March 1, 2024

Rachel Hemphill
Chair, Life Actuarial (A) Taskforce
National Association of Insurance Commissioners (NAIC)

Re: VM-21 Order of Operations—IMR and CSV

Dear Chair Hemphill,

On behalf of the Variable Annuity Reserves and Capital Subcommittee (VARCS) of the American Academy of Actuaries,[1] I am providing comments on the order of operations between the interest maintenance reserve (IMR) and cash surrender value (CSV) floor in the VM-21 reserve calculation.

The VARCS believes that the order of operations within the VM-21 reserve calculation may lead to unintended results. The IMR is currently applied after the CSV floor, which can result in spurious gains or losses to surplus. Applying the IMR before the CSV floor alleviates this effect.

In the determination of the stochastic reserve under VM-21, the following are specified related to IMR and CSV:

- Section 3.A: "The aggregate reserve for contracts falling within the scope of these requirements shall equal the SR (following the requirements of Section 4) plus the additional standard projection amount (following the requirements of Section 6) less any applicable *PIMR* for all contracts not valued under the Alternative Methodology (Section 7), plus the reserve for any contracts determined using the Alternative Methodology (following the requirements of Section 7)."
- Section 4.B.1: "The scenario reserve for any given scenario shall not be less than the *cash surrender value* in aggregate on the valuation date for the group of contracts modeled in the projection."

We performed an analysis to understand whether the current treatment of IMR and CSV could result in changes in surplus as interest rates changes occur and assets are traded.

[1] 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.

**Analysis**

To understand the potential impacts to surplus, let's begin with a simple example to illustrate the issue as well as the impact of changing the order of operations. We illustrate this impact within both the formulaic and PBR reserving frameworks.

The following assumptions are made in the example:

- Assets are $100 made up entirely of bonds earning 5% interest.
- Aggregate reserves under VM-21 and formulaic reserves are both $100.
- Cash surrender value is $98.
- IMR and Surplus are $0.
- A claim of $105 is expected in one year.
- Per VM-21, Aggregate Reserve (AR) = Stochastic Reserve (SR) + Additional Standard Projection Amount (ASPA) – Pre-tax IMR (PIMR) + Alternative Methodology (AM).
- For simplicity, tax rates are assumed to be 0% and no ASPA or AM on VM-21.

We assume interest rates increase to 10% and an asset is sold and immediately repurchased. The asset is sold at a loss of $4.55 that is transferred into IMR. As the underlying economics have not changed as a result of the transactions, one would not expect an impact to surplus.

We observe the following impacts to surplus under different reserve calculations:

*Formulaic Reserves*

Under formula reserves, there are no changes to surplus. The assets bought back would be at $95.45, which would be equal to total liabilities, i.e. reserves of $100 and IMR of -$4.55.

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| | |
|---|---|
| $100.00 | Formula reserves before CSV floor |
| $98.00 | CSV |
| $100.00 | Formula reserves |

| Assets | | Liabilities | |
|---|---|---|---|
| $95.45 | Bonds | $100.00 | Formula reserves after CSV floor |
| | | ($4.55) | IMR |
| **$95.45** | **Total Assets** | **$95.45** | **Total Liabilities** |

*Principle-Based Reserves*

However, under the current VM21 order of operations, we find that surplus is decreased by $2.55. The SR that would decrease to $95.45 as the bond earns higher interest. The cash surrender value floor of $98 is applied, thereby increasing the aggregate reserve to $102.55 once the IMR is deducted.

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| | | | |
|---|---|---|---|
| | | $95.45 | (1) SR before CSV floor |
| | | $98.00 | (2) CSV |
| | | $98.00 | (3) SR after CSV floor [max (1, 2)] |

| Assets | | Liabilities | |
|---|---|---|---|
| $95.45 | Bonds | $102.55 | (4) Aggregate Reserve [3 -5] |
| | | ($4.55) | (5) IMR |
| **$95.45** | **Total Assets** | **$98.00** | **Total Liabilities** |

This can be resolved by changing the order of operation between the application of the CSV floor and the IMR (i.e. apply the CSV floor after the IMR adjustment).

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| | | | |
|---|---|---|---|
| | | $95.45 | (1) SR |
| | | ($4.55) | (2) IMR |
| | | $100.00 | (3) AR before CSV floor [1-2] |
| | | $98.00 | (4) CSV |
| | | $100.00 | (5) AR after CSV floor [max (3,4)] |

| Assets | | Liabilities | |
|---|---|---|---|
| $95.45 | Bonds | $100.00 | Aggregate Reserve |
| | | ($4.55) | IMR |
| **$95.45** | **Total Assets** | **$95.45** | **Total Liabilities** |

Appendix A includes this example as well as examples of when surplus would increase and when surplus would remain unchanged. In all these scenarios, we show that changing the order of operations within VM 21 would result in no impact to surplus.

