SOCIETY OF ACTUARIES

Article from:

Risks and Rewards Newsletter

February 2001 – Issue No. 36

RISKS and REWARDS

The Newsletter of the Investment Section of the Society of Actuaries

NUMBER 36 | SPECIAL INVESTMENT ACTUARY SYMPOSIUM ISSUE | FEBRUARY 2001

The Bullet GIC as an Example

by David F. Babbel, Jeremy Gold, and Craig Merrill

There has been considerable discussion of a variety of issues related to fair value in the actuarial literature, in conferences, and among individuals interested in this topic. Unfortunately, we seem to be failing to communicate due, in part, to inconsistent use of terminology. The goal of this discussion paper is to present a few concepts that we hope will be of use in the broader discussion of fair value of liabilities.

Fair Value from the Perspective of FASB

Current practice dictates that corporate liabilities (specifically, bonds) are listed on the balance sheet on a book value basis. The liability changes only if the company actually refunds or retires the bond. FASB is moving toward a requirement that the market value of the bond be reported in place of, or in addition to, the book value of the bond. The reasons for this change are covered in some detail in document number 204-B of the Financial Accounting Series (December 14, 1999) entitled, "Preliminary views on Major Issues Related to Reporting Financial Instruments and certain related assets and liabilities at fair value."

In the preliminary views document they indicate that "fair value" should be determined based on observable market prices.

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Beyond the Bullet GIC

by Stephen J. Strommen

In a separate article in this edition of Risks and Rewards, Babbel, Gold and Merrill provide an excellent exposition of three approaches to present-valuing a series of risky cash flows and provide several insights into the way modern finance theory deals with risk. The purpose of this article is to bring these insights to the world of insurance risks and view them in relation to existing actuarial techniques.

All three of the valuation approaches presented by Babbel, Gold and Merrill involve direct discounting of liability cash flows. However, current actuarial practice for determining liability exit value (i.e. fair value) is embodied by the actuarial appraisal method, an indirect method under which the value of the liability is computed as the market value of assets supporting the liability less the present value of future distributable earnings at a hurdle rate.

Many observers feel that direct discounting and the actuarial appraisal method produce different values. However, Luke Girard demonstrated that these two methods produce identical values when identical assumptions are used. The source of confusion is that many observers find it hard to justify the assumptions that must be used under a direct discounting

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method to arrive at the same liability value as the actuarial appraisal method. The principal areas of discomfort are the discount rate and the provision for risk.

To justify the required assumptions under direct discounting, let's decompose a liability exit transaction (i.e. assumption reinsurance) into the parts that have financial value. A liability exit transaction involves three key elements that have real financial effects.

1. The liability cash flows become the responsibility of the buyer.

2. The seller provides the buyer with cash or invested assets whose market value is equal to the fair value of the liability.

3. The buyer accepts the liability risk. To do so, the buyer commits some capital in addition to the amount provided by the seller to provide security for the liability.

When a buyer determines the amount of cash or invested assets to demand from the seller, the buyer sums the effect of all three parts of the transaction. These effects are:

1. The liability cash flows become the buyer's responsibility. This value by itself is the discounted present value of the liability cash flows at a risk-free rate. If credit standing is to be reflected, then the liability cash flows should be adjusted downward to reflect the probability of default.

2. The buyer acquires cash or invested assets that can be re-invested for the duration of the liabilities to earn a return above the risk-free rate. The possibility of earning a spread over the risk-free rate is an opportunity that has value for the buyer. This value serves to reduce the fair value of the liability.

3. The buyer's acceptance of risk requires a commitment of capital to provide security for the liability. The cost of this capital commitment increases the value of the liability.

Thus we have the following:

Liability exit value = Present value of liability cash flows at risk-free rate less Value of buyer's opportunity to re-invest plus Provision for risk

While it's clear how to calculate the present value of liability cash flows at a risk-free rate, it's not obvious how the other parts of liability exit value can be treated under a direct discounting approach. Here's how:

- **The value of the buyer's opportunity to re-invest** can be represented by an expected investment yield spread over the risk-free rate. This spread is the excess of the investment yield the buyer expects to achieve over the risk-free rate. Use of this spread when discounting liability cash flows results in a smaller present value, thereby taking into account the value of the buyer's opportunity to re-invest.

- **The cost of capital** can be computed as a dollar amount and added to liability cash flows just like any expected claim payment. When the present value of liability cash flows is computed with this amount added to cash flows, the resulting present value is larger, thereby taking into account the buyer's cost of capital. (It's also possible to express the cost of capital as a reduction to the discount rate rather than as an addition to liability cash flows.)

To summarize, direct discounting of liability cash flows will produce a liability value equal to that under the actuarial appraisal method if the following assumptions are made:

1. The discount rate includes a spread over the risk-free rate equal to what the buyer expects to earn on the invested assets.

2. The buyer's cost of capital is added to the liability cash flows being valued, or equivalently, converted to a reduction in the discount rate.

These two assumptions focus on areas of much debate: the discount rate and the provision for risk. Here are a few observations on each, taking into account both the analysis above and the discussion by Babbel, Gold, and Merrill.

The Discount Rate

As suggested above, the discount rate should include a spread over the risk-free rate. The spread should be what the buyer (not the seller) expects to achieve. Since it is the buyer's expectation in which we are interested, we can assume for the sake of discussion that the existing portfolio will be sold and re-invested as part of the exit transaction. The spread on a portfolio selected by a reasonable buyer is what we need to estimate. This could well be different from the spread on the seller's portfolio, although it may be the same.

