VM-22 Field Test Update and Model Office Results

NAIC Life Actuarial Task Force

November 15, 2024

About the Academy

- The American Academy of Actuaries is a 20,000-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.

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History

Since the 2022 final presentation of the reasonable assumptions for the standard projection amount, work has continued to develop the VM-22 field test

- ARCS drafted preliminary specifications for the field test, complete with a template for the collection of data in June 2022
- Draft preliminary specifications for public comment were exposed in Dec 2023
- Also in Dec 2023, the NAIC, Academy and the ACLI engaged EY to:
  - Assist all parties in the preparation for, conduct of, and analysis of the field test results; and
  - Develop a model office implementation of the VM-22 specifications, usings results from that model office to compare results with those from the field test and to assess products and/or scenarios which might be difficult for participants in the field test.
- EY reviewed preliminary draft specifications from ARCS, providing comments and suggestions to the NAIC, Academy and ACLI in Jan 2024
- Between Feb and June 2024, the NAIC, Academy, ACLI, and EY met weekly to review specifications and seek consensus.

Current State

Analyzing the results of the field test and the model office analysis

On Aggregation of results from field test:

- Aggregation to allow public dissemination of results as anonymized (requires a minimum of 5 entities for each set of results)
- Limits on public dissemination still allow regulators to view results which do not meet aggregation minima and to view individual company responses
- Academy working closely with EY on producing aggregated results.
- Aiming to have preliminary aggregate results for a VM-22 work group meeting scheduled for December 18th
  - Will inform work group by November 30th if this will be possible.
- Full aggregated results available by early January.

Results submitted:

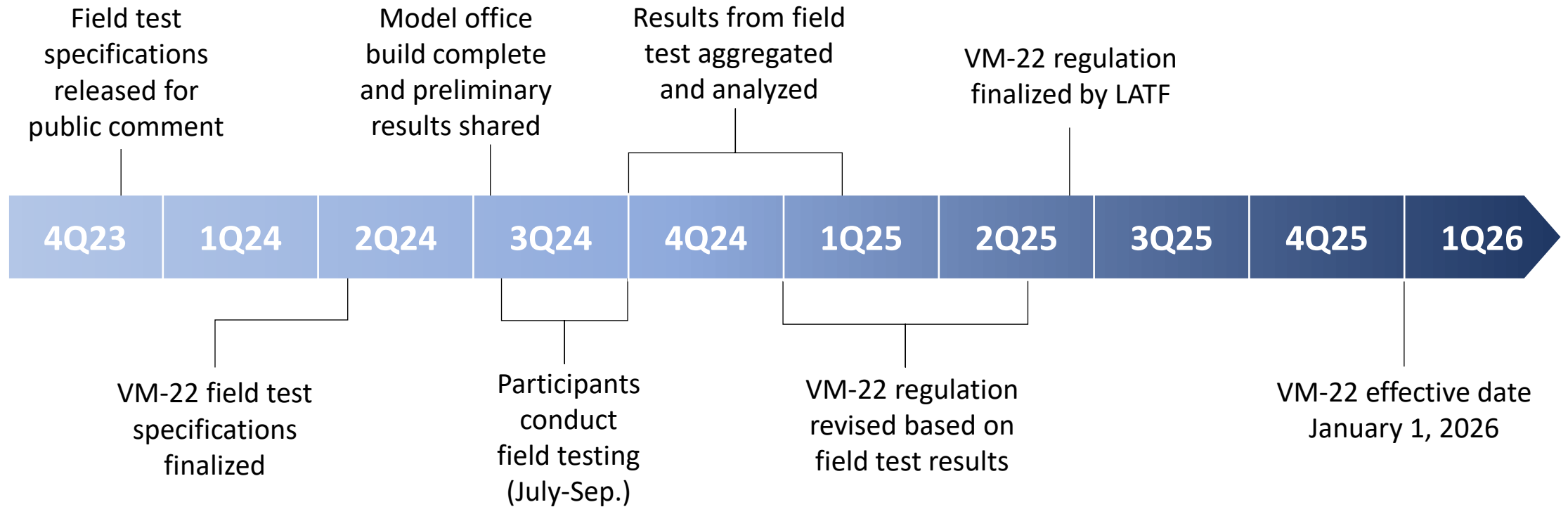# of Entities or Groups with Baseline results: 20

# of Entities with results for:

SPIA	9	FDA w/ no WB	13	FIA w/ no WB	13
SSC	5	FDA w/ WB	4	FIA w/ WB	11
PRT	6				

EY to discuss Project Timeline and Model Office Results

Target VM-22 Timeline

VM-22 field test timeline and key milestones are provided below:

Field test specifications released for public comment

Model office build complete and preliminary results shared

Results from field test aggregated and analyzed

VM-22 regulation finalized by LATF

4Q23	1Q24	2Q24	3Q24	4Q24	1Q25	2Q25	3Q25	4Q25	1Q26

VM-22 field test specifications finalized

Participants conduct field testing (July-Sep.)

