

Pre-Tax vs. Post-Tax Interest Maintenance Reserves in Stochastic Principle-Based Reserves



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Life Valuation Committee

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Background

In 2021, a comment letter (Appendix A) was sent to the NAIC's VM-22 Subgroup recommending that the Academy's Annuity Reserves and Capital Work Group (ARCWG) proposal at that time "not be adopted with the inclusion of the pre-tax interest maintenance reserve (PIMR)." The rationale was that "IMR is not a cash flow and therefore does not directly impact the quantification of the amount of assets required to mature the liabilities." Additionally, an example was provided illustrating that use of the pre-tax IMR can result in less assets than what is needed to pay claims. In response to this, the Academy's Life Valuation Committee (LVC) was asked to comment on the use of a pre-tax IMR in principle-based reserves (PBR)—i.e., not just limited to VM-22.

LVC built a simplified Excel model to help better understand the nuances of using a pre-tax IMR as well as the alternatives of using a post-tax IMR and eliminating the IMR altogether. Additionally, LVC obtained prior analysis on this issue that was completed in 2007 by the Academy's Life Reserves Work Group (LRWG) Asset Subgroup (Appendix B). The results from the LVC Excel model were consistent with the findings by the LRWG.

There are advantages and disadvantages to all three methods. The appropriateness of using a pre-tax IMR depends on one's views of these advantages and disadvantages. As members of the LVC had differing views, it was decided to summarize the findings for use in further discussions on this topic.

Summary Findings

The following is based on analysis from the simplified Excel model. Additional details regarding this model can be found in the “Analysis” section of this document.

PIMR or IMR?

The impact of using PIMR vs. IMR in principle-based stochastic reserves is summarized below into three areas: the level of reserves carried on the balance sheet, income/surplus volatility, and the impact on taxes. It should be noted that the difference between using PIMR and IMR in many situations may not be material.

Level of reserves carried on the balance sheet

The stochastic reserve (SR) is the CTE 70 of the scenario reserves. It is the amount of starting assets whose cash flows are sufficient to pay the future claims and expenses on a pre-tax CTE 70 basis. The aggregate reserve (AR) is the amount posted to the balance sheet and is currently equal to the SR less the PIMR.

$$AR = SR - PIMR$$

Note that the amount held on the balance sheet is the AR and the IMR (not the PIMR).

$$\begin{aligned} \text{Balance sheet liabilities} &= AR + IMR \\ &= (SR - PIMR) + IMR \\ &= SR + (IMR - PIMR) \end{aligned}$$

If the SR amount is viewed as the proper amount to be held on the balance sheet to pay the future claims and expenses, then use of the PIMR in the AR calculation results in an understatement/overstatement of balance sheet liabilities depending on whether the net IMR amount is positive or negative.

If IMR rather than PIMR were to be used in the AR calculation, then there would be no understatement or overstatement of the balance sheet liabilities relative to the SR amount. This is the issue that was raised in the 2021 comment letter referred to above.

Income/surplus volatility

The use of PIMR would result in less income statement and surplus volatility than if IMR were used. This happens when the PIMR is used in determining the AR—the AR remains the same as if the asset had not been sold. In other words, there is less reserve volatility due to asset sales, and this results in less income volatility.

Tax impact

Use of IMR is marginally more tax-efficient than using PIMR.

Eliminating the IMR for PBR Business

In a principle-based stochastic reserve calculation, the SR is being continually reset based on the supporting assets, so an IMR is not needed. As realized gains and losses occur from the sale of the assets, the SR is reset to adjust for any change in future cash flows.

Eliminating the IMR for PBR business is a significant change with several issues that may need to be addressed. However, it should be noted that such an approach likely has less income/surplus volatility and might be more tax-efficient than incorporating the PIMR or the IMR.

RBC Impact (C-3 Phase II)

In C-3 Phase II the PIMR is generally interpreted to be used in both the statutory reserve and total asset requirement calculations before adjusting RBC to an after-tax basis.

