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PBA Corner

By Karen Rudolph

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The Life Actuarial Task Force (LATF) continues to refine the methods and language of the Valuation Manual. One such refinement was introduced in early 2014. Called the "Direct Iteration" method, it presents an alternate approach to calculating the deterministic reserve required by VM-20. In the "PBA Corner" article from the December 2011 *Financial Reporter*, Ken Vande Vrede and I discussed this alternate method, describing it as a method that solves for an equilibrium amount, i.e., that amount of starting assets that completely satisfies the projected obligations such that no material asset balance remains once all liabilities are matured. Some readers have interpreted that article to say these two methods—the Gross Premium Valuation (GPV) method of VM-20 and the Direct Iteration method—produce different results. This was not the intended message. The GPV and Direct Iteration methods are two different ways of obtaining the same objective: identifying assets at the valuation date that support and mature the obligations associated with the modeled policies. This objective aligns with the purpose of the deterministic reserve: to assure premium adequacy under a moderately adverse economic scenario. The two methods are theoretically equivalent.

The December 2011 article was written assuming this premise of equivalence. It went on to identify cases within the Impact Study where this equivalence was not demonstrated. The reader must understand the Impact Study was conducted on VM-20, which uses GPV for the deterministic reserve calculation. It was only subsequent to the Impact Study during phase 2 analysis performed by the American Council of Life Insurers (ACLI) that these participants disclosed the ending asset values within the deterministic reserve runs. The following paragraph is from the December 2011 article. In this paragraph, the VM-20 method is termed "GPV" methodology and the amount solved for by the Direct Iteration method is termed "equilibrium amount."

In theory, the GPV approach specified and required by VM-20 should result in a starting asset amount approximately equal to the equilibrium amount described above. In work performed by some participating companies, the starting asset amount used in the GPV approach (i.e., the amount within the 2 percent tolerance) was indeed a fair approximation for the equilibrium amount of starting assets (i.e., the amount resolving to a zero asset value at the point liabilities are exhausted). Another participant observed, however, the GPV methodology seemed flawed. Once an asset amount was determined within the 2 percent tolerance, the integrated asset-liability model did not necessarily end up with a near $0 asset value at the end of the projection horizon. Why would there be disconnect between these two approaches?

The article went on to discuss various elements of the GPV methodology in response to this question of disconnect. In short, these elements include, but are not limited to: (i) various aspects of including starting PIMR and ongoing PIMR; (ii) impact of policy loans, if applicable; (iii) difficulties in extracting the exact information necessary to replicate the net asset earned rate (NAER) used by the projection system in rolling the financial statement forward; (iv) the complication of discounting the projected cash flows over very long periods of time particularly when those cash flows may be irregular, proportionately larger at the tail of the projection than the beginning, for example.

The modeling example in the December 2011 article was performed for an insurance block with a long horizon and significant cash flows at later durations. Under this circumstance, the construct of VM-20's requirement of a 2 percent collar on starting assets restricted the "theoretical" correctness of the GPV method. Specifically, complying with the collar requirement implied over-funding of the projection, i.e., ending assets greater than necessary. If the GPV method were the only method allowed for determining the deterministic reserve, then for this case, the collar requirement seems somewhat artificial.

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Karen Rudolph, FSA, MAAA, is a consulting actuary at Milliman Inc. She can be reached at Karen.rudolph@milliman.com. *The author extends thanks to Dave Neve, FSA, MAAA, for his peer review of this article.*

Table 1

Period	0	1	2	3	4	5	6	7	8	9	10
A) Net cash flows		-40	-20	-10	-5	-1	-1	-2	-1	-2	-1
B) NAER		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
C) Path of discount rates		0.9615	0.9246	0.8890	0.8548	0.8219	0.7903	0.7599	0.7307	0.7026	0.6756
D) -A*C		38.4615	18.4911	8.8900	4.2740	0.8219	0.7903	1.5198	0.7307	1.4052	0.6756
E) Sum (D) from (t) to 10	76.06	37.60	19.11	10.22	5.94	5.12	4.33	2.81	2.08	0.68	-
Asset roll forward	**$76.06**	**$39.10**	**$20.67**	**$11.49**	**$6.95**	**$6.23**	**$5.48**	**$3.70**	**$2.85**	**$0.96**	**$(0.00)**

The American Academy of Actuaries' (Academy's) amendment proposal form describing the Direct Iteration method also introduces a modeling example, albeit a very simple one. Characteristics that make the example simple are: (i) a level NAER, and (ii) 10 years of annual cash flows where such cash flows are assumed to occur precisely at the end of each period. Table 1 shows a GPV of $76.06 (Row E, period 0) and an ending asset value of $0 (Row F, period 10).

The amendment proposal form suggests this Direct Iteration method has strong similarities to an existing method in Canada; the Canadian Asset-Liability Method or CALM. Under CALM, the reserve is the reported value of the starting assets whose cash flows, when considered with other modeled asset and liability cash flows, completely liquidate all modeled liabilities by the end of the projection horizon under conservative economic scenarios.

Valid reasons exist for permitting the Direct Iteration method, and these reasons are included in the amendment proposal.

- Equivalence—GPV and Direct Iteration are theoretically equivalent and satisfy the goal of finding the base of starting assets that satisfy the liabilities over time, under the assumptions specified for the deterministic reserve.
- Simplicity—from a practical viewpoint, the Direct Iteration method avoids the complexities of extracting NAERs from the model (which involves careful consideration of the non-cash accounting items such as accrual of discount). It also avoids having to discount the liability cash flows over the projection system frequency (oftentimes monthly) while meeting the 2 percent collar requirement.
- Avoidance of errors in approximation—an actuarial projection system with a robust asset model does not first develop an NAER then accumulate asset values with it, but rather it models the actual asset cash flows and develops appropriate accrual items. If the company attempts to approximate the effective NAER of this process for use in the GPV calculation, small errors in the approximation can, over long periods of time, bias the calculation. Said another way, why try to replicate something that is already produced in a very accurate way within the system itself?
- Proof of reserve adequacy—the Direct Iteration method provides proof of the adequacy of the starting asset pool by simply noting the ending asset value once the liabilities have fully run off. In this way, the method also provides regulators with auditability.

The Academy's amendment proposal form suggests the Direct Iteration method be offered as an option or alternative to the GPV method in calculating the deterministic reserve. Specifically, the description reads:

Calculate the deterministic reserve as a-b, where

a = the aggregate annual statement value of those starting assets which, when projected along with all premium and investment income, result in the liquidation of all projected future benefits and expenses by the end of the projection horizon. Under this alternative, the following considerations apply:

1. Cash flows are projected in compliance with the applicable requirements in Section 7, 8 and 9 over the single scenario described in Section 7.G.1.

2. *The requirements for future benefits and premiums in Section 4.A apply as well to the calculation of the deterministic reserve under this subsection.*

b = that portion of the PIMR amount allocated under Section 7.

The amendment proposal is supplemented by an attachment intended to answer the question: "Does the Direct Iteration approach for the deterministic reserve result in the same amount as the GPV approach currently required by VM-20?" The attachment provides real model output using a vendor system and concludes the two approaches do result in the same amount assuming the GPV is performed with a robust level of granularity, particularly in regard to the timing of cash flows during the cycle of the projection. The attachment lists characteristics of the sample that allow the Direct Iteration method result to converge to the GPV result.

"…companies [will have] the option of choosing the calculation approach to derive the deterministic reserve."

LATF adopted the Direct Iteration method during its meeting at the 2014 Spring National Meeting in Orlando giving companies the option of choosing the calculation approach to derive the deterministic reserve. ■