons (e.g., 10, 20, 30 years), especially since these distributions are key to the performance of long-duration life and annuity products.

7. Future equity scenarios should include events that are **plausibly more extreme than history**.

8. Equity returns have both a **price and dividend component**, and they behave differently—dividend returns tend to be more stable than price returns.

9. Returns between different equity indices **are generally positively correlated** over **long** time horizons. This correlation may increase sharply in bear markets, but it tends to revert to normative levels in a short period of time.

Appendix 2—Detail on reference models considered for equity returns

A. **Heston with Jumps ("Jump")**[20]

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

- Stochastic equity variance follows Heston/CIR:

   (a) $v_t = \max \left[\tau^2(1 - \zeta) + v_{t-1}\zeta + \sigma \sqrt{\tau^2/2\varphi\,(1 - \zeta)^2 + v_{t-1}/\varphi\,(\zeta - \zeta^2)} \, Z_t^v, \, v_{min} \right]$

   where:

   - τ^2, φ *and* σ are the steady state target, reversion speed, and monthly diffusion coefficient of the monthly variance process

   - $\zeta = e^{-\varphi}$

   - $Z_t^v \sim N(0,1)$

   - v_{min} is a suitably small floor to ensure stability of the variance process

   - v_0 is set to $v_0 = initial\ volatility^2$

- Periodic log-return follows:

   (b) $lr_t = (A + (C - .5)v_{t-1})\,\Delta_t + \sqrt{v_{t-1}\,\Delta_t}\,Z_t^{lr} - \lambda_t m + N_t \mu_j + \sigma_j \sqrt{N_t} Z_t^j$

   where:

   - v_{t-1} is the beginning-of-the-period Heston variance defined above

   - $Z_t^{lr} \sim N(0,1)$, where $\langle Z_t^{lr}, Z_t^v \rangle = \rho$ is the correlation parameter between variance and log-return process

   - $\lambda_t = v_{t-1}\,\lambda_1\,\Delta_t$ is the intensity of Poisson counting process tied to the beginning-of-period Heston variance v_{t-1}

   - $N_t \sim Poisson(\lambda_t)$ is a Poisson random variable that is un-correlated with Heston variance and the core return process

   - $m = e^{\mu_j + .5\sigma_j^2} - 1$, with μ_j and σ_j as mean and volatility of the variable jump γ

   - Z_t^j is a standard normal variate that drives the log-normal jump diffusion of γ

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[20] Note that GEMS employs a Heston with Jumps model for equity returns.

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B. Heston

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

- Stochastic equity variance follows Heston/CIR:

(a) $\quad v_t = \max\left[\,\tau^2(1-\zeta) + v_{t-1}\zeta + \sigma\sqrt{\tau^2/2\varphi\,(1-\zeta)^2 + v_{t-1}/\varphi\,(\zeta-\zeta^2)}\; Z_t^v,\; v_{min}\right]$

where:

- τ^2, φ *and* σ are the steady-state target, monthly reversion speed, and diffusion coefficient of the monthly variance process

- $\zeta = e^{-\varphi}$

- $Z_t^v \sim N(0,1)$

- v_{min} is a suitably small floor to ensure stability of the variance process

- v_0 is set to $v_0 = initial\ volatility^2$

- Periodic log-return follows:

(b) $\quad lr_t = (\mu_0 - .5v_{t-1})\,\Delta_t + \sqrt{v_{t-1}\,\Delta_t}\; Z_t^{lr}$

where:

- v_{t-1} is the beginning-of-the-period Heston variance defined above

- $Z_t^{lr} \sim N(0,1)$, where $\langle Z_t^{lr}, Z_t^v \rangle = \rho$ is the correlation parameter between variance and log-return process

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C. **Stochastic Log Volatility ("SLV")[21]**

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

- Stochastic equity log-volatility follows OU process:

  (a) $lv_t = \min\left[\varphi\tau + (1-\varphi)lv_{t-1},\ log(SoftMaxVol)\right] + \sigma\, Z_t^{lv}$

  where:

  - $\tau,\ \varphi\ and\ \sigma$ are the steady-state target, reversion speed, and monthly diffusion coefficient of the monthly log-volatility process

  - $Z_t^v \sim N(0,1)$

  - $vol_t = \max\left[\min\left(e^{lv_t}, MaxVol\right),\ MinVol\right]$

  - lv_0 is set to $lv_0 = log(initial\ volatility)$

- Periodic log-return follows:

  (b) $lr_t = \left(A + B\, vol_t + C\, vol_t^2\right)\Delta_t + vol_t\sqrt{\Delta_t}\, Z_t^{lr}$

  where:

  v_{t-1} is the beginning-of-the-period Heston variance defined above

  $Z_t^{lr} \sim N(0,1)$, where $\langle Z_t^{lr},\ Z_t^v\rangle = \rho$ is the correlation parameter between log-volatility and log-return process

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[21] Note that the AIRG employs an SLV model for equity returns.

D. Lognormal ("LN")[22]

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

(a) $lr_{1,t} = \mu\Delta_t + \sigma\sqrt{\Delta_t}Z_t$

where:

- $Z_t \sim N(0,1)$

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[22] The LN model was included in our analysis due to its simple nature and historical significance, however over longer time horizons it does not meet all our stylized facts for equity returns and so was not used to derive the updated tables of least binding GWFs. In particular, the LN model lacks negative skew, and doesn't exhibit excess kurtosis over longer time horizons.

E. Regime-Switching Lognormal Model for 2 regimes ("RSLN2")

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

- Periodic log-return for two regimes follows:

    (a) $lr_{1,t} = \mu_1 \Delta_t + \sigma_1 \sqrt{\Delta_t} Z_t$

    (b) $lr_{2,t} = \mu_2 \Delta_t + \sigma_2 \sqrt{\Delta_t} Z_t$

    where:

    - $Z_t \sim N(0,1)$

    - $p11, and\ p21$ are monthly transition probabilities indicating continuing in state 1, and migrating from state 2 to state 1 respectively.

    - For each scenario, the initial state is initialized to 1 if the scenario-specific $U(0,1) < p_1 = {p_{21}}/{p_{21} + p_{12}}$, and to state 2 otherwise.

    - Transition states are evolved using independent and identically distributed uniform variates compared to transition probabilities in the subsequent projection steps.

F. Regime-Switching Lognormal Model for 2 regimes with Draw Down ("RSDD2")[23]

- Process specified for discrete monthly timestep, $\Delta_t = 1/12$

- Periodic log-return for two regimes follows:

(a) $\quad lr_{1,t} = \mu_1 \Delta_t + \varphi_1 DD_t + \sigma_1 \sqrt{\Delta_t} Z_t$

(b) $\quad lr_{2,t} = \mu_2 \Delta_t + \varphi_2 DD_t + \sigma_2 \sqrt{\Delta_t} Z_t$

where:
   - $Z_t \sim N(0,1)$

   - Draw Down at each projection point, t, is defined as $DD_t = min(0, \ DD_{t-1} + lr_{t-1})$ and is initialized with $DD_1 = 0$.

   - $p11, \ and \ p21$ are monthly transition probabilities indicating continuing in state 1 and migrating from state 2 to state 1 respectively.

   - For each scenario, the initial state is initialized to 1 if the scenario-specific $U(0,1) < p_1 = {}^{p_{21}}/_{p_{21} + p_{12}}$, and to state 2 otherwise.

   - Transition states are evolved using independent and identically distributed uniform variates compared to transition probabilities in the subsequent projection steps.

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[23] The RSDD2 model was included in our analysis because it met our stylized facts for equity returns, but it was not used to derive the updated tables of least binding GWFs. RSDD2 has theoretical and empirical support but it is sensitive to the data period used and risks understating extreme events like the great depression. Had RSDD2 been used to derive the updated tables of least binding GWFs, the distribution of GWFs would have been narrower, i.e., *less* constraining.

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G. Parameters and sum of log likelihood for reference models fit using unconstrained Maximum Likelihood Estimation (MLE) based on S&P 500 monthly returns from 1957.03 to 2022.12

	Heston	Jump	SLV	AIRG
tau	0.14694	0.14242	0.13076	0.12515
phi	0.09317	0.08436	0.09871	0.35229
sigma	0.04130	0.03805	0.16559	0.32645
A	0.10844	0.10886	0.09904	0.05500
B	0.00000	0.00000	0.00000	0.56000
C	0.00000	0.13580	2.45530	-0.90000
correlation (skew)	-0.54794	-0.58593	-0.68936	-0.24880
initial vol	0.14467	0.14242	0.15010	0.14760
min vol	0.03000	0.03000	0.03000	0.03050
soft max vol	0.30000	0.30000	0.30000	0.30000
max vol	0.35000	0.35000	0.35000	0.79880
mu_jump	0	-0.14740	0	0
sigma_jump	0	0.07000	0	0
lambda_jump	0	2.51937	0	0
MLE: Sum of LL	*1,430*	*1,435*	*1,447*	*1,418*

	RSLN2	RSDD2	LN
p11	0.93540	0.94077	1.00000
p21	0.10313	0.17652	0.00000
mu1	0.16570	0.13209	0.09910
mu2	-0.00720	-0.15209	0.00000
sigma1	0.09901	0.10749	0.14835
sigma2	0.20042	0.21292	0.10000
phi1	0	-0.06935	0
phi2	0	-0.00317	0
MLE: Sum of LL	*1,413*	*1,421*	*1,418*

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H. Log return statistics for reference models fit using unconstrained Maximum Likelihood Estimation (MLE) based on S&P 500 monthly returns from 1957.03 to 2022.12

Monthly Log Return Statistics (first 600 months, 10k scenarios)								
	Heston	**Jump**	**SLV**	**RSLN2**	**RSDD2**	**LN**	**AIRG**	**History**
mean	0.81%	0.84%	0.83%	0.83%	0.83%	0.83%	0.61%	0.83%
st. dev.	4.25%	4.26%	4.28%	4.29%	4.29%	4.28%	4.36%	4.28%
skew	-0.03	-0.32	-0.69	-0.33	-0.56	0.00	-0.67	-0.67
kurt	4.25	5.79	5.47	4.39	4.63	3.00	7.00	5.32

Annual Log Return Statistics (first 50 years, 10k scenarios)								
	Heston	**Jump**	**SLV**	**RSLN2**	**RSDD2**	**LN**	**AIRG**	**History**
mean	9.78%	10.07%	9.93%	9.79%	9.90%	9.90%	7.31%	10.16%
st. dev.	14.92%	14.88%	14.14%	15.96%	15.72%	14.84%	15.13%	15.41%
skew	-0.58	-0.66	-0.74	-0.53	-0.66	0.00	-0.41	-0.90
kurt	4.20	4.41	4.77	3.73	4.36	3.01	4.12	4.54
Average Annual Return (30 yrs)	11.47%	11.80%	11.37%	11.94%	11.22%	11.68%	8.81%	n/a
Amount over AIRG	2.66%	2.99%	2.56%	3.13%	2.42%	2.87%	0.00%	n/a

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I. **Distribution of 1-yr and 20-yr returns for reference models fit using Maximum Likelihood Estimation (MLE) based on S&P 500 monthly returns from 1957.03 to 2022.12**

The tables below show annualized equity returns across the reference models for 1-year and 20-year horizons compared to similar statistics for the AIRG and the GEMS Field Test (FT) #1a[24] scenario sets as well as to the distribution of rolling 1-year returns observed in history.

