Article from
The Financial Reporter
June 2019
Issue 117

Volatility From FASB Changes to Traditional Liabilities (Part 2)

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Under targeted improvements to accounting for long-duration insurance contracts under U.S. GAAP that will generally become effective in 2021, reserves for traditional nonparticipating contracts will begin to use unlocked assumptions and discount rates. The impact of unlocking the discount rate will be reported in other comprehensive income (OCI). The impact of unlocking cash flow assumptions will result in retrospectively updating the net premium ratio (or net to gross ratio), with the net impact to the reserve reported in net income. For limited payment products, the deferred profit liability will also be retrospectively updated. The unlocking of assumptions will generate more volatility in the reserves than occurs under current U.S. GAAP.

The first article in this series (*Financial Reporter* March 2019) examined the impacts to these reserves from updating projected future cash flows or truing up assumptions to reflect actual experience, assuming no changes to the discount rate since the contracts were issued. This article will examine reserve impacts when discount rates have changed since the contracts were issued. Because net income is always determined based on a locked-in rate at contract inception, the results from the prior article will define the net income impacts from reserve changes. Any additional reserve changes resulting from changes in the discount rate since contract inception would be reported in OCI.

As in the first article, I will assume that the net premium ratio is not currently capped at 100 percent (i.e., the present value of gross premiums in the contract exceeds the present value of benefits) and that the reserve is not currently floored at zero. For contracts that apply modified retrospective transition, the transition date would replace the contract inception date.

UPDATING CASH FLOW ASSUMPTIONS FOR PERIODIC PREMIUM PRODUCTS (NO CHANGE IN DISCOUNT RATE)

As a review of the results from the first article, if I assume that the discount rate had not changed from inception and that historical cash flows have been trued up to reflect actual experience, the reserve at time t can be written as:

$$V_t = PVFB_t - PVFP_t \times NPR_t, \text{ where}$$

V_t = Reserve at time t

$PVFB_t$ = Present value of future benefits (plus any expenses included in the reserve) at time t

$PVFP_t$ = Present value of future gross premiums at time t

NPR_t = Net premium ratio as measured at time t

The net premium ratio can be written as:

$$NPR_t = PVFB_{0,t}/PVFP_{0,t}, \text{where}$$

$PVFB_{0,t}$ = Present value of all benefits from inception through the end of the contract, as measured at time t at the original contract discount rate

$PVFP_{0,t}$ = Present value of all gross premiums from inception through the end of the contract, as measured at time t at the original contract discount rate

I can drop the t subscript from the (0,t) and just use $PVFB_0$ and $PVFP_0$. I also introduced two additional terms:

$PVFB_s = PVFB_0 - PVFB_t$ = Present value of all benefits incurred through the valuation date, as measured at time t at the original contract discount rate

$PVFP_s = PVFP_0 - PVFP_t$ = Present value of all gross premiums incurred through the valuation date, as measured at time t at the original contract discount rate

The change in reserve for a change in projected future benefits was equal to:

$$\frac{dV_t}{dPVFB_t} = PVFP_s/PVFP_0$$

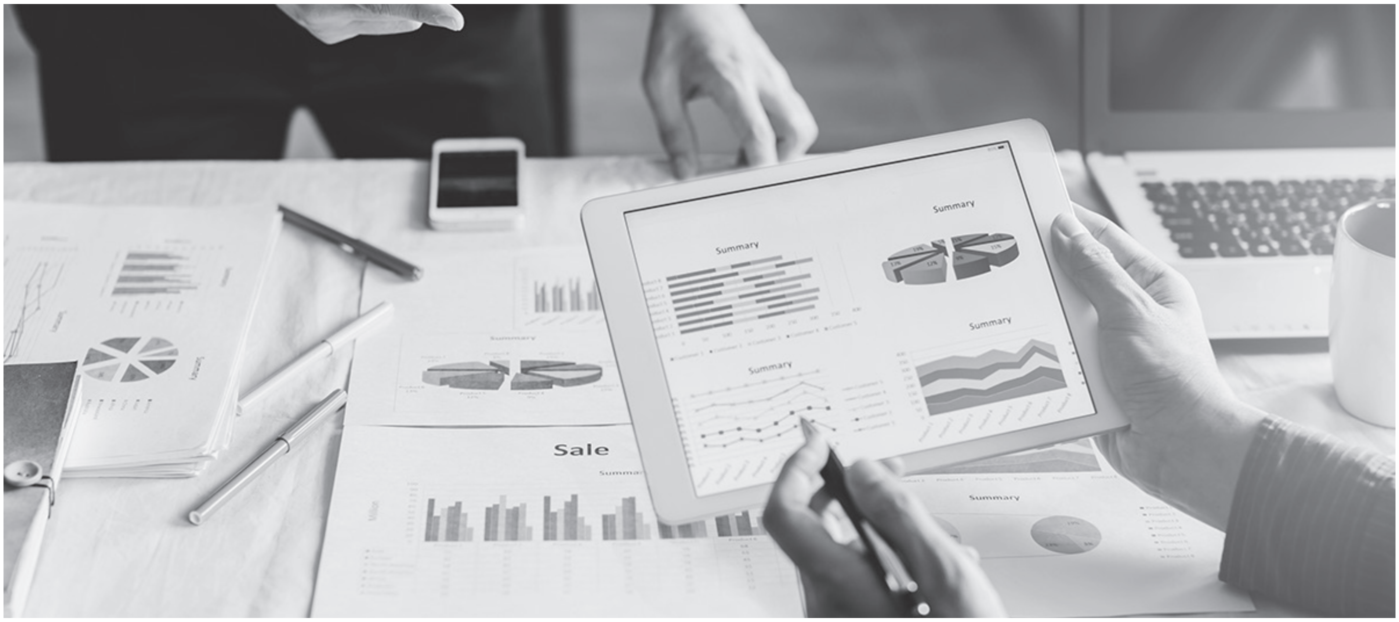
The change in reserve for an update or true-up from assumptions to actual historical incurred benefits was equal to:

$$\frac{dV_t}{dPVFB_s} = -PVFP_t/PVFP_0$$

The effects of changes to gross premiums were similar to changes in benefits, except for the sign and an effect of the net premium ratio on the change in reserve. The change in reserve for a change in projected future gross premiums was equal to:

$$\frac{dV_t}{dPVFP_t} = -NPR_t \times (PVFP_s/PVFP_0)$$

Finally, the change in reserve for an update or true-up from assumptions to actual historical incurred gross premiums was equal to:



$$\frac{dV_t}{dPVFP_s} = NPR_t \times (PVFP_t/PVFP_0)$$

I also looked at impacts for single premium with a deferred profit liability (DPL) that is amortized over an appropriate base. I assumed with no loss of generality that in force is the DPL amortization basis.

If there have been no discount rate changes since contract inception, Vt, can be written as:

$$V_t = PVFB_t$$

And the DPL at time t can be written as:

$$DPL_t = (P - PVFB_0) \times (PVFI_t/PVFI_0), \text{ where}$$

P = Single premium at contract inception
$PVFI_t$ = Present value of future in-force amounts at the locked-in discount rate at time t
$PVFI_0$ = Present value of future in-force amounts at the locked-in discount rate as of contract inception

For convenience, I defined $PVFI_s$ as $PVFI_0 - PVFI_t$ (i.e., the present value of the in-force amounts that have already been reflected in DPL amortization through the valuation date).

The impact to the liability for a change in the present value of future benefits was:

$$\frac{dL_t}{dPVFB_t} = PVFI_s/PVFI_0$$

The change in total liability for a true-up of actual benefits was:

$$\frac{dL_t}{dPVFB_s} = -PVFI_t/PVFI_0$$

So the change in total liability for changes in benefits for a single premium contract is similar to the change in reserve for regular premium contracts, except that the DPL amortization base replaces the gross premium.

UPDATING CASH FLOW ASSUMPTIONS FOR PERIODIC PREMIUM PRODUCTS (IF DISCOUNT RATES HAVE CHANGED)

The reserve impacts of changes in benefits and premiums are more complicated if discount rates have changed since contract inception. That is because the reserve calculation discounts premiums and benefits at a current discount rate, but the net premium ratio is always calculated using the discount rates locked in at contract inception. Although the reserve amount reported on the balance sheet reflects the changes in discount rate since contract inception, all reserve changes resulting from changes in discount rates are reported in OCI, not net income. So the impacts discussed in this section would not affect net income. The impact to the reserve of cash flow changes on net income would be based on the results of the prior section, in which discount rates remain unchanged.

To account for the change in discount rates, I need two additional factors:

a_t = Ratio of the present value of future benefits at the current discount rate to the present value of future benefits using the discount rate at contract inception

b_t = Ratio of the present value of future gross premiums at the current discount rate to the present value of future gross premiums using the discount rate at contract inception

Applying a_t and b_t, the reserve at time t becomes:

$$V_t = a_t \times PVFB_t - b_t \times PVFP_t \times PVFB_0/PVFP_0$$
$$= a_t \times PVFB_t - b_t \times PVFP_t \times (PVFB_s + PVFB_t)/(PVFP_S + PVFP_t)$$

All present values in the above equation (e.g., PVFBt, PVFP0, etc.) are taken at the discount rate from contract inception. I will assume that:

$$\frac{da_t}{dPVFB_t} \approx \frac{db_t}{dPVFP_t} \approx 1$$

In other words, I will assume that a change in cash flows does not significantly change the ratio of the present values of the cash flows whether using current or locked-in discount rates.