We also developed a stochastic model in Excel to further test the order of operations in VM-21. We examined multiple scenarios (e.g. relationship of CSV to CTE 70, market changes) and variations in the level/granularity of operations when reflecting the CSV floor and the IMR. In all examples we find that applying the CSV floor after adjusting for IMR avoids impacts to surplus. We would be happy to provide these results upon request.

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If you have any questions or would like to discuss further, please contact Amanda Barry-Moilanen, the Academy's life policy analyst, at barrymoilanen@actuary.org.

Sincerely,

Maambo Mujala, MAAA, FSA

Chairperson, Variable Annuity Reserves and Capital Subcommittee

American Academy of Actuaries

# Appendix A

Per VM-21, Aggregate Reserve (AR) = Stochastic Reserve (SR) + Additional Standard Projection Amount (ASPA) – Pre-tax IMR (PIMR) + Alternative Methodology (AM).

Examples have been simplified to AR = SR – IMR, i.e. assumes 0% tax rate and no ASPA or AM.

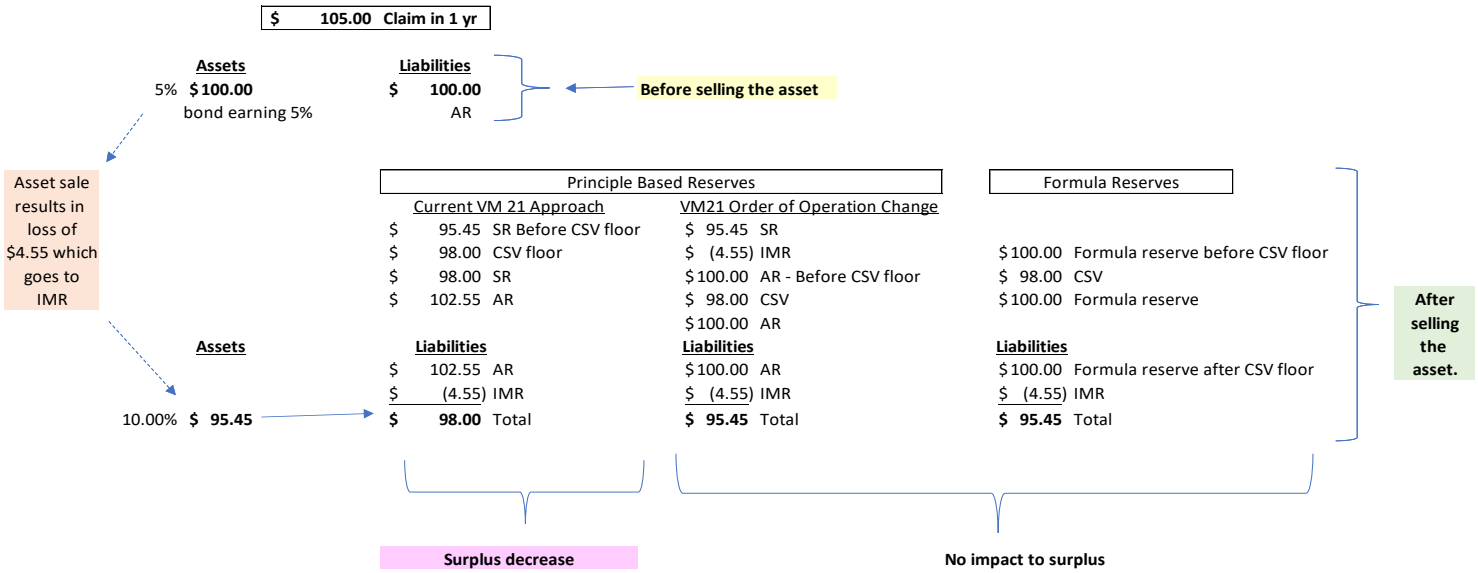
## Assumptions

- Assets are $100 made up entirely of bonds earning 5% interest (perfectly matched).
- Aggregate reserves, stochastic reserves under VM-21 and formulaic reserves are $100.
- IMR and Surplus are $0.
- A claim of $105 is expected in one year.