VM-22 regulation revised based on field test results

VM-22 effective date January 1, 2026

VM-22 Field Test Model Office:
Life Actuarial Task Force

November 15, 2024

Disclaimer

These model office results are based on the model specifications agreed upon by members of the NAIC, ACLI, and AAA. Results from actual companies participating in the field test will vary based on real product features, assumptions and distribution of inforce blocks.

Overview of Model Office

EY developed a Moody's AXIS-based model office to support the field test

Overview

Model office specifications were finalized after rounds of discussions between EY, NAIC, ACLI and Academy personnel. The specifications were also refined as per feedback provided by ACLI member companies and ARCSC.

Objectives

- Produce results to analyze VM22 framework on a **representative set of products**, under various sensitivities and scenarios
- Provide **first cut of analysis** in advance of field test commencement, to get ahead of any unexpected test-related results or issues
- Perform further ad-hoc analysis and sensitivities to **lighten the load** on the number of runs being demanded of industry participants
- **Establish a forum** with industry participants while field test is in progress, to triage emerging issues and provide support
- Assess products, scenarios or projections **which may not be feasible** for participants in the field test

VM-22 Impacts by Product

For the products modeled in the model office, deferred annuities with guaranteed living benefits had the largest decrease when moving from pre-PBR CARVM to VM-22.

Product	CARVM ($M)	SR ($M)	SPA ($M)	CSV ($M)	Final VM-22 reserve ($M)	Change from CARVM (%)
SPIA	530.6	512.4	500.5	N/A	512.4	(3.4%)
PRT	501.3	472.3	484.0	N/A	484.0	(3.5%)
FDA (no WB)	278.0	278.7	276.0	275.5	278.7	0.3%
FDA (WB)	1,055.3	808.7	836.7	765.7	836.7	(20.7%)
FIA (no WB)	281.1	289.3	294.0	279.3	294.0	4.6%
FIA (WB)	1,050.9	846.9	875.6	792.2	875.6	(16.7%)

*** Important disclaimer for the FIA model office results**: the cost of the FIA hedges is currently accounted for via a spreadsheet topside for each scenario. The model currently incorporates the payoffs of the hedges, but not the costs. We have included the costs via topside, estimated as *option budget x AV / 12* (since there are annual resets), which are reflected in the results above and throughout this presentation. A system enhancement is in progress from the vendor.

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Payout Annuities Reserving Category: SPIA and PRT

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SPIA: NAER Analysis

CARVM	SR	SPA	Final VM-22 Reserve	Change from CARVM
530.6	512.4	500.5	512.4	(3.4%)

Using an initial asset portfolio of 10- and 15-year bonds, weighted to produce a duration match with the liabilities, our model office produced a VM-22 reserve which was 3.4% lower than pre-PBR CARVM.

As part of the attribution of these results from current CARVM, we determined a "break-even" rate of 3.3%, by calculating a PV of benefits and expenses under the VM-22 scenarios that would equal the current CARVM reserve of $530.6m. The graph to the right shows the VM-22 reserves by scenario, compared with the weighted average earned rate. In nearly all 1,000 scenarios, the portfolio returns exceeded the break-even rate, driving the reduction in reserves under VM-22.

