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Liability Valuation In A Fair Value Environment: The Interest Credited Rate Dilemma

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Recent events have led to a flurry of activity in the industry related to fair value type valuations of insurance liabilities. From FAS 157/159 to the IFRS Phase II Discussion Paper on Insurance Contracts (DP) to market consistent embedded value (MCEV) to Solvency II discussions, practitioners have been working to understand the appropriate way to calculate a fair value.

There are many methodology issues involved in determining fair value. One of the more difficult is developing the policyholder credited rate assumptions on North American style interest sensitive products. We explore two very different approaches that are currently being considered for use in projecting credited rates and show how they can be reconciled with one another. We illustrate these different approaches using a simple single premium deferred annuity (SPDA) product.

For the purpose of this article, we assume fair value is broadly defined as the amount of cash hypothetical market participants (similar companies to the one selling the business) require to take on the liabilities. We assume that market participants use a discounted liability cash flow approach to compute that amount. We also assume the fair value can reflect crediting of interest that is higher than the guaranteed rate; this might not comply with the DP requirements.[1] We take a very simplified approach with respect to risk margins, stochastic projections, own credit standing, expenses, and income tax, as they are not the principal issue being addressed by this article.

COMPANY AND PRODUCT DESCRIPTION

The product is an SPDA with an annual reset of the interest credited rate, which is guaranteed for one year upon each reset. Generally (but not contractually), the interest credited rate is based on the company's expected statutory (i.e., book, not market) investment earnings in the future year, net of expected default and investment expenses, less a pricing spread. The annual minimum guaranteed interest rate is 1.50 percent.

Commissions are 7 percent of premium. There is a declining surrender charge scale. More specific details are included in the appendix at the end of this article.

The company's credit rating is AA. The company's AA-rated debt trades at the risk-free rate plus 0.35 percent.

PRODUCT PRICING

The company prices the product using a traditional approach. It projects realistic distributable earnings (statutory net income less any increase/decrease in regulatory required capital, where investment income is earned on assets backing statutory reserves plus regulatory required capital) on a deterministic basis. A pricing spread (earned investment yield minus realistic expected defaults and investment expenses) is determined in order for the company to achieve its desired pre-tax return on investment (ROI).

Average risk-free forward rates are approximately 4.70 percent. The company purchases A-rated bonds and assumes it will earn 0.70 percent over risk-free interest rates, yielding 5.40 percent, net of expected investment expenses and defaults.

The pre-tax ROI target is 11 percent. To achieve this ROI, the pricing spread between the earned and credited interest rates is 1.40 percent, implying a credited rate of 4.00 percent in this deterministic test. In terms of average risk-free forward rates, the credited rate is equal to the risk-free forward rate less 0.70 percent.

Detailed pricing assumptions are included in the appendix.

EXPERIENCE PROJECTION ASSUMPTIONS

For the purpose of showing projected financial results, we choose a deterministic scenario for cash flows to be consistent with pricing.

FOOTNOTES:

[1] This will depend upon a company's facts and circumstances, since the DP requires that liabilities can only be established for future excess interest credits, if the future credits are deemed "constructive obligations" under IAS 37.

As with pricing, shareholder dividends are determined such that the book value of invested assets equals the statutory reserves plus regulatory required capital at each valuation date.

FAIR VALUE ANALYSIS

COMPONENTS OF VALUE

The fair value of the product can be decomposed into the following three components:

1. The pass-through nature of the crediting rates. Companies generally (although not contractually) base the credited rates on the earnings (at book, not market) of the assets backing the products. This is analogous to a variable annuity, backed by bonds.[2]

2. The minimum return guarantee. This is analogous to a put option, although the minimum return guarantee is not cumulative, but annual.

3. The annual credited rate guarantee. In practice, companies lock-in credited rates at the beginning of a policy year, based on what they expect the assets to earn (net of defaults and investment expenses) in the coming year. This annual credited rate guarantee is analogous to a credit default swap on the assets backing the contract, because companies credit interest, based on the assumed performance of the underlying assets in the upcoming year rather than directly reflecting actual default experience on those assets.