To determine the impact to the reserve of a change to the present value of future benefits, I get:

$$\frac{dV_t}{dPVFB_t} = a_t \times \frac{da_t}{dPVFB_t} - b_t \times \frac{db_t}{dPVFP_t} \times PVFP_t/PVFP_0$$
$$\approx a_t - b_t \times PVFP_t/PVFP_0$$
$$= (a_t \times PVFP_s + a_t \times PVFP_t - b_t \times PVFP_t)/PVFP_0$$
$$= [a_t \times PVFP_s + (a_t - b_t) \times PVFP_t]/PVFP_0$$

Taking account of changes in the discount rate since contract inception makes the impact of a change in future benefits more complex. Rather than just multiplying the change in the present value of future benefits by the ratio of the present value of all historic gross premiums collected through the valuation date to the present value of all gross premiums expected to be collected over the life of the contract, the impact is affected by the impacts of prior discount rate changes as well as by the ratio of the present value of future gross premiums to the present value of all gross premiums.

In many cases, $(a_t - b_t)$ may be small enough to ignore. This would be the case if discount rates have not changed much since contract inception. It may also be the case for shorter duration contracts or for other contracts, such as annual renewable term, where the difference in the timing of premiums and benefits is not great. In that case, any impact from future premiums is eliminated and the reserve impact reduces to:

$$\frac{dV_t}{dPVFB_t} \approx a_t \times PVFP_s/PVFP_0$$

If the simplification of ignoring $(a_t - b_t)$ is appropriate, the result of a change in the present value of future benefits is more intuitive. If interest rates have increased since the contract was issued, a_t is likely less than 100 percent, so the impact of a change in the present value of future benefits is somewhat muted relative to interest rates being unchanged since contract inception. If interest rates have decreased since the contract was issued, a_t is likely greater than 100 percent, so the impact of a change in the present value of future benefits is somewhat larger than if interest rates are unchanged since contract inception.

For other changes to premiums and benefits, the result of a change taking account of previous discount rate changes is simpler. That is because the a_t factor impacts only the present value of future benefits, so it drops out of the derivative of the reserve with respect to other cash flows.

For a true-up of actual benefits I get:

$$\frac{dV_t}{dPVFB_s} \approx -b_t \times PVFP_t/PVFP_0$$

In this case, the impact looks very much like the reserve impact from truing up benefits when discount rates have not changed since contract inception, except multiplied by the ratio of the present value of future premiums at the current discount rate to the present value of future premiums using the discount rate at contract inception. Since b_t is the ratio of the present value of future premiums using the current rate rather than the locked-in rate, this can also be stated as the reserve decreases by

- Amount by which actual benefits exceeded previously assumed benefits, multiplied by

- Ratio of the present value of future gross premiums at the current discount rate to the present value of all gross premiums at the locked-in discount rate.

For a change in future premiums, I get:

$$\frac{dV_t}{dPVFP_t} \approx -b_t \times NPR_t \times PVFP_s/PVFP_0$$

For a true-up of actual premiums, I get:

$$\frac{dV_t}{dPVFP_s} \approx b_t \times NPR_t \times (PVFP_t/PVFP_0)$$

The impact of a true-up of actual premiums is similar to the impact of a true-up of actual benefits, except for the sign and an effect from the net premium ratio.

UPDATING CASH FLOW ASSUMPTIONS FOR SINGLE PREMIUM CONTRACTS (IF DISCOUNT RATES HAVE CHANGED)

I can generalize the single premium results from the last article to a situation where the current discount rate has changed since contract inception. The change in current rate impacts only the base reserve, since the DPL is always calculated using discount rates locked in at contract inception. As before, I define the factor a_t as the ratio of the present value of future benefits at the current discount rate to the present value of future benefits using the discount rate at contract inception. Now the reserve becomes:

$$V_t = a_t \times PVFB_t$$

Now the total liability, including DPL, becomes:

$$L_t = V_t + DPL_t = a_t \times PVFB_t + (P - PVFB_s - PVFB_t) \times (PVFI_t / PVFI_0)$$

I can see that the change in discount rate will not impact the effect of a true-up to the benefits. That makes sense since true-ups to the benefits impact only the DPL, not the base reserve.

When I look at the impact to the reserve from a change in future benefits, I get a more complex result:

$$\frac{dL_t}{dPVFB_t} = a_t - PVFI_t/PVFI_0 = (a - 1) + PVFI_s/PVFI_0$$

Basically, the base reserve increases by the change in the present value of future benefits multiplied by the ratio a_t, while the DPL decreases by the change in benefit multiplied by the ratio of the present value of future in-force amounts to the present value of all in-force amounts from contract inception to termination (all discounted at the locked-in rate).

CONCLUSION

Under targeted improvements, it will be challenging to explain changes in traditional nonparticipating reserves. This article dealt primarily with the interaction between cash flow changes and discount rate changes. In the third article in this series, I will discuss the direct impact of discount rate changes on the reserves. ■

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