All reference models except for Lognormal (LN) allow for explicit return/volatility (negative skew) and produce scenarios with 1-year losses and gains that exceed the worst seen in history since 1957.03. Furthermore, when mean equity returns are constrained to 8.75% all reference models produce scenarios with negative returns over the first 20 years, an event not seen in history even including the great depression, and approximately 1% of scenarios experience negative returns over the first 20 years.

GEMS FT #1a shows a much lower median of 6.7% over the first year due to equity returns in that scenario set keying off the short interest rate which starts near 0% in that scenario set, while its first percentile is like the reference models (other than LN), i.e., reference models that model equity returns using a constant mean are able to achieve rates as low as GEMS FT #1a, even when starting short rates are near 0%. Over the first 20 years, GEMS FT #1a (which was calibrated to align with the AIRG 30-year GWF over the long-term) shows a median of 7.2% that is similar to the reference models when the mean equity return is constrained to 8.75% (first percentiles are also similar, as was the case over the first year).

Distribution of 1-yr Return (Historical MLE, unconstrained mean)								GEMS	
	Heston	**Jump**	**SLV**	**RSLN2**	**RSDD2**	**LN**	**AIRG**	**FT #1a**	**History**
min	-50.7%	-51.5%	-52.3%	-58.3%	-51.8%	-41.9%	-59.5%	-49.7%	-43.3%
1	-26.9%	-27.7%	-28.0%	-29.2%	-31.1%	-22.1%	-28.5%	-29.2%	-33.2%
5	-15.1%	-15.0%	-14.8%	-17.6%	-18.2%	-13.6%	-17.3%	-18.2%	-15.2%
15	-5.5%	-4.8%	-4.5%	-5.7%	-6.4%	-5.4%	-7.7%	-8.7%	-5.0%
30	3.2%	3.9%	4.3%	3.8%	2.1%	2.3%	0.5%	-0.9%	5.3%
50	11.7%	12.5%	12.3%	12.4%	9.7%	10.8%	8.2%	6.7%	13.3%
70	19.7%	20.5%	20.2%	20.7%	17.6%	19.6%	16.4%	14.1%	19.9%
85	28.2%	28.2%	27.3%	28.8%	25.2%	28.8%	25.3%	21.7%	27.9%
95	38.1%	37.3%	36.1%	39.6%	34.8%	40.8%	36.5%	30.6%	37.8%
99	49.5%	48.5%	45.9%	53.0%	47.0%	56.1%	51.6%	41.0%	48.2%
max	82.9%	72.1%	71.0%	96.1%	78.9%	89.3%	85.2%	80.9%	61.1%

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[24] Note that GEMS Field Test scenario (FT) set #2a would produce higher GWFs than GEMS FT #1a. This is because those two scenario sets model equity returns as a constant mean equity risk premium over the short rate, and starting short rates were significantly higher in GEMS FT #2a than GEMS FT #1a, especially for the one-year horizon.

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Distribution of 20-yr Return (Historical MLE, unconstrained mean)								GEMS	
	Heston	Jump	SLV	RSLN2	RSDD2	LN	AIRG	FT #1a	History
min	-3.7%	-3.6%	-3.3%	-6.7%	-0.5%	-3.0%	-4.4%	-4.5%	n/a
1	1.2%	1.2%	2.4%	0.9%	3.7%	2.2%	-0.6%	-0.9%	n/a
5	4.0%	4.3%	4.9%	3.7%	5.5%	4.6%	1.7%	1.5%	n/a
15	6.5%	7.0%	7.1%	6.2%	7.3%	6.7%	3.9%	3.4%	n/a
30	8.5%	8.9%	8.9%	8.4%	8.7%	8.5%	5.8%	5.3%	n/a
50	10.5%	10.9%	10.6%	10.6%	10.3%	10.4%	7.7%	7.2%	n/a
70	12.4%	12.8%	12.3%	12.7%	11.9%	12.4%	9.5%	9.3%	n/a
85	14.2%	14.5%	13.9%	14.8%	13.6%	14.4%	11.4%	11.3%	n/a
95	16.3%	16.4%	15.7%	17.2%	15.6%	16.7%	13.7%	14.0%	n/a
99	18.4%	18.7%	17.6%	19.9%	17.8%	19.3%	16.2%	17.1%	n/a
max	22.1%	22.2%	21.2%	27.6%	23.1%	28.4%	20.3%	22.3%	n/a

Distribution of 20-yr Return (Historical MLE, mean constrained to 8.75%)								GEMS	
	Heston	Jump	SLV	RSLN2	RSDD2	LN	AIRG	FT #1a	History
min	-6.1%	-6.2%	-5.6%	-9.4%	-2.7%	-5.5%	-4.4%	-4.5%	n/a
1	-1.2%	-1.5%	0.0%	-2.0%	1.4%	-0.4%	-0.6%	-0.9%	n/a
5	1.5%	1.5%	2.4%	0.7%	3.1%	1.8%	1.7%	1.5%	n/a
15	3.9%	4.1%	4.6%	3.2%	4.9%	3.9%	3.9%	3.4%	n/a
30	5.8%	5.9%	6.3%	5.3%	6.3%	5.7%	5.8%	5.3%	n/a
50	7.8%	7.8%	8.0%	7.4%	7.9%	7.5%	7.7%	7.2%	n/a
70	9.7%	9.7%	9.7%	9.5%	9.4%	9.4%	9.5%	9.3%	n/a
85	11.4%	11.4%	11.2%	11.5%	11.0%	11.4%	11.4%	11.3%	n/a
95	13.4%	13.2%	13.0%	13.9%	13.0%	13.7%	13.7%	14.0%	n/a
99	15.6%	15.5%	14.8%	16.5%	15.1%	16.2%	16.2%	17.1%	n/a
max	19.2%	18.9%	18.4%	24.0%	20.3%	25.0%	20.3%	22.3%	n/a

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Appendix 3—Graphical view of table 3.2 showing proposed criteria for selected percentiles based on a constrained mean equity return of 10.00%

Potential equity return criteria (least binding over selected reference models)

Target mean return = 10.00%

green = median, yellow = 15th to 85th, orange = 1st to 99th, blue = min to max

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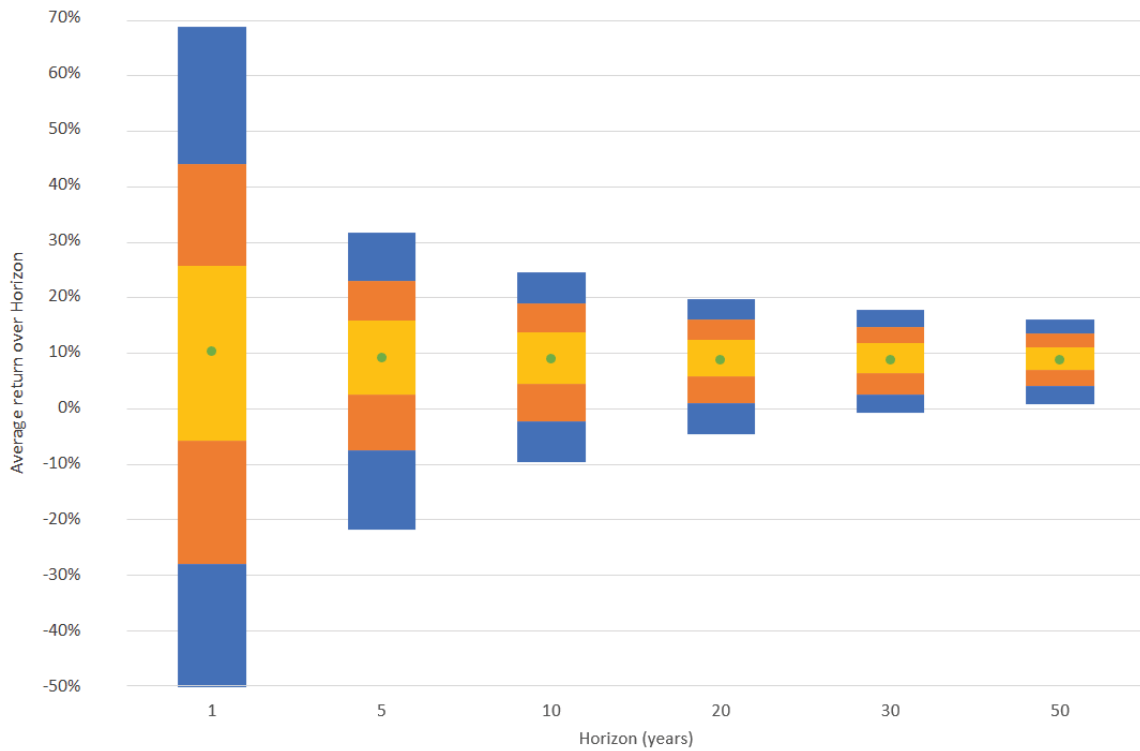
Appendix 4—Additional analysis on the relationship between equity returns and interest rates

A. Summary of additional analysis

Historical Observations:
o   Realized equity return (and ERP) are _inversely related_ to the 3M UST rate in the top and bottom deciles, i.e., 17.6% equity return (17.6% ERP) when 3M UST rates are below 15 basis points, and 0.6% equity return (-9.9% ERP) when UST 3M rates are above 8.33%.
o   The Fed's mandate includes balancing moderate inflation against employment and economic growth. Monetary tightening (e.g., when inflation is high) and easing (e.g., to stimulate the economy) rely on fundamental economic principles and contribute to the observed equity/rate dynamics of equity returns being _inversely_ related to the level of 3M UST rates at tail levels.

