MILLIMAN RESEARCH REPORT

VM-21 Survey Report

2019 Q3 Survey

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Matt Cheung, FSA, MAAA
Ian Laverty, FSA, CFA, MAAA
Zi Xiang Low, FSA, FIA, MAAA
Bill Matczak, FSA, MAAA
Zohair Motiwalla, FSA, MAAA

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Executive Summary

In the third quarter of 2019, Milliman conducted a survey to establish market practice in the application of VM-21: Requirements for Principle-Based Reserves for Variable Annuities. Written into the requirements are several decision points for the application of the standard that are at the discretion of the carrier. This survey summarizes responses from 25 variable annuity carriers surrounding these decision points. The carriers surveyed are diverse in terms of total in-force account value and material account value exposure to living and death benefits. In-force account values range from under $1 billion to over $100 billion, with material rider exposure as outlined in the table in Figure 1.

FIGURE 1: MAJOR PRODUCT EXPOSURE BY CARRIER

Exposure	GMDB	GMAB	GMIB	Hybrid GMIB	GMWB
Number of carriers	24	9	9	4	23

As part of the survey, we asked these carriers questions regarding 12 major decision points in the application of VM-21.

1. **Scenario Reserve approach:** 56% of participants intend to derive Net Asset Earned Rates from the modeled additional asset portfolio to determine the Greatest Present Value of Accumulated Asset Deficiencies (GPVAD). Another 20% of the participants were undecided.
2. **Treatment of currently held hedges:** 52% of participants have currently held hedges and have decided on the approach to how they should be treated. Of those participants, 60% intend to allow currently held hedges to run off in the projection.
3. **Error factor level:** 64% of participants intend to model a Clearly Defined Hedging Strategy (CDHS). Of those, 63% have decided on an error factor level of 30% or less. The remaining 37% are undecided.
4. **CDHS hedging methodology:** Of the participants that intend to model a CDHS, 56% intend to model hedging cash flows explicitly in the cash flow model. Six percent are undecided.
5. **Standard Projection Amount approach:** In calculating the Standard Projection Amount, 68% of participants intend to use the conditional tail expectation (CTE) with prescribed assumptions approach (CTEPA). Another 12% of participants were undecided.
6. **Modeling of the Withdrawal Delay Cohort Method (WDCM):** 64% of participants have decided on their simplification approach for the WDCM. Of those participants, 63% intend to use random sampling, while 13% intend to use a method not explicitly outlined in the VM-21 requirements.
7. **Risk-Based Capital (RBC) C-3 charge tax effect approach:** 84% of participants intend to use a macro-level tax adjustment, while another 13% of participants are undecided.
8. **Smoothing of RBC C-3 charge:** 68% of participants have decided on whether or not they intend to use smoothing for the RBC C-3 charge. Of those participants, 65% do not intend to use smoothing.
9. **Use of phase-in:** 72% of participants do not intend to utilize a phase-in period and will opt for immediate application of VM-21. Sixteen percent of participants are undecided.
10. **Allocation of aggregate reserve to contract level:** 80% of participants report that they are undecided on their risk-adjustment measure for allocating the aggregate excess reserve to the contract level. Of the 20% that have decided on an approach, none of them are identical.
11. **Reinvestment floor:** 76% of participants have decided on an approach to demonstrate compliance with the reserve floor driven by the reinvestment strategy. Of those, 53% report that they intend to use the floor investment strategy as the baseline investment strategy for the reserve calculation.
12. **SSAP 108 election:** 68% of participants have decided on whether or not they intend to adopt the Statement of Standard Accounting Practice (SSAP) 108 treatment for interest rate hedges. Of those participants, 65% do intend to adopt SSAP 108.

In addition to the above questions regarding decisions on the application of VM-21, we asked survey participants how prepared they are for the implementation of VM-21 on a scale of 1 to 10, and what they see as the biggest implementation challenges.

Over half of the participants rated themselves from 5 to 7. The remaining participants were split roughly in half below 5 and above 7, with slightly more under 5. The overall average level of preparedness was 5.9.

