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FASB Long-Duration Contracts Redeliberations

By Leonard Reback

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Publication Schedule
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2018 SECTION LEADERSHIP

Chairperson's Corner

By Bob Leach

Implementation of the NAIC Valuation Manual (VM) for 2017 reporting reminds us of the many things we must do in order to be good financial reporting actuaries. Some may view these activities as merely a distraction. Nothing could be further from the truth. It is in the attending to these details that the financial reporting actuary engenders confidence among associates, regulators and other users of our statutory financial reports, and gains distinction as a true professional. The new requirements will also result in improved governance and understanding of our work and increased appreciation from others for the responsibilities of the financial reporting actuary. For example, consider the following:

- VM-05 (the NAIC Model Standard Valuation Law) requires that the assumptions and methods used in principle-based reserve (PBR) valuation are consistent with the company's risk assessment process. It also requires a certification of PBR control effectiveness to the company's board of directors and its domiciliary regulator. This solidifies the link that should exist among three important processes: valuation, risk management and controls. It also helps to increase the board's understanding and engagement in our work.

- VM-30 (Actuarial Opinion and Memorandum Requirements) requires the Actuarial Opinion to include a Table of Key Indicators, making it easier for the regulator to determine whether the appointed actuary's opinion regarding reserve adequacy is unqualified, and alerting the regulator to the use of wording in the opinion that is other than that prescribed in VM-30. The VM creates additional requirements for regulatory actuaries too, so it makes sense to minimize obstacles they might otherwise face in understanding a company's Actuarial Opinion.

- VM-G (Corporate Governance Guidance for Principle-Based Reserves) spells out specific responsibilities with respect to PBR valuation for the company's board of directors, senior management and the qualified actuary (or actuaries) providing certification of PBR reserves. Clarity with respect to the roles played by each party helps all of those involved in the PBR process to ensure that they have appropriately fulfilled their responsibilities.

To be sure, these and other aspects of the VM have created a lot of new requirements. This year-end was busier than last, and for companies which have elected to defer implementation of VM-20 (Requirements for Principle-Based Reserves for Life Products) to a future year, there is even more work ahead. Also remaining ahead for all of us is the implementation of VM-50 (Experience Reporting Requirements).

Paying attention to these details can provide a learning experience, and it helps to approach the new requirements with this mindset. I have often found that documentation of a procedure or execution of a control can uncover opportunities to enhance actuarial modeling. The documentation, governance and control requirements laid out in the VM are not a distraction—rather, they are a means to improve and validate the quality of our actuarial work. And quality work is the hallmark of professionalism! ■

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FASB Long-Duration Contracts Redeliberations

By Leonard Reback

The Financial Accounting Standards Board (FASB) was busy in the second half of 2017 redeliberating decisions made under their long-duration contracts accounting project for insurance companies. FASB promulgates Generally Accepted Accounting Principles (GAAP) for general reporting purposes in the United States. FASB has been working on a project to update and improve accounting for insurance contracts for almost 10 years now. In 2015 it issued new guidance for short-duration contracts, requiring several additional disclosures. It is now approaching the finish line on its long-duration contracts project, and is expected to issue a new standard updating both disclosure and measurement of insurance contracts in 2018.

FASB had issued an exposure draft (ED) of its tentative decisions on long-duration contracts in September 2016. After receiving 39 formal comment letters responding to the ED, performing outreach with financial statement users and holding a roundtable discussion in April, FASB began redeliberating its ED proposals in August. Two more meetings followed in October and November. As a result of redeliberations, FASB made several key changes to its previous decisions. The basic scope of the proposed changes remains similar, however. As of December 2017, it appears that all major decisions have been made except for determining the effective date of the new standard, although no decisions are final until the standard is issued. The major changes that had been decided through December are discussed in this article.

TRADITIONAL NON-PARTICIPATING INSURANCE CONTRACT RESERVES

Under current US GAAP, traditional non-participating insurance contracts (FAS 60 and FAS 97 limited pay) hold net premium reserves based on assumptions that are locked in when the contract is issued unless a premium deficiency emerges. The assumptions, including the expected investment return that is used as the discount rate, include a provision for adverse deviation (PAD), which incorporates some conservatism into the reserve. A premium deficiency test is required periodically to ensure that the reported reserve is not inadequate.

Under the ED proposals, cash flow assumptions would be reviewed for possible updates at least annually. When assumptions are updated, the net premium ratio (and any deferred profit liability for limited pay contracts) would be updated retrospectively. That is, the net premium ratio would be reset assuming all actual historical experience, as well as the new assumptions, had been known since the contract was issued. This process is similar to current US GAAP accounting for deferred acquisition costs (DAC) on universal life contracts. The net premium ratio would be subject to a cap of 100 percent. One subtle change to the cash flow assumptions is that the ED eliminated most maintenance expenses from the reserve calculations, retaining only such non-level expenses as claim costs.

To the extent that the net premium ratio changes, that would offset part of the impact of the present value of future cash flows on the reserve. But the change in present value of future cash flows that would not be offset by unlocking the net premium ratio would impact the reserve immediately, with a corresponding impact to net income. Because the assumptions would be updated, provisions for adverse deviation were eliminated. And because the net premium ratio would be subject to a 100 percent cap, premium deficiency testing was eliminated.

In the ED, FASB proposed to treat the discount rate differently. FASB proposed using a more market-based objective discount rate than the expected investment (i.e., "book") yield, feeling that it was not appropriate for a non-participating liability value to be impacted by expected asset performance. FASB proposed discounting the liability using a "high-quality fixed-income yield," generally interpreted to mean a AA-quality bond yield. The discount rate would be updated each reporting period. The impact of changing the discount rate would be reported in other comprehensive income (OCI) without impacting the net premium ratio. Reporting the change in discount rates through OCI was deemed to avoid accounting mismatches with the assets insurers hold to back such liabilities, which typically report changes in fair value due to changes in interest rates through OCI.

Many companies and industry groups objected to the ED proposal to retrospectively unlock the net premium ratio. They felt that this would be costly to implement and would result in unnecessary net income volatility. Many comment letters proposed using a prospective unlocking approach instead, similar to the ED proposals for DAC. Many comment letters also objected to using a AA discount rate, feeling that such a rate was overly conservative and did not provide an adequate illiquidity premium.

In response, the board made a number of changes during redeliberations. The board felt that a retrospective unlocking approach provided the most relevant measure for a liability that represents a future cash flow. As a result, FASB retained retrospective unlocking for the net premium ratio. But it did make a number of changes to make the process somewhat less operationally burdensome.

FASB recognized that a significant portion of the cost of retrospective unlocking for universal life DAC relates to allocating items such as expenses and investment income to contracts. The proposed calculation of non-participating contract reserves would already not require an allocation of investment income and only a limited amount of expense would be permitted in the reserve calculation. So FASB decided to eliminate the requirement to unlock the remaining expense assumptions, leaving a company an option on whether or not to do so. FASB also recognized that much of the cost of retrospective unlocking relates to truing up actual experience, as opposed to just updating assumptions. So FASB decided to eliminate the requirement for companies to true-up actual experience each reporting period, permitting companies to choose to only true-up actual experience once a year at the same time as assumption updates. FASB also simplified the transition requirements for these contracts, as will be discussed in the "Transition" section of this article.

With respect to discount rates, FASB retained the requirement to update the discount rate each reporting period and report the impact of the change through OCI. But FASB agreed with the comment letters stating that a AA discount rate was overly conservative and decided to require an "upper-medium grade fixed income yield," generally interpreted as a single-A quality discount rate.

TRADITIONAL PARTICIPATING CONTRACT RESERVES

The ED proposed that participating contract (FAS 120) reserves (including those for closed blocks) be calculated in a manner similar to the proposed approach for non-participating reserves. Many comment letters objected on the basis that the proposed model was not suited to the unique features of participating contracts. For example, the proposed model would ignore the link between the investment returns on assets backing the liability and the dividend cash flows of the liability. In response to these comments FASB decided to exclude FAS 120 contract reserves from the scope of the targeted improvement project. Thus, FAS 120 reserves would continue to be calculated as they are currently, including the need for a premium deficiency test (without the inclusion of DAC). There would likely be some minor changes to accounting for these contracts to conform to other aspects of the targeted improvements, such as simplified DAC amortization. For example, currently terminal dividend liabilities are accrued over estimated gross margins (EGMs). With EGMs being eliminated from the DAC model, terminal dividend liabilities would likely be accrued using the new basis for amortizing DAC.

FASB decided to largely retain the existing approach to calculating SOP 03-1 reserves.

UNIVERSAL LIFE CONTRACT RESERVES

The ED proposed significant changes to the calculation of SOP 03-1 reserves for additional death and annuitization benefits on universal life contracts. As with the participating contract reserve proposals, comment letters convinced FASB that the proposal would not work as intended. As a result, FASB decided to largely retain the existing approach to calculating SOP 03-1 reserves. There would likely be some minor conforming changes. For example, the discount rate to use for discounting payout annuity benefits back to the anticipated annuitization date would be the single-A "upper-medium grade fixed income yield," consistent with the discount rate for non-participating reserves.

Since the universal life contract valuation model would remain essentially unchanged, the premium deficiency test would continue to be required, albeit excluding DAC.

DAC AND SIMILAR ITEMS

Under current US GAAP there are multiple approaches to amortize DAC (and similar items such as deferred sales inducements and unearned revenue). Depending on which accounting model the underlying contracts fall into, DAC is amortized in proportion to premiums, estimated gross profits, estimated gross margins or in some cases in proportion to some other contract element, such as death benefits. Some DAC models use locked-in assumptions, others use retrospective unlocking. Some investment contracts use an effective yield approach to amortize DAC.

In the ED, FASB proposed to conform almost all DAC approaches, the exception being retaining the effective yield approach for certain investment contracts. FASB proposed to amortize DAC for all other contracts in proportion to amount of insurance, or if amount of insurance cannot be projected then on a straight line basis. Assumptions would be unlocked prospectively; that is, when future assumptions of terminations change, the future DAC amortization schedule would "pivot" to reflect the revised assumptions, but the current balance would not change. Interest would no longer be accrued on DAC or similar items. The amortization ratio would not be permitted to anticipate future renewal expenses or front-end fees. Rather, the

In its redeliberations FASB expanded the scope of MRBs to go beyond just variable contracts.

amortization ratio would be updated as the new expenses were incurred, so the amortization ratio could increase over time even if experience materialized exactly as expected. DAC would no longer be tested for impairment.

In its redeliberations FASB retained most of their ED decisions. However, in response to comments that amount of insurance in force is not necessarily an appropriate amortization approach for all contract types, FASB agreed to be less restrictive. As a result, DAC and similar items would be amortized in constant proportion to some contract element (or straight line), but the contract element would not necessarily need to be the amount of insurance in force. DAC and similar items would still not accrue interest or be subject to impairment testing, and future renewal costs or front-end fees would still not be anticipated in the amortization ratio. Some actuaries remain concerned about the latter issue with respect to front-end loads in situations where the front-end fees are charged over an extended period, potentially resulting in an amortization ratio that increases significantly over time.

Some comment letters noted the irony that FASB was eliminating retrospective unlocking for DAC, partially in response to concerns from companies over cost and from users over incomprehensibility. On the other hand, FASB was introducing retrospective unlocking for non-traditional contract reserves. FASB seems to believe that a retrospective unlocking approach is appropriate for changes in future cash flows, and that the resulting volatility is meaningful as an improved measurement of the present value of future cash flows. However, FASB seemed to agree that retrospective unlocking of DAC, which represents a cash flow that has occurred in the past, is not particularly meaningful. In particular, FASB seemed concerned about the practice of amortizing DAC and then potentially reestablishing it through an unlocking event.

MARKET RISK BENEFITS

The ED introduced a new concept of a market risk benefit (MRB). This concept would apply to guarantees on certain variable contracts that expose the insurer to other than nominal capital market risk. In particular, guaranteed minimum death, income, withdrawal and accumulation benefits on qualifying variable contracts would be MRBs. Also, many variable life no-lapse guarantees would be MRBs. If a guarantee was considered an MRB, the benefit would be reported at fair value. Changes in fair value would be reported in net income, except for changes in fair value resulting from changes in own credit which would be reported in OCI. This accounting would apply regardless of whether the guarantee is considered an embedded derivative under current US GAAP.

In its redeliberations FASB expanded the scope of MRBs to go beyond just variable contracts. The revised scope seems to encompass guaranteed minimum death, income, withdrawal and accumulation benefits on both variable and indexed contracts. The equity indexing feature which is currently typically reported as an embedded derivative on EIA and EIUL contracts also appears to be within the revised MRB scope. However, FASB focused the revised scope on account balance guarantees, which may scope out variable life no-lapse guarantees. The revised basic definition of an MRB (excluding some explanatory language) as disclosed at the November 2017 FASB meeting is as follows:

"A market risk benefit shall be recognized for a contract feature that exposes the insurance entity to other-than-nominal capital market risk that arises from either of the following:

a. a contract feature that protects the account balance (or similar amount) from adverse capital market performance or

b. a contract feature that causes variability in the account balance (or similar amount) in response to capital market volatility."