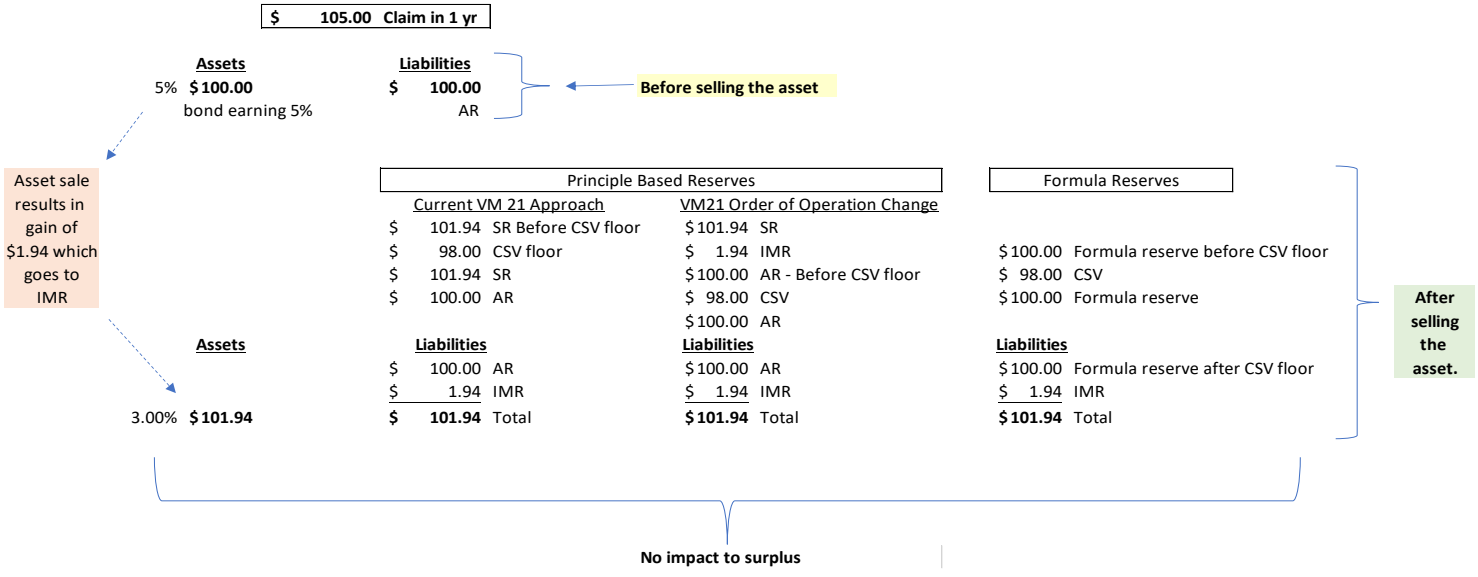
**Per VM 21, Aggregate Reserve (AR) = SR + ASPA - PIMR + AM.**
**Will simplify to AR = SR - IMR (i.e. 0% tax rate and no ASPA or AM)**

**Assume a $105 claim one-year from now. Supported by a $100 bond earning 5% (perfectly matched). IMR = $0 and the current CSV = $98.**
**The AR = $100, SR = $100, IMR =$0. Also assume the "formula" reserve is spot on at $100.**