Reserves and Weighted Average NAER

Legend: VM-22 SR — CARVM — NAER — 3.3% Breakeven
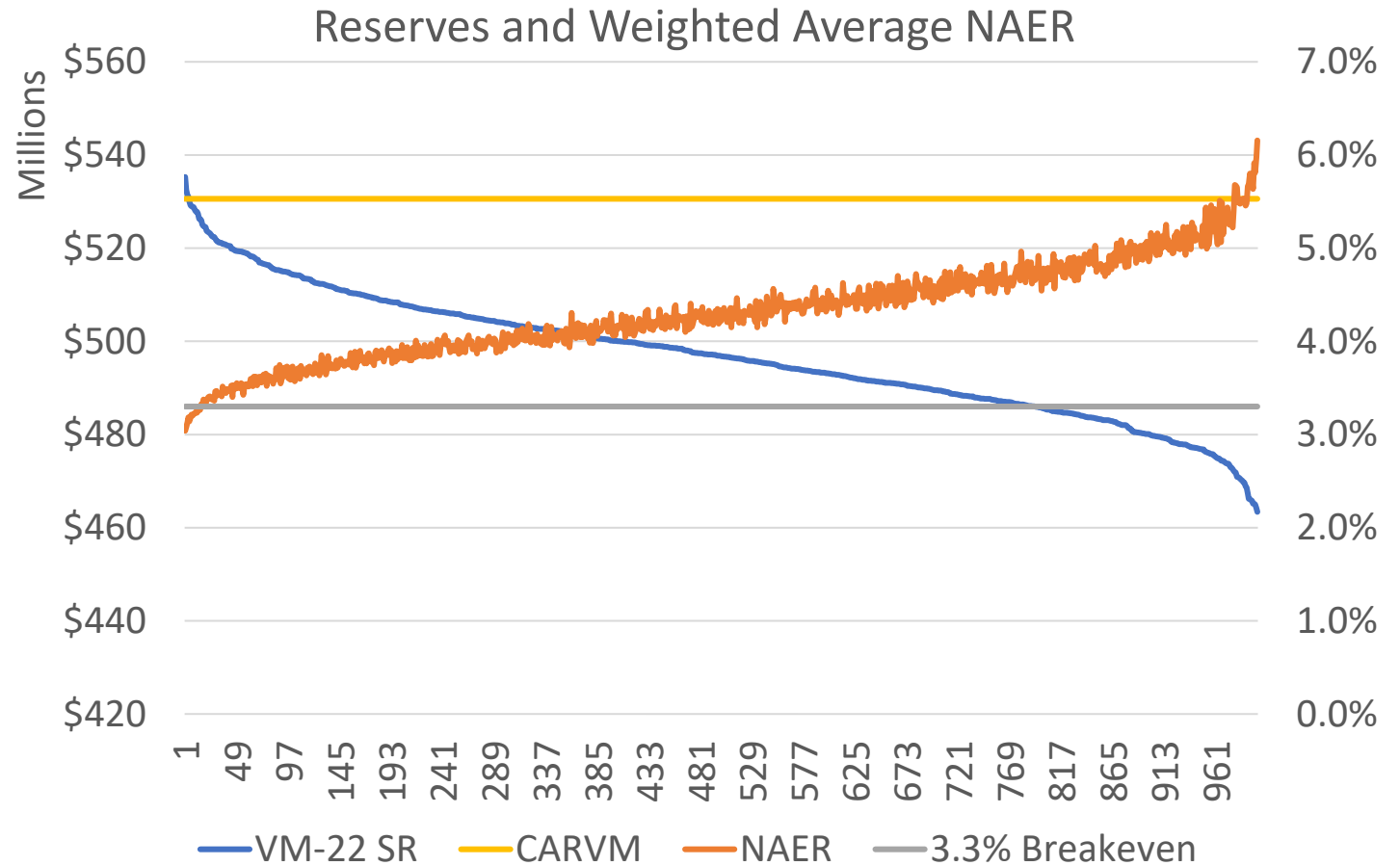
PRT Results by Sub-block

CARVM	SR	SPA	Final VM-22 Reserve	Change from CARVM
501.3	472.3	484.0	484.0	(3.5%)

The PRT block in our model office consisted of three sub-blocks: structured settlements (SS), a retiree block and a deferred block. Overall, the results from PRT were similar to SPIA, but in looking deeper at the sub-block level, we see differences in the comparisons of results. This is a product where we expect to see more variance in results from the industry participants, depending on the characteristics of the specific blocks, which has started to be revealed with some of the early submissions for PRT.

Description	Metric	SR ($M)	SPA ($M)	CARVM ($M)	Change from CARVM(%)
SS	CTE 70	318.5	316.8	337.6	(5.7%)
Retired	CTE 70	114.7	124.3	120.5	3.1%
Deferred	CTE 70	39.5	43.1	43.2	(0.1%)
Total	**CTE 70**	**472.3**	**484.0**	501.3	**(3.5%)**