VALUATION TECHNIQUES

We obtain the fair value of the first component (the pass-through feature) by computing the fair value of a variable annuity with no additional living or death benefit features. We project liability cash flows (benefits and maintenance expenses) and risk margins and then discount this stream using the risk-free forward rates. Economic assumptions are risk-neutral, meaning that the assets backing the product earn risk-free forward rates. In our example, credited rates are equal to risk-free rates less the mortality and expense charge, or pricing spread, of 1.40 percent. For the

purpose of simplicity, we assume that non-economic valuation assumptions (including expenses) are consistent with pricing. We also assume that book returns equal market returns, implying the value of the stabilizing feature is zero.

In addition, we arbitrarily establish risk margins by multiplying the pricing lapse rate in each year by 110 percent in order to obtain the valuation lapse rate. This tends to increase the liability, as long as the discount rate (risk-free forward rate) is higher than the credited rate; in fact, the lower the difference, the lower the risk margin.[3]

We obtain the fair value of the second component (minimum return guarantee) by first projecting benefits and expenses on the variable annuity, as discussed above, but using a risk neutral stochastic interest rate scenario generator. Then, we compute the expected (average) present value of benefits and expenses. The value of this feature is then the excess of the value of the variable annuity with the guarantee over the value of the variable annuity without the guarantee.

FOOTNOTES:

[2] In addition, there is a feature which "stabilizes" the market returns of the bonds backing the variable annuity, since book, not market, returns are passed to the policyholder.

[3] Where the discount rate equals the credited rate, and there are no surrender charges or maintenance expenses, the liability is equal to the account value, no matter what the lapse rates are. In this case, risk margins are zero. Where the discount rate is lower than the credited rate, a multiplicative factor less than 100 percent must be used in order for the risk margin to have the proper sign (increase the liability).

For simplicity, in our examples, we express the cost of this feature as a level cost of option and add it to the assumed credited rate.

We obtain the fair value of the third component (annual credited rate guarantee) by making an assumption regarding the expected level of the future annual credited rate resets. The value reflects the amount by which future crediting rates are expected to exceed the risk-free-based crediting rates reflected in component (1). We add this to the credited rate in the variable annuity product feature in order to project liability cash flows. The value of this component is equal to the present value of liability cash flows reflecting the expected level of annual credited rate guarantees in all future projected years, less the present value of liability cash flows reflecting credited rates based solely on a pass-through of the risk-free rate. We analogize this to the value of a credit default swap because it reflects a guarantee of the credit spreads in the underlying assets to the policyholder.

We test two approaches to reflecting the annual credited rate guarantee in calculating the fair value of the SPDA.

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Approach A states that the annual credited rate guarantee has no value (i.e., that the company credits no more than would be suggested by the assets earning a risk-free rate). A justification of Approach A is that in a risk neutral world, a company's expectation is that it will, on average, only be able to earn risk-free rates. In that case, it will credit interest rates equal to the risk-free forward rates less its pricing spread. The valuation under Approach A considers crediting rates no greater than those supported by these risk-free returns.

Approach B states that the company will continue to credit interest in excess of what is supported by risk-free assets. In other words, the company will continue to offer valuable credit default swaps in every future year. A justification for Approach B is that it is consistent with how companies currently declare credited rates at the beginning of a policy year. Companies commonly assume that yields, net of defaults and investment expenses, are higher on riskier assets than on risk-free assets at the time they declare the next year's credited rate. The valuation under Approach B considers liability cash flows that reflect these higher expected annual credited rate guarantees.

In our example, we assume a 0.10 percent cost of option in Approach A. (The cost of option is relatively low in this example, primarily because the risk-free interest rates are sufficiently higher than the 1.50 percent credited interest rate guarantee, producing few random cases when the guarantee comes into the money.) Therefore, the total credited rates for Approach A are equal to the risk-free forward interest rates less 1.30 percent (1.40 percent pricing spread less the 0.10 percent cost of option). The discount rates are set at the risk-free forward rates.

In Approach B, we assume that at the beginning of each year, a company bases credited rates in the upcoming year on the yield, net of investment expenses and defaults, it expects on A-rated bonds less the pricing spread of 1.40 percent. Since A-rated bonds are expected to earn risk-free plus 0.70 percent, the credited rate is risk-free minus 0.70 percent.