GEMS assumed relationship:
o   GEMS assumes a constant expected ERP regardless of the level of rates, i.e., assumes expected equity return is an _increasing_ function of the short (e.g., 3M) UST rate, which is opposite the historical relationship observed in the tails.
o   Historical data suggests a constant ERP should be rejected at p-values of **0.3%** and **1.6%** in low- and high-rate deciles respectively. Low p-values indicate the model is not able to explain the realized equity return, even accounting for historical volatility.

AIRG assumed relationship:
o   The AIRG model assumes a _constant_ expected equity return, i.e., an ERP that decreases with the level of short (e.g., 3M) UST rate.
o   While stylized, this assumption represents a middle ground between an inverse relationship seen in history and an increasing relationship embedded in GEMS.
o   The AIRG model would be rejected at a p-value of 2.4% in the low-rate decile but shows p-values of 10%+ across the rest of the distribution.

Both the AIRG (constant mean equity return) and GEMS (constant mean equity risk premium) assume ERP dynamics which are stylized simplifications of the complete historical record. Both may adequately account for historical equity returns in the middle 80% of the distribution and on average over the long term, but the constant mean equity return approach better accounts for the historical dynamics (and underlying Fed policy) observed in the tails (i.e., top and bottom deciles).

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B. Realized Excess Equity Returns are Inversely Tied to Tail Rate Levels

Decile Plot of 3M Rate and S&P Premium
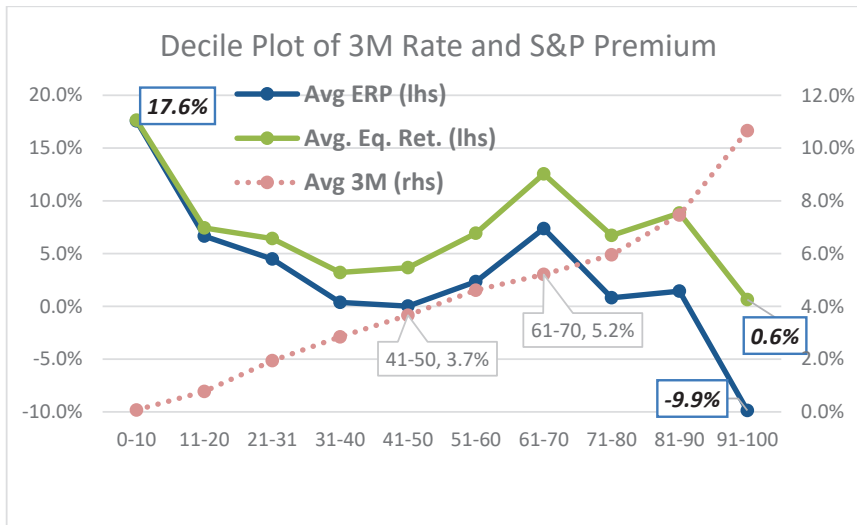
o Based on monthly 3m treasury and S&P price index data from 4/1953 to 12/2020, covering 814 months, or 67.8yrs.

o Monthly ERP calculated as return on S&P less average 3M yield through the month, expressed on continuous/log basis.

o Each decile represents 81-82 monthly points, or 6.8yrs, where data was grouped by 3M rate.

o Average Eq. Return and ERP were then calculated for each decile, and annualized.

o Realized equity return and ERP are inversely related to 3M rate in the top and bottom deciles: 17.6% equity return (17.6% ERP) where rates are below 15bp, and 0.6% return (-9.9% ERP) when rates are above 8.33%.

o Historically, the 3M treasury rate is strongly tied to Fed Funds rate, which is typically targeted by the Fed to achieve its objectives under different market environments: Easing post 2008 Financial Crisis intended to stimulate economic growth and employment, resulted in near 0% short rates for most of the last 11 years. The policy, facilitating borrowing and spending, had contributed to growth in equities and outperformance over the money market.

o Fed tightening intended to control high inflation in 70s and 80s lead to double-digit short rates, especially in late 70s through early 80s. As intended, the policy of flooring borrowing rates at historically high levels stimulated savings while stifling inflation and economic growth, contributing to money-market outperformance vs. equities over an extended period.

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C. Simplified Modeling of Equity Return/ERP

Average Eq. Return: Historical vs. Model Implied

	Avg. ERP (RF)	Avg. Return (RF)	Avg. Implied ERP	Avg. Implied Return
Constant Return (AIRG)	7.43% - RF	7.43%	3.15%	7.43%
Constant ERP (GEMS)	3.15%	RF + 3.15%	3.15%	7.43%
Regression Line	10.58% - 1.74 x RF	10.58% - .74 x RF	3.13%	7.41%

o   Above assumes: **Equity Return = RF + ERP**, where RF is the return associated with risk free rate, and ERP is the Equity Risk Premium or excess earned over RF.

o   Analysis considers constant ERP, constant Return, and ERP as a linear function of risk-free rate.

o   While no considered approach perfectly captures historical data, a regression line showing inversely related equity return and risk-free rate, best aligns with the decile distribution.

o   Constant (expected) Return (used in AIRG) implies ERP that is inversely related to risk-free rate.

o   Constant (expected) ERP assumption, such as used in GEMS, results in increasing equity returns as a function of short rate – _directionally opposite_ to what has been observed. Economic scenarios based on constant ERP would tend to:

▪   Produce overly punitive equity returns in low-rate tail scenarios.

▪   Understate the risk of adverse equity performance in high-rate tail scenarios.

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D. Historical Example: Fitting to January 2011 Treasury Curve

Average Eq. Return: Historical vs. Model Implied

Deciles of 3M UST Yield	Average 3M UST Yield	Regression constrained to constant mean ERP	Regression constrained to constant mean Equity Return	Regression unconstrained
0-10	0.1%	0.3%	2.4%	8.2%
10-20	0.8%	29.5%	50.0%	34.6%
20-30	1.9%	40.1%	42.5%	30.5%
30-40	2.8%	29.6%	20.8%	15.5%
40-50	3.7%	20.5%	16.1%	13.5%
50-60	4.6%	43.9%	46.2%	48.1%
60-70	5.2%	21.6%	17.1%	14.1%
70-80	6.0%	35.9%	45.6%	46.8%
80-90	7.5%	39.9%	41.7%	28.8%
90-100	10.7%	1.6%	12.6%	35.7%
Mean ERP =		*Constant*	*Constant - (1.00 × Risk Free Rate)*	*Constant - (1.74 × Risk Free Rate)*
Mean Equity Return =		*Risk Free Rate + Constant*	*Constant*	*Constant - (0.74 × Risk Free Rate)*

o P-values were calculated to test the null hypothesis where average observed Equity Return within each decile was generated by each of the simplified ERP models.

o A small value of p, below a significance level (a popular choice is 5%) implies that the null hypothesis can be rejected with high confidence.

o Constant ERP produces very small p-values in the tails, especially in the first decile, where p = 0.3% implies that the model would produce average ERP/equity return > 17.6% over 82 months with only 0.3% probability.

o Constant Return assumption (used in AIRG) improves upon Constant ERP in the tails and is better capable of generating scenarios that reflect historical macro-economic/fed policy interactions.

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E. **Simplified Modeling of ERP**

Average ERP: Historical vs. Model Implied

	Avg. ERP (RF)	Avg. Return (RF)	Avg. Implied ERP	Avg. Implied Return
Constant Return (AIRG)	7.43% - RF	7.43%	3.15%	7.43%
Constant ERP (GEMS)	3.15%	RF + 3.15%	3.15%	7.43%
Regression Line	10.58% - 1.74 x RF	10.58% - .74 x RF	3.13%	7.41%

o   Above assumes: ***Equity Return = RF + ERP***, where RF is the return associated with risk-free rate, and ERP is the Equity Risk Premium or excess earned over RF.

o   Analysis considers constant ERP, constant Return, and ERP as a linear function of risk-free rate.

o   Rather than focusing on Equity Return by decile, this view of the data focuses on averaged realized ERP by decile.

o   The chart suggests Constant Return assumption is better aligned with historical experience in tail deciles.

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F. Historical Tails

Equity Premium in Low Rates (2008-2020)

Legend: mm · ERP · 3m (RHS)

Equity Premium in High Rates (1978-1985)

money-market outperforms equity

1986, (0.02)