- The results presented above are for the three sub-blocks of PRT.
    - No changes were made to the starting asset portfolio, economic scenarios, or reinvestment strategy to vary by block
- Nearly all of the reserve reduction from CARVM came from the structured settlement (SS) block, due to the higher mortality rates used in our prudent margin assumptions and prescribed SPA assumptions
- The Retired block saw an increase in VM-22 Reserve from CARVM, driven by the higher SPA amount
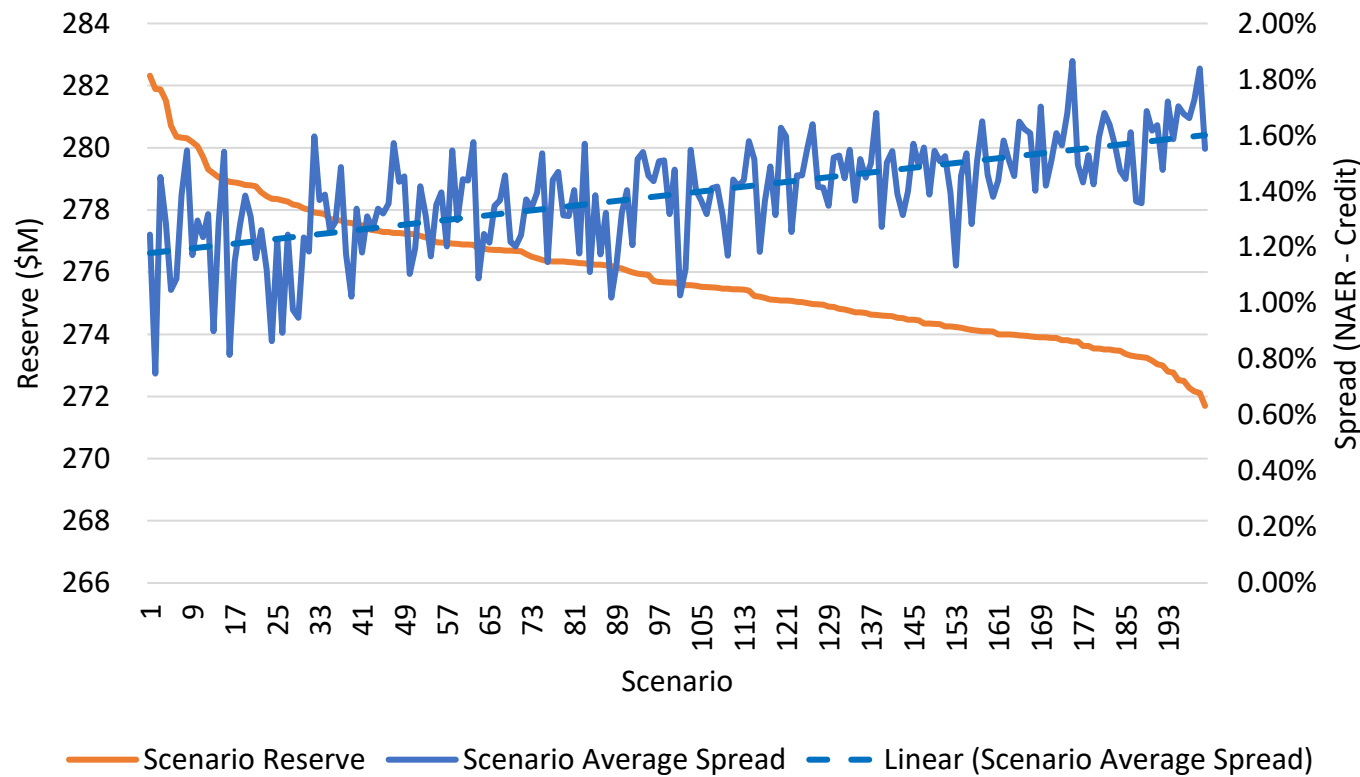- The total line shows the results from the aggregate baseline run shown in slide 5

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Accumulation Annuities
Reserving Category: FDA and FIA

FDA without GLWB: Reserve Sensitivity by Weighted Average Spread

| CARVM	SR	SPA	CSV	Final VM-22 Reserve	Change from CARVM
278.0	278.7	276.0	275.5	278.7	0.3%

Stochastic Reserve vs Average Spread

- For each of the 200 stochastic scenarios, the graph shows the VM-22 Stochastic Reserve (orange line) and average spread (blue line), where the average spread is calculated as the **weighted average NAER minus weighted average implied crediting rate**.

- This supports the intuition that larger reserves are correlated with compressed spreads as the scenario will require a larger beginning asset amount to support future cashflow needs.

- The relationship is more muted than seen on SPIA due to liabilities also being impacted by scenarios.

FDA without GLWB: Weighted Average Spread versus 7-Year Treasury

CARVM	SR	SPA	CSV	Final VM-22 Reserve	Change from CARVM
278.0	278.7	276.0	275.5	278.7	0.3%

In the graph below, the solid lines represent the 7-year treasury rates, for all Conning scenarios, anchored on the 50th, 75th and 90th percentiles. Dashed lines represent the average spread earned on investments, calculated as the weighted average NAER minus weighted average crediting rate. Years 1-10 are shown as ~85% of the block has decremented by year 10.