On average, if we use a stochastic interest rate scenario generator and ignore the 1.50 percent minimum guarantee, credited rates are 0.70 percent higher than in Approach A. For simplicity, we assume that the 0.10 percent cost of option from Approach A is entirely absorbed and reflected within the higher crediting rates modeled under this approach. Because the projected credited rates are higher than in Approach A, it is less likely that the guaranteed credited interest rate is pierced in Approach B. Therefore, we assume a zero cost of option in Approach B.

Two possible discount rates are considered for calculating fair values under Approach B. In Approach B1 (as in Approach A), discount rates are set at the risk-free forward rates. This is consistent with the risk-free approach underlying the treatment of credited rates in Approach A and would appear to be consistent with the *Market Consistent Embedded Value (MCEV) Principles* published by the CFO Forum in June 2008. In Approach B2, discount rates are set at the risk-free forward rates plus a provision for the credit standing of the insurance company that issues the SPDA (own credit). This approach is justifiable if one believes that the possibility that the insurance company will not make good on its obligations must be reflected in the fair value of a liability and is required under FAS 157 and the DP.

Note that since the spread between the discount rates and credited rates is lower in Approach B1 than in Approach A, the risk margins relative to the fair value liability without risk margins are consequently lower in Approach B1 as well. This is because we define risk margins as a function of lapse rates. However, since the spread between the discount rate and the credited rate is the primary driver in the fair value calculation, the effects of the risk margin are less consequential to our analysis. In our example, the Approach A spread between the discount rates (risk-free forward rates) and credited rates (risk-free forward rates less 1.40 percent plus 0.10 percent cost of option) is 1.30 percent. The Approach B1 spread between discount rates (risk-free forward rates) and credited rates (risk-free forward rates less 0.70 percent) is 0.70 percent. Therefore, the liability is much higher under Approach B1 than under Approach A, even though Approach B1 has a relatively smaller risk margin.

For simplicity in our example, we assume the impact of own credit is to discount the liability cash flows using the yield on the company's debt. In our example, the debt trades at risk-free forward rates plus 0.35 percent. Therefore, the Approach B2 spread between discount rates (risk-free forward rates plus 0.35 percent) and credited rates (risk-free forward rates less 0.70 percent) is 1.05 percent. Consequently, the fair value liability is lower than in Approach B1, but higher than in Approach A.

Following is a summary of the key parameters driving the fair value liability calculations under each approach.

APPROACH	CREDITED RATE	DISCOUNT RATE	DISCOUNT RATE LESS CREDITED RATE
A	Risk-free — 1.30%	Risk-free	1.30%
B1	Risk-free — 0.70%	Risk-free	0.70%
B2	Risk-free — 0.70%	Risk-free + 0.35%	1.05%

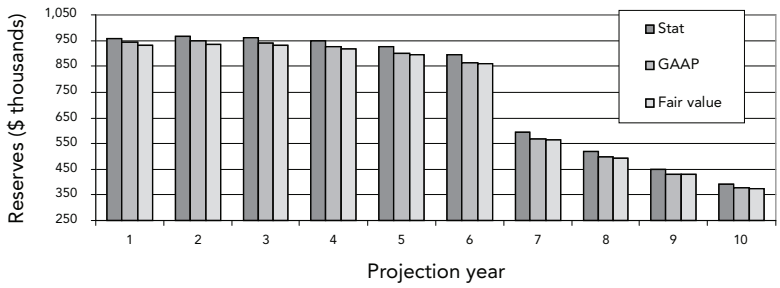
A complete set of fair value assumptions is shown in the appendix.

EXAMPLE RESULTS

- Approach A

The graph below shows a progression of the liability values for U.S. Statutory, US GAAP net of deferred acquisition costs (DAC), and Fair Value Approach A.

RESERVE COMPARISON - APPROACH A



U.S. statutory reserves are the largest in all years. At issue, US GAAP reserves, net of the asset for DAC, are equal to the premium less deferrable expenses. Going forward, GAAP reserves equal account value and DAC is amortized in proportion to estimated gross profits.