It is not entirely clear which other insurance contract features would be scoped into this definition. It is possible that the definition may be refined and further clarified when the new accounting standard gets drafted in order to ensure that FASB scopes in the features it intends without scoping in other features.

DISCLOSURES

The ED proposed requiring many new footnote disclosures. In response to comment letter feedback FASB decided to eliminate a few of the more onerous requirements. But many new footnote disclosures would be added.

Most notably, roll-forwards would be required for all reserve and DAC balances. Information about assumptions and changes in assumptions would be required, as well as information about the impact of assumption changes on the reserve balances. For traditional non-participating contracts, information would be required about the gross premiums, net premiums and benefits, including their undiscounted amounts. For universal life contracts a table would be required showing guaranteed and current credited rates. For market risk benefits, information would be required about benefits whose fair value is an asset versus a liability. Disclosures would be required for non-participating traditional contracts whose net premium ratio gets capped at 100 percent and for other contracts that fail a premium deficiency test. And there would be other requirements as well. There may be some changes to the requirements as FASB gets feedback from users on their recent decisions, particularly on ED requirements that were eliminated.

TRANSITION

FASB made some minor and some major changes to the transition requirements from the ED. The most significant changes were to transition for non-participating reserves. Under the ED, non-participating reserves would have been required to use a retrospective transition. That is, the reserve would have had to be calculated since the contract was issued as if the new guidance had been in effect all along. Only if it was "impracticable" to determine or estimate the historical information necessary could a prospective transition be used. Under a prospective transition, the existing GAAP balance on the transition date would carry over (after removing any amounts that had been reported through OCI) and the net premium ratio would be calibrated to the reserve balance on the transition date. When assumptions would be updated in the future, the retrospective unlocking of the net premium ratio would go back to the transition date, not the original issue date.

FASB decided to change the ED proposal to instead require a prospective transition for all non-participating contract reserves. FASB is allowing an option to use a retrospective transition, but with several strings attached:

a. A company must be able to use actual historical data in order to apply retrospective transition; the historical information may not be estimated, and

b. a company must retrospectively transition all contracts issued in a given year or later.

For example, if a company had actual historical information for all contracts issued from 2014 and later, it would be permitted to use retrospective transition for all contracts issued in 2014 or later. It could choose a later issue date for which to apply retrospective transition, but not an earlier date. It could not retrospectively transition contracts issued in 2014 but prospectively transition contracts issued in 2016. Any contracts older than 2014 (or whatever year was chosen for retrospective transition) would have to be transitioned prospectively.

For DAC and similar balances the ED had proposed a prospective transition. FASB mostly retained this decision, but conformed the decision to the non-participating contracts decision. So, if a company decided to retrospectively transition all non-participating contracts issued in 2014 and later, it would also need to retrospectively transition all DAC for all contracts (including other types of contracts) issued in 2014 and later. If the company did not have the actual data to retrospectively transition all DAC on 2014 issues, it would also not be permitted to retrospectively transition non-participating contracts issued in 2014.

FASB also made a small but possibly significant change to the transition requirements for market risk benefits. The ED had required a retrospective transition. That is, the attributed fee associated with the market risk benefit would need to be calibrated to conditions as of the issue date of the contract. Many comment letters argued that this was an onerous requirement and also expressed concern that this could dramatically increase the reserve for these benefits upon transition, thus materially reducing GAAP equity. Comment letters also argued that it was unrealistic to require an actuary to estimate an attributed fee for a contract issued in, say 2006, and calibrate stochastic scenarios to do so pretending to be unaware of future dramatic events that

had actually subsequently occurred, such as the significant stock market declines in 2008/2009 and negative interest rates.

FASB gave some relief to the latter issue by still requiring a retrospective transition, but permitting the actuary to use "hindsight" when calibrating the necessary scenarios. It is not entirely clear that this resolves all the practical issues, and this may not give much if any relief from the possible hit to GAAP equity upon transition.

CONCLUSION

Big changes are coming to GAAP accounting for long-duration contracts for insurance companies. FASB seems determined to conclude this project as quickly as possible, and so a final standard is expected in 2018, possibly in early 2018. Although we do not yet know when the new standard would be effective, we do know we would need to change our valuation models for several reserve categories. Valuation of non-participating traditional contract reserves is likely to become much more complicated. Many benefits on variable and indexed contracts that are not fair valued today would need to be fair valued in the future. DAC amortization would become simpler but there would still be one-time changes needed to the amortization models. And many more disclosures would be required. ■

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GAAP Targeted Improvements—Unlocking Persistency

By Steve Malerich

In two earlier articles ("Retrospective Noise" and "Unlocking 2.0," *The Financial Reporter*, September and December 2017) I illustrated the noise that can result from the retrospective method when experience is consistently better or worse than assumed and I described a technique for substantially reducing that noise. Both articles examined effects when mortality deviates from the original valuation assumption.

At the end of the December article, I noted that lapses and surrenders typically have a greater effect on subsequent cash flows than on immediate cash flows. In this article, we consider what to do when lapses and surrenders differ from expected.

LAPSE VARIANCES

In Figure 1, with early lapses much lower than expected, earnings are close to ideal without any adjustment to the reserve assumption. Since lapses align with the ultimate assumption after a few years, there is no need for an assumption change. If early lapses were instead higher than expected, the requirement to write off a portion of unamortized deferred acquisition costs (DAC) could significantly distort the earnings pattern, but DAC amortization is outside the scope of these articles.

[As in the earlier illustrations "Expected" shows what would happen if experience exactly follows the original assumption, "Ideal" shows what would happen if the original assumption had correctly anticipated actual experience, and "Retrospective" shows the effect of actual experience when different from the original assumption.]

Figure 1
Favorable Early Lapse Experience

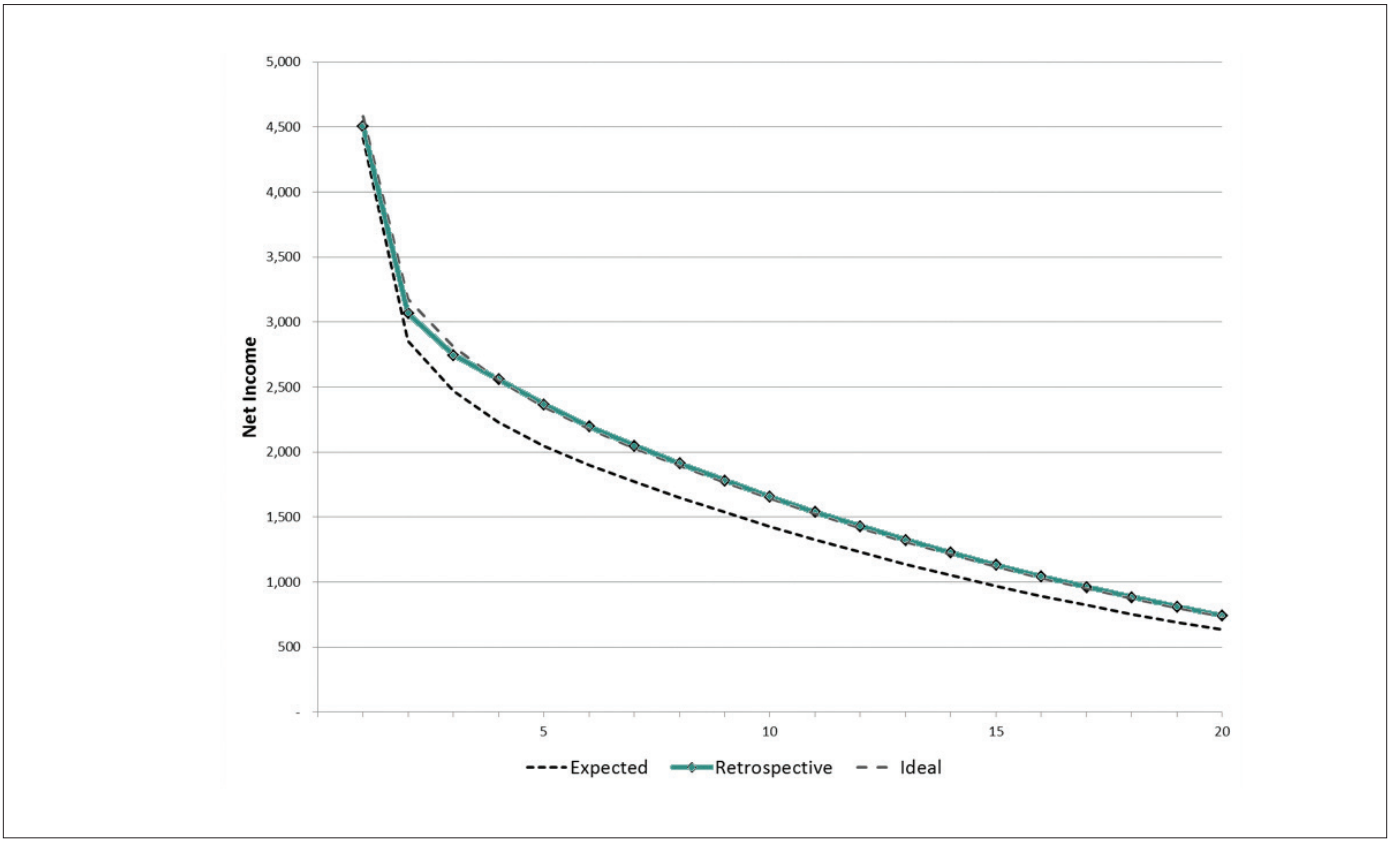


Figure 2
Persistent Adverse Lapse Experience

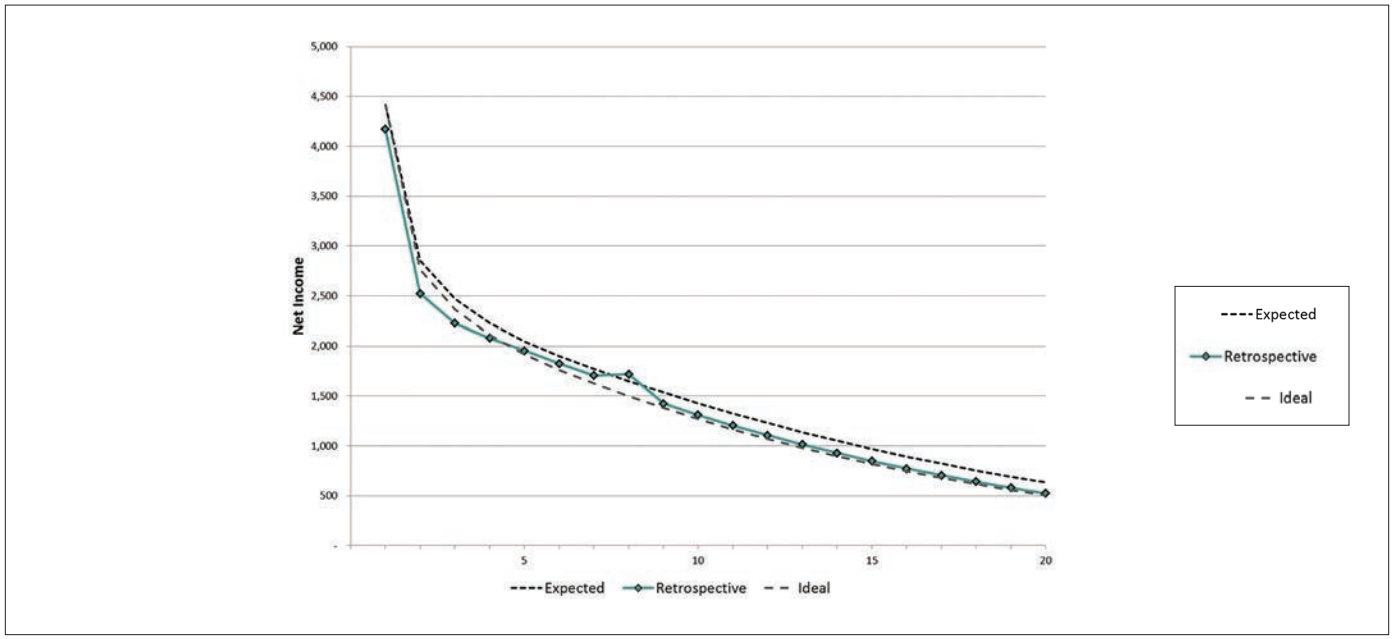
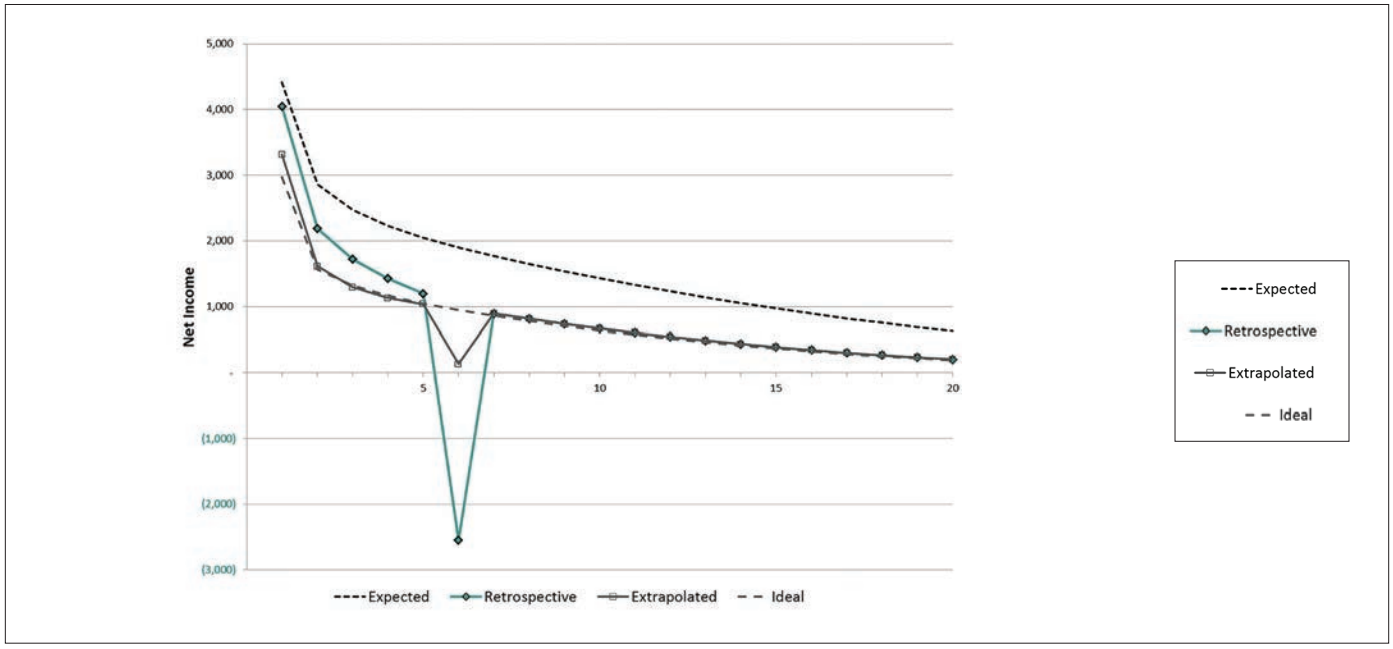