Analysis

Assumptions

To understand how the reflection of IMR impacts principle-based reserving, a simplified model/example was used in the analysis of this issue. The following assumptions were made:

- The example is a 5-year bullet GIC. Note that this could equivalently be viewed as a projected claim payment five years from the starting point of the example for a life insurance contract (VM-20), a variable annuity contract (VM-21), or a fixed annuity contract (VM-22).
- The GIC is initially matched with 5-year assets with an earned rate of 5%, which matches the credited rate of 5%.
- There are no expenses, and the tax rate is 21%.
- Tax reserves are assumed to equal statutory reserves for simplicity.
- Results are shown assuming the following scenarios 1) asset is not sold, 2) asset being sold under a pre-tax IMR regime, 3) asset being sold under post-tax IMR regime, and 4) asset being sold under no IMR regime.
- When the asset is sold it occurs at the end of year 2 and is reinvested for the remaining three years in a 3% (realized gain) as well as in an 8% (realized loss) interest rate environment.
- When a sale occurs, all the assets backing the contract are assumed to be sold.
- There are no reserve deficiencies or surplus before the asset is sold.
- The model assumes the IMR balance reflects the difference in asset values rather than a straight-line amortization of the capital gain or loss.
- Tax impacts of capital gains and losses offset over time, except for the lack of a time value of money adjustment (see discussion below).

The results are contained in Appendix C. The following sections provide observations based on the results for the four scenarios.

Pre-tax IMR

Reserves

When the asset is sold, realized gains/losses do not impact the AR amount. The aggregate reserves are what they would have been had the asset not been sold. This is also true for future periods as the IMR runs off.

When gains occur, for example, the SR amount increases due to the lower interest yielding assets. The amount of the increase is equal to the pre-tax gain amount. As the pre-tax IMR is deducted from the SR amount, the AR is the same as if the asset had not been sold.

Statutory income and surplus

Statutory income and surplus are not impacted by realized gains/losses at the time of sale.

Future statutory income and surplus are slightly lower/higher (vs. no asset sale) when capital gains/losses are realized due to tax timing impacts. The ultimate impact on surplus is a slight loss/gain for realized gains/losses due to lack of an interest adjustment to the tax amounts (i.e., time value of money). Note that this assumes that all tax timing differences are all realized over time (e.g., taxes paid up front are recouped in future years by tax losses) and the only impact from taxes is due to lack of an interest adjustment.

Therefore, ignoring time value of money, the tax gain/loss that occurs at the time of asset sale is exactly offset by future tax cashflows.

Taxes

A tax gain/loss occurs at the end of year 2 when the asset is sold, and it is recouped over the next three years. The tax gain/loss would be equal to the tax rate applied to the realized gain/loss at the time of sale.

Assuming tax credits are all realized over the projection period, there is an ultimate loss/gain equal to the time value of money impact for realized gains/losses.

The balance sheet impact for realized gains, for example, is like that of an admitted DTA. By using a pre-tax IMR, the AR is lower by the tax difference (PIMR-IMR), which impacts surplus in a manner like that of an admitted DTA. It assumes that taxes were fronted and will be recouped at some point in the future.

To illustrate the impact of the lack of a time value of money adjustment, assume assets are sold and a realized capital gain occurs. Assets are decreased due to taxes being paid when the gain is realized. Future taxable income will be lower, and the assumption is that the taxes paid on the realized gain will be recouped in later years due to tax credits. However, the tax credits are not adjusted for the time value of money. In other words, if one pays tax of \$100 in year 2, only \$100 can be recouped in year 3 or later. There is no adjustment for interest over the period and this lost interest is net cost for capital gains.

Post-tax IMR

Reserves

At the time of asset sale, realized gains/losses produce a higher/lower AR than if the asset had not been sold. This is also true for future periods as the IMR runs off.

When gains occur, for example, the SR amount increases due to the lower-interest-yielding assets. The amount of the increase is equal to the pre-tax gain amount. As the post-tax IMR is deducted from the SR amount, the AR is higher or lower than if the asset had not been sold by the difference between the pre-tax IMR and post-tax IMR amounts. This difference impacts taxable income as described below.

Statutory income and surplus

Initial impact of realized gains/losses is a statutory loss/gain at time of sale equal to the taxes paid/credit offset in part by the impact of the change in reserve.