The fair value liability from Approach A is the lowest, due to the 1.30 percent difference between the discount

rate and the credited rate. This is analogous to a situation that most actuaries are familiar with in the calculation of reserves under the Commissioners' Annuity Reserve Valuation Method (CARVM) for fixed deferred annuities. Absent the application of a cash value floor, the larger the difference between the discount rate and the guaranteed credited rate, the lower the CARVM reserve.

The first graph below shows the earnings emergence on each of these accounting bases.

Statutory earnings follow a typical pattern. There is a first year loss because the initial CARVM allowance is less than first year commissions. Subsequent statutory earnings are positive, but depressed during the surrender charge period, as the CARVM reserve grades to account value when the surrender charges go to zero.

US GAAP earnings are a level percent of estimated gross profits plus interest on assets backing US GAAP equity. (For simplicity, there are no non-deferrable acquisition or overhead expenses assumed in this example.)

In contrast, the fair value profit in the first year is significant (1.80 percent of the single premium), because the first year liability is significantly less than the premium minus commissions.

In subsequent years, fair value profits emerge from: (1) interest on assets backing surplus; (2) the release of risk margins; and (3) crediting rate spreads in excess of those included in the fair value liability calculation. The fair value liability calculation includes a pricing spread (discount rate less credited rate) of 1.30 percent, while the experience projection assumes a spread (earned rate less credited rate) of 1.40 percent.

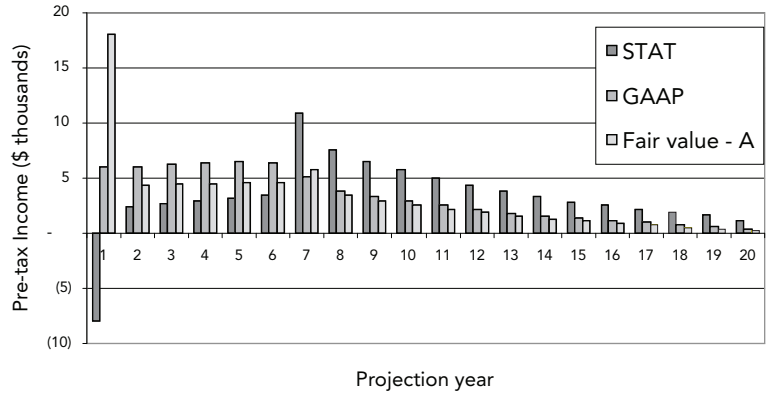
One critique of the fair value liability assumptions is that since the first year profit is so large, the risk margins might be too thin. If, instead, a 0.25 percent of account value risk (or service) margin is included in the calculation, the profit in the first year is now only 0.20 percent of premium, with subsequent higher earnings when the margin is released in future years. Since the focus of this article is not on risk margins, we acknowledge this weakness in the risk margin level, and move forward with our discussion of interest credited rate approaches.

- Approach B

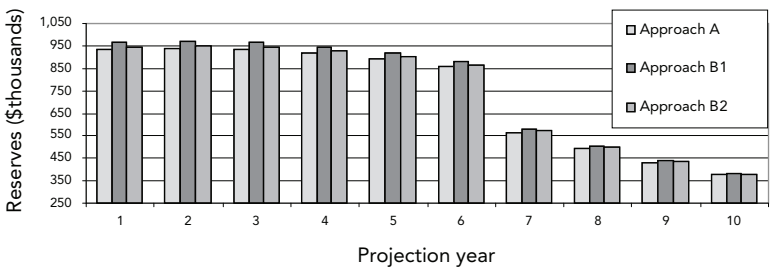
The graph to the left (bottom) compares the fair value liability under approaches A, B1 and B2.

As expected, the wider the difference between the discount rate and the credited rate, the lower the liability. The difference for Approach A is 1.30 percent, for Approach B1 is 0.70 percent, and for Approach B2 is 1.05 percent.

COMPARISON AMONG DIFFERENT BASES



FAIR VALUE RESERVE COMPARISON



The graph to the right (top) shows the pre-tax income results on a fair value basis for Approach A as compared to Approach B1.