Figure 3
Persistent Adverse Lapse and Mortality



In Figure 2, lapses are higher than expected by 1 percent of the amount in force each year. Recognizing the pattern in year 8, we unlock the assumption.

In contrast to earlier illustrations of mortality, persistent lapse variances and the eventual assumption update have little effect on net income. Even if we could extrapolate from actual experience, we wouldn't see much benefit.

On a whole life contract, where surrenders affect cash flows immediately and far into the future, similar experience is even less significant to profit emergence. For the sample

whole life contract illustrated in the earlier articles, the difference between retrospective and ideal is too small to illustrate.

COMBINED LAPSE AND MORTALITY VARIANCES

Figure 3 (page 11) illustrates the effects of persistent adverse mortality and lapse variances, and of unlocking both assumptions in year six. Before the assumption change, only mortality is extrapolated; actual lapses are reflected as they occur.

Having seen insignificant distortions in applying the retrospective method to lapse variances, it should be no surprise that this looks much like December's Figure 3.

Given these illustrations, it seems likely that a formulaic extrapolation from actual lapse experience would cause more problems than it would solve.

PUTTING IT INTO PRACTICE

GAAP will not specify exactly when we should update our calculations for actual experience, except that we cannot delay beyond the annual assumption review.

Unlocking for universal life has shown us that not updating immediately for actual experience can create confusion by separating its effect on DAC (and SOP 03-1 reserves) from its effect on cash flow. If anything, the problem will get worse if applied to traditional contract reserves.

With unlocking 2.0, the reserve is less sensitive to excess claims and there is little to gain from an immediate update for actual claims. The net premium ratio, however, is more sensitive and frequent updates could add volatility to new disclosures.

To realize the benefits of unlocking 2.0 without adding volatility to the disclosures, I expect that many of us will find it best to hold the net premium ratio constant in between annual assumption reviews, updating it earlier only for especially large lapse variances. True up for actual experience, including the ratio of accumulated excess claims to accumulated basis[1], would be done only during the annual assumption review process. That would minimize disclosure volatility and have little effect on the reserve and net income. ■

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ENDNOTE

1 See PV (Excess Claims) in "Unlocking 2.0", *The Financial Reporter,* December 2017, page 30.

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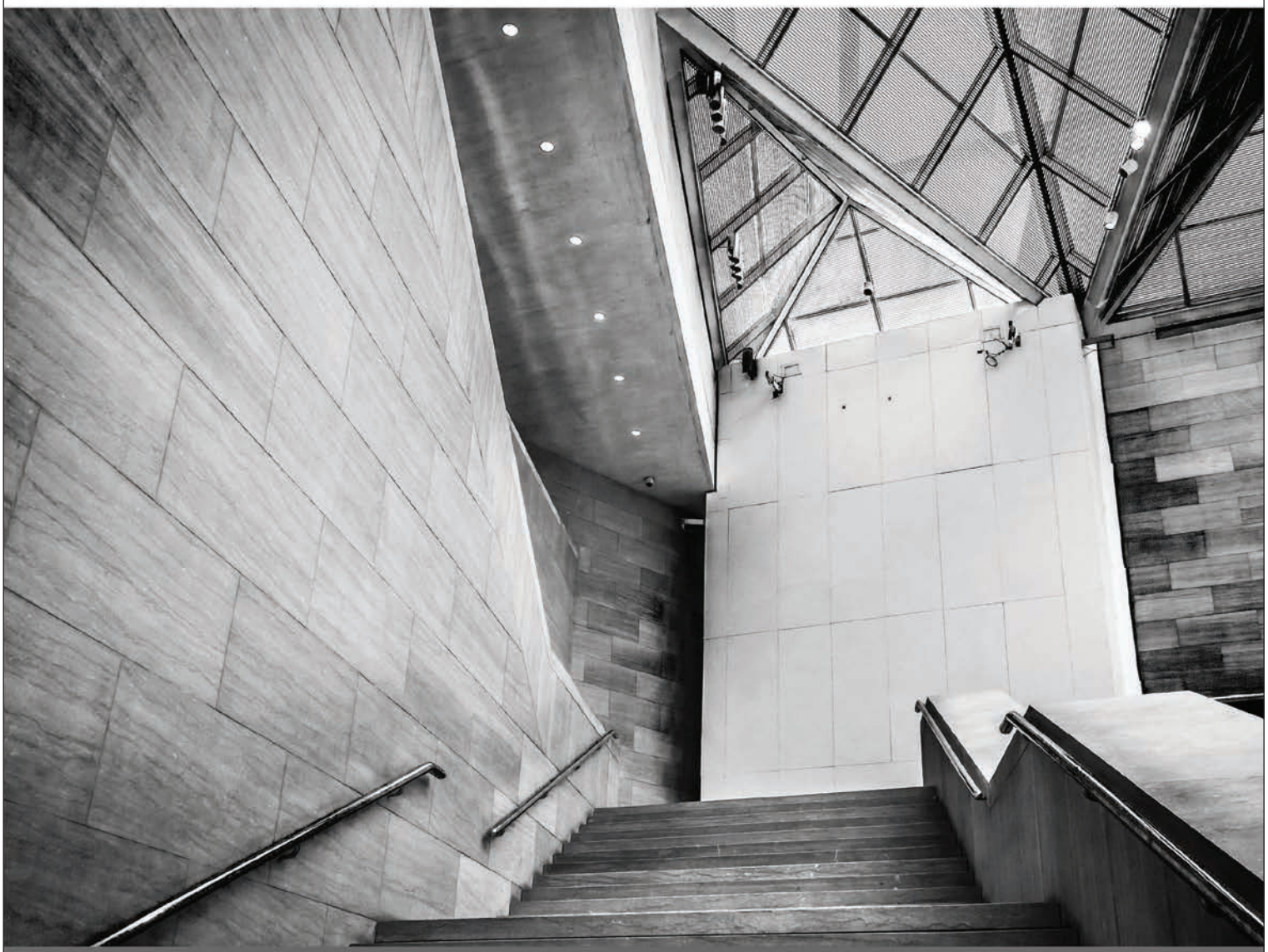

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Indexed Variable Annuities: The Next Product Frontier for the U.S. Annuity Market

By Simpa Baiye, Robert Humphreys and David Knipe

Editor's Note: This article first appeared in the February issue of Product Matters! *It is reprinted here with permission.*

Indexed variable annuities (IVAs)—also known as "structured" or "buffer" annuities—are a relatively new product that have drawn interest both among insurers and investors. IVAs have traits insurance companies and customers find attractive, but complex financial reporting and compliance considerations accompany them. In order for actual and potential issuers and other interested parties to better understand the nature of these products, we discuss in this article:

- product design,
- product engineering,
- issuance,
- asset-liability management, and
- accounting considerations across regulatory and GAAP accounting frameworks.

WHAT ARE INDEXED VARIABLE ANNUITIES?

Indexed variable annuities (IVAs) (also known as "structured" or "buffer" annuities) are a relatively new deferred annuity product. An IVA is essentially a deferred annuity that provides equity index-linked accumulation potential with some exposure to downside market performance. IVAs stand in contrast to fixed indexed annuities (FIAs), which provide limited exposure to positive index returns and no exposure to downside performance, and also to variable annuities, which provide full exposure to market performance. Figure 1 (page 15) demonstrates this design feature by illustrating periodic rates of return (or credited rates) for one IVA design relative to other types of annuities and for various levels of equity market returns.

IVA sales have grown steadily since their introduction to the U.S. annuity market in 2012. Industry sales figures in Figure 2 (page 15) point to growing market acceptance of these annuities. Anecdotal surveys indicate that sales growth has been driven by retirees and pre-retirees seeking more attractive accumulation opportunities relative to those offered by fixed annuities and fixed indexed annuities. We thus expect IVAs to feature more in insurers' product lineups in the near future.

IVA DESIGN

IVAs consist of crediting accounts for renewable terms wherein periodic interest credits (positive or negative) are linked to the performance of a reference equity index via a formula. The crediting formula places limits on upside performance that accrues and also provides defined limits on how negative performance is passed on to the contracts. Figure 3 (page 15) illustrates (assuming that the length of the crediting strategy term is one year) the crediting rate potential for three different crediting designs that are prevalent as of 2017. IVA 1 provides crediting rates that vary directly with the market and up to a predefined limit, along with negative credits that apply to the extent that the market drops below a defined level. IVA 2 provides crediting rates that vary directly with market returns up to a predefined limit with negative credits that both apply as markets drop and level off at a defined loss level. IVA 3 provides a fixed credited rate as long as market returns are zero or greater, along with negative credits that apply to the extent that the market drops below a defined level.

Early redemptions typically involve some upward or downward adjustment to the initial deposit for the interim value of index credits and also potentially for the market value of the bonds backing product reserves.

Traditional variable annuity subaccounts and fixed-rate accounts are often offered alongside IVA crediting options. In some instances, IVAs feature limited insurance guarantees such as guaranteed death benefits or waivers of otherwise applicable contingent deferred sales charges.

PRODUCT ENGINEERING

The financial building blocks for IVAs comprise a bond component and derivatives component made up of complementary positions in equity index options. For IVA strategy 1 illustrated in Figure 3, the IVA effectively consists of a zero-coupon bond, a European call option that is bought, and a European put option that is simultaneously sold. The call option provides the upside index potential, while the put option puts the bond investment at risk should index performance be negative. The performance of this structure is illustrated in Figure 4 under a variety of annual index return scenarios.

The decomposition in Figure 4 (page 16) helps clarify how insurers could manage IVA risks. It also provides a clear path towards interim redemption value calculations for policyholders.