0.16

Legend: mm · ERP · 3m (RHS)
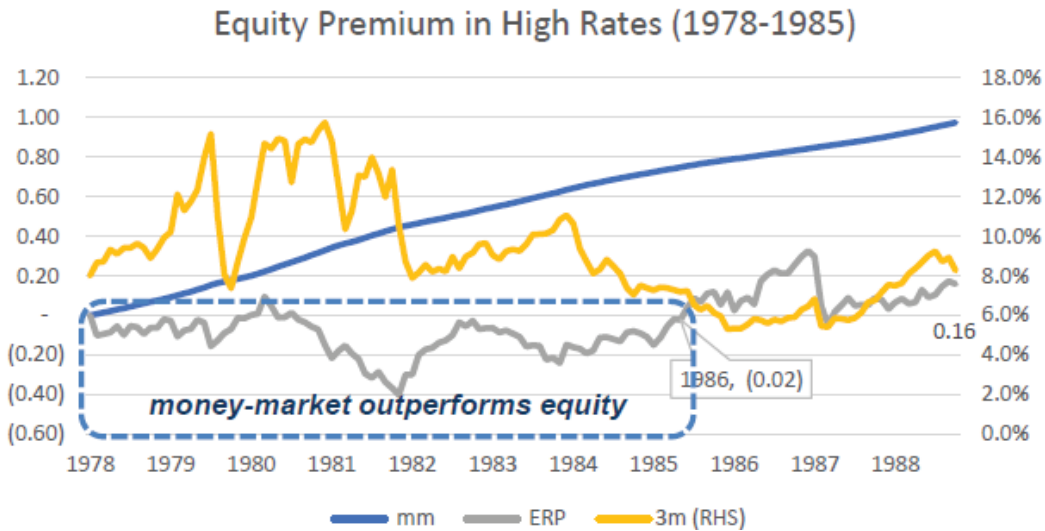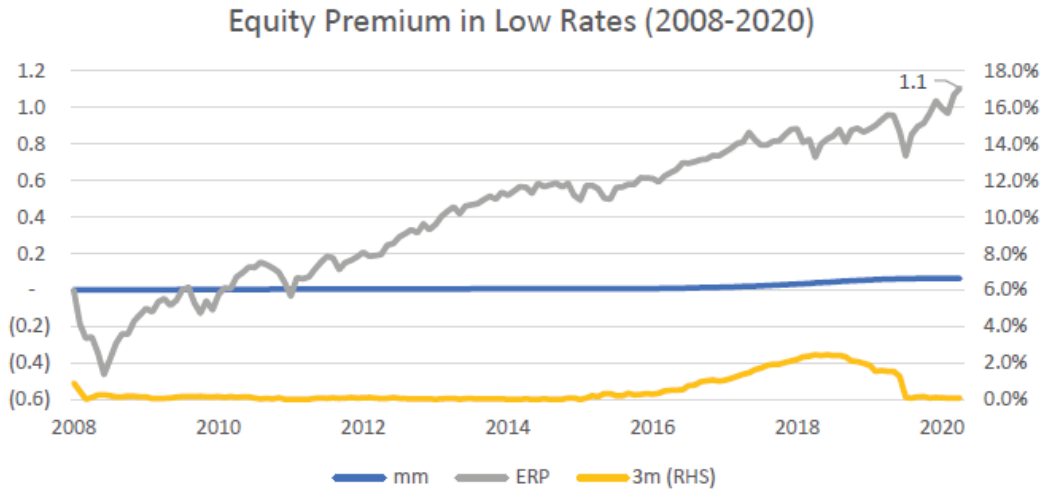
- o Cumulative Money Market return and ERP are presented on a continuous (log-return) basis, scaled on the left-hand side.
    - Example: wealth ratio (year 10) = exp(cumulative log return (year 10)).

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November 13, 2023

Rachel Hemphill
Chair, NAIC Life Actuarial (A) Task Force (LATF)

   Re: APF 2023-10 (Discount Rate for VM-20 Stochastic Reserves)

Dear Chair Hemphill:

The American Council of Life Insurers (ACLI) appreciates the opportunity to submit comments on APF 2023-10 which was exposed by LATF during their meeting on September 28, 2023. ACLI has no objections to the APF's proposed modifications to the discount rate used to calculate VM-20 Stochastic Reserve scenario reserves which include the primary use of Net Asset Earned Rate (NAER) on additional assets and the allowance of Direct Iteration Method (DIM) as an alternative calculation strategy.

While ACLI generally supports adoption of this APF, we do have a number of questions and concerns for regulators to consider so there aren't any unintended consequences for industry caused by the proposed changes post-implementation. These considerations are listed below:

- One question we have is regarding the asset collar requirement on VM-20 (which does not exist on VM-21). If the SR is winning, the assets from that model should be included in the asset collar analysis. Since there are now two methods for doing the SR, both should be considered:
  - Present Value Method - Do we use the starting assets only, or do we use the starting assets plus the CTE (70) of the additional invested assets (i.e., the SR reserve)?
  - Direct Iteration Method - Each scenario has different starting assets. Do we use the CTE (70) of the starting assets (i.e., the SR reserve) as the starting assets?
    - i. In either case, a reasonable result might be to treat the SR result as the starting asset position for any model blocks where the SR is the dominant reserve.

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Once again, ACLI is appreciative of the opportunity to provide feedback on this APF, and we look forward to additional conversation with regulators on this and other topics others as we move towards the end of the calendar year.

Sincerely,

Colin Masterson

cc: Scott O'Neal, NAIC

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation and a very brief description (title) of the issue.

    Identification:
    American Academy of Actuaries, Life Reserves Subcommittee (formerly LRWG)

    Title of the Issue:
    Discount Rate for VM-20 Stochastic Reserve

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    January 1, 2023, NAIC Valuation Manual

    VM-20 sections 5.B and 7.H.4; VM-31 sections 3.D.2 and 3.D.6

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    See attached. The proposed changes are extracted from existing language in VM-21 (see VM-21 Section 4.B.3) or from existing language in VM-31 related to the deterministic reserves but modified for the stochastic reserve

4. State the reason for the proposed amendment? (You may do this through an attachment.)

    We propose modifying the discount rate used to calculate the scenario reserves within the VM-20 Stochastic Reserve (SR) to be the Net Asset Earned Rate (NAER) on additional assets while also allowing for the Direct Iteration Method (DIM) as an alternative approach to calculating these scenario reserves. The principal reason for making this change is to address concerns related to APF 2023-03 Part 3, which deals with borrowing costs. In particular, it has been noted that a disconnect would now exist between the borrowing rate and the scenario discount rate used in calculating the scenario reserves for the VM-20 SR. Secondly, the upcoming changes to the Economic Scenario Generator will likely lead to instances of negative interest rates, which calls into question the appropriateness of discounting at 105% of a Treasury rate. Changing to the NAER will allow for more appropriate discounting in these types of scenarios. Thirdly, the existing methodology of using SR discount rates equal to 105% of the path of 1-year Treasury rates does not have a clear, strong rationale for use. The methodology originated from C3P2 Standard Scenario for variable annuities, and the discount rate in C3P2 was later revised and eventually the Standard Scenario was eliminated altogether. This methodology for discounting is not used in most current applications where GPVAD are calculated.

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* This form is not intended for minor corrections, such as formatting, grammar, cross–references or spelling. Those types of changes do not require action by the entire group and may be submitted via letter or email to the NAIC staff support person for the NAIC group where the document originated.

NAIC Staff Comments:

Dates: Received	Reviewed by Staff	Distributed	Considered
8/17/23	K.K		
Notes: APF 2023-10			

VM-20

Section 5: Stochastic Reserve

For a group of one or more policies for which a SR is to be calculated, the company shall calculate the SR as follows:

A. Project cash flows in compliance with the applicable requirements in Section 7, Section 8 and Section 9 using the stochastically generated scenarios described in Section 7.G.2., and further described in Appendix 1. In determining the SR, the company shall determine the number and composition of subgroups for aggregation purposes in a manner that is consistent with how the company manages risks across products with significantly different risk profiles, and that reflects the likelihood of any change in risk offsets that could arise from distributional shifts between product types due to, for example, differing policyholder behavior. If a company is managing the risks of two or more products with significantly different risk profiles as part of an integrated risk management process, then the products may be combined into the same subgroup for aggregation purposes. If policies from more than one VM-20 Reserving Category are included in such a subgroup, the reserve for each VM-20 Reserving Category shall also be determined, as described in Section 5.G.

   Guidance Note: Aggregation refers to the number and composition of subgroups of policies that are used to combine cash flows. Aggregating policies into a common subgroup allows the cash flows arising from the policies for a given stochastic scenario to be netted against each other (i.e., allows risk offsets between policies to be recognized). Note Section 5.G regarding the calculation of the ~~SRon~~SR on a stand-alone basis for each VM-20 Reserving Category.

B. Calculate the scenario reserve for each stochastically generated scenario ~~as follows~~using the method described in either Section 5.B.1 or Section 5.B.2:

   1. Present Value Method
       a. For each model segment at the model start date and end of each projection year, calculate the discounted value of the negative of the projected statement value of general account and separate account assets using the path of discount rates for the model segment determined in compliance with Section 7.H.4 from the projection start date to the end of the respective projection year. The balance of policy loans on the valuation date (if explicitly modeled under Section 7.F.3.b) and the balance of separate account assets on the valuation date are modeled each period in compliance with the applicable changes in these asset balances as defined in Section 7.

   Guidance Note: The projected statement value of general account and separate account assets for a model segment may be negative or positive.

       b. Sum the amounts calculated in Subparagraph 1 above across all model segments at the model start date and end of each projection year.

   Guidance Note: The amount in Subparagraph 2 above may be negative or positive.

       c. Set the scenario reserve equal to the sum of the statement value of the starting assets across all model segments and the maximum of the amounts calculated in Subparagraph ~~2~~b above.

   2. Direct Iteration Method

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> Solve for the amount of starting assets which, when projected along with all contract cash flows, result in the defeasance of all projected future benefits and expenses at the end of the projection horizon with no accumulated deficiencies at the end of any projection year during the projection period.

C. Rank the scenario reserves from lowest to highest.

D. Calculate CTE 70.

E. Determine any additional amount needed to capture any material risk included in the scope of these requirements but not already reflected in the cash-flow models using an appropriate and supportable method and supporting rationale.

F. Add the CTE amount (D) plus any additional amount (E) less the positive or negative PIMR balance allocated to the group of one or more policies being modeled under Section 7.D.7.

G. The SR equals the amount determined in Section 5.F. If the company includes policies from two or more VM-20 Reserving Category in a subgroup for aggregation purposes as described in Section 5.A, the company shall calculate the SR for policies from each VM-20 Reserving Category on a stand-alone basis by following the process of A through F above.

Section 7.H

4. ;The company shall use the path of NAER on an additional invested asset portfolio of general account assets for each model segment within each scenario as the discount rates in the SR calculations in Section 5.

  a. The additional invested asset portfolio for a scenario is a portfolio of general account assets as of the valuation date, outside of the starting asset portfolio, that is required in that projection scenario so that the projection would not have a positive accumulated deficiency at the end of any projection year. This portfolio may include only (i) general account assets available to the company on the valuation date that do not constitute part of the starting asset portfolio; and (ii) cash assets.

Guidance Note: Additional invested assets should be selected in a manner such that if the starting asset portfolio were revised to include the additional invested assets, the projection would not be expected to experience any positive accumulated deficiencies at the end of any projection year. It is assumed that the accumulated deficiencies for this scenario projection are known.

  b. To determine the NAER on additional invested assets for a given scenario:
    i. Project the additional invested asset portfolio as of the valuation date to the end of the projection period,
        a) Investing any cash in the portfolio and reinvesting all investment proceeds using the company's investment policy.
        b) Excluding any liability cash flows.
        c) Incorporating the appropriate returns, defaults, and investment expenses for the given scenario.
    ii. If the value of the projected additional invested asset portfolio does not equal or exceed the accumulated deficiencies at the end of each projection year for the scenario, increase the size of the initial additional invested asset portfolio as of the valuation date, and repeat the preceding step.
    iii. Determine a vector of annual earned rates that replicates the growth in the additional invested asset portfolio from the valuation date to the end of the projection period for the scenario. This vector will be the NAER for the given scenario.