While responses were diverse about what challenges the participants are facing in the implementation of VM-21, a few stood out as being cited by several carriers. The most prevalent response was concern surrounding the implementation of the WDCM, with a secondary concern surrounding the WDCM being the required run time. The second most commonly cited concern regarded the application and additional requirements in New York. The third most commonly cited was general concern surrounding resources.

Please note that Milliman does not endorse any specific answer to any of the survey questions nor any specific approach outlined in VM-21. It is possible that different approaches may make sense for different companies based on any number of reasons, including (but not limited to) the book of business in question, operational constraints, and implementation considerations, all of which often vary across company. In particular, any reliance on this survey in making methodology decisions is solely at the companies' own risk. Lastly, we note it is possible the companies that have participated in this survey have changed their approaches since responding, given that many companies are still fully analyzing the implications of the new statutory framework.

Survey results

Question 1: Scenario Reserve approach

In the determination of the Stochastic Scenario Reserve, the company has two alternatives in calculating the Scenario Reserve:

1. Derivation of Net Asset Earned Rate (NAER) approach: Derive an implied NAER on an additional portfolio of assets (outside of the Starting Assets) projected according to the company's investment policy. The additional asset amount is the amount of assets necessary, in addition to the starting asset amount, to equal or exceed the accumulated asset deficiencies at the end of each projection period. The projected accumulated asset deficiencies are discounted at the implied NAER to obtain the Greatest Present Value of Accumulated Asset Deficiency (GPVAD). This amount plus the Starting Asset portfolio is the Scenario Reserve.
2. Direct iteration approach: Iteratively solve for the amount of Starting Assets such that there are no accumulated asset deficiencies at the end of any projection year in the scenario. This amount is the Scenario Reserve. By construction, the amount of Starting Assets is likely to vary across scenarios.

FIGURE 2: SCENARIO RESERVE APPROACH

APPROACH	COUNT	%
DERIVATION OF NAER	14	56%
DIRECT ITERATION	6	24%
UNDECIDED	5	20%
TOTAL RESPONSES	25	100%

Five participants reported that they were undecided at the time of this survey. Of the 20 remaining participants, 14 reported that they intend to derive NAERs from the projected portfolio of additional assets and calculate the GPVAD. Six reported that they intend to use the direct iteration approach.

Question 2: Treatment of currently held hedges

The company has two alternatives regarding hedge assets held on the valuation date:

1. Liquidate hedges at time zero.
2. Run off hedge assets as static hedges.

FIGURE 3: TREATMENT OF CURRENTLY HELD HEDGES

APPROACH	COUNT	%
RUN OFF CURRENTLY HELD HEDGES	8	32%
LIQUIDATE CURRENTLY HELD HEDGES AT TIME ZERO	5	20%
UNDECIDED	6	24%
NO HEDGES	6	24%
TOTAL RESPONSES	25	100%

Six participants reported that they were undecided at the time of this survey. Of the remaining 19 participants, eight reported that they intended to run off currently held hedges. Five reported that they intend to assume liquidation of currently held hedges at time zero. Six reported that they have no currently held hedge assets.

Question 3: Minimum allowable error factor

For companies that model a Clearly Defined Hedging Strategy (CDHS), the company must specify an error factor (E) in the range of 5% to 100% to reflect the ineffectiveness of the hedge program. The error factor must reflect the level of sophistication of the cash flow model, its ability to capture the risks being covered by the hedge strategy (i.e., "Greeks"), and the associated costs, risks, and benefits of the program. The company must conduct a formal back-test to assess how well the model is able to replicate the hedging strategy in a way that supports the error factor chosen. We asked survey participants the range of E they intend to use.

FIGURE 4: MINIMUM ALLOWABLE ERROR FACTOR

ERROR FACTOR RANGE	COUNT	%
5% ≤ E < 10%	5	20%
10% ≤ E < 30%	5	20%
30% ≤ E < 50%	0	0%
E ≥ 50%	0	0%
UNDECIDED	6	24%
NO CDHS	9	36%
TOTAL RESPONSES	25	100%

Nine participants do not model a CDHS. Six participants reported they are undecided at the time of this survey on the value of E they intend to use. Of the remaining 10 participants, five reported that they intend to use an error factor between 5% and 10%. Five participants reported that they intend to use an error factor between 10% and 30%. No participants reported that they intend to use an error factor greater than 30%.