Figure 1
Annuity Returns Comparison

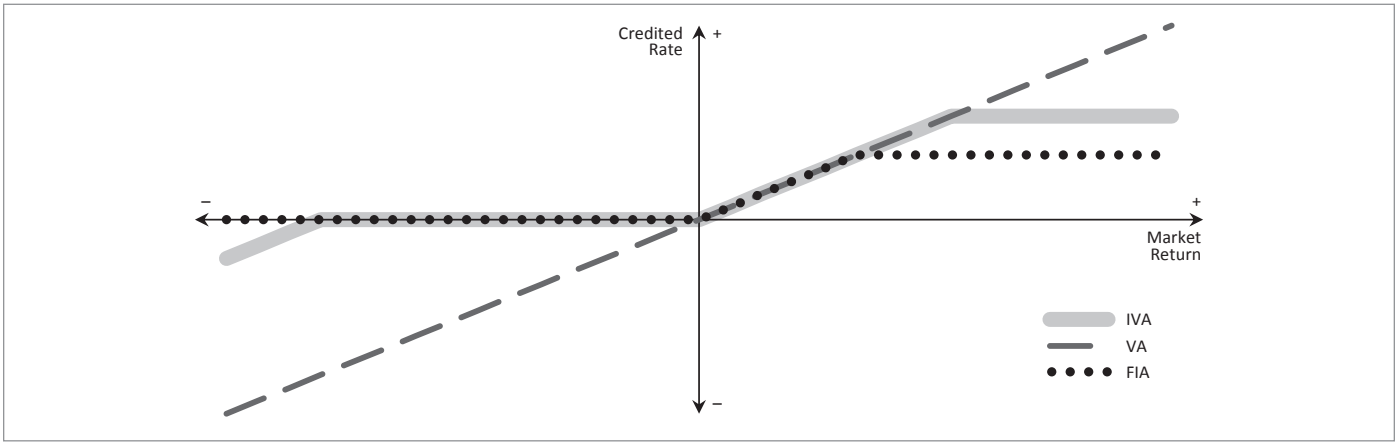
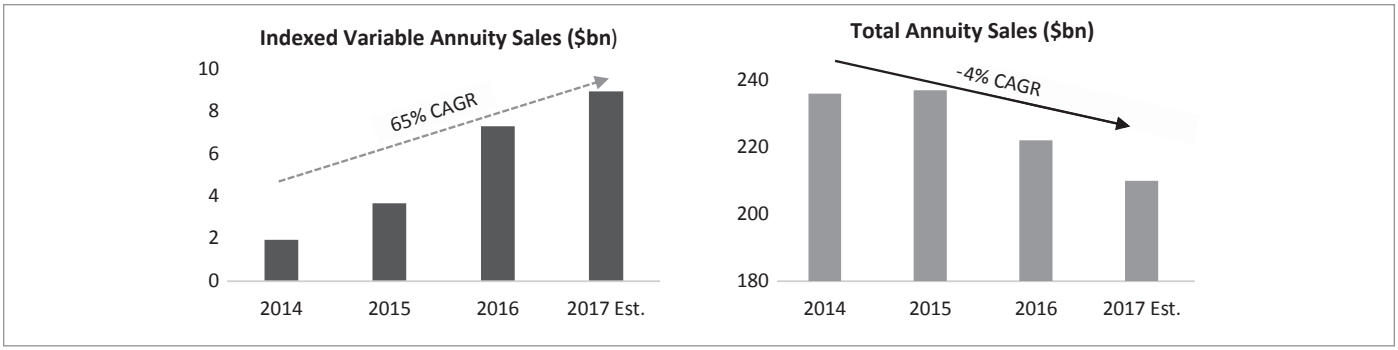


Figure 2
Annuity Sales by Year



Source: LIMRA Secure Retirement Institute

Figure 3
IVA Crediting Strategies

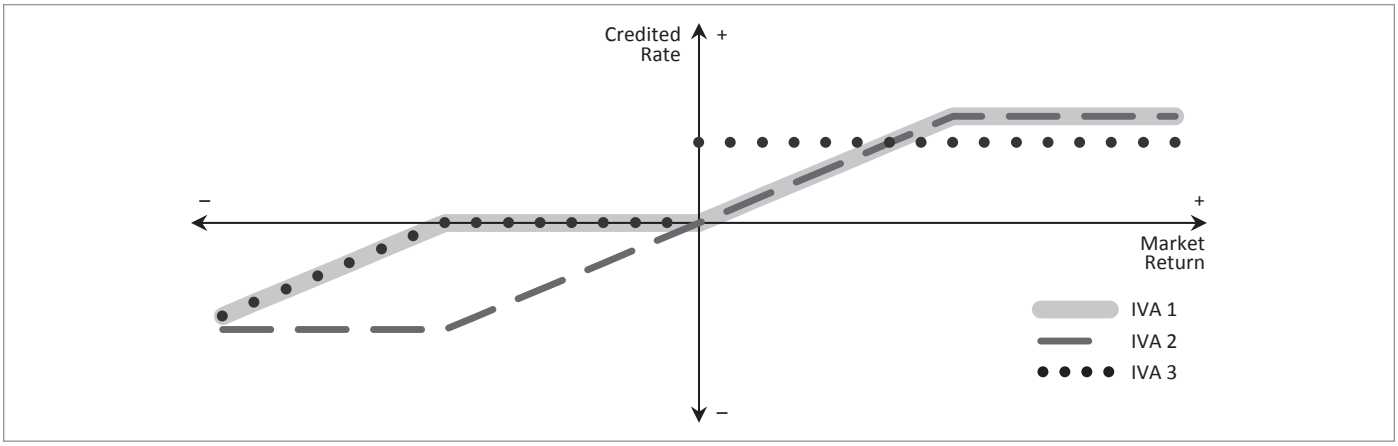
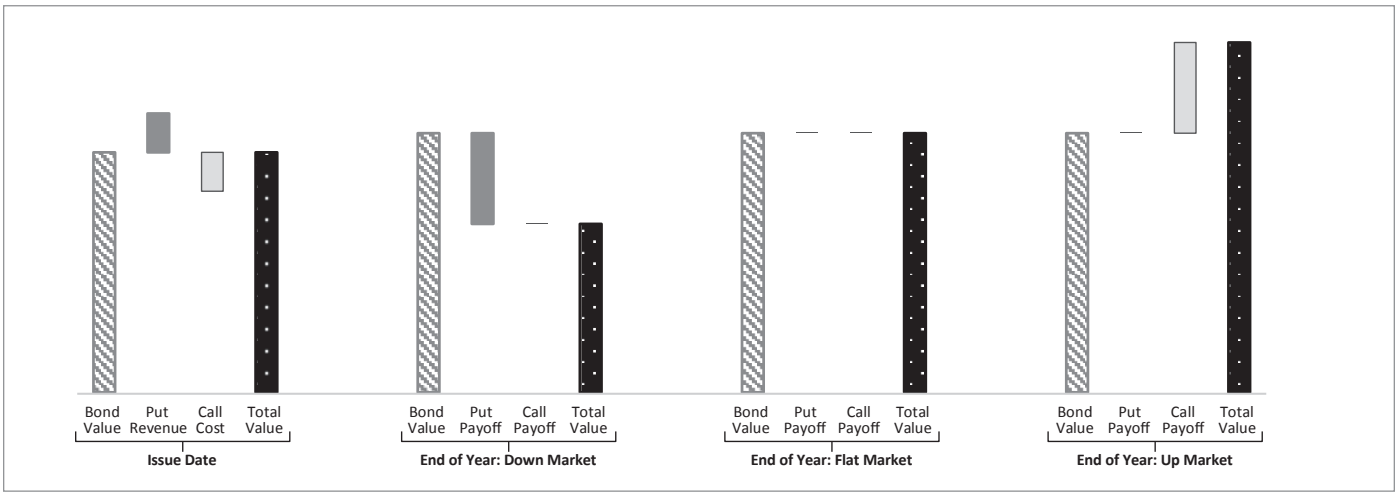


Figure 4
IVA Building Blocks



Insurer profit margins come from explicit product fees, spreads on investments made with premium deposits, and differentials (if any) between the revenue generated from the sale of derivatives (that provide downside exposure) in excess of purchase prices of options that provide upside market potential.

ASSET-LIABILITY MANAGEMENT

Bond Component

Insurers can hedge the bond component by investing contract deposits in fixed income securities. Fixed-income investments generate yield that accrues to the insurer and for which the insurer may take some credit, interest-rate, and liquidity risk. The duration, liquidity and credit risk of the bond investment should reflect product design, the likelihood of withdrawals and redemptions, and the ongoing need for collateral to back any derivatives traded to fund index-linked crediting.

Derivatives Component

Interest crediting can be hedged by simultaneously purchasing call options with the proceeds of a simultaneous sale of put options. The anticipated yield on fixed-income investments may also contribute towards the purchase of call options. Call options can be purchased on an exchange-traded or over-the-counter (OTC) basis.

Put options can be sold on both an exchange-traded or OTC basis to derivatives dealers. Put options could in theory also be traded internally to meet the demand for put options to support the hedging of existing variable annuity guarantee business.

Regulatory requirements can have a meaningful impact on the extent to which economic asset-liability management can be practiced. Regulation 128 in New York, as an example, effectively places constraints on investments made with IVA product deposits. Such regulatory limits on asset-liability risk tolerances could indirectly influence product design options and asset-liability management alternatives.

PRODUCT ISSUANCE

The statutory product form for an IVA would in most cases be a modified guaranteed annuity (MGA). MGAs are effectively deferred variable annuities which guarantee a rate of return only if held for a defined period. Modified guaranteed annuities are subject to regulations which impact (among other things) product features, the creation of guaranteed separate accounts for IVAs, and the market valuation of assets backing reserves.

Inherent in the product design for IVAs is the possibility that policyholders may lose part or all of their initial deposits at contract maturity. For this reason, IVAs require registration under the 1933 securities act. Issuance under securities laws is complemented by the establishment of non-unitized, guaranteed separate accounts which house assets backing reserves. These separate accounts need to comply with relevant state laws.

Transfers between the separate account and the insurer's general account (as permitted) can be used to fund reserve requirements, ongoing derivative collateral requirements, provide insurer margins, and pay policy benefits.

US STATUTORY ACCOUNTING

The valuation of IVA insurance liabilities under SAP involves classifying the product within the appropriate valuation framework. IVA product design and ancillary features could be subject to valuation under Actuarial Guideline 43 (AG43) for insurance entities not effectively domiciled in New York. However, AG43 guidelines do not provide explicit prescriptions for the valuation

of indexed variable annuities. As such, the specific path towards fulfilling valuation requirements would ideally consider both annuity minimum valuation standards and any conflicting interactions with economic asset-liability management. IVAs issued out of legal entities effectively domiciled in New York would have reserves computed in accordance with Regulations 151 and 128.

The valuation of investments backing IVAs in the separate account would be at market value, unless otherwise permitted by regulators. To the extent that reserves produced by the guideline do not share the same market sensitivity with assets backing the same, balance sheet volatility and redundancies may occur.

US GAAP ACCOUNTING

Valuation of IVA insurance liabilities under GAAP needs to take into account the embedded derivative inherent in the crediting design. As a result, ASC 815-15, which provides guidance on embedded derivatives, would apply and involve identifying the host contract and embedded derivative components of the product. The host contract would be accounted for as a debt instrument, typically at amortized cost, while the embedded derivative would be measured at fair value through income. An alternative method involves valuing the entire contract (both host contract and embedded derivative) using fair value principles by electing the Fair Value Option based on ASC 825, financial instruments.

Derivatives employed in hedging[1] the crediting option would be measured at fair value through the income statement. Fixed income investments backing the IVA contract would typically be classified as available for sale (AFS) or trading, or the fair value option could be elected. An AFS classification for fixed income securities involves recording unrealized gains or losses in other comprehensive income and would be least inconsistent with a host contract that is effectively measured at amortized cost, while a trading securities classification or the election of the fair value option for fixed income instruments and accounting for derivatives at fair value would be consistent with fair valuing of the entire annuity contract under ASC 825. A trading classification, or the election of the fair value option for the relevant fixed income securities would bring all realized and unrealized gains and losses into earnings.

IMPLICATIONS

Industry sales for indexed variable annuities should continue to grow as more insurers launch competing products in the growing IVA space. The design and risk-management approach for IVAs need to balance customer needs and insurer risk appetite.

Fixed income investments and margins from the trading of derivatives are key sources of profits for insurers. Accordingly, the optimal investment and derivatives-use strategy for an insurer will need to reflect product design and risk appetite, and requires detailed analysis.

A careful analysis of accounting and valuation approaches should occur with a clear view of the economic risk-management approach. This analysis will serve to minimize inconsistencies between GAAP and SAP accounting measures for both assets and IVA liabilities.

In conclusion, IVAs represent the next potentially sizeable opportunity for insurers to provide tax-deferred savings opportunities that meet the risk tolerances of a growing segment of pre-retirees. We anticipate continued product innovation in this space with the introduction of newer and more complex crediting designs. Product transparency will need to remain paramount as insurers manage legal and compliance risks that could come with the proliferation of these products.

For more information, please contact the authors of this article. ■

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ENDNOTE

[1] The above does not refer to a formal designation of the hedge relationship in accordance with ASC 815, Derivatives and hedging.

Asset Modeling Challenges for VM-20 Projections

By Ben Slutsker, Jason Kehrberg and Reanna Nicholsen

With the first year of the NAIC VM-20 transition period under the U.S. life insurance industry's belt, there has been significant focus on overcoming modeling challenges for principle-based reserve (PBR) valuation. In light of companies' efforts to turn the page from implementing point-in-time PBR reserves for statutory reporting to projecting PBR reserves at future dates, this article aims to unmask the technical challenges around asset modeling for projecting reserves. In the following sections, we will not only cover technical issues related to nested structures and inner and outer loops, but also profile challenges around projected starting assets, future hedges, negative reserves and modeling simplifications.