> **Guidance Note:** There are multiple ways to select the additional invested asset portfolio at the valuation date. Similarly, there are multiple ways to determine the earned rate vector. The company shall be consistent in its choice of methods, from one valuation to the next.

a.

> **Guidance Note:** The use of different discount rate paths for the deterministic and scenario reserves is driven by differences in methodology. The DR is based on a present value of all liability cash flows, with the discount rates reflecting the investment returns of the assets backing the liabilities. The scenario reserve is based on a starting estimate of the reserve and assets that support that estimate, plus the greatest present value of accumulated deficiencies. Here, the discount rates are a standard estimate of the investment returns of only the marginal assets needed to eliminate either a positive or negative deficiency.

VM-31

Section 3.D.2

 i. Stochastic Reserve Method – Identification of the method used to determine the scenario reserve, either (1) the present value method described in VM-20 Section 5.B.1; or (2) the direct iteration method described in VM-20 Section 5.B.2.

Section 3.D.6

 i. Net Asset Earned Rate – For each model segment's DR: If the gross premium valuation method outlined in VM-20 Section 4.A was used, a listing or graph of the path of calculated NAER for all years of the projection and an explanation of any abnormally high or low NAER values or unusual patterns over time. For each model segment's SR: If the present value method outlined in VM-20 Section 5.B.1 was used, a description of the vectors of NAER, including graphs or tables of summary statistics helpful to the understanding of the NAER vectors produced for each scenario, with a statement that a complete listing of NAER will be made available in electronic spreadsheet format upon request.

 v. Additional Assets – For each model segment's SR: If the present value method outline in VM-20 Section 5.B.1 was used, a summary of the amounts of additional assets needed to fund the present value of the accumulated deficiency, including a description of the calculation process and the types of assets included.

EQUITABLE

DATE: November 17, 2023

FROM: Di Yang, Actuarial Methodology & Regulatory Affairs

SUBJECT: APF 2023-12 Exposure

Equitable appreciates the opportunity to comment on APF 2023-12. This proposal requires Asset Adequacy Testing (AAT) investment return assumptions for equity-like instruments reflect volatility instead of solely projecting a flat long-term average return. The proposal requires that this language be included in VM-30.

We support this APF, as we believe guardrails on AAT assumptions, including on investments, ensure robust reserves. Additionally, including guardrails on equity-like instruments is appropriate and consistent with intention of AG53 for the fixed income and equity-like instruments disclosure, as noted in the APF submission.

We favor a General Account equity return guardrail that is consistent with CTE 70 under the new economic scenario generator but that has a defined maximum difference vs. the fixed income guardrail. The rationale for this is two-fold: (1) CTE 70 under GOES will be consistent with liability side regulations and (2) using a maximum spread to fixed income will ensure companies are not incentivized to shift assets to equities to reduce AAT reserves.

In addition, regarding concerns on asset volatility, we believe the best way to test balance sheet resiliency to asset drawdowns is to stress asset values down (moderately adverse) for a defined period within AAT, allowing for reflection of demonstrable hedging, and then followed by use of the long-run assumptions discussed above.

Finally, we also support this language to be included in VM-30 as more robust guardrail and ensure consistent applications across the industry.

Equitable appreciates the opportunity to comment on the proposal. We are available to discuss our comments further at your convenience.

Sincerely,

Di Yang

Di Yang, Actuarial Methodology & Regulatory Affairs

cc. Aaron Sarfatti, ASA, Chief Risk Officer & Strategy Officer, Equitable

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November 17, 2023

Rachel Hemphill,
Chair, NAIC Life Actuarial (A) Task Force

     Re: APF 2023-12 (VM-30 Equity Return Volatility).

Dear Chair Hemphill:

The American Council of Life Insurers (ACLI) appreciates the opportunity to submit comments on APF 2023-12, which aims to clarify expectations on reflection of equity return volatility in VM-30 cash-flow testing.

We agree that the provisions of the APF should be considered by Appointed Actuaries. However, industry is concerned that including such prescriptive requirements in the Valuation Manual diminishes the value of the Actuarial Opinion and the dialogue necessary between the Appointed Actuary and their domestic regulator.

We would propose regulators consider requesting the American Academy of Actuaries to include approaches to account for equity volatility (APF subsection 3.B.7.a) in a Practice Note.

Given the considerations above, we propose the following edits to subsection 3.B.7:

    7.   When the form of asset adequacy analysis is cash-flow testing, investment return assumptions for equity-like instruments shall not solely project the anticipated long-term average return (e.g., a single level assumption set to the long-term average) but ~~account for the~~ should analyze how volatility of such returns ~~which may be expected in moderately adverse conditions~~ may affect the asset adequacy analysis results.

        a. ~~To accomplish the accounting for volatility, one or more of the following~~

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~~approaches may be employed, as appropriate:~~

    ~~i.~~ ~~Stochastic modeling for equity returns, with accompanying analysis of risk metrics.~~

    ~~ii.~~ ~~As relevant to capture the risk, including up, down, and/or volatile equity return scenarios for each given set of interest rate paths.~~

    ~~iii.~~ ~~Projecting one or more market drops, taking into consideration future points at which cash-flow testing results could be vulnerable to market downturns.~~

    ~~iv.~~ ~~Reflecting a level return assumption set equal to a tail risk metric, for example, setting investment returns to the average of the worst 30% of future scenarios, i.e., CTE70.~~

    ~~b.~~ A qualitative description of why the equity return scenario used in asset adequacy analysis is moderately adverse in light of the company's portfolio should be provided.

Further, the definition of "equity-like instrument" matches the AG 53 definition; however, the additional guidance for YE2023 states, "surplus notes, bond ETFs, and preferred stock ETFs, companies should treat these as non-equity-like instruments". It would make sense to align the definition with the latest guidance, so we would suggest the following edits to the definition:

The term "equity-like instruments" means assets<u>, excluding surplus notes, bond ETFs, and preferred stock ETFs,</u> that include the following:

- Any assets that, for purposes of risk-based capital C-1 reporting, are in the category of common stock, i.e., have a 30% or higher risk-based capital charge.

- Any assets that are captured on Schedule A or Schedule BA of the annual statement.

- Bond funds.

Thank you very much for considering our feedback and we look forward to discussion at the NAIC Fall National Meeting in Orlando.

Sincerely,

Colin Masterson

cc: Scott O'Neal, NAIC

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation, and a very brief description (title) of the issue.

    Identification:
    Fred Andersen, FSA, MAAA and Ben Slutsker, FSA, MAAA

    Title of the Issue:
    Clarify expectations on reflection of equity return volatility in VM-30 cash-flow testing.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    VM-01

    VM-30 Section 3.B (new item 7 with items below renumbered)

    January 1, 2023 NAIC Valuation Manual

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted, or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    Add the following definition to VM-01

    - The term "equity-like instruments" means assets <u>excluding surplus notes, bond ETFs, and preferred stock ETFs</u> that include the following:
        o Any assets that, for purposes of risk-based capital C-1 reporting, are in the category of common stock, i.e., have a 30% or higher risk-based capital charge.
        o Any assets that are captured on Schedule A or Schedule BA of the annual statement.
        o Bond funds.

    Add the following subsection 3.B.7. and renumber the items below:

    7. When the form of asset adequacy analysis is cash-flow testing, investment return assumptions for equity-like instruments shall not solely project the anticipated long-term average return (e.g., a single level assumption set to the long-term average) but account for the volatility of such returns which may be expected in moderately adverse conditions.

        a. To accomplish the accounting for volatility, one or more of the following approaches may be employed, as appropriate:

            i. Stochastic modeling for equity returns, with accompanying analysis of risk metrics.

            ii. As relevant to capture the risk, including up, down, and/or volatile equity return scenarios for each given set of interest rate paths.

            iii. Projecting one or more market drops, taking into consideration future points

at which cash-flow testing results could be vulnerable to market downturns.

iv.   Reflecting a level return assumption set equal to a tail risk metric, for example, setting investment returns to the average of the worst 30% of future scenarios, i.e., CTE70.

b.   A qualitative description of why the equity return scenario used in asset adequacy analysis is moderately adverse in light of the company's <u>current or reinvestment</u> portfolio should be provided.

4.   State the reason for the proposed amendment? (You may do this through an attachment.)

This is a next step after what was presented at the August 2023 NAIC meeting, where Actuarial Guideline 53 reviews revealed usage of flat, high, unchanging equity return assumptions for the length of 30+ year projections by many industry members.

Dates: Received	Reviewed by Staff	Distributed	Considered
11/30/23	SO		
Notes: 2023-12			

Life Actuarial (A) Task Force/ Health Actuarial (B) Task Force
Amendment Proposal Form*

1. Identify yourself, your affiliation and a very brief description (title) of the issue.

    Linda Lankowski, RGA, William Leung, MO DCI

    Annuity mortality tables and non-US lives mortality.

2. Identify the document, including the date if the document is "released for comment," and the location in the document where the amendment is proposed:

    -   VM-M Sections 1 and 2
    -   VM-31 Section 3.D.3

3. Show what changes are needed by providing a red-line version of the original verbiage with deletions and identify the verbiage to be deleted, inserted or changed by providing a red-line (turn on "track changes" in Word®) version of the verbiage. (You may do this through an attachment.)

    VM-M: Section 1: Valuation and Nonforfeiture Mortality Tables

    K. 2017 Commissioners Standard Guaranteed Issue Mortality Tables

    1. "2017 Commissioners Standard Guaranteed Issue Mortality Table" (2017 CSGI) means that 2017 Guaranteed Issue basic ultimate mortality table with 75% loading, consisting of separate rates of mortality for male and female lives, as well as combined unisex rates, developed from the experience of 2005–2009 collected by the SOA. This table was adopted by the NAIC on Aug. 7, 2018 and is included in the NAIC Proceedings of the 2018 Summer National Meeting.