Spread and 7-Year Treasury by Projection Year
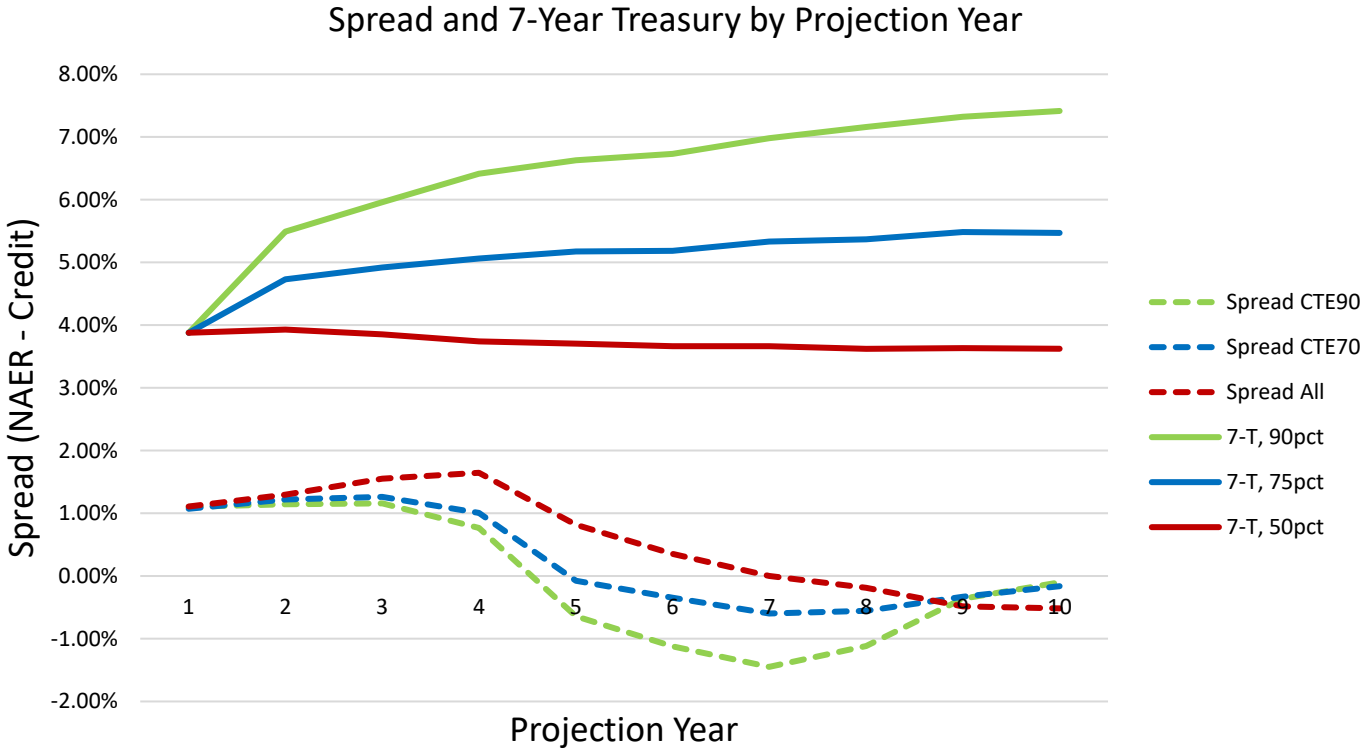
- The relationship shows higher CTEs are comprised of scenarios that observe worse (more negative) spreads, but also higher interest rates.

- The crediting rate formula for this representative product is the driver, as renewal credits equal 7-year Treasury minus 50 bps spread.

- The impact is also likely compounded by lower dynamic lapses when the crediting rate is outperforming the GMIR by greater margins.

FDA with GLWB: CARVM vs. VM-22

CARVM	SR	SPA	CSV	Final VM-22 Reserve	Change from CARVM
1,055.3	808.7	836.7	765.7	836.7	(20.7%)

We performed a set of runs to understand the reserve differences from the current CARVM methodology to VM-22.

Impacts from CARVM
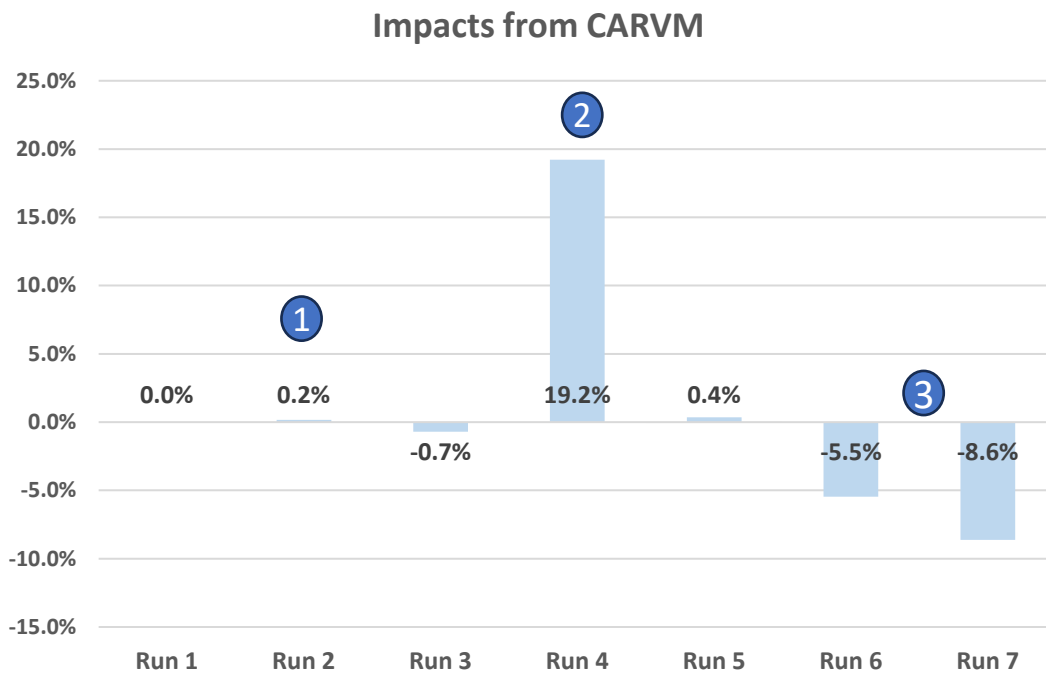
Commentary

Run 1: CARVM reserve using immediate withdrawals as only withdrawal path, and SPA mortality assumption ($885.1M)

Run 2: VM-22 SPA, with no lapses and 100% immediate withdrawals ($886.6M)

Run 3: CARVM reserve using immediate withdrawals and CARVM mortality assumption ($878.9M)

Run 4: CARVM reserve using perfect efficiency on withdrawals ($1,055.3M)

Run 5: VM-22 SPA with no lapses, and partial withdrawal utilization assumption ($888.3M)

Run 6: VM-22 SPA with assumed lapses and utilizations ($836.7M)

Run 7: VM-22 SR with assumed lapses and utilizations ($808.7M)

There are three key takeaways from this analysis:

1. When we remove the perfect efficiency from CARVM, remove lapses from SPA, and use the same mortality assumption in both, the reserve differences are only 0.2%.