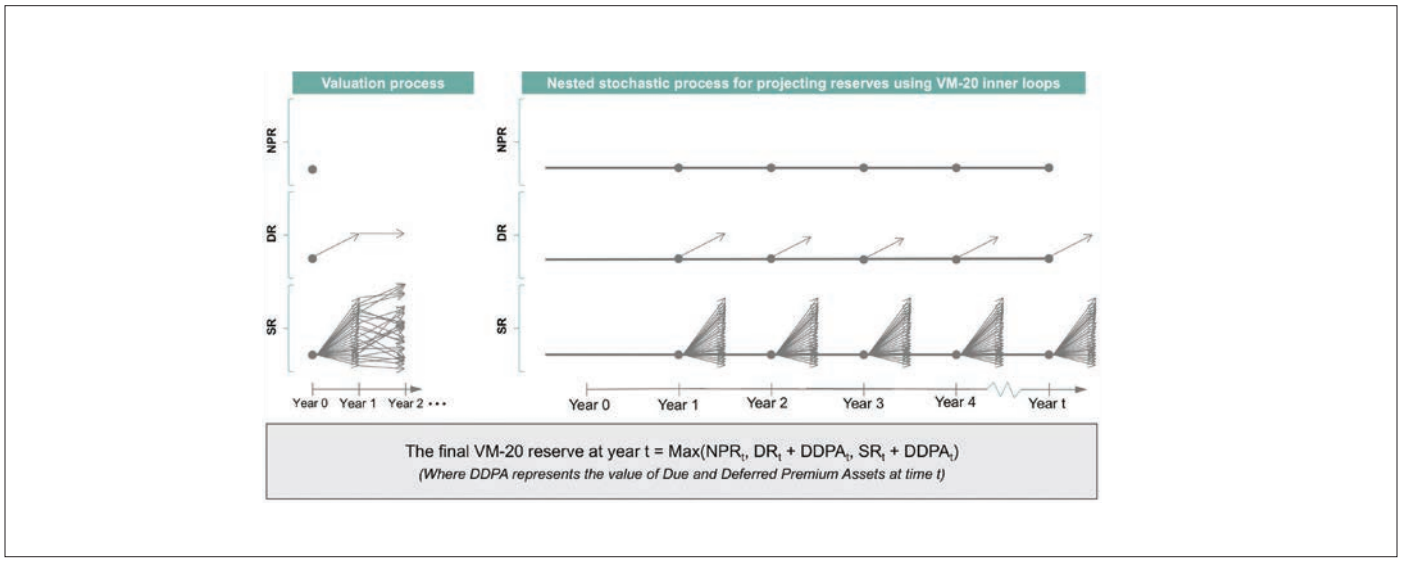
FUTURE RESERVE ASSUMPTIONS: INNER VS. OUTER LOOPS

A key challenge when projecting VM-20 deterministic reserves (DR) and stochastic reserves (SR) past the valuation date is that we do not know what prescribed scenarios and statutory valuation asset assumptions will be at future points in time. VM-20 prescribes these assumptions for calculating reserves at the valuation date, but not beyond.

Let's first consider the situation of projecting VM-20 cash flows for a time zero valuation. Starting Treasury rates and spreads are based on market values observed on the valuation date, and ultimate (baseline) spreads and default rates are based on historical market averages. Starting default rates are determined by adjusting baseline default rates for the difference between starting and ultimate spreads, with a final adjustment if the preliminary net spread for the entire portfolio exceeds a specified threshold.[1] VM-20 prescribes that initial spreads and default rates grade to ultimate values by the beginning of projection year four. Finally, future Treasury rates are generated from starting Treasury rates using the prescribed generator.[2]

Now let's consider the situation when projecting future VM-20 reserves for pricing, ALM and other internal forecasting exercises. A general nested stochastic approach to project reserves past the valuation date involves an outer loop projection based on experience assumptions set at company discretion, and sets of inner loop projections for each future valuation date based on valuation assumptions. These inner loop projections not only follow VM-20 requirements, but are also consistent with the market environment dictated by the outer loop on the future valuation date. In addition, each set of future inner loop projections is used to calculate a future VM-20 reserve for the outer loop projection. This concept is illustrated in Figure 1.

Figure 1
Nested Stochastic Approach for Projecting Reserves



How can we determine future valuation asset assumptions for Treasury rates, spreads and default rates that not only follow VM-20 requirements, but are also consistent with the market environment dictated by the outer loop?

An inner loop projection starts with the Treasury rates and spreads assumed by the outer loop at that point in time. The future Treasury rate scenarios can then be generated from the prescribed scenario generator using Treasury rates from the outer loop at that point in time. In addition, because the ultimate spread and baseline default rate assumptions are based on long-term historical market averages, some actuaries may find it reasonable to use the same ultimate spreads and baseline default rates that were prescribed at time-zero for all future projected valuation dates. Alternatively, others may prefer to modify these assumptions to better reflect the economic conditions in the outer loop at that time. Finally, once the baseline default rates for a future valuation date are determined, the corresponding initial default rates can be calculated using the process prescribed for the time zero valuation.

On top of developing processes for determining future valuation asset assumptions, there are also challenges related to embedding those processes within the projection model itself, which determines the assumptions needed in VM-20 reserve projections. For example, models may contain embedded processes for generating future Treasury rate scenarios. But are those processes consistent with the logic contained in the prescribed scenario generator? As another example, let's consider the process to determine starting default rates for future inner loop projections. Depending on the level of rigor desired, the model may need to recalculate each asset's weighted average life, option adjusted spread, and maximum net spread adjustment at each future valuation date.

Finally, cash flow models at many companies make use of external systems to project certain assets. However, there are challenges that must be overcome when using externally projected assets (EPAs) for future inner loop projections.

- If the cash flow model relies on importing EPA files produced by the external system, the volume of data and time spent handling it can be severe. A company can avoid this by using an application programming interface (API) approach, which allows the modeling platform to dynamically call the external system and read-in external asset projections as needed.

- To preserve specific calibrations, some external systems have limited functionality for overriding starting Treasury rates and market values. In such cases, projecting external assets for future inner loops may require starting at the beginning of the outer loop, using outer loop assumptions to project to the start of the inner loop, and using the inner loop assumptions thereafter.

STARTING ASSET COLLAR IMPLICATIONS

VM-20 requires that the aggregate annual statement value of starting assets, after deducting the pre-tax interest maintenance reserve (PIMR) balance, used to model the DR and SR must be at least 98 percent of the final modeled reserve and no greater than the maximum of 102 percent of the final modeled reserve, net premium reserve (NPR) and zero. Since VM-20 only applies to new business, in the early years of PBR valuation, the level of starting assets backing the modeled reserves may be substantially smaller than the actual asset portfolio if the portfolio also supports years of business that are outside the scope of PBR. This issue will recede over time as pre-PBR policies terminate, but initially can have several impacts on the projected asset portfolio used for point-in-time PBR valuations.

A low level of starting assets due to the asset collar leads to a larger portion of the portfolio being made up of future projected purchased assets over time. This affects the future asset mix of the projected PBR portfolio and may cause projected PBR portfolio rates to grade to scenario new money rates faster than the actual portfolio would grade in reality.

This will impact both the DR and SR. Under the gross premium valuation (GPV) method[3], the DR is sensitive to the portfolio rate, or net asset earned rate (NAER), because it is used to discount the DR cash flows. In a low interest rate DR scenario, the projected NAER will fall quickly, leading to a lower discount rate and a higher DR. The DR calculated using the direct iteration method (DIM), in addition to the SR, will also be sensitive to the interest rate environment in each scenario, as the investment income earned will be heavily dependent on new money rates. Furthermore, guardrails on the modeled investment strategy, such as requiring that fixed income reinvestment assets are no more favorable than public non-callable corporate bonds with a credit rating blend of 50 percent A2/A and 50 percent Aa2/AA (VM-20 Section 7.E), may drag down modeled portfolio yields when a large portion of the portfolio is made up of newly purchased assets.

How should a company manage the discrepancy between the projected modeled PBR portfolio and the expected actual portfolio? To produce reasonable projections with the modeled portfolio, a company must ensure that assumptions that rely on the portfolio rate are aligned with the modeled portfolio rates (e.g., crediting rates and competitor rates modeled as spreads off of the portfolio rate).

The starting asset collar requirement creates additional implementation complexities when a company projects future PBR

reserves. At the beginning of each inner loop projection, assets should once again be scaled to meet the starting asset collar requirement. Ideally, a company would project its entire block of business, comprised of PBR and non-PBR business, up to the projected valuation date, then scale assets to within the asset collar before beginning the PBR projection. However, simplifications may be made, such as modeling only the PBR business in the outer loop or not rescaling at the beginning of future inner loops.

MODELING OF DERIVATIVE PROGRAMS

VM-20 requirements for modeling derivative programs, covered in VM-20 Section 7.K, are also complex. They divide derivative programs into three types, each with its own requirements: clearly defined hedging strategies (CDHS), non-CDHS hedging programs, and non-hedging derivative programs. All existing derivative instruments already held to support liabilities on PBR policies must be modeled, but the treatment of future derivative instrument transactions will depend on the type of program into which the transaction falls, which can introduce modeling challenges.

CDHS

A company is required to model future derivative transactions associated with a CDHS. Furthermore, a company is required to calculate an SR for any group of policies for which there is at least one CDHS. An example of this may be an automated hedging program for an Index Universal Life (IUL) product.

Non-CDHS Hedging Programs

In contrast, a company is not permitted to model future hedging transactions that are not associated with a CDHS. Interestingly, VM-20 includes a guidance note mentioning that this requirement was added due to concerns that reserves could be unjustifiably reduced by including a hedging program that is not certain to be executed. However, the guidance note also indicates that excluding these hedging transactions may not be in the spirit of PBR. So while VM-20 requires excluding future non-CDHS hedging programs that decrease VM-20 reserves, it is unclear how to treat those that increase VM-20 reserves.

Non-Hedging Programs

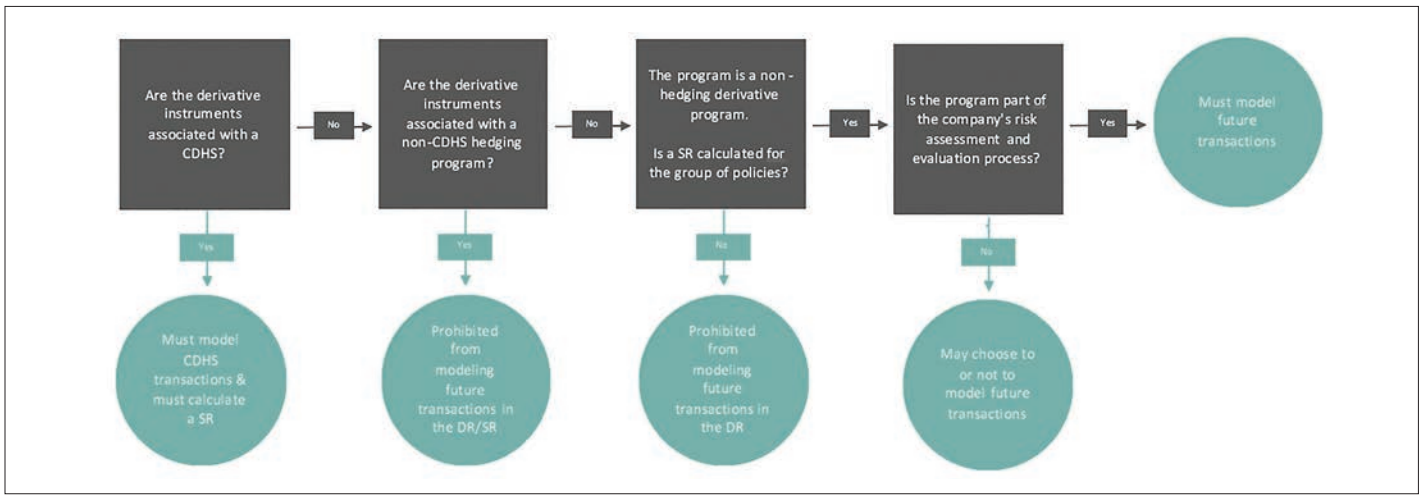
Finally, a company can model non-hedging derivative transactions in certain cases. If a group of policies is excluded from the SR requirements, future non-hedging transactions associated with those policies cannot be modeled for the DR as per VM-20 Section 4.A.5. However, if an SR is calculated and the derivative program is part of the company's risk assessment and evaluation process, future non-hedging transactions must be modeled.

These hedging requirements, summarized in Figure 2, impact a company's implementation of PBR. First, a company must be prepared to model an SR for any group of policies that employs a CDHS, even if it would otherwise be excluded from calculating an SR. As it may take company resources to implement the SR for the first time, valuation actuaries must know in advance if a CDHS will be added to a group of policies. Additionally, as hedging programs that are not part of a CDHS cannot be modeled, modeled reserves may differ from what the actual investment strategy would indicate. However, companies should monitor changes to VM-20 over time, as the restrictions on modeling hedging programs could change as the industry and regulators become more comfortable with PBR.

NEGATIVE ASSET CONSIDERATIONS

As stated, the starting assets must be at least 98 percent of the final modeled reserve and no greater than the maximum of 102

Figure 2
Modeling Future Derivative Programs in VM-20



percent of the final modeled reserve, NPR and zero. So what happens when the final modeled reserve is negative?