The initial statutory gain/loss is recouped in future years, except for the impact of the time value of money on the tax amounts.

Surplus initially is lower/higher for gains/losses and trends back over the remaining period with an ultimate loss/gain equal to the impact of the time value of money on the tax amounts.

Taxes

A tax gain/loss occurs at the end of year 2 when the asset is sold, and it is recouped over the next three years. The tax gain/loss is equal to the tax rate applied to the realized gain/loss at the time of sale offset in part by the change in tax reserves.

Assuming tax credits are all realized over the projection period, there is an ultimate loss/gain equal to the time value of money impact for realized gains/losses.

Comparison to pre-tax IMR

Unlike the pre-tax IMR approach, use of a post-tax IMR results in a statutory loss/gain at the time the realized gains/losses occur.

The post-tax IMR has higher statutory income and surplus volatility than pre-tax IMR.

Although both methods are impacted by the time value of money effect on the tax amounts, the impact is slightly lower using a post-tax IMR.

If the SR is the proper amount needed to pay future claims and expenses, then a balance sheet reserve equal to $SR - IMR$ may be viewed as more appropriate than $SR - PIMR$.

Eliminating the IMR

This scenario assumes that an IMR is not established at the time of asset sale (i.e., no IMR for principle-based business).

Reserves

At the time of asset sale, realized gains/losses produce a higher/lower SR than if the asset had not been sold. This is due to the reserve increasing/decreasing by the amount of the capital gain/loss (the pre-tax amount of the capital gain or loss). This resets the reserve back to equal the claim discounted back to the valuation rate at the new market rate.

For later years the reserve is also higher/lower for realized gains/loss and is equal to the discounted value of the claim back to the valuation date at the new market rate.

Statutory income and surplus

Without an IMR, statutory income and surplus are as if the asset was not sold. This is because the realized gain/loss would be offset by the increase/decrease in reserve at the time of asset sale.

Taxes

No tax gains or losses due to no change in taxable income. Results are as if the asset was not sold.

Note that this simple example assumed that tax reserves were equal to statutory reserves.

VM-20, VM-21, and VM-22 Current Treatment

VM-20 uses a pre-tax IMR in determining both the stochastic reserve and deterministic reserve. The net premium reserve amount is not impacted by the IMR (consistent with formula reserves).

The VM-21 stochastic reserve calculation uses a pre-tax IMR. The Alternative Method reserve calculation does not include an IMR adjustment.

VM-22 is still in development.

The LVC is available to answer any questions and/or provide additional information.

Appendix A

William H. Wilton

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September 1, 2021

Reggie Mazyck
National Association of Insurance Commissioners
1100 Walnut Street – Suite 1500
Kansas City, MO 64106-2197

Re: VM-22, ARCWG Proposal

I appreciate the opportunity to provide comments on the document [ARCWG_VM_22_Draft_Proposal_July_2021_Combined.pdf](#).

Before getting into some of the cosmetic items, I think it is important to make sure the foundation of VM-22 is actuarially sound. For a number of years, I have highlighted my concerns with pre-tax IMR (PIMR).

Conceptually, IMR is not a cash flow and therefore does not directly impact the quantification of assets required to mature the liabilities.

Let's take a simple example. I have promised to make a \$100 annuity payment at the end of the year. Let's assume I invest 100% in cash with no expected return (or expenses). It would seem that my balance sheet presentation for this liability would consist of \$100 invested assets (Cash) and a \$100 reserve.

Assets		Liabilities	
Cash	100.00	VM-22 Reserve	100.00

Now let's assume that my \$100 cash resulted from the sale of an asset that generated \$10 of IMR. Statutory accounting requires the establishment of a liability equal to the post-tax IMR of \$10. I still have \$100 cash, but I also have a liability of \$10 for IMR, therefore rather than holding a reserve of \$100, under current statutory accounting rules I should be allowed to reduce the reserve to \$90 because I am holding an additional liability of \$10 in IMR. This still requires the \$100 in invested assets to mature the obligation.