2. The CARVM implicit assumption of perfect withdrawal efficiency is main driver of differences between VM-22 and current reserving methodology. CARVM reserves increased by 19% when all paths were modeled.

3. VM-22 lapses also lowered the reserve, as shown in the Run 5 and Run 6 results for SPA and SR, respectively.

Reinvestment Guardrail Sensitivities

VM-22 Reinvestment Guardrail Sensitivities

The impacts of testing alternative reinvestment guardrails resulted in lower reserves than the baseline 50/50 A/AA split. The table below shows the impact on the Stochastic Reserve for the following tests:

- **Baseline:** 50% AA, 50% A

- **Sensitivity 1:** 5% Treasury, 15% AA, 40% A, 40% BBB

- **Sensitivity 2:** 5% Treasury, 15% AA, 80% A

Product	Baseline ($M)	Sensitivity 1 ($M)	Difference from baseline	Sensitivity 2 ($M)	Difference from baseline
SPIA	512.4	512.6	0.0%	511.9	(0.1%)
PRT	472.3	471.7	(0.1%)	470.2	(0.5%)
FDA (no WB)	278.7	277.4	(0.5%)	277.9	(0.3%)
FDA (WB)	808.7	802.3	(0.8%)	806.5	(0.3%)
FIA (no WB)*	289.3	286.2	(1.1%)	288.0	(0.4%)
FIA (WB)*	846.9	839.9	(0.8%)	844.3	(0.3%)

* ***Important disclaimer for the FIA model office results***: the cost of the FIA hedges is currently accounted for via a spreadsheet topside for each scenario. The model currently incorporates the payoffs of the hedges, but not the costs. We have included the costs via topside, estimated as *option budget x AV / 12* (since there are annual resets), which are reflected in the results above and throughout this presentation. A system enhancement is in progress from the vendor.

Stochastic Exclusion Ratio Test (SERT)

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Stochastic Exclusion Ratio Test results

The table below summarizes the results of the stochastic exclusion ratio test for each product included in the model office. The impact of applying a +/- 5% mortality margin did not materially impact the resulting ratio for all products.

Product	95% Mortality Factor	100% Mortality Factor	105% Mortality Factor
SPIA	3.6%	3.3%	3.1%
PRT	3.7%	3.4%	3.2%
FDA (no WB)	1.3%	1.3%	1.3%
FDA (WB)	2.1%	2.2%	2.3%
FIA (no WB)*	5.8%	5.8%	5.8%
FIA (WB)*	33.8%	33.7%	33.6%

* ***Important disclaimer for the FIA model office results***: the cost of the FIA hedges is currently accounted for via a spreadsheet topside for each scenario. The model currently incorporates the payoffs of the hedges, but not the costs. We have included the costs via topside, estimated as *option budget x AV / 12* (since there are annual resets), which are reflected in the results above and throughout this presentation. A system enhancement is in progress from the vendor.

Next Steps for the VM-22 Field Test

- Field test results from participants have been received from all entities that were scheduled to submit

- Work is now in progress to aggregate and analyze participant results

- Additional model office sensitivity testing will be performed as necessary to support questions that arise from the field test participant results

Appendix: Modeling Specifications

SPIA Methods and Assumptions

The table below provides a summary of the assumptions and common model elements used in the development and testing of the model office's SPIA block.

Modeled Balance	Assumptions	Common Model Elements
Stochastic Exclusion Ratio Test (SERT)	• 95%, 100% and 105% of anticipated experience mortality assumption excluding margin as prescribed • Prudent estimate expenses (+5% margin) • 16 scenarios prescribed by the NAIC	
Stochastic Reserve (SR)	• 2012 IAM mortality table with 0.5% mortality improvement applied from 2012 up until each future projection year • Maintenance expense of $10 per contract with 2% annual inflation • Prudent margins for mortality and expenses • 200 and 1,000 scenario sets (random selection) from GOES scenario set #1*	• 50-year projection • Block of business consists of ~$500M current stat reserves (CARVM) • Greatest Present Value of Accumulated Deficiency (GPVAD) and Direct Iteration Method (DIM) reserving methods used for both exclusion testing and stochastic reserves
Standard projection amount (SPA)	• 2012 IAM mortality table with projection Scale G2 improvement factors applied from 2021 up until each future projection year • Maintenance expense of $50 per contract multiplied by $1.025^{(valuation\ year - 2015)}$ in the first projection year and increased by an annual inflation of 2% each year thereafter • 200 and 1,000 scenario sets from GOES scenario set	