Question 4: CDHS modeling approach

For companies that intend to model a CDHS, there are two modeling alternatives:

1. Implicit Method (aka "Cost of Reinsurance" method): The effectiveness of the hedging strategy on future cash flows is evaluated, in part or in whole, outside of the stochastic cash flow model (e.g., calculating cost and benefit of hedging using the fair value of the hedged item, commonly the present value of rider claims less rider fees). The impact on the Company CTE 70 (Best Efforts) should be commensurate with the degree of effectiveness of the strategy at reducing accumulated asset deficiencies.
2. Explicit Method: The projected hedge cash flows generated by the hedging program are modeled directly as part of the stochastic cash flow model.

FIGURE 5: CDHS MODELING APPROACH

APPROACH	COUNT	%
IMPLICIT METHOD	6	24%
EXPLICIT METHOD	9	36%
UNDECIDED	1	4%
NO CDHS	9	36%
TOTAL RESPONSES	25	100%

Nine participants do not model a CDHS. One participant reported it was undecided at the time of this survey. Of the remaining 15 participants, six reported that they intended to use the Implicit Method. Nine reported that they intend to use the Explicit Method.

Question 5: Standard Projection approach

For the Standard Projection calculation, companies can elect one of two alternatives:

1. Company Specific Market Path (CSMP) approach: This approach involves choosing scenarios from a set of at least 40 prescribed scenarios based on the Company CTE70 (Adjusted) according to a defined methodology. The Scenario Reserve for these paths is calculated both using the same assumptions used in the calculation of the CTE70 (Adjusted) as well as a set of prescribed assumptions. These Scenario Reserves along with the CTE70 (Adjusted) are used to formulaically determine the Prescribed Projection Amount:
2. CTE with Prescribed Assumptions (CTEPA) approach This approach involves calculating the Company CTE70 (Adjusted) using the same method as the Company CTE (Adjusted) but using prescribed assumptions in place of prudent estimate assumptions. As with the Company CTE (Best Efforts) and Company CTE (Adjusted) calculations, this approach also requires that the Scenario Reserve be equal to or in excess of the cash surrender value in aggregate on the valuation date.

FIGURE 6: PRESCRIBED PROJECTION AMOUNT APPROACH

APPROACH	COUNT	%
CSMP	5	20%
CTEPA	17	68%
UNDECIDED	3	12%
TOTAL RESPONSES	25	100%

Three participants reported that they were undecided at the time of this survey. Of the 22 remaining participants, 17 reported that they intend to use the CTEPA approach. Five reported that they intend to use CSMP approach.

Question 6: Withdrawal Delay Cohort Method simplification

To model the timing of initial withdrawal for certain Guaranteed Minimum Withdrawal Benefit (GMWB) and hybrid Guaranteed Minimum Income Benefit (GMIB) plans, it is required that each contract is split into several copies, with each copy assuming a different initial withdrawal period. The weight assigned to each copy is determined by a prescribed methodology ultimately based on the present value of future benefits associated with each potential withdrawal period, adjusted by an amount, depending on the product, to reflect a “never withdraw” cohort. To increase computational efficiency, two simplifications are specifically outlined in the requirements to reduce the number of modeled copies (though the carrier can choose another appropriate approach so long as results closely align to the full-blown prescribed approach):

1. Discard certain withdrawal ages: This simplification allows for the removal of certain withdrawal ages from the modeled set. These ages must be removed in such a manner that the remaining ages can be considered representative of the distribution.
2. Random sampling: This method involves using random sampling to assign only a small number of cohorts to each contract. This must also be done in a way that the cohorts modeled can be considered representative in aggregate.

FIGURE 7: WITHDRAWAL DELAY COHORT METHOD SIMPLIFICATION

SIMPLIFICATION	COUNT	%
DISCARD CERTAIN WITHDRAWAL AGES	5	20%
RANDOM SAMPLING METHOD	9	36%
UNDECIDED	9	36%
NO SIMPLIFICATION	0	0%
OTHER (PLEASE SPECIFY)	2	8%
TOTAL RESPONSES	25	100%

Nine participants reported that they were undecided at the time of this survey. One participant reported that this does not apply as it has no GMWBs or hybrid GMIBs (noted as "other" in Figure 7). Of the remaining 15 participants, nine reported that they intend to use the random sampling method. Five reported that they intend to discard certain withdrawal ages. One participant reported that it intends to use a different method not explicitly mentioned in VM-21.