Assets		Liabilities	
Cash	100.00	VM-22 Reserve	90.00
		IMR	10.00

Now comes my confusion. In VM-22, why am I actually able to hold a reserve of \$87.34? Implied PIMR is 12.66 [10/(1-.21)]. The reserve is then \$87.34 [100 - 12.66]. I now have assets of \$97.34 to support a \$100 annuity payment. What is the justification for this?

Assets		Liabilities	
Cash	97.34	VM-22 Reserve	87.34
		IMR	10.00

I personally believe pre-tax IMR was an ill-conceived concept and artificially reduces reserves under the PBR framework. Therefore, I believe the Academy's ARCWG proposal is fundamentally flawed and should not be adopted with the inclusion of the pre-tax interest maintenance reserve (PIMR).

Sincerely,



William H. Wilton, CFA, FSA, MAAA

Appendix B

To: Life Financial Soundness / Risk Management Committee

From: Gary Falde, Chair, LRWG Asset Subgroup

Date: August 16, 2007

Subject: Interest Maintenance Reserves Issues and Coordination

Background

Treatment of the Interest Maintenance Reserve (IMR) in the LRWG's PBR exposure drafts has been stable for about two years. The Starting Assets for each PBR Model Segment are adjusted by the negative of the IMR liability allocable to each segment, and the runoff of the liability is treated as net investment income for purposes of calculating the path of Net Asset Earned Rates and Discount Rates. (Note that the IMR balance for a given segment may be negative, i.e. an IMR asset.) A similar result could be achieved by ignoring IMR in the model and then deducting the IMR from the final Reported Reserve; however the LRWG method has the advantage of automatically allocating a portion of the IMR to each policy through the Discount Rates. Please note that a couple minor changes related to IMR are expected to be introduced in the September 2007 draft to accommodate the movement of the Stochastic Reserve to a GPVAD approach.

Recently, we have had questions arise from various parties inside and outside the Academy about the treatment of IMR, and as a result the LRWG Asset Subgroup, which drafted the IMR sections, created some examples to illustrate how it works. The examples confirmed to us that our methodology accomplishes what we expected it to achieve; however, they also raised a new issue we had not thought of related to the capital gains tax that arises when a bond is traded at an interest-rate related gain or loss.

Because IMR treatment is a PBA-wide issue, we recommend that a consistent approach be adopted across PBA projects to the extent justifiable. Toward that end, we decided to raise our findings and conclusions about IMR to the SVL2 level so that the issues are fully understood at that level and any needed consideration by various other work groups, such as accounting, tax, and capital can be facilitated. I am providing here only the summary of our findings and conclusions along with a one-page attachment showing the balance sheets that resulted in our five examples. Further calculation details and explanatory material are available upon request.

The Examples

We focused on illustrating the effect on the balance sheet of selling a bond at a capital gain and using the proceeds to immediately repurchase the same bond just prior to the valuation date. We did the illustration five ways, first using the current reserving / accounting regime (Example 1), then using the LRWG exposure draft mixed with three possible ways the NAIC might consider defining IMR for business subject to PBR (Examples 2, 3, and 4), and finally using an adjusted LRWG approach (Example 5). The three possible NAIC IMR definitions tested were:

1. Eliminate the IMR for asset transactions related to PBR blocks;
2. Continue to set up IMR across the company, but set up a pre-tax amount for PBR blocks (i.e. ignoring the capital gains tax when an asset is sold); and
3. Continue to set up IMR across the company on a post-tax basis as in current accounting.

The product example we used was as simple as possible—a funding agreement (FA) liability with a 7% semi-annual interest payment and a bullet maturity, backed by an exactly-matching 7% semi-annual coupon Treasury bond. As long as the bond continues to be held, both the bond statement value and the FA reserve are assumed to be \$1000 under both the current regime and under PBR. What we tested is what happens to the balance sheet when:

- Both the bond and the FA have a remaining duration of 5;
- The current semi-annual market yield for the bond is 5% instead of the original 7%;
- The bond is sold and immediately repurchased just prior to the valuation date, with a resulting capital gain of \$100, or 10%. (The bond is repurchased at \$1100.)