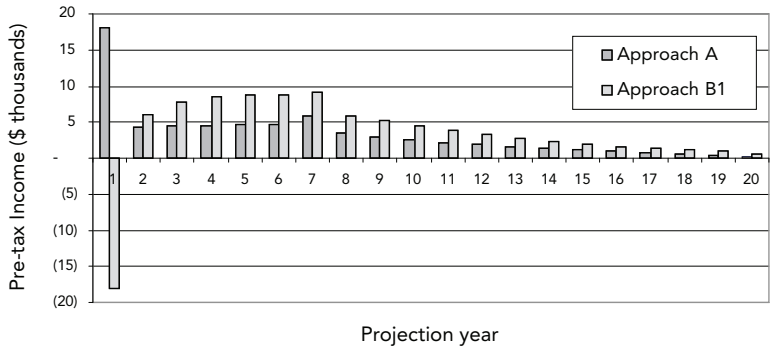
The Approach B1 liability in the first year is significantly higher than the premium minus commissions, producing a loss in the first year of about 1.8 percent of the premium. This loss is close to a mirror image of the gain produced in Approach A in year one. Under Approach A, the difference between the discount rate and the credited rate is more than enough to support the commissions paid to acquire the business, resulting in a gain at issue. Conversely, under Approach B1, the loss at issue suggests that if assets earn no more than the risk-free rate over time, the interest spread will not be enough to pay for the commission spent at issue.

Just as in the Approach A example, we see Approach B1 profits emerge from three sources: (1) interest on surplus; (2) the release of risk margins; and (3) crediting rate spreads emerging in excess of those included in the fair value reserve calculation. The Approach B1 fair value liability calculation includes a spread between the discount rate and credited rate of 0.70 percent, while the experience projection assumes a spread of 1.40 percent. This 0.70 percent difference (1.40 percent spread in experience minus a 0.70 percent spread reflected in reserves) in Approach B1 compares to a 0.10 percent difference (1.40 percent spread in experience minus a 1.30 percent spread reflected in reserves) in Approach A, explaining the significantly larger later year gains in Approach B1 than in Approach A.

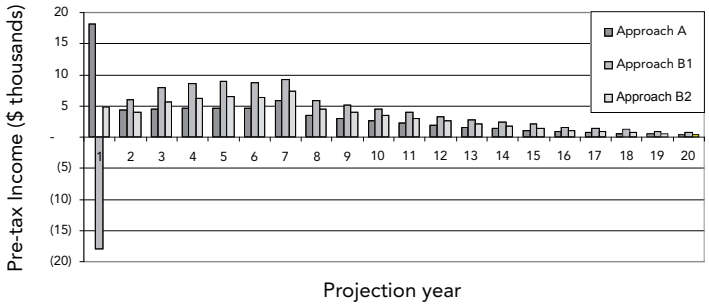
The graph to the right (middle) shows the pre-tax income results on a fair value basis for Approach A as compared to Approach B1 and Approach B2. The initial loss of 1.80 percent of premium from Approach B1 compares to a gain of 0.50 percent of premium for Approach B2, as shown in the graph to the right (middle). Again, the driver in this calculation is the excess of the discount rate over the credited rate, which increases by 0.35 percent over that in Approach B1.

The chart to the right (bottom) details the reconciliation between approaches A and B2.

APPROACH A VERSUS APPROACH B1



EARNINGS UNDER FAIR VALUE APPROACHES



APPROACH	CREDITED RATE	DISCOUNT RATE	DISCOUNT RATE LESS CREDITED RATE
A	Risk-free — 1.30%	Risk-free	1.30%
B2	Risk-free — 0.70%	Risk-free + 0.35%	1.05%

The 0.25 percent difference in spreads in these approaches is made up of two components:

The first is the difference in the excess of the expected earnings of the A-rated bonds (risk-free plus 0.70 percent) over the company's own AA-rated bonds (risk-free plus 0.35 percent). This 0.35 percent excess is essentially the annual market cost of a credit default swap on the insurance company's A-rated bonds. Note the intuitive result that the cost would be zero if the AA company purchased AA-rated bonds on itself in lieu of A-rated bonds.

The second is the excess of the cost of option assumed in Approach B2 over the cost of option assumed in Approach A. The cost of option is higher in Approach A, since credited rates in that approach are lower. This results in a -0.10 percent impact, which, when added to the 0.35 percent noted above, yields the 0.25 percent difference in spreads shown in the table.

WHERE DO WE GO FROM HERE?

A company's decision of which approach to use depends upon how it views the annual credited rate guarantee.