The participant that reported that it intended to use an alternative method intends to use the random sampling method combined with grouping of similar riders.

Question 7: RBC C-3 calculation of tax approach

For the RBC C-3 calculation, companies can reflect the impact of taxes in one of two ways:

1. Macro tax adjustment: With this method taxes are incorporated as a top-side adjustment to the pretax distribution of results produced by the VM-21 reserve calculation (on a CTE 98 basis).
2. Explicit tax recognition: Models taxes explicitly in the cash flow model.

FIGURE 8: RBC C-3 TAX APPROACH

APPROACH	COUNT	%
MACRO TAX ADJUSTMENT	21	84%
EXPLICIT TAX RECOGNITION	1	4%
UNDECIDED	3	12%
TOTAL RESPONSES	25	100%

Three participants reported that they were undecided at the time of this survey. Of the remaining 22 participants, 21 reported that they intend to use a top-side adjustment to pretax numbers. Only one participant reported that it intends to explicitly model taxes in the cash flow model.

Question 8: RBC C-3 charge smoothing

In calculating the RBC C-3 capital requirement, companies are permitted to use a smoothing method to minimize volatility in the capital requirement from period to period. We asked participants whether they intended to use smoothing for the RBC C-3 capital calculation.

FIGURE 9: RBC C3 SMOOTHING

APPROACH	COUNT	%
Yes	6	24%
No	11	44%
Undecided	8	32%
TOTAL RESPONSES	**25**	**100%**

Eight participants reported that they were undecided at the time of this survey. Of the remaining 17 participants, 11 reported that they do not intended to use smoothing. Six participants reported that they do intend to use smoothing in the capital calculation.

Question 9: VM-21 phase-in

Companies are allowed to phase in to the new VM-21 requirements over a period of up to 36 months, or up to seven years with permission of the domiciliary commissioner. We asked participants whether they intend to use the phase-in period, and for how long.

FIGURE 10: USE OF PHASE-IN

APPROACH	COUNT	%
PHASE-IN ≤ 36 MONTHS	**3**	**12%**
PHASE-IN > 36 MONTHS	**0**	**0%**
IMMEDIATE ELECTION	**18**	**72%**
UNDECIDED	**4**	**16%**
TOTAL RESPONSES	**25**	**100%**

Four participants reported that they were undecided at the time of this survey. Of the remaining 22 participants, 18 reported that they intended to move to the new requirements immediately upon the effective date. Three participants reported that they intended to use the allowable 36-month phase-in period. No participants reported that they intend to request longer than a 36-month phase-in period.

Question 10: Allocation of aggregate reserve to contract level

The requirements dictate that the aggregate reserve in excess of the cash surrender value be allocated to the contract level. The method used is at the discretion of the company. However, the method must use a risk-adjusted measure reflecting the risk of the product relative to the cash surrender value. The measure of risk must account for risk-mitigation programs, including hedge programs and reinsurance. We asked participants an open-ended question regarding the risk measure they intend to use to allocate aggregate reserves to the contract level.

Twenty participants reported that they were undecided at the time of this survey. Of the remaining five, all reported different risk-adjusted methods:

1. Allocate according to a combination of moneyness and guarantee value
2. Allocate aggregate reserves based on Financial Accounting Standard (FAS) 133 claims
3. Allocate based on the greater of the fund value and benefit base
4. Allocate according to the GPVAD
5. Allocate following VM-21 guidance on calculating the aggregation benefit

Question 11: Compliance demonstration for modeled investment strategy

Under VM-21, the modeled investment strategy and any non-prescribed asset spreads shall be adjusted as necessary such that the aggregate reserve produced is not less than that which would be generated by substituting an alternative strategy consisting of 50% A-rated and 50% AA-rated, non-callable corporate bonds. We asked participants how they plan to demonstrate compliance with this requirement.