SPIA Product Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for SPIA:

Modeled Balance	Assumptions
Base Product	• Single premium at issue • 10 year certain payout annuity with life contingent payments thereafter
Riders	• None
In-force distribution	• 1,200 policies (600 male, 600 female) • 10 issue years of business (2014-2023), distributed equally across issue months • Issue ages 60 (10%), 65 (25%), 70 (35%), 75 (20%), 80 (10%)
Anticipated experience assumptions	• Mortality: 2012 IAM ANB • Mortality improvement: 0.5%, using 2012 as base year • Lapses: 0% • Partial Withdrawals: N/A • Annuitizations: N/A • Maintenance expenses: $10 per contract with 2% annual inflation

PRT Product Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for PRT:

Modeled Balance	Assumptions
Base Product	• Three sub-blocks of business under PRT (to capture variations for SS and DIA) which can be reported and calculated separately or combined as needed: • 1) 80% retirees & 20% deferreds. For the deferreds, 75% take a lump sum prior to retirement and 25% annuitize (proxy for a deal where the carrier writes the contract prior to the plan conducting a termination) • 2) 90% retirees and 10% deferreds but 100% of the deferreds annuitize (proxy for a deal where the carrier writes the contract after the plan has already done a lump sum offering or a plan that does not offer lump sums at all) • 3) Younger age block (DIA and SS), with payments starting at specified age or duration
Riders	• None
In-force distribution	• 3,600 policies (1,800 male, 1,800 female) • 10 issue years of business (2014-2023), distributed equally across issue months • Issue ages 50 (3%), 55 (2%), 60 (15%), 65 (20%), 70 (20%), 75 (20%), 80 (20%)
Anticipated experience assumptions	• Mortality: 50/50 mix of blue and white collar mortality • Mortality improvement: None • Lapses: 0% • Partial Withdrawals: N/A • Annuitizations: Base case is all policies annuitize • Maintenance expenses: $61 per contract with 2% annual inflation and a 5% margin

FDA and FIA Methods and Assumptions

The table below provides a summary of the assumptions and common model elements used in the development and testing of the model office's FDA and FIA blocks.

Modeled Balance	Assumptions	Common Model Elements
Stochastic Exclusion Ratio Test (SERT)	• 95%, 100% and 105% of anticipated experience mortality assumption excluding margin as prescribed • 16 scenarios prescribed by the NAIC	• 50-year projection • Greatest Present Value of Accumulated Deficiency (GPVAD) and Direct Iteration Method (DIM) reserving methods used for both exclusion testing and stochastic reserves
Stochastic Reserve (SR)	• 2012 IAM mortality table with 0.5% mortality improvement applied from 2012 up until each future projection year • Base lapses of 1%, 1%, 2%, 2%, 2%, 2%, 3%, 3%, 4%, 5%, 10% (ultimate rate – 10 year CDSC product) • Dynamic lapse factors based on rider ITM, from 50% to 150% • Maintenance expense equal to SPA assumption • Prudent margins for mortality, lapses, expenses • 200 and 1,000 scenario sets (via scenario picker) from GOES scenario set #1*	
Standard projection amount (SPA)	• 2012 IAM mortality table with projection Scale G2 improvement factors applied from 2012 up until each future projection year and prescribed Fx • Maintenance expense of $75 per contract multiplied by $1.025^{(\text{valuation year} - 2015)}$ in the first projection year and increased by an annual inflation of 2% each year thereafter, plus 7bps of projected AV for each year in the projection • 200 and 1,000 scenario sets from GOES scenario set	

FDA (without GLWB) Product and Rider Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for FDAs (without GLWB):

Modeled Balance	Assumptions
Base Product	• Single premium at issue • 5-year surrender charge period (9%, 8.5%, 7.5%, 5.5%, 4%), with MVA • Free partial withdrawal of 10% • 1% minimum guarantee crediting rate • Crediting equal to 7-year treasury minus 50 bps spread; Crediting is reset at end of CDSC and then annually thereafter
Riders	• None
Commissions	• 5% of year 1 premium
In-force distribution	• 1,200 policies (600 male, 600 female) • 10 issue years of business (2014-2023), distributed equally across issue months and based on expected lapsation through valuation date • Issue ages 45 (5%), 50 (15%), 55 (20%), 60 (30%), 65 (25%), 70 (5%)
Anticipated experience assumptions	• Mortality: 2012 IAM ANB • Mortality improvement: 0.5%, using 2012 as base year • Base lapses: 1%, 1%, 2%, 2%, 4%, 40%, 10% (ultimate rate) • Dynamic lapses: Factor based on ITM, where ITM = Current Crediting Rate / Market Rate. If ITM <= 0.8, then Factor = 150%. If ITM >= 1.2, then Factor = 50%. Factor is interpolated between these points. • Partial Withdrawals: SPA prescribed assumption • Annuitizations: 0% • Maintenance expenses: SPA prescribed assumption