In the case of negative modeled reserves, a company can avoid modeling negative starting assets by flooring at zero. However, if the company chooses, starting assets may be negative if no less than 98 percent of the final modeled reserve. But why would a company choose to model negative starting assets? Intuitively, assuming higher starting assets will generate more investment income and lower the SR[4]. However, if the DR prevails, then if new money rates are expected to increase, there may be incentive to grade into new money more quickly at the onset of PBR implementation.

Note that negative modeled reserves may be a common situation. Several analyses, such as the SOA VM-20 Product Development Report[5], show examples of a negative DR for term products in early durations. Even if modeled reserves are negative, the final PBR reserve will always be floored at the NPR, which in turn is floored at the cost of insurance.

There are not only considerations for negative starting assets, but also for negative future assets. Starting assets must either cover the liquidation of benefit and expense payments (DIM) or be set within the required range of the final reserve level (GPV method). In both cases, there are roughly zero assets remaining by the end of the projection. However, in theory, there may be multiple numerical solutions to this constraint. For instance, there may be a numerical solution in which assets become negative before returning to zero. In this situation, as invested assets approach zero, the NAER calculated for the GPV method may artificially inflate as the denominator decreases. This could produce an unreasonable DR level. Companies may avoid this for the GPV method by implementing guardrails, such as ensuring the NAER is never more negative than the borrowing rate or never more positive than a specified yield.

POTENTIAL MODEL SIMPLIFICATION TECHNIQUES

As outlined in this article, there are many complications for projecting future PBR reserves. Since projected reserves are not for reporting purposes, what simplifications can companies use? Below are common approaches:

- Proxy Estimate: Companies can express the DR and SR as percentage factors of the NPR or the gross premium reserve (GPR) using best estimate assumptions. Using the NPR as a proxy may be crude if the NPR reserve pattern varies significantly from modeled reserves. The GPR using best estimate assumptions may serve as a better proxy for modeled reserves, since it represents an "un-margined" DR. If the GPR assumes best estimate assumptions, then there is no split between inner and outer loops, making it easier to project at future points.
- Reduced Scenarios/Policies: Use a subset of the population or, for the SR, a subset of scenarios.
- Reduced Durations: Project reserves at periodic durations, such as every five years, and then interpolate between. This will reduce model run-time.
- Asset Simplifications for Non-Interest-Sensitive Business: For products that are not sensitive to economic risk (for example, short liability duration products such as term), assets may not need to be modeled. Instead, a moderately adverse constant discount rate can be assumed.
- Investment Strategy Guardrail Demonstration: For situations in which the portfolio contains a material amount of callable bonds, the company may consider comparing the average credit quality of a portfolio's fixed income assets to the VM-20 guardrail of 50 percent AA/50 percent A public

Negative modeled reserves may be a common situation.

non-callable guardrail rather than projecting reserves twice to see which is higher.

CONCLUSION

With VM-20 inching closer, companies should feel encouraged to go beyond the day one big picture items, and explore the vast terrain of nitty-gritty details required for PBR projections. While projecting reserves at future valuation dates may not be critical for point-in-time statutory reporting, this capability assists companies in conducting business forecasting, pricing and modeling economic capital in a post-PBR world. ■

The views reflected in this article are the views of the authors and do not necessarily reflect the views of their employers.

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ENDNOTES

1 The process for determining starting default rates on fixed income assets with an NAIC designation is prescribed in VM-20 Section 9.F.1. If an asset does not have a PBR credit rating then prescribed spreads and defaults cannot be determined and its net yield is capped at 104% of the corresponding Treasury rate plus 25 basis points, as prescribed in VM-20 Section 9.F.5.

2 VM-20 Appendix 1 provides details on the prescribed scenario generator, which is available in spreadsheet form on the SOA's website at www.soa.org/tablescalcs-tools/research-scenario/.

3 VM-20 Section 4.B (direct iteration method) describes an approach in which companies may solve for starting assets that result in the liquidation of future benefits and expenses. Section 4.A (gross premium valuation method) also provides an alternative approach of net asset earned rate (in compliance with the starting asset requirement in Section 7.D.2 in VM-20) to discount projected cash flows for the reserve calculation. The two approaches should result in solutions that are close, but may not be equal.

4 The stochastic reserve accumulates starting assets at the projected portfolio rate and then discounts cash flows at 105% of the 1-year treasury, per VM-20 Section 7.H.4, before subtracting the initial starting asset amount. Therefore, the spread of the excess of the portfolio rate over the discount rate on starting assets results in a decrease to stochastic reserves.

5 Keating, Jacqueline. Fedchak, Paul. Rudolph, Karen. Sobel, Uri. Steenman, Andrew. Stone, Rob. Impact of VM-20 on Life Insurance Product Development, Society of Actuaries. Pages 20-21. November 2016. https://www.soa.org/Files/Research/Projects/2016-impact-vm20-life-insurance-product.pdf.

Leveraging X-factor Testing Techniques in Developing Mortality Assumptions for VM-20

By Jeffrey R. Lortie and Ying Zhao

VM-20 requires prudent estimate assumptions that are based upon a combination of company experience, industry basic tables and prescribed margins. VM-20 has requirements on how company experience is defined, and also requires that additional margins be established if the actuary does not consider the prescribed margins to be adequate. The use of company-based assumptions for statutory valuation and performance of certain tests on that mortality have been in place since Regulation XXX became effective, and some of the tools used within X-factor testing can be leveraged for use with VM-20. In this article, we will connect VM-20 to Regulation XXX and repurpose some of the techniques that actuaries have been using for X-factor testing to aid in setting VM-20 mortality assumptions.

REVIEW OF VM-20 AND REGULATION XXX

Requirements for Principle-Based Reserves for Life Products (VM-20) took effect for direct writers on Jan. 1, 2017, with the adoption of the Valuation Manual. VM-20 contains a three-year transition period so that by Jan. 1, 2020, all newly issued policies must be valued in accordance with VM-20. Generally speaking, VM-20 implementation is (or will be) a long and strenuous process, requiring a great deal of rigor, judgment and documentation. One of the many challenges companies face is the development of prudent estimate mortality assumptions as required in Section 9.C. In addition to the mechanical requirements, VM-31 (which includes requirements for disclosures of assumptions within the PBR Actuarial Report) and VM-G (which covers corporate governance regarding principle-based reserves) bring assumption-setting for booked statutory reserves under greater scrutiny.

Assuming mortality segments have been defined, the prudent estimate mortality assumption process can be summarized in a few steps, as is done in Section 9.C.1:

1. Develop company experience mortality rates,
2. determine industry basic table to which company experience mortality rates will grade,
3. determine credibility of underlying company experience,
4. determine prescribed margins and
5. blend company experience mortality rates and industry basic table according to grading period determined.

While several aspects of the prudent estimate mortality assumption are prescribed (selection of industry basic table, margins, grading), the process of determining company experience mortality rates according to Section 9.C.2 is less rigidly defined. However, there are several governing requirements outlined within VM-20:

- Annual Assumption Review and Validation via Statistical Testing

  From 9.A: "The company shall use its own experience, if relevant and credible, to establish an anticipated experience assumption for any risk factor…

  The appointed actuary shall annually review relevant emerging experience for the purpose of assessing the appropriateness of the anticipated experience assumption. If the results of statistical or other testing indicate that previously anticipated experience for a given factor is inadequate, then the appointed actuary shall set a new, adequate, anticipated experience assumption for the factor."

- Company Experience Mortality Rates used in VM-20 are at or greater than best estimate

  From 9.C.2.c: "The company experience mortality rates shall not be lower than the mortality rates the company expects to emerge which the company can justify and which are disclosed in the PBR Actuarial Report."

- Further analysis required to determine if the prudent estimate mortality assumption is sufficient

  From 9.C.5.d: "The prescribed margin percentages shall be increased, as appropriate, to reflect the level of uncertainty related to situations …" ASOP 52, Section 3.4.6, further clarifies:

  "a. Mortality Margins—Section 9 of VM-20 prescribes the margins that are to be added to the anticipated experience mortality assumptions but also requires the establishment of an additional margin if the prescribed margin is inadequate. The actuary should use professional judgment in determining such additional margin. The guidance in the remainder of this section on determining assumption margins does not

apply to the prescribed mortality assumptions but does apply when determining additional margins for mortality.

"b. Establishing Margins—For each assumption that includes a margin, the actuary should reflect the degree of risk and uncertainty in that assumption in determining the magnitude of such margin. When determining the degree of risk and uncertainty, the actuary should take into account the magnitude and frequency of fluctuations in relevant experience, if available. In doing so, the actuary should consider using statistical methods to assess the potential volatility of the assumption in setting an appropriate margin."

There are direct connections between the wording of VM-20 and Regulation XXX regarding the assessment of the appropriateness of the company experience assumptions. Section 5B(3)(g)(iii) of Regulation XXX calls for review of continued appropriateness of X-factors taking into account relevant emerging experience, a method generally known as "retrospective testing," which aligns to the wording in Section 9.A of VM-20. Section 5B(3)(c) of Regulation XXX provides the requirement that mortality rates over a period of time from the valuation date must exceed company best-estimate (which, when combined with other requirements spelled out in Regulation XXX, comprise "prospective testing"), comparable to the wording in Section 9.C.2.c of VM-20. The retrospective testing might also help the actuary understand the volatility around the company experience mortality rates, which is helpful in understanding the appropriateness of prescribed margins outlined in Section 3.4.6(a) of ASOP 52.

REVISITING X-FACTOR TESTING TECHNIQUES

In the context of Regulation XXX, retrospective testing provides insight as to whether or not emerging experience supports the use of a particular set of X-factors. Typically, the test involves building a statistical distribution of claims based upon the X-factors being tested and determining whether actual claim experience is an outlier in that distribution, generally at or above the 95th percentile. Similarly, building a statistical distribution of claims may be useful for VM-20. By generating a claim distribution where the expectation is based upon a proposed set of company experience mortality rates, the actuary can benchmark where actual experience lies on the distribution to assess appropriateness of the proposed rates. In addition, the actuary may assess volatility, distinguish fluctuation from a change in trend of emerging experience, or identify the percentile ranking of claims emerging according to the prudent estimate mortality to determine whether additional margins are needed according to Section 9.C.5.d of VM-20.

Two tools, prevalent in X-factor testing, are used to build out the claim distribution. The Panjer recursive method is an algorithm designed to build a distribution based upon grouped data (e.g., face amount bands), and has the advantages of being formulaic and repeatable (which auditors and reviewers appreciate). The distribution is initialized with the probability of zero claims and builds from there. The reader is directed to a pair of write-ups that are of great value: the original article[1] by Harry H. Panjer which develops the method, and a later article[2] by Lloyd Spencer which provides an excellent illustrative example.

The other tool, Monte Carlo simulation, is based on randomly generated numbers and can better emulate the true distribution if given enough trials and seriatim data. For each policy, within a single trial, a random number is drawn between 0 and 1. If the random number is less than the mortality rate for that policy, then a death is assumed to occur, and the sum of the deaths across all policies provides the claims for a single trial. Then, the process is repeated for a particular number of trials, usually a number large enough so that the randomness of the number generation does not materially alter the result (typically 10,000). Results are then ordered and the distribution created. While the Monte Carlo method is possibly a better representation of the true claim distribution, at least if done at a seriatim level to capture individual policy expected mortality, it is calculation-intensive and more challenging to audit due to its random number generation.

Within the Regulation XXX framework, prospective testing is a two-step test to determine if X-factor mortality is at least as great as best estimate. Starting with the in force policies subject to XXX as of a particular date, the following calculations are performed, using both X-factor and best-estimate mortality (without mortality improvement beyond the valuation date):

- Calculate the actuarial present value of future death benefits to the end of the first segment per policy and
- calculate mortality rates without recognition of mortality improvement beyond the valuation date, in each of the first five years after the valuation date.

In both steps, the metric computed using X-factor mortality must exceed the same metric based upon best-estimate. Translating to VM-20, the actuary could perform similar tests, projecting out to the point where the prudent estimate is fully dependent upon the industry-basic table (i.e., after the grading has completed), which could cover the requirement of Section 9.C.2.c of VM-20 by comparing the mortality rates based upon the company experience mortality rates to best-estimates to ensure that the former rates exceed the latter. The actuary could also use this technique to confirm that the prudent estimate mortality rates (post-grading) exceed best-estimate, especially in later projection years, where old-age mortality assumptions are commonly graded to industry averages.