Appendix C

\$100 deposit into 5-yr GIC crediting 5%. Initial 5-yr asset earning 5%. Bond is sold end of year 2 and reinvested in 3-yr bond. Tax rate of 21%

Rates are 3%, bond generates capital gain of \$ 6.55

SR (CTE 70)	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	116.80	120.30	123.91	127.63
Post-tax IMR	105.00	116.80	120.30	123.91	127.63
No IMR	105.00	116.80	120.30	123.91	127.63

IMR	End of year				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	6.55	4.54	2.36	-
Post-tax IMR	-	5.17	3.59	1.86	-
No IMR	-	-	-	-	-

AR (SR -IMR)	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	110.25	115.76	121.55	127.63
Post-tax IMR	105.00	111.63	116.72	122.05	127.63
No IMR	105.00	116.80	120.30	123.91	127.63

Balance Sheet SR + IMR	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	115.42	119.35	123.42	127.63
Post-tax IMR	105.00	116.80	120.30	123.91	127.63
No IMR	105.00	116.80	120.30	123.91	127.63

Assets	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	115.42	119.32	123.36	127.56
Post-tax IMR	105.00	115.71	119.52	123.48	127.57
No IMR	105.00	116.80	120.30	123.91	127.63

Surplus	End of year				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	-	(0.03)	(0.06)	(0.07)
Post-tax IMR	-	(1.09)	(0.78)	(0.44)	(0.05)
No IMR	-	-	-	-	-

Stat Income	Year				
	1	2	3	4	5
No asset sale	-	-	(0.00)	0.00	-
Pre-tax IMR	-	-	(0.03)	(0.02)	(0.01)
Post-tax IMR	-	(1.09)	0.31	0.34	0.38
No IMR	-	-	(0.00)	0.00	(0.00)

Taxes	Taxes Paid (Credits Realized)				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	1.38	(0.43)	(0.46)	(0.50)
Post-tax IMR	-	1.09	(0.34)	(0.37)	(0.39)
No IMR	-	-	(0.00)	0.00	(0.00)

Rates are 8%, bond generates capital loss of \$8.93

SR (CTE 70)	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	101.32	109.42	118.17	127.63
Post-tax IMR	105.00	101.32	109.42	118.17	127.63
No IMR	105.00	101.32	109.42	118.17	127.63

IMR	End of year				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	(8.93)	(6.34)	(3.38)	-
Post-tax IMR	-	(7.06)	(5.01)	(2.67)	-
No IMR	-	-	-	-	-

AR (SR -IMR)	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	110.25	115.76	121.55	127.63
Post-tax IMR	105.00	108.37	114.43	120.84	127.63
No IMR	105.00	101.32	109.42	118.17	127.63

Balance Sheet SR + IMR	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	103.19	110.75	118.88	127.63
Post-tax IMR	105.00	101.32	109.42	118.17	127.63
No IMR	105.00	101.32	109.42	118.17	127.63

Assets	End of year				
	1	2	3	4	5
No asset sale	105.00	110.25	115.76	121.55	127.63
Pre-tax IMR	105.00	103.19	110.87	119.09	127.90
Post-tax IMR	105.00	102.80	110.57	118.90	127.84
No IMR	105.00	101.32	109.42	118.17	127.63

Surplus	End of year				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	-	0.12	0.21	0.27
Post-tax IMR	-	1.48	1.15	0.73	0.21
No IMR	-	-	-	-	-

Stat Income	Year				
	1	2	3	4	5
No asset sale	-	-	(0.00)	0.00	-
Pre-tax IMR	-	-	0.12	0.09	0.06
Post-tax IMR	-	1.48	(0.34)	(0.42)	(0.51)
No IMR	-	-	-	-	-

Taxes	Taxes Paid (Credits Realized)				
	1	2	3	4	5
No asset sale	-	-	-	-	-
Pre-tax IMR	-	(1.88)	0.58	0.65	0.72
Post-tax IMR	-	(1.48)	0.46	0.51	0.57
No IMR	-	-	-	-	-

Amount highlighted above in yellow illustrate the issue raised in the 2021 letter by Mr. Wilton.