FDA (with GLWB) Product and Rider Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for FDAs (with GLWB):

Modeled Balance	Assumptions
Base Product	• Single premium at issue • 10-year surrender charge period (9%, 8.5%, 7.5%, 6.5%, 5.5%, 4.5%, 3.5%, 3%, 2%, 1%), without MVA • Free partial withdrawal of 10% • 1% minimum guarantee crediting rate • Crediting equal to 7-year treasury minus 50 bps spread; Crediting is reset at end of CDSC and then annually thereafter
Riders	• GLWB rider with fees equal to 75 bps of BB • BB grows at 8% (simple interest) per year for 10 years or until withdrawals begin (whichever comes first)
Commissions	• 5% of year 1 premium
In-force distribution	• 1,200 policies (600 male, 600 female) • 10 issue years of business (2014-2023), distributed equally across issue months and based on expected lapsation through valuation date • Issue ages 50 (15%), 55 (25%), 60 (35%), 65 (20%), 70 (5%)
Anticipated experience assumptions	• Mortality: 2012 IAM ANB • Mortality improvement: 0.5%, using 2012 as base year • Base Lapses: 1%, 1, 2, 2, 2, 2, 3, 3, 4, 5, 10 (ultimate rate) • Dynamic Lapses: Factor from 50% to 150% when AV > 0; Factor = 0% when AV = 0; Factor based on ITM, where ITM = PV of WB payments divided by CSV. If ITM <= 0.8, then Factor = 150%. If ITM >= 1.2, then Factor = 50%. Factor is interpolated between those two points. • Partial Withdrawals: assume policyholders withdraw 100% of the MWP; wait periods distributed by duration and attained age • Annuitizations: 0% • Maintenance expenses: SPA prescribed assumption

FIA (without GLWB) Product and Rider Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for FDAs (without GLWB):

Modeled Balance	Assumptions
Base Product	• Single premium at issue • 5-year surrender charge period (9%, 8.5%, 7.5%, 5.5%, 4%), with MVA • Free partial withdrawal of 10% • Option budget equal to 7-year treasury minus 50 bps spread, with 1-year cap crediting based on S&P index
Riders	• None
Commissions	• 5% of year 1 premium
In-force distribution	• 1,200 policies (600 male, 600 female) • 10 issue years of business (2014-2023), distributed equally across issue months and based on expected lapsation through valuation date • Issue ages 45 (5%), 50 (15%), 55 (20%), 60 (30%), 65 (25%), 70 (5%)
Anticipated experience assumptions	• Mortality: 2012 IAM ANB • Mortality improvement: 0.5%, using 2012 as base year • Base lapses: 1%, 1%, 2%, 2%, 4%, 40%, 10% (ultimate rate) • Dynamic lapses: Factor based on ITM, where ITM = Current Crediting Rate / Market Rate. If ITM <= 0.8, then Factor = 150%. If ITM >= 1.2, then Factor = 50%. Factor is interpolated between these points. • Partial Withdrawals: SPA prescribed assumption • Annuitizations: 0% • Maintenance expenses: SPA prescribed assumption

FIA (with GLWB) Product and Rider Features

The table below provides a summary of the product features, in-force distribution and actuarial assumptions modeled for FIAs (with GLWB):

Modeled Balance	Assumptions
Base Product	• Single premium at issue • 10-year surrender charge period (9%, 8.5%, 7.5%, 6.5%, 5.5%, 4.5%, 3.5%, 3%, 2%, 1%), without MVA • Free partial withdrawal of 10% • Option budget equal to 7-year treasury minus 50 bps spread, with 1-year cap crediting based on S&P index
Riders	• GLWB rider with fees equal to 75 bps of BB • BB grows at 8% (simple interest) per year for 10 years or until withdrawals begin (whichever comes first)
Commissions	• 5% of year 1 premium
In-force distribution	• 1,200 policies (600 male, 600 female) • 10 issue years of business (2014-2023), distributed equally across issue months and based on expected lapsation through valuation date • Issue ages 50 (15%), 55 (25%), 60 (35%), 65 (20%), 70 (5%)
Anticipated experience assumptions	• Mortality: 2012 IAM ANB • Mortality improvement: 0.5%, using 2012 as base year • Base Lapses: 1%, 1, 2, 2, 2, 2, 3, 3, 4, 5, 10 (ultimate rate) • Dynamic Lapses: Factor from 50% to 150% when AV > 0; Factor = 0% when AV = 0; Factor based on ITM, where ITM = PV of WB payments divided by CSV. If ITM <= 0.8, then Factor = 150%. If ITM >= 1.2, then Factor = 50%. Factor is interpolated between those two points. • Partial Withdrawals: assume policyholders withdraw 100% of the MWP; wait periods distributed by duration and attained age • Annuitizations: 0% • Maintenance expenses: SPA prescribed assumption

Please send questions or comments to:

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