



Article from

Financial Reporter

March 2017

Issue 108

Unlocking of Traditional Contract Assumptions

By Steve Malerich

S ometime this year, we expect to see significant revisions to Generally Accepted Accounting Principles (GAAP) for long-duration insurance contracts. Among the more significant changes seen in the exposure draft are a requirement to regularly update assumptions used in the valuation of the traditional contract liability for future policy benefits (reserve) and a simpler method of amortizing deferred acquisition costs (DAC). Reserve valuation and DAC amortization will no longer be integrated.

In this article, we'll look at key liability calculations for assumption changes. The focus here is entirely on liabilities—the contract reserve and, for limited-pay contracts, the deferred profit liability.

The exposure draft calls for retrospective revision of the liabilities—recalculation of current balances as if actual experience to-date and current assumptions about future experience were known at issue.

In light of past difficulties with retrospective unlocking of universal life DAC and additional liabilities, most comment letters argue for changing to a prospective assumption update method, where the net premium ratio is recalculated so that an assumption change has no immediate effect on the reserve (subject to a 100 percent cap on the net premium ratio).

A third alternative was considered by FASB during their deliberations, what they've called the immediate method. Under the immediate method, the net premium ratio is fixed at issue and the reserve is restated by applying that ratio to updated cash flow projections. Though no comment letters advocate this method, it was the second most preferred method among board members during their earlier deliberations and cannot yet be dismissed.

All three methods start with some common measurements, and their differing effects can easily be compared in relation to those measurements.

NOTATION

In the following formulas, accumulated values of actual cash flows are presented as “AV(Cash Flow)” and discounted present

values of expected cash flows, projected from the valuation date, are presented as “PV(Cash Flow)”.

The subscripts “prior” and “new” are used to represent values before and after assumption changes. Since assumption changes have no effect on actual cash flows, accumulated values need no subscript.

When applied to projected cash flows and ratios, the prefix Δ represents the difference between new and prior values. For example:

$$\Delta PV(\text{Benefits}) = PV_{\text{New}}(\text{Benefits}) - PV_{\text{Prior}}(\text{Benefits})$$

BENEFIT RESERVE

For all three methods, understanding the effect of an assumption change begins with measuring its effect on the net present value of cash flows (ΔNPV) assuming no change in the net premium ratio (b_{prior}):

$$\Delta NPV = \Delta PV(\text{Benefits}) - b_{\text{prior}} \times \Delta PV(\text{Premiums})$$

Note the similarity to a basic reserve formula. In fact, if we substitute new and prior present values for the deltas and then rearrange the terms, we can see that the change in NPV as defined here is the amount the reserve would change if the net premium ratio were held constant.

This change translates into two effects—an immediate change in the reserve (ΔV) and a change in the net premium ratio (Δb) for future valuations. The amounts of change depend on the method used as shown in Table 1 (pg. 15, top).

In the absence of constraints (not considered in this short article), we can see in Table 1 the fundamental characteristics of the prospective method (no immediate change in the reserve) and the immediate method (no change in the net premium ratio). We can also see that the immediate method adjusts the reserve for the full change in net present value. To fully fund remaining benefits without any immediate reserve change, the prospective method must charge the change in net present value against future gross premiums, dividing ΔNPV by $PV_{\text{New}}(\text{Premium})$.

The retrospective method, by design, applies the same net premium ratio to past and future premiums. To preserve that relationship after an assumption change, a portion of the change in net present value is charged immediately to the reserve. That portion is the ratio of accumulated actual gross premiums to the present value of total lifetime expected gross premium, shown here as the historical ratio:

$$h_{\text{New}}(\text{Premium}) = \frac{AV(\text{Premium})}{AV(\text{Premium}) + PV_{\text{New}}(\text{Premium})}$$

Table 1
Benefit Reserve

Method	Immediate Change	Change in Amortization Rate
Prospective	$\Delta V = 0$	$\Delta b = \frac{\Delta NPV}{PV_{New}(Premium)}$
Retrospective	$\Delta V = \Delta NPV \times h_{New}(Premium)$	$\Delta b = \frac{\Delta NPV}{AV(Premium) + PV_{New}(Premium)}$
Immediate	$\Delta V = \Delta NPV$	$\Delta b = 0$

The change in the net premium ratio under the retrospective method is similar to prospective, except the denominator is lifetime expected premium rather than projected premium.

LIMITED-PAY CONTRACTS

Limited-pay contracts defer the profit margin $(1 - b)$ to be amortized over the expected amount of insurance in force. (For products that have no specified in force measure, another amortization basis is needed and that basis replaces amount in force in these formulas.)