FIGURE 11: INVESTMENT STRATEGY COMPLIANCE DEMONSTRATION

APPROACH	COUNT	%
Use a 50% AA/50% A reinvestment strategy as the baseline strategy.	10	40%
Full rerun using the 50% AA/50% A reinvestment strategy in place of the company's baseline reinvestment strategy.	5	20%
Compare the initial and ultimate net spreads in the baseline reinvestment strategy to the initial and ultimate spreads for the 50% AA/50% A reinvestment strategy.	2	8%
Undecided	6	24%
Other (Please Specify)	2	8%
TOTAL RESPONSES	**25**	**100%**

Six participants reported that they were undecided at the time of this survey. Of the remaining 21 participants, 10 reported that they intended to align the calculated reserve with the floor by using 50%/50% A and AA reinvestment strategy as the baseline reinvestment strategy. Five participants reported that they intend to perform a full rerun with 50%/50% A and AA in place of the baseline reinvestment strategy. Two participants reported that they intend to compare initial and ultimate spreads in the baseline reinvestment strategy to initial and ultimate spreads for the 50%/50% A and AA reinvestment strategy. Two participants reported that they intend to use a different methodology.

Of the two that reported they intend to use a different strategy, one reported that it intended to use a 100% AA reinvestment strategy as the baseline reinvestment strategy. The other participant reported that it intended to perform a single run with a reinvestment strategy producing lower spreads, then annually rerun both strategies as of the same date to validate the approach.

Note that recent industry discussions indicate that regulators are leaning toward requiring that companies perform both the alternative reinvestment strategy and the company baseline strategy.

Question 12: Adoption of SSAP 108 for interest rate hedges

Under the VM-21 framework, companies are permitted to reflect a deferred asset or liability for fair value fluctuations in interest rate hedges under SSAP 108. We asked participants if they intend to adopt this practice.

FIGURE 12: ADOPTION OF SSAP 108

APPROACH	COUNT	%
Yes	6	24%
No	11	44%
Undecided	8	32%
TOTAL RESPONSES	**25**	**100%**

Eight participants reported that they were undecided at the time of this survey. Of the remaining 17 participants, 11 reported that they do not intend to adopt SSAP 108 treatment for interest rate hedges. Six participants reported that they do intend to adopt SSAP 108 treatment.

Question 13: VM-21 preparedness

We asked survey participants to rank their preparedness to implement VM-21 on a scale of 1 (least prepared) to10 (most prepared). Below is a summary of the responses:

FIGURE 13: PREPAREDNESS FOR VM-21

RANK*	COUNT	%
10	1	4%
9	3	12%
8	1	4%
7	7	28%
6	3	12%
5	4	16%
4	2	8%
3	2	8%
2	1	4%
1	1	4%
TOTAL RESPONSES	**25**	**100%**

* Some participants elected half ranks between the integers of 1 to 10. These were rounded up for the purposes of this table.

Over half of the participants rated themselves from 5 to 7. The remaining participants were split roughly in half below 5 and above 7, with slightly more in the below-5 range. The overall average level of preparedness was 5.9.

Question 14: VM-21 implementation challenges

We asked participants the open-ended question of what they view as the biggest challenges to implementation. While the responses were generally diverse, some concerns were more prevalent.

1. Of the participants, 40% explicitly cited concern surrounding the implementation of the WDCM.
    a. Of those, 16% explicitly cited run time as the primary or secondary concern of the WDCM.
2. Of the participants, 36% cited concern regarding the deviation from the standard in New York.
3. Of the participants, 24% cited concern surrounding resource constraints.

Other key issues cited included:

1. Additional analysis and disclosures required.
2. Implementing prescribed assumptions for Standard Projection Amount.
3. Some companies are in the midst of software conversions and/or have concerns about receiving VM-21-compliant models from software vendors.
4. Overlap of implementation with VM-20.
5. Developing a risk-adjusted measure to allocate excess reserves to contract level.

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CONTACT

Matt Cheung

matt.cheung@milliman.com

Ian Laverty
ian.laverty@milliman.com

Zi Xiang Low
zixiang.low@milliman.com

Bill Matczak
bill.matczak@milliman.com

Zohair Motiwalla
zohair.motiwalla@milliman.com