**(A) The one-year rises to 10% and the asset is sold, and then immediately repurchased.**



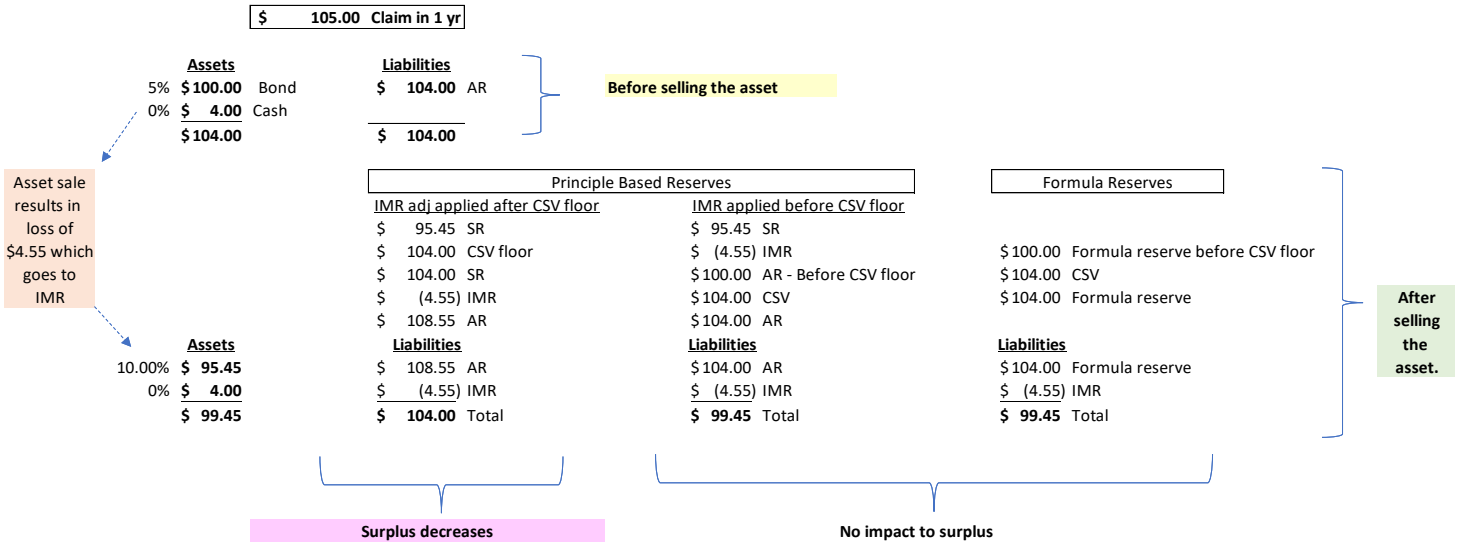

**(B) The one-year drops to 3% and the asset is sold, and then immediately repurchased.**

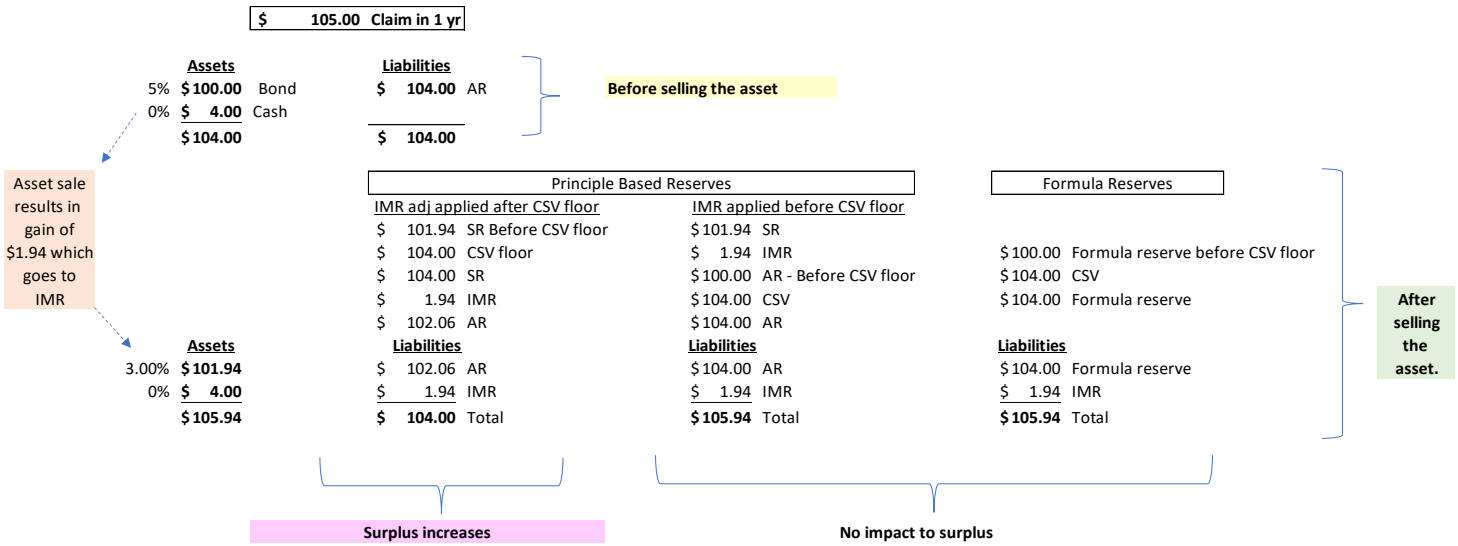


**Per VM 21, Aggregate Reserve (AR) = SR + ASPA - PIMR + AM.**
**Will simplify to AR = SR - IMR (i.e. 0% tax rate and no ASPA or AM)**

**Assume a $105 claim one-year from now. Supported by a $100 bond earning 5% (perfectly matched) and $4 in cash earning 0%. The CSV is $104.**
**The AR = $104, SR = $104, IMR =$0. Also assume the "formula" reserve is $104. All are $104 due to the CSV floor.**

**(A) The one-year rises to 10% and the asset is sold, and then immediately repurchased.**




**(B) The one-year drops to 3% and the asset is sold, and then immediately repurchased.**