    L. 1994 Group Annuity Reserving (1994 GAR) Table

    1. "1994 GAR Table" means that mortality table developed by the Society of Actuaries Group Annuity Valuation Table Task Force and shown on pages 866-867 of Volume XLVII of the Transactions of the Society of Actuaries (1995).

    M. 1983 Table a

    1. "1983 Table 'a'" means that mortality table developed by the Society of Actuaries Committee to Recommend a New Mortality Basis for Individual Annuity Valuation and adopted as a recognized mortality table for annuities in June 1982 by the National Association of Insurance Commissioners. [See 1982 Proceedings of the NAIC II, page 454.]

    > **Commented [LML1]:** The GAR and Table a language came from Model 821. While the draft of VM-22 references a 2021 SOA Deferred Annuity Table, this has not yet been adopted by LATF.

    N. Non-US Insured Mortality

    1. For blocks of polices covering insureds who are not residents of the United States, the company may use a mortality table developed for the country(ies) of residence. While it is anticipated that this table would be developed by the regulatory authority or the actuarial society of the country, in the absence of such an industry table, the insurer may develop a table appropriate for reserve valuation. Such mortality tables must be approved by the insurance department of the state of domicile before being used for

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reserve purposes. Margins consistent with the purpose of US statutory reserve methods are to be included in this table.

VM-M: Section 2: Industry Experience Valuation Basic Tables

A. 2008 Valuation Basic Table (2008 VBT)

B. 2015 Valuation Basic Table (2015 VBT) The 2015 Valuation Basic Table is a valuation table without loads jointly developed by the Academy and SOA for use in determining a company's prudent estimate mortality assumption for valuations of Dec. 31, 2015, and later. The table consists of the Primary table (Male, Female, Smoker, Nonsmoker and Composite), 10 Relative Risk tables for nonsmokers (Male and Female) and four Relative Risk tables for smokers (Male and Female). Rates for juvenile ages are included in the composite tables. The tables are on a select and ultimate and ultimate-only basis and are available on an age nearest and an age last birthday basis.

C. For blocks of polices covering insureds who are not residents of the United States, the company may use a mortality table developed for the life insurance industry in the country of residence. If a relevant industry table is not available, the company will create an industry table by applying a margin to its anticipated mortality which would be equivalent to the difference between the company's anticipated mortality for US business and the VBT table used for its US business. Such mortality tables must be approved by the insurance department of the state of domicile before being used for reserve purposes.

VM-31: Section 3.D.3: Life Report Mortality

n. <u>Adjustments to NPR Mortality</u> – Description and rationale of any adjustments made to the CSO mortality rates used in the NPR calculation to reflect the requirements of VM-20 Section 3.C.1.g.

o. <u>Adjustments to Prescribed Margins</u> - Description and rationale for any adjustments made to prescribed mortality margins pursuant to VM-20, Section 9.C.6.d or Section 9.C.6.e.

p. <u>Non-US Mortality – Description and rationale for mortality tables used to value non-US blocks of business.</u>

4. State the reason for the proposed amendment? (You may do this through an attachment.)

   1994 GAR and 1983 Table a will be needed for valuations using (proposed) VM-22 methodology.

   Life insurance that is sold internationally is reinsured into the United States. Mortality for international insureds may vary significantly from that of US insurance markets. The Valuation Manual should be updated to allow for international mortality tables.

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* This form is not intended for minor corrections, such as formatting, grammar, cross–references or spelling. Those types of changes do not require action by the entire group and may be submitted via letter or email to the NAIC staff support person for the NAIC group where the document originated.

<u>NAIC Staff Comments:</u>

Dates: Received	Reviewed by Staff	Distributed	Considered
11/15/23, 11/17/23	S.O.		
Notes: 2023-13			
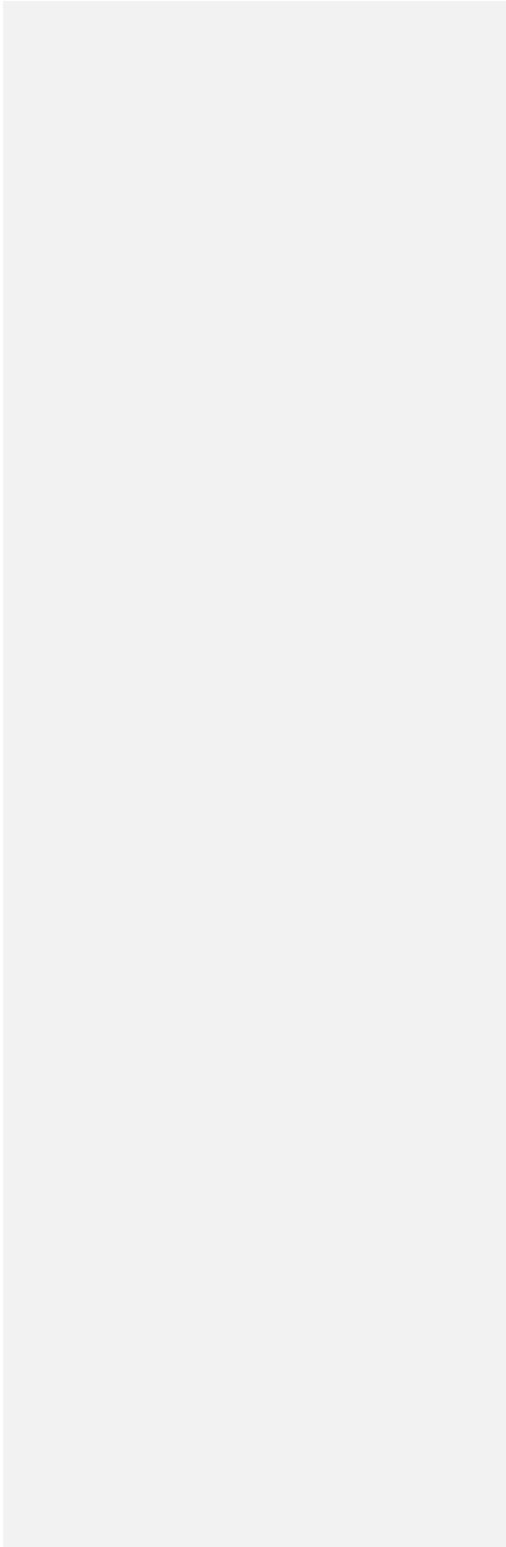
SOCIETY OF ACTUARIES RESEARCH UPDATE TO LATF

November 29, 2023

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Rating Agency Perspectives on Capital Requirements

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Rating Agency Perspectives on Insurance Company Capital

- Constructed to add to the curriculum of the SOA Corporate Finance & Enterprise Risk Management and Individual Life & Annuity FSA tracks
- Overview of rating agencies
- Background on credit ratings, rating types, rating process and rating scales using examples from four major rating agencies: A.M. Best, Fitch, Moody's, S&P
- Examples of quantitative tools used to evaluate and differentiate an insurer's available capital relative to modeled required capital

https://www.soa.org/resources/research-reports/2023/ratingagency-perspectives-insurancecompany-capital/

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Accelerated Underwriting Survey and Impact of COVID in Underwriting

Mortality and
Longevity

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Accelerated Underwriting Survey and Impact of COVID in Underwriting

- Initiated by Reinsurance Section; Milliman as researcher
- Follow-up to 2019 Survey
- 2 surveys - Direct writer (24) and Reinsurer (7)
- Examines how Accelerate Underwriting (AU) practices are evolving and changing
- Responses collected 4Q 2022 – 1Q 2023
- Target Release by November 17

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Survey Scope

- Most of the analysis was done on companies' "most prevalent" AU program
- General information on AU Programs
- Algorithms
- Post-Issue Audits and Random Holdouts
- Mortality and Lapse
- General Questions
  - Challenges in designing and drivers for success
  - Best data for assessing mortality
  - Top Tools to mitigate fraud

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Results – General Information

The most prevalent AU program was	Number of Companies
A modification	7
New	17
Total Respondents	24

Was the most prevalent program changed/created because of COVID-19?	Number of Companies
Yes	8
No	16
Total Respondents	24

Comparison: 2022 Survey to 2019 Survey
- Average minimum issue age decreased from 20 to 16. (18 most common)
- Average maximum issue age increased from 55 to 59.
- Average minimum face amount increased from $53,000 to $79,000.
- Average maximum face amount increased from $800,000 to $2,100,000.

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Results – Mortality Slippage

Estimate of Mortality Slippage in 2022

Method	All Companies	Number of Respondents
Direct Company Ratio of AU to Fully Underwritten	9%	20
Direct Company Random Holdouts	17%	15
Direct Company Post-Issue Audits	9%	6
Reinsurer Lowest Mortality Clients	1%	5
Reinsurer Highest Mortality Clients	>20%	5

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Analysis and Trends of U.S. Insurance Industry Climate Risk Financial Disclosures

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Catastrophe and Climate

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U.S. Insurance Industry
Climate Risk Financial Disclosures