CONCLUSION

Establishing prudent estimate mortality assumptions under VM-20 is a long and complex process. Having the ability to generate company experience mortality rates, creating a mechanism to determine the validity of these assumptions, and developing a manner in which to benchmark the prescribed mortality margins for adequacy, will be critical components of the VM-20 process. While still a significant undertaking, techniques from Regulation XXX can be repurposed to address these challenges. ■

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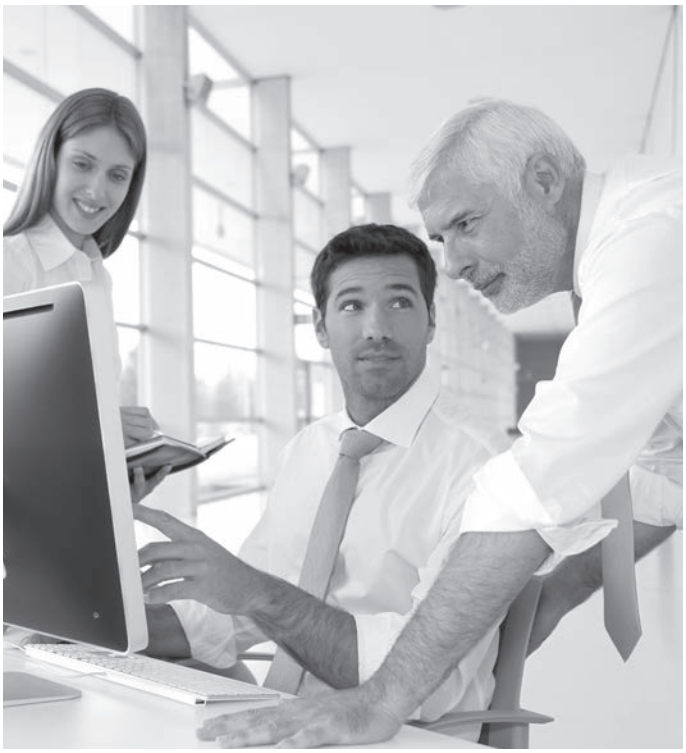
ENDNOTES

1 "The Aggregate Claims Distribution and Stop-Loss Reinsurance" published in the Transactions of the Society of Actuaries, Volume XXXII, 1980, pages 523–545.) *https://www.soa.org/library/research/transactions-of-society-of-actuaries/1980/january/tsa80v3215.pdf*

2 "An Overview of the Panjer Method for Deriving the Aggregate Claims Distribution," Lloyd Spencer *http://www.actuary.org/pdf/external/panjer_spencer.pdf*

IFRS 17 Variable Fee Approach

By Tze Ping Chng, Steve Cheung and Anson Yu



After a very long journey, the International Accounting Standards Board (IASB) issued IFRS 17 Insurance Contracts (IFRS 17). IFRS 17 replaces IFRS 4 that was issued in 2004. The overall objective is to provide a more useful and consistent accounting model for insurance contracts among entities issuing insurance contracts globally.

GENERAL MODEL AND VARIABLE FEE APPROACH

The IASB introduces a general accounting model (GM, previously called building-block-approach) for the insurance contract liability measurement.[1] In order to cater to the unique features of insurance contracts with direct participation features, IFRS 17 provides for a specific approach called the variable fee approach (VFA). Insurance contracts with direct participation features (or "direct participating contracts") are insurance contracts that are substantially investment-related service contracts under which an entity promises an investment return based on underlying items. These may be regarded as creating an obligation to pay policyholders an amount that is equal to the fair value of the underlying items, less a variable fee for service.

Table 1
Differences between GM and VFA

Measurement model	Changes in fulfilment cash flows (FCF) due to the changes in financial variables	Insurance finance income or expenses
GM	All changes in discount rates and other financial variables are reported in the statement of comprehensive income	The interest expenses on the contractual service margin (CSM) are explicitly accreted using rates at the initial recognition of the contracts
VFA	CSM is adjusted to reflect the changes in the variable fee, which includes some changes in discount rates and other financial variables	The interest expenses are implicit in the changes in the insurer's variable fee

VFA is a modification of GM in order to reflect the nature and economics of these direct participating contracts. Table 1 summarizes the key differences between GM and VFA.

VFA ELIGIBILITY CRITERIA

The IASB made it clear that only insurance contracts with direct participation features are eligible for the VFA, but significant judgment is required to assess the VFA eligibility, as outlined in paragraph B101 and BC238.

Insurance contracts with direct participation features are insurance contracts for which, on inception:

a. the contractual terms specify that the policyholder participates in a share of a clearly identified pool of underlying items; (VFA criteria I)

b. the entity expects to pay to the policyholder an amount equal to a substantial share of the fair value returns from the underlying items; (VFA criteria II) and

c. the entity expects a substantial proportion of any change in the amounts to be paid to the policyholder to vary with the change in fair value of the underlying items. (VFA criteria III)

KEY CONSIDERATIONS FOR LIFE INSURERS

With the significant judgment required for the VFA eligibility assessment, we expect these to be part of the key issues to be discussed by the Transition Resource Group (TRG). Below are some evolving questions we observed from the market.

1. What is a clearly identified pool of underlying items?

The pool of underlying items can comprise any items, for example a reference portfolio of assets, the net assets of the entity, or a specified subset of the net assets of the entity, as long as they are clearly identified by the contract. An entity need not hold the identified pool of underlying items because the measurement of insurance contracts should not depend on what assets the entity holds. The underlying items do not need to be a portfolio of financial assets. They can comprise items such as the net assets of the entity or a subsidiary within the group that is the reporting entity.

2. What is the definition of "contract" and "contractual terms" when defining the clearly identified pool of assets?

A contract is an agreement between two or more parties that creates enforceable rights and obligations. Enforceability of the rights and obligations in a contract is a matter of law. Contracts can be written, oral or implied by an entity's customary business practices. Contractual terms include all terms in a contract, explicit or implied. Implied terms in a contract include those imposed by law or regulation.

There are certain features which may not satisfy VFA criteria I: (i) different portfolios of participating contracts (direct or indirect) share the same fund with notionally separated assets in the entity's general account, and (ii) the segregation of assets are only managed internally without enforceability or proper disclosure to the policyholders. While "ring-fenced-asset" may better meet this criterion, there are also discussions if the "accounting designation" or "entity's governance framework and disclosure" meet this criterion. Advocates argue that commercial communication, i.e., materials presented or disclosed to the policyholders, can form part of the enforceability and the entity should consider these factors for the assessment of clearly identified pool of assets. In any case, the definition of the "underlying items" should be documented clearly, and the entity cannot change the underlying items with retrospective effects.

3. Does "a share of a clearly identified pool of underlying items" preclude the entity's discretion to vary the amounts paid to the policyholder?

No, but the link to the underlying items must be enforceable.

4. How to interpret the word "substantial" in VFA criteria II and III?

> The IASB made it clear that only insurance contracts with direct participation features are eligible for the variable fee approach, but significant judgment is required to assess the VFA eligibility.

The IASB does not provide a concrete definition for the term "substantial" as noted in the VFA criteria II and III. This is to allow entities to apply IFRS 17 for their particular circumstances without being limited by any quantitative rules. We expect that market consensus will converge with potential help from TRG discussion. However, a range of sharing percentages may still be expected from various jurisdictions due to different product offerings, and comparability with the fee structures of the investment products offered. An individual entity needs to perform its own assessment, and verify its conclusion with its respective auditor.

5. What is the "variable fee"?

A variable fee that the entity will deduct in exchange for the future service provided by the insurance contract, comprises: (i) the entity's share of the fair value of the underlying items; less (ii) fulfilment cash flows that do not vary based on the returns on underlying items. Contracts eligible for VFA should specify a determinable fee which can be expressed as a percentage of portfolio returns or asset values rather than only as a monetary amount. Without a determinable fee, the share of returns on the underlying items the entity retains would be entirely at the discretion of the entity, and this would not be consistent with that amount being equivalent to a fee.

ILLUSTRATIVE EXAMPLE

A simple five-year investment-linked product is created to illustrate the CSM differences between VFA and GM, with the projection given in Table 2:

- Death benefit (sum assured) = fixed 500 + account value (AV),
- maturity benefit = AV,
- level annual premium = 500,
- 2 percent asset management charge (AMC),
- cost of insurance charge (COI charge) and
- 100 identical policies issued.

Table 2
Assumed projected cash flows and AV

Projected best estimate cash flows (BECFs) for 100 policies at inception						
BE projection/Year	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Yr6**
No. survival(BOY)	100	99	97	94	90	85
No. deaths(EOY)	1	2	3	4	5	
No. survival(EOY)	99	97	94	90	85	
Premium(BOY)	50,000	49,500	48,500	47,000	45,000	-
Commission(BOY)	5,000	2,475	970	-	-	-
Expense(BOY)	200	198	194	188	180	-
Death outgo(EOY)	1,000	3,030	6,186	10,638	16,667	-
Survival outgo(BOY)	-	-	-	-	-	240,833
Net CF	43,800	43,797	41,150	36,174	28,153	(240,833)
Projected policyholder AV (PHAV) for 100 policies at inception						
PHAV(BOY)	-	49,500	98,470	146,814	194,362	
Premium(BOY)	50,000	49,500	48,500	47,000	45,000	
COI charge(BOY)	(500)	(1,000)	(1,500)	(2,000)	(2,500)	
Investment income(EOY)	1,490	4,460	8,940	15,022	22,876	
AMC(EOY)	(990)	(1,960)	(2,909)	(3,836)	(4,737)	
Death outgo from PHAV(EOY)	(500)	(2,030)	(4,686)	(8,638)	(14,167)	
PHAV(EOY)	49,500	98,470	146,814	194,362	240,833	

Table 3 summarizes the key steps in calculating the initial and subsequent CSM under GM as follows:

1. FCF and initial CSM are the same under both GM and VFA. In this example, the cash flows for the FCF calculation are based on the BECFs with the following assumptions: (i) directly attributable expenses = 100% BE expenses, and (ii) investment component = death and survival outgo supported by PHAV.

2. FCF is the PV of the risk adjusted cash flows which includes best estimate liability (BEL) and risk adjustment (RA). The discount rate (initial DR) is assumed to be the PHAV growth rate (which in this example is the risk-free yield curve). Initial CSM is the unearned profit at inception and is equal to the negative of FCF floored by zero. For simplicity, RA is assumed to be zero.

3. The number of coverage units in a group is the quantity of coverage provided by the contracts in the group, determined by considering for each contract the quantity of the benefits provided under a contract and its expected coverage duration. In this example, it is assumed to be **the number of policy in force * sum assured (including AV).**

4. The BOY CSM is accreted with interest (at initial DR), and then amortized according to the coverage unit pattern.

Table 3
CSM under GM

Step (1): CFs for FCF calculation						
	Inception	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**
Premium	50,000	49,500	48,500	47,000	45,000	-
Commission & Expense	(5,200)	(2,673)	(1,164)	(188)	(180)	-
Survival outgo	-	-	-	-	-	(240,833)
Death(ins component)	-	(500)	(1,000)	(1,500)	(2,000)	(2,500)
Death(inv component)	-	(500)	(2,030)	(4,686)	(8,638)	(14,167)
Net CF (NCF)	44,800	45,827	44,306	40,626	34,182	(257,500)

Step (2): FCF calculation						
BEL	(3,200)					
RA	-					
FCF	(3,200)					
Step (3): Coverage unit						
NOP		100	99	97	94	90
SA		1,000.0	1,515.2	2,061.9	2,659.6	3,333.3
Coverage unit		100,000	150,000	200,000	250,000	300,000
Step (4): CSM under GM						
CSM(BOY)		3,200	2,913	2,472	1,858	1,047
Interest accretion		96	133	152	146	101
Amortization		(383)	(574)	(765)	(957)	(1,148)
CSM(EOY)		2,913	2,472	1,858	1,047	-

Table 4 summarizes the key steps in calculating the initial and subsequent CSM under VFA as follows:

5. The variable fee that the entity will deduct from fair value of the underlying items in exchange for the future service provided, comprises: (i) the entity's share of the fair value of the underlying items; less (ii) fulfilment cash flows that do not vary based on the returns on underlying items.

    a. The entity's share of the fair value of the underlying items is assumed to be the cash flows paid to the entity including the COI charge and AMC. The initial balance as of inception is the present value of the related cash flows (at initial DR). The beginning of year balance is accreted with interest (at initial DR), and then adjusted by the amount paid to the entity.