If a company assumes that in a risk-neutral valuation it will no longer offer annual credited rate guarantees that assume returns higher than the risk-free rate, it will choose Approach A or something similar. For example, one alternative approach, which we do not analyze, is where the company offers an annual credited rate guarantee each year equal to the risk-free rate plus its own credit spread. This produces a similar result to Approach A, as long as the company's own credit standing is taken into account in the discount rate. This is because the credited rate and discount rate are both higher by the same amount as compared to Approach A.

If a company views the annual credited rate guarantee, instead, as a credit default swap, where a company's own credit standing is leveraged, as in our example, it will choose Approach B. If this approach is chosen, a company needs to think about how to value this credit default swap, because if its own credit standing is not taken into account, as in Approach B1, the difference between the two approaches is dramatic.

SUMMARY

Our examples show only one of a myriad of modeling nuances and decisions that one must make as fair value type techniques become more widespread. Not only does the particular issue discussed above affect companies implementing MCEV and pilot testing potential IFRS Phase II outcomes, it also affects US GAAP reporting companies this year-end as companies estimate the fair values of investment contracts for their FAS 107 disclosures.

LIMITATIONS

This article is not meant to be considered accounting advice, and should not be construed in that manner. It is not meant to represent the view of Ernst & Young LLP. ■

APPENDIX

PRODUCT FEATURES

Guaranteed interest credited rate: 1.50%
Annual free partial withdrawal allowance: 10%

POLICY YEAR	1	2	3	4	5	6	7+
COMMISSIONS	7%	0%	0%	0%	0%	0%	0%
SURRENDER CHARGE	6%	5%	4%	3%	2%	1%	0%

MODEL ASSUMPTIONS

Pricing/experience/GAAP assumptions

Shareholder distributions assumed such that invested assets at end of year equals statutory reserves plus required surplus.
Maintenance expenses: 0.20% of AV

STATUTORY RESERVES:

POLICY YEAR	1	2	3	4	5	6+
STATUTORY RESERVE / AV	95%	96%	97%	98%	99%	100%

Regulatory required capital: 3.00 percent of AV
Earned rate: 5.40 percent (No assumed unrealized gains, MV assets = BV assets)
Credited rate: 4.00 percent
Target spread: 1.40 percent
Pre-tax ROI generated using pricing assumptions: 11 percent

Mortality: 90 percent A2000 Table, 1 percent improvement per year.

LAPSES AND FREE PARTIAL WITHDRAWALS:

POLICY YEAR	1	2	3	4	5	6	7	8+
LAPSES	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%	35.0%	15.0%
FREE PARTIAL WITHDRAWALS	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%

GAAP expense deferrals: commissions
GAAP non-deferrable acquisition and overhead expenses: none

Approach A fair valuation assumptions

Discount rate: risk-free rate
Credited rate: risk-free rate less 1.40 percent (pricing spread) plus .10 percent (cost of option) equals risk-free rate less 1.30 percent

POLICY YEAR	1	2	3	4	5	6	7	8	9	10
RISK-FREE FORWARD RATE	5.09%	4.91%	4.75%	4.70%	4.68%	4.70%	4.69%	4.71%	4.68%	4.70%
CREDITED RATE	3.79%	3.61%	3.45%	3.40%	3.38%	3.40%	3.39%	3.41%	3.38%	3.40%

POLICY YEAR	11	12	13	14	15	16	17	18	19	20
RISK-FREE FORWARD RATE	4.70%	4.71%	4.75%	4.77%	4.80%	4.84%	4.86%	4.86%	4.90%	4.94%
CREDITED RATE	3.40%	3.41%	3.45%	3.47%	3.50%	3.54%	3.56%	3.56%	3.60%	3.64%

Mortality: Same as experience assumptions.
Lapses: Same as experience assumptions.
Partial withdrawals: Same as experience assumptions.
Maintenance expenses: Same as experience assumptions.
Risk margin: 10 percent increased lapse.
Service margin: None.

Approach B fair valuation assumptions

Credited rate: risk-free rate less 0.70 percent
Discount rate:
Approach B1: risk-free rate
Approach B2: risk-free rate plus 0.35 percent
All other assumptions: same as Approach A