- Partnership Project with NAIC's Center For Insurance Policy Research
- Analysis of climate risk disclosures for the 2021 reporting year
  - TCFD format: Narrative responses
  - Governance
  - Strategy
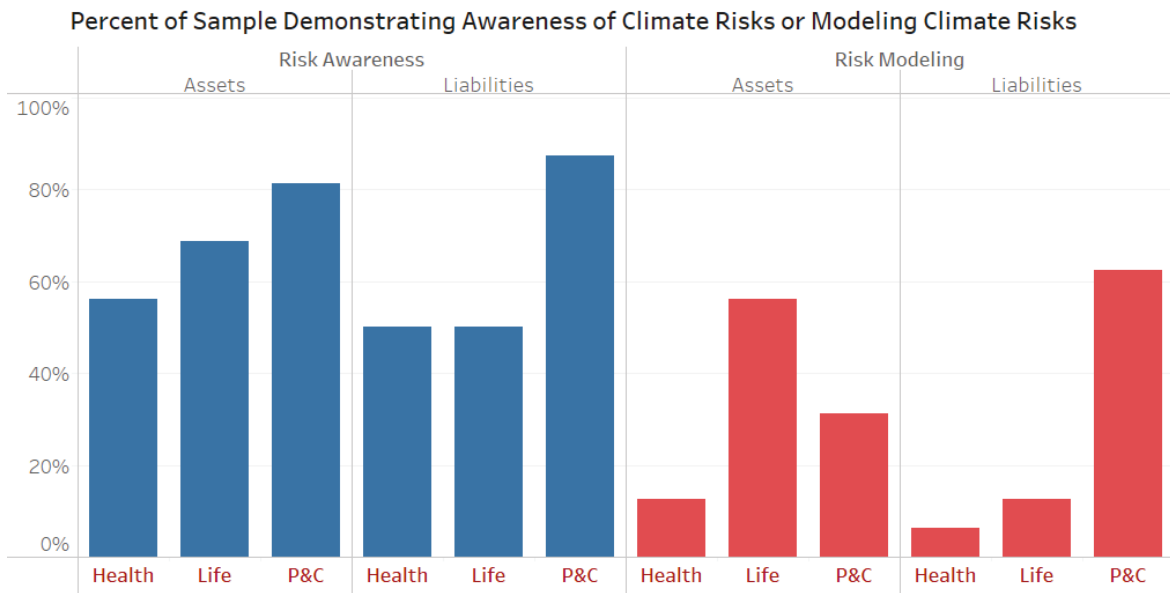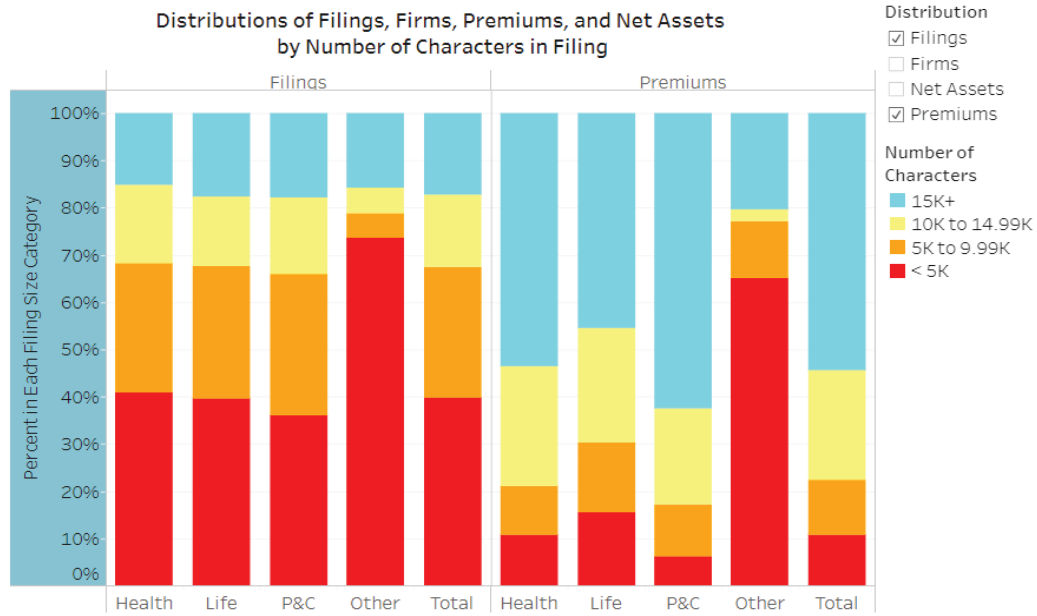 - Risk management
  - Metrics and targets

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U.S. Insurance Industry
Climate Risk Financial Disclosures

- High-level observations
- Short: About 40% of the universe of 2021 disclosures contain less than 5000 characters of text – too brief to offer a meaningful discussion of climate risk.
- Length and comprehensiveness of disclosures is positively correlated with the size of insurers. Consequently, while about 40% of the disclosures are less than 5000 characters, this group collectively represents only 11% of total direct premiums.
- Broad range of approaches to disclosing climate risk especially by line-of-business

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Distributions of Filings, Firms, Premiums, and Net Assets by Number of Characters in Filing

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Percent of Sample Demonstrating Awareness of Climate Risks or Modeling Climate Risks

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U.S. Insurance Industry
Climate Risk Financial Disclosures

- Health:
  - 50% of health insurers in the sample discuss climate-related risks to underwriting and liabilities, but only 6% report attempts to qualitatively or quantitatively assess or model these risks.
- Life: Investment oriented
  - 70% of the sampled disclosures of life insurers specifically identify climate-related investment risks, and 56% report attempts to assess or model (either qualitatively or quantitatively) the potential impact of climate-related risks on their investment portfolios.

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U.S. Insurance Industry
Climate Risk Financial Disclosures

- P&C:
  - Relative to other types of insurers, P&C insurers were more likely to have established a governance framework to address climate-related risks, as well as a strategy and risk management process to assess and manage the risk.
 - More likely to have identified metrics and targets related to climate risks and opportunities

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Population and Insured Mortality Update

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Mortality and Longevity

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The Overarching Story

Population Trends

- 2019: 715 Deaths per 100,000
- 2020: 835 Deaths per 100,000
  - 16.8% increase over 2019
- 2021: 880 Deaths per 100,000
  - 5.3% increase over 2020
- 2022: 811 Deaths per 100,000
  - 7.8% decrease over 2021

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https://www.cdc.gov/nchs/nvss/vsrr/mortality-dashboard.htm#

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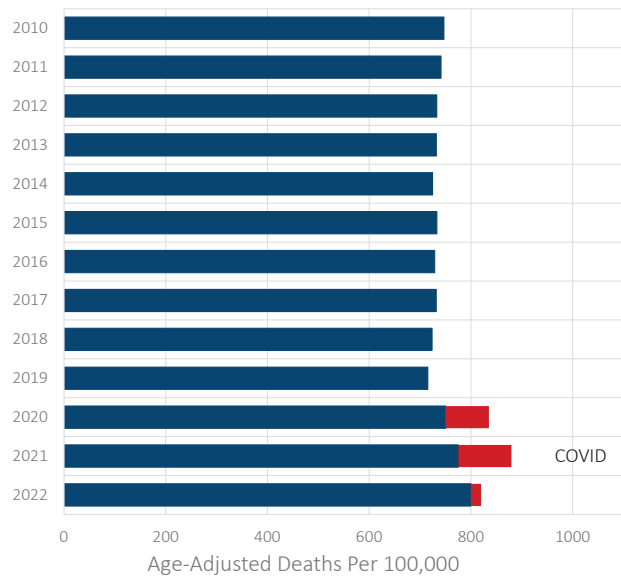
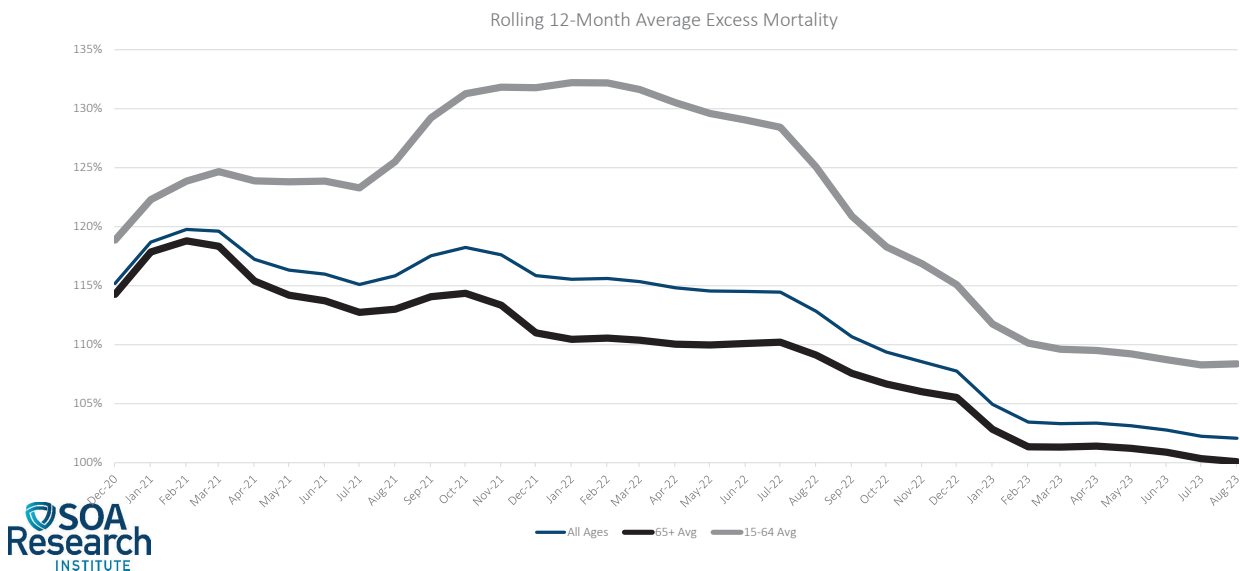# Awareness of Chronic Condition causes of death

- Rates per 100,000 population; Age-Adjusted across population
- Chronic condition mortality deaths continue to be monitored

Cause of Death	2017	2018	2019	2020	2021	2022	Increase 2022 over 2019
Cancer	152.5	149.1	146.2	144.1	146.6	143.4	(1.9%)
Diabetes	21.5	21.4	21.6	24.8	25.4	24.2	12.0%
Liver	10.9	11.1	11.3	13.3	14.5	13.8	22.1%
Hypertension	9.0	8.9	8.9	10.1	10.7	10.5	17.9%

https://www.cdc.gov/nchs/nvss/vsrr.htm

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Population Mortality Trends Reducing Different Level Trends by Age Group

Rolling 12-Month Average Excess Mortality

All Ages   65+ Avg   15-64 Avg

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2019-2021 Variable Annuity Study Update

Aging and
Retirement

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2019-2021 Variable Annuity Contract Owner Behavior Experience Study

- Published in November as latest release in ES Pro partnership between SOA Research Institute and LIMRA

- Data reflected in the study:
  - 15 companies
  - 64% market share based on industry new sales
  - Over 500,000 surrenders and $41 billion in contract value withdrawn

- Contract owner behavior studied:
  - Withdrawal activity, including under various GLBs
  - Surrender rates
  - Additional premium deposits

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Universal Life Lapse and Surrender Study Update

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Mortality and Longevity

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2015-2021 Universal Life Lapse and Surrender Experience Study

- Soon-to-be published as the next release in ES Pro partnership between SOA Research Institute and LIMRA

- Data reflected in the study:
  - 24 companies
  - 83% market share
  - Over 1.3 million lapses/surrenders