Understanding the effect of an assumption change begins with measuring its effect on an adjusted present value of cash flows (ΔAPV) assuming no change in the deferred profit amortization ratio (k_{prior}):

$$\Delta APV = \Delta PV(Benefits) - \Delta PV(Premiums) + k_{prior} \times \Delta PV(in Force)$$

Note that the adjusted present value is independent of the net premium ratio. That's because the portion of gross premium not applied to reserve accrual $(1 - b)$ goes into the deferred profit liability. Together, 100 percent of gross premium is applied to the liabilities.

Though not as obvious, this again resembles a liability formula. Splitting the premium term into multiples of b and $1 - b$,

gives us the sum of ΔNPV and the corresponding formula for deferred profit. If we substitute new and prior present values for the deltas and then rearrange the terms, we can see that the change in adjusted present value equals the sum of the changes in the two liabilities before updating the net premium ratio and the amortization rate.

This change in adjusted present value translates into two effects—an immediate change in the combined liability (ΔL) and a change in the deferred profit amortization rate (Δk). The change in the net premium ratio has no effect on the total liability or on future changes in total liability.

Again, the amounts of change depend on the method used. The structure of the formulas in Table 2 (below) is identical to those in Table 1. Only the variables change; adjusted present value replaces net present value and amounts in force replace gross premiums.

MEASURING EFFECTS ON NET INCOME

In these two small tables, we have most of the key measurements that will be needed to explain the effects of assumption changes on GAAP earnings for all three methods.

Table 2
Total Liability (Benefit Reserve plus Deferred Profit)

Method	Immediate Change	Change in Amortization Rate
Prospective	$\Delta L = 0$	$\Delta k = \frac{-\Delta APV}{PV_{New}(in Force)}$
Retrospective	$\Delta L = \Delta APV \times h_{New}(in Force)$	$\Delta k = \frac{-\Delta APV}{AV(in Force) + PV_{New}(in Force)}$
Immediate	$\Delta L = \Delta APV$	$\Delta k = 0$

An assumption change alters the current liability by a multiple of the change in the net present value of expected cash flows or, for limited-pay contracts, the adjusted present value. The multiple depends on the update method—0 percent or 100 percent for the prospective and immediate methods, respectively, or the appropriate historical ratio for the retrospective method.

For example, if $\Delta NPV = \$1,000$ under all three methods for a fairly new book of business, ΔV will be \$0, \$300, or \$1,000 under the prospective, retrospective, or immediate methods. [With a historical ratio of 30 percent, that portion of the change in NPV is matched with past premium and charged immediately when using the retrospective method.]

Recognizing that assumption changes do not alter actual cash flows, the effect of the change on near-term reserve accruals can be estimated by applying the change in the net premium ratio to the run-rate of gross premiums or, for limited-pay contracts, applying the change in the amortization rate to the current amount in force.

Continuing the example, if $PV_{New}(\text{Premium}) = \$28,000$, then Δb will be 3.6 percent, 2.5 percent, or 0 percent under the prospective, retrospective, or immediate methods. [If the historical ratio is 30 percent and $PV_{New}(\text{Premium})$ is \$28,000, then $AV(\text{Premium})$ must be \$12,000.] If premiums are running about \$1,200 per quarter, the quarterly reserve accrual will increase by about \$43, \$30, or \$0, respectively.

Updating of reserve assumptions will also change the size of experience variances. If the assumption change reasonably approximates recent actual experience, the average difference

between actual and expected claims will decline to approximately zero after the assumption change.

If, in our example, claims have been running \$40 per quarter higher than expected, that amount will be absorbed into the reserve calculation and will no longer fall to the bottom line.

SUMMARY OF ILLUSTRATED RESULTS

In total, for our simple example:

- Prospective unlocking would see no immediate change in the liability but subsequent earnings would be reduced at the rate of about \$3 per quarter (3.6 percent of 1,200, minus \$40).
- Retrospective unlocking would see an immediate \$300 increase in the reserve and subsequent earnings would be reduced at the rate of about \$18 per quarter (2.5 percent of \$1,200, minus 30 percent of \$40—since the retrospective method’s true up for actual experience would have been deferring all but 30 percent of the quarterly variances before the assumption change).
- Immediate unlocking would see an immediate \$1,000 increase in the reserve and subsequent earnings would be increased at the rate of about \$40 per quarter (no change in reserve accrual rate, but the higher claims would now be offset by a reserve release). ■



Steve Malerich, FSA, MAAA, is a director at AIG. He can be reached at steven.malerich@aig.com.