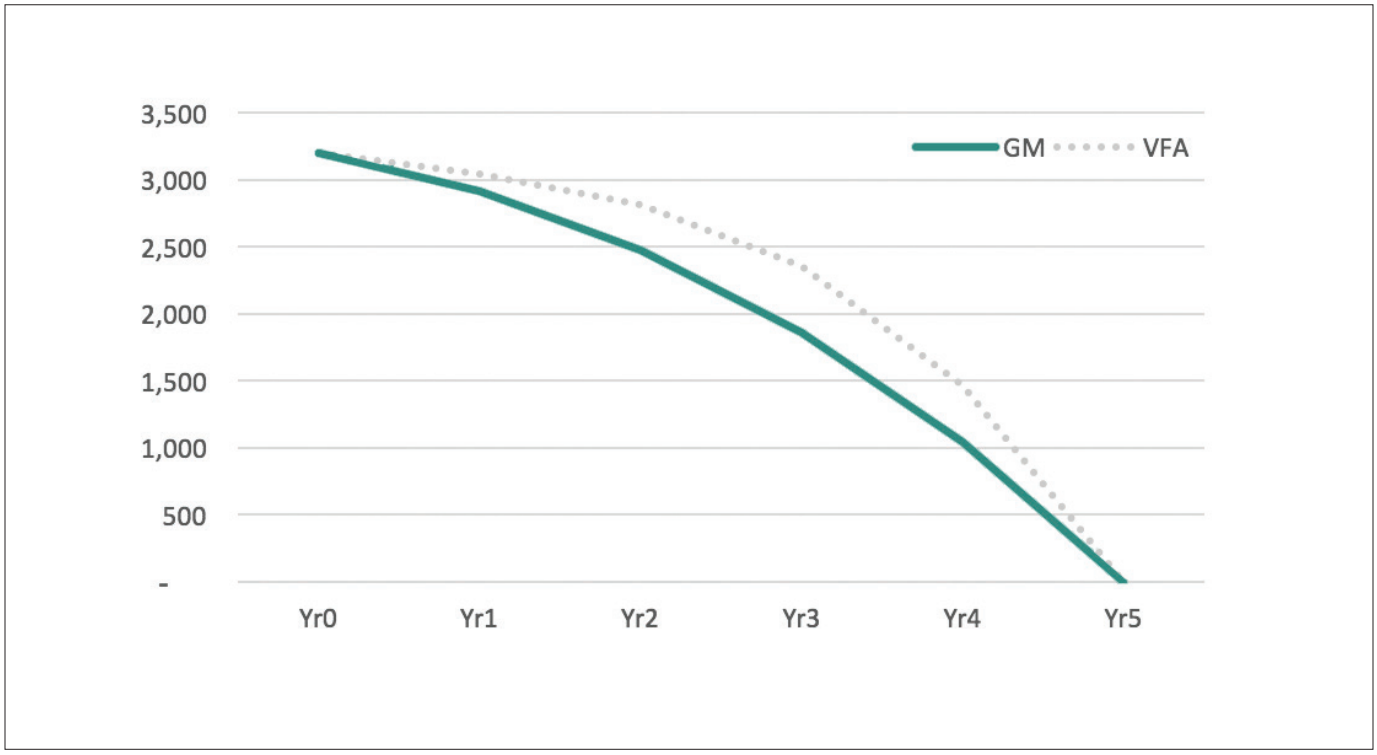
    b. FCF that do not vary based on the return on underlying items are assumed to be the cash flows paid by the entity including the commission, expenses and death outgo (insurance component). The initial balance as of inception is the present value of the related cash flows (at initial DR). The beginning of year balance is accreted with interest (at initial DR), and then adjusted by the amount paid by the entity.

6. The initial CSM is the same under VFA and GM. Figure 1 illustrates that the emerging patterns of CSM are different between the two models. CSM is amortized according to the coverage unit pattern under GM while it is affected by the fair value of the underlying items and the cash flows paid to or by the entity under VFA. The CSM amortization approach under VFA is the same as the one under GM.

Table 4
CSM under VFA

Step (5)(a): Entity's share of the fair value of the underlying items (ES of UI)						
	Inception	Yr1	Yr2	Yr3	Yr4	Yr5
BOY	18,584	18,084	16,638	13,935	9,882	4,320
Paid to entity(BOY)	(500)	-	-	-	-	-
Change in ES of UI		544	757	856	774	417
Paid to entity(EOY)		(1,990)	(3,460)	(4,909)	(6,336)	(4,737)
EOY	18,084	16,638	13,935	9,882	4,320	-
Step (5)(b): FCF that do not vary based on the return on underlying items (FCF non UI)						
BOY	15,384	10,184	7,318	5,487	4,136	2,280
Paid by entity(BOY)	(5,200)	-	-	-	-	-
Change in FCF non UI		307	333	337	324	220
Paid by entity(EOY)		(3,173)	(2,164)	(1,688)	(2,180)	(2,500)
EOY	10,184	7,318	5,487	4,136	2,280	-
Step (6): CSM under VFA						
CSM(BOY)		3,200	3,038	2,810	2,358	1,467
Change in ES of UI		544	757	856	774	417
Change in FCF non UI		(307)	(333)	(337)	(324)	(220)
Amortization		(399)	(653)	(971)	(1,341)	(1,664)
CSM(EOY)		3,038	2,810	2,358	1,467	-

Figure 1
Comparison of the CSM balance between VFA and GM



CONCLUSION

There are a number of factors that require the entity's judgment for the VFA eligibility assessment. Different assessment outcomes may result in a similar product sold by two insurers because of different management frameworks. Similarly, two products with similar economic nature (written by an insurer) may fall into different measurement models because of the contractual terms. All these may impact the comparability of results across the industry or within the same entity.

Similar to the Solvency II experience, it is expected that certain market consensus will converge for these judgmental areas. The assessment for certain products may be easier than others, depending on the complexity of the product features. The methodology and assessment should be properly documented and approved within the entity's governance structure, and agreed with the entity's auditor. It is also important for individual entities to understand both the financial and operational impacts of using different measurement models at the beginning of the implementation journey. ■

The views reflected in this article are the views of the authors and do not necessarily reflect the views of the global EY organization or its member firms.

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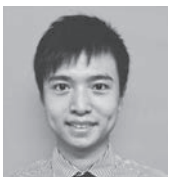

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ENDNOTE

[1] Please refer to EY's Insurance Accounting Alert (May 2017) for an IFRS 17 overview; *http://www.ey.com/Publication/vwLUAssets/Insurance_Accounting_Alert_May_2017/$FILE/ey-insurance-accounting-alert-may-2017.pdf*

Briefly Noted: Goings on in Reserving and Modeling for A&H Waiver of Premiums

By Xianmei Tang, Anthony Muturi, Shanpi Yu and Isaac Larbi

Waiver of premium is a common supplemental benefit to the main contract of long duration accident and health (A&H) insurance products such as Long-Term Care and Individual Disability Income, and valuation actuaries certainly haven't ignored the reserves for it. But actuaries have rarely bragged about the artistry in the actuarial work behind those numbers. The reasons appear to be the popular business words—gray areas, immateriality, lack of resources and so on—which indicate a wide diversity of practice.

So, uniformity is still out of reach on this matter and actuaries have been comfortable with this. For the sake of simply being "right," however, individual practitioners should at least nail down exactly what the laws say and what actuarial models should do before claiming reasonableness of outputs that are based on individual judgment. The industry collectively should demystify how results can be both different and correct. How well has that been done?

There didn't seem to be a comprehensive deep dive conveniently available to the public, at least not to the authors' knowledge. We think such work was overdue, particularly when modern day valuation actuaries are facing unprecedented challenges and scrutiny: tightened controls over assumption development and model risk, escalated activity-driven financial measures reducing dependency on accounting rules, expanded first-principle approaches for actuarial models, and so forth. The authors' recent efforts, digging up actual experience, raking up dusty actuarial literature, and even seeking inspiration from heaps of old books (Confucius for actuaries, really?), has produced a white paper published in the *2017.2* volume of the SOA Education and Research Section's ARCH: *"Valuation for Waiver of Premium Benefit in Long Duration A&H Insurance Products: A review of regulatory requirements and demonstrations of actuarial modeling approaches."*

Below is the abstract. Interested readers can download the full-length article from the SOA website *https://www.soa.org/research/arch/2017/arch-2017-iss2-tang-muturi-yu-larbi.pdf.*

"Reserving for waiver of premium benefits in long duration accident and health insurance products has traditionally been an overlooked, if not neglected, issue in life insurance valuation due to gray areas of the law, immateriality of the affected business, and lack of actuarial resources. The existing regulations require appropriate set-up of active life reserves and disabled life reserves for both waiver of premium benefits and base contract benefits with careful considerations for how assumptions are developed and how cash flows are projected. The underlying actuarial modeling approaches may vary in two dimensions where the in-force could be total lives or healthy lives only and the benefit amounts could be incurred claims or claim payments. The aggregate reserves are mathematically identical for all the approaches to the extent that assumptions are consistent. However, the reserve balances will differentiate when experiences deviate from assumptions and the corresponding financial impacts could be significant and tangible as reflected by experience gains or losses. These conclusions strongly suggest that the choice of actuarial modeling should be a business decision with appropriate management accountabilities." ■

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Alert on New Valuation Rate Methodology for Payout Annuities and Similar Contracts

By Paul Hance and Heather Gordon

The methodology underpinning statutory valuation rates for the products listed below is changing for contracts issued on or after Jan. 1, 2018:

- Single Premium Group Annuities (Pension Risk Transfer)
- Immediate Annuities
- Deferred Immediate Annuities (DIAs)
- Structured Settlements
- Payout Annuities (Settlement Options)
- Supplementary Contracts
- Living Benefits (GLWBs) and Contingent Deferred Annuities (CDAs) once account value is exhausted

There will now be different rates for "jumbo" contracts (initial premium greater than or equal to $250 million) and "non-jumbo" contracts. Jumbo contracts will use a rate that is updated daily whereas non-jumbo contracts will use a rate that is updated quarterly. In addition, there will now be four different valuation rates; issue age and certain period will determine which valuation rate applies.

Proposed rate changes were adopted by the Life Actuarial Task Force (LATF) of the National Association of Insurance Commissioners (NAIC) and are now incorporated into the Valuation Manual under VM-22. These rates replace the rates from the Standard Valuation Law under CARVM for these products.

A high level comparison of the current method and the new method is shown in Table 1.

Table 1
Comparison of Current and New Methods

		Current	New
A	Reference Index	Moody's Long-Term Corporate Bond Index	Treasuries plus VM-20 Spreads
B	Credit Quality	Moody's Index	Based on Average Life Insurer Bond Portfolio
C	Prudence	20% of reference rate in excess of 3%	VM-20 Baseline Defaults and Spread Deduction
D	Floor	None, bias toward 3%	None
E	Valuation Rate Buckets	One	Four to reflect duration differences
F	Frequency of Updates	Annual	Quarterly (non-jumbo) / Daily (jumbo)
G	Rounding	Nearest 25bp	Non-jumbo: nearest 25bp Jumbo: nearest 1bp

Look for a forthcoming FAQ document on either the Life Actuarial Task Force website *(http://www.naic.org/cmte_a_latf.htm)* or the VM-22 website *(http://www.naic.org/cmte_a_latf_vm22sg.htm)*. Rates will be published by the NAIC at *http://www.naic.org/index_industry.htm*. ■

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Financial Reporting Research Update

By David Armstrong and Ronora Stryker

Research is a primary mission of the Financial Reporting Section and a significant use of our section dues revenue. Here is an update, as of September 2017, on projects in process and those recently completed.

CURRENTLY IN PROCESS …

The 2015 research report on earnings emergence under multiple financial reporting bases is being expanded to examine an additional product and upcoming accounting changes. The original report looked at deferred annuities and term life insurance under U.S. SAP, US GAAP, IFRS, CALM and market-consistent balance sheet approaches. The expanded report will add universal life and make updates for principle-based U.S. statutory reserves, targeted US GAAP changes, and the new IFRS for insurance products. The Financial Reporting Section is co-sponsoring this initiative with the Reinsurance Section. Work is in the middle project stage.

Waiver of premium in a principle-based environment—the Financial Reporting Section is co-sponsoring this review of pricing, reserving and experience with the Product Development Section. The project is in the end stages, with the oversight group currently reviewing a draft report summarizing the analysis performed.

Simplified methods for principle-based reserve calculations—the Project Oversight Group has selected the researcher and work is in the middle project stage.

COMPLETED IN 2017…

PBA change attribution analysis—this project studies the drivers of change in principle-based reserves. This project was published in August. An SOA webcast was also done at that time and the report is summarized in this issue of the newsletter. ***https://www.soa.org/Research-Reports/2017/2017-understand-vm-20-results***

Modern deterministic scenarios—a review of possible deterministic scenario sets which could be useful to company management, regulators and rating agencies under PBA. This project was published in September and the report is summarized in this issue of the newsletter. ***https://www.soa.org/Research-Reports/2017/2017-modern-deterministic-scenarios***

"Actuarial Model Governance: A Survey of Actuarial Modeling Governance and the Industry Evolution Report"—this is an update to the original 2012 report co-sponsored by the Financial Reporting and Modeling Sections. ***https://www.soa.org/Research-Reports/2017/2017-01-actuarial-model-governance***

COMPLETED IN 2016…

Nested modeling—A company survey on the use of nested stochastic modeling and an analysis of ways to reduce run time and improve the efficiency of nested simulations: ***https://www.soa.org/Research-Reports/2016/nested-stochastic-modeling***

"PBA Implementation Guide" update and PBA beginning tales: ***https://www.soa.org/Research/Research-Projects/Life-Insurance/research-2013-pba-implementation-guide.aspx***

Retention management: ***https://www.soa.org/Research/Research-Projects/Life-Insurance/research-quantitative-retention.aspx***

Predictive analytics call for papers: ***https://www.soa.org/News-and-Publications/Publications/Essays/2016-predictive-analytics.aspx***

Many of these projects were co-sponsored with other sections and organizations. Please visit the SOA research website for more information, or contact David Armstrong or Ronora Stryker. ■

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