- This study is a precursor to a UL Premium Persistency experience study that is expected to be published in first half of 2024

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Discussion

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Additional Life Research

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Experience Studies

Project Name	Objective	Link/Expected Completion Date
2019 Quintile Analysis	Publish a report that ranks individual company experience into quintiles	https://www.soa.org/resources/research-reports/2023/us-ind-life-quintile/
2019-20 Fixed Indexed Annuity Study - Report	Examine lapse and the utilization of guaranteed living withdrawal benefit options on fixed index annuity policies under a Joint SOA/LIMRA project and release Tableau visualizations with the observations from the study.	https://www.soa.org/resources/experience-studies/2023/19-20-fia/
COVID-19 Cause of Death Study - 2022 Q2 Update	Publish a semi-annual cause of death study for individual life insurance	https://www.soa.org/resources/research-reports/2023/ind-life-covid-cod/
2023 Life Mortality Improvement	Develop AG38 mortality improvement assumptions for YE 2023	https://www.soa.org/resources/research-reports/2023/ind-life-mort-imp-scale/
COVID-19 Individual Life Mortality Study - Experience Study Report - 2022 Q3	Complete a mortality study assessing the impact of COVID-19 on Individual Life Insurance.	https://www.soa.org/resources/research-reports/2023/ind-life-covid-mort-landing/
COVID-19 Reported Claims Study - 1Q 2023 Update	Draft a research study reviewing Covid-19 reported deaths by quarter	https://www.soa.org/resources/research-reports/2023/us-ind-life-covid-rca-landing/
GRET for 2024	Develop the Generally Recognized Expense Table (GRET) for 2024	https://www.soa.org/resources/research-reports/2023/2024-gret-recommendation/
COVID-19 Individual Life Mortality Study - Experience Study Report - 2022 Q4	Complete a mortality study assessing the impact of COVID-19 on Individual Life Insurance.	https://www.soa.org/resources/research-reports/2023/ind-life-covid-mort-landing/
2000-2021 U.S. Historical Population Mortality Rates	Publish unsmoothed SSA-Style historical mortality rates for 2000-2021	https://www.soa.org/resources/research-reports/2023/us-historical-mortality/
2019-21 Variable Annuity Guaranteed Living Benefit Utilization Study - Report	Examine the utilization of guaranteed living benefit options on variable annuity policies under a Joint SOA/LIMRA project.	11/15/2023
Group Life COVID-19 Mortality Survey Update - through June 2023	Complete an update on a mortality study assessing the impact of COVID-19 on Group Life Insurance.	11/15/2023
COVID-19 Reported Claims Study - 2Q 2023 Update	Draft a research study reviewing Covid-19 reported deaths by quarter	11/21/2023
2015-21 Universal Life Premium Persistency Study - Report	Analyze the premium persistency for universal life products - Data collection and validation phase	11/27/2023
COVID-19 Cause of Death Study - 2022 Q4 Update	Publish a semi-annual cause of death study for individual life insurance	11/28/2023
ILEC Mortality Experience Report Update for 2018 - 2019	Draft a report updating the ILEC mortality experience reporting for 2019	12/14/2023
2009-2015 Individual Life Experience Committee Lapse and Mortality Study	Study mortality and lapse experience in the database of 2009-2015 individual life experience data and release a report with the findings.	12/15/2023
Life Predictive Mortality Model	The theme is around the sharing and warehousing of PA tools and information, similar to a data science environment.	12/29/2023
US Population Mortality Observations: Updated with 2022 Experience	Explore observations from the release of the 2022 U.S. population mortality data.	2/14/2024

Practice Research

Project Name	Objective	Link/Expected Completion Date
International Comparison of Regulatory Requirements Study Note; 2021.08	Capital Adequacy Regulatory Requirements in Life Insurance across 4 key models in the US, Canada, EU and Bermuda.	https://www.soa.org/resources/research-reports/2023/regulatory-capital-adequacy-four-jurisdictions/
Expert Opinion on Impact of COVID-19 on Future Mortality - Survey 2	Survey panel of experts on short and mid term thoughts on future population and insured mortality.	https://www.soa.org/resources/research-reports/2023/covid-impact-future-mortality-us/
Unhealthy Longevity	Examine differences in mortality/longevity between impaired vs healthy lives.	https://www.soa.org/resources/research-reports/2023/unhealthy-longevity-us/
2023 MIM Update	Enhance MIM-2021 with additional data and guidance	https://www.soa.org/4aa1fe/globalassets/assets/files/resources/research-report/2023/mortality-improvement-model.pdf
Challenges and Opportunities with Rethinking Fairness Metrics for Life Insurance Processes: An Actuarial Perspective	Summarize the challenges and complexities with defining and measuring fairness for life insurance products and processes.	11/13/2023
2023 Living to 100	Produce body of research to help with old age mortality modeling and projection and research to support the needs of an increasing aging population.	11/17/2023
Accelerated Underwriting Survey and Impact of COVID in Underwriting	Update prior survey and explore the way insurers have adapted their underwriting practices	11/17/2023
Ethics and AI 2023 Update	This report will highlight the ethical risks arising from the application of Artificial Intelligence (AI) in actuarial practice and to have tools to use to identify and manage it, **with a new additional focus on the fast-growing use of generative AI tools**. This paper provides a technical overview of the tools and disciplines currently in AI as well as the forces at work that financial institutions such as insurance companies are using to modernize their analytical processes.	12/5/2023
Mortality and Race	Summarize available literature on mortality and race and discuss actuarial aspects.	12/6/2023
Maternal Mortality	Study maternal mortality in US and compare to other countries	12/6/2023
National-Level Mortality Data SSA Versus NCHS Mortality Trend Discrepancies	Create credible resource for actuaries to determine appropriate U.S. population data source to use for a specific actuarial application.	12/29/2023
2022 Mortality by socioeconomic category update	Update mortality by socioeconomic lifetables with 2020 data and examine the impact of COVID 19 on socioeconomic mortality trends	12/31/2023
Comparison of 2015 VBT to Socioeconomic decile mortality	Examine life insurance VBT vs NCHS mortality by socioeconomic category.	12/31/2023
Cardiovascular Disease	Examine cardiovascular disease mortality trends	12/31/2023
Statistical Approaches for Imputing Race and Ethnicity	Outline the various approaches for statistically imputing race and ethnicity in the U.S. along with their strengths and weaknesses to help familiarize actuaries with these techniques.	2/29/2024

Life Practice Council Update

Amanda Barry-Moilanen
Policy Analyst, Life

Life Actuarial Task Force (LATF) Meeting

November 30, 2023

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Academy Webinars and Events

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- **Recent**
  - <u>PBR Bootcamp</u>: Combination Products
  - <u>PBR Bootcamp</u>: Hedge Modeling
  - <u>PBR Bootcamp</u>: Reinsurance
  - <u>Academy Annual Meeting</u>: Envision Tomorrow
- **Upcoming**
  - <u>PBR Bootcamp</u>: VM-31 as Seen by Regulators
  - In-person PBR Bootcamp (stay tuned!)

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Recent Activity

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- ☐ Delivered comments to the Valuation Manual (VM)-22 (A) Subgroup on the July 2023 Exposure Draft of the VM-22 Standard Projection Amount (SPA).

- ☐ In collaboration with the Academy's Casualty Practice Council, delivered comments to the Colorado DOI on proposed regulations on unfairly discriminatory testing practices.

- ☐ C1 Subcommittee Chair, Steve Smith, and Senior Life Fellow, Nancy Bennett, presented to the Valuation of Securities (E) Task Force on principles for structured securities modeling.

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Ongoing Activity

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- ☐ Educational material on economic scenario generators and acceptance criteria for LATF

- ☐ Annual Life and Health Law Valuation Manual will be released in January, 2024

- ☐ Revisiting the covariance methodology in life RBC

- ☐ Updating the Asset Adequacy Analysis Practice Note

- ☐ Developing a Non-Guaranteed Elements Practice Note

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Thank you

Questions?

For more information, please contact the Academy's life policy analyst,
Amanda Barry-Moilanen (barrymoilanen@actuary.org)

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NAIC NATIONAL ASSOCIATION OF
INSURANCE COMMISSIONERS

TO: Bill Michalisin, Executive Director, AAA
             Ken Kent, Past President, AAA
             Lisa Slotznick, President, AAA
             Darrell Knapp, President-Elect, AAA

FROM: Rachel Hemphill, Chair, Life Actuarial (A) Task Force
             Craig Chupp, Vice-Chair, Life Actuarial (A) Task Force

RE: Request for Life Knowledge Statements for US Appointed Actuaries, Illustration Actuaries
             and Qualified Actuaries

DATE: November 30, 2023

In light of planned changes to the required educational material for the Society of Actuaries (SOA) fellowship tracks, the Life Actuarial (A) Task Force (LATF) finds that it is necessary to formally outline the knowledge statements necessary for life actuaries signing certain statements of actuarial opinion, including for actuaries serving as appointed actuaries, as illustration actuaries, and as qualified actuaries for principle-based reserves. To this end, LATF requests that the AAA recommend knowledge statements that must be met by life actuaries signing such statements of actuarial opinion. In particular, this would address the US regulatory content that is necessary to be able to adequately fulfill each of these roles. However, the list would not be limited to regulatory content, as a clear, comprehensive list of knowledge statements for US life actuaries fulfilling these critical roles would broadly support the robustness and reliability of these actuarial opinions. We anticipate that the knowledge statements may vary by practice area, notably for long-term care actuarial opinions, and request your input on where such variances are necessary or appropriate. In addition, as the actuaries opining in these areas often rely on a number of other actuaries to complete supporting work, we request that the AAA similarly formally outline knowledge statements for US life actuaries working in asset-liability matching, valuation, and pricing. Once a comprehensive set of knowledge statements is developed, we would also request the AAA's input as to how the knowledge statements could be met, including what should be satisfied through tested material vs. what may be met through self-study and the AAA's opinion on which knowledge statements are adequately met by exams currently offered by actuarial organizations (e.g., SOA or Canadian Institute of Actuaries). We request your input on this item by December 31, 2024, so that LATF may thoroughly consider it in advance of the Fall 2025 SOA educational updates. We appreciate the AAA's role supporting the professional responsibility of US practicing actuaries.