Many observers object to including an investment spread on risky assets when determining the discount rate. In their article in this issue of *Risks and Rewards*, Babbel, Gold, and Merrill point out that the return on assets does not explicitly appear in their option-based formula for the value of a bond. However, they are careful to observe that its absence is due to the use of martingale probabilities rather than "real" probabilities. The return on risky assets is implicit in their formula because it is used when deriving martingale probabilities from "real" probabilities. Therefore the expected return on risky assets influences the value of a bond or other financial liability under both their analysis and that presented here.

The Provision for Risk

The analysis above uses the cost of capital to quantify the provision for risk. Before discussing the cost of capital, let's review the way risk should affect fair value of a financial instrument.

Risk can be accepted by either the payer of the cash flows or by the receiver of the cash flows. Risks accepted by the receiver reduce the fair value of the instrument. Risks accepted by the payer increase the fair value of the instrument.

In their discussion of bonds and mortgage-backed securities, Babbel, Gold, and Merrill dealt only with risks accepted by the receiver of the payments. The risks were default or prepayment. Both risks reduce the fair value of the instrument in question. They can be valued by including a positive spread in the discount rate, as in their method 1, or by subtracting a "certainty equivalent" from cash flows as in their method 3.

In the general insurance context, most risks are accepted by the payer, that is, the insurer. The risk is that future insurance claims could be much different than expected. This risk *increases* the fair value of insurance liabilities. The risk can be represented by including a *negative* spread in the discount rate under method 1 or *adding* a "certainty equivalent" to cash flows under method 3.

A number of methods have been proposed for quantifying the provision for risk. Babbel, Gold, and Merrill refer to methods (their method 2) that have been developed and used widely to quantify interest rate risk.

These methods rely upon the existence of a com- plete and active market from which the "market price of risk" can be determined. With the market price of risk one can in theory compute the martingale probabilities that must be used when discounting cash flows using a risk-neutral interest rate process.

The use of the martingale probabilities eliminates the need for the interest rate spread that could otherwise be used to value the risk.

Since there is no complete and active market for insurance policy risks, applying that approach isn't practical in the insurance context. The actuarial appraisal method uses a different approach. The provision for risk is the cost of capital. Insurers hold capital to make the pay-ment of claims a near certainty.

Under a direct discounting approach equivalent to the actuarial appraisal method, the cost of carrying capital is added to liability cash flows in the manner of the "certainty equivalent" under method 3 of Babbel, Gold, and Merrill.

Some observers feel that the cost of capital is difficult to estimate. Clearly there is some judgment involved. The cost of capital is the product of the amount of capital required and the excess of the required pre-tax return on that capital over the portfolio investment yield[4]. Estimates must be used for the amount of capital required and for the required return.

In the United States, it is common practice for actuaries pricing life insurance and annuity business to build the cost of capital into their calculations in exactly the terms described here.

Since it is common practice for such estimates to be made in pricing, it is hard to argue that such estimates cannot be made for valuation. Over time, either actuarial standards or pressure from auditors will push companies towards reasonable consistency in these assumptions.

It's important to realize that when the cost of capital is used to quantify the provision for risk in a multi-scenario valuation model, the real probabilities must be used rather than the martingale or risk-neutral probabilities. That's because the use of martingale probabilities makes a provision for risk. If the full cost of capital is also included, then the provision for risk is at least partly double-counted.

Some observers prefer to make the provision for risk as an adjustment to the interest rate used for valuation rather than as an addition to cash flows. It is certainly possible to do this in a manner that produces the same result as the approach given here. Arguments as to which approach is best are beyond the scope of this article.

Interaction of the Discount Rate and Provision for Risk

One way to think about Girard's transformation of the actuarial appraisal method is to consider it an indirect approach to determining the appropriate interest rate spread for use in present-valuing insurance liabilities. We start with the risk-free rate, add a spread for investment risk, and then subtract a spread for total enterprise risk. What's left is the spread for liabilities.

As we've discussed, the spread for investment risk is the spread included in the expected return on the investment portfolio. The spread for total enterprise risk is the cost of capital expressed in terms of a yield spread.

This framework explains some of the liability spreads observed in the marketplace. For example:

1. In the case of a bullet GIC, we have an illiquid financial instrument. Insurers typically invest in somewhat illiquid assets to support the GIC, and thereby earn a yield spread attributable to the liquidity risk. However, since the GIC liability's liquidity characteristics hedge the liquidity risk, the total enterprise risk is smaller than the asset risk. When the total enterprise risk spread is deducted from the investment risk spread, there is a positive remainder. So the discount rate for a GIC liability can be greater than the risk-free rate because of the market liquidity premium that is hedged by the liability.

2. In the case of some property-casualty business, there is no hedging relationship between the investment portfolio and the liabilities. The total enterprise risk is greater than the investment risk. When the spread for total enterprise risk is subtracted from the spread for

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investment risk the result is a negative net spread. So the discount rate for some property-casualty business can be less than the risk-free rate.

These examples show that the liability discount rate can be either greater or less than the risk-free rate. In general, it can only be greater than the risk-free rate when there is some sort of hedging relationship (or negative risk covariance) between the insurance policies and the investments so that the insurer does not retain the entire investment risk.

Conclusion

The purpose of this article has been to bring the insights of Babbel, Gold, and Merrill to the world of insurance risks and view them in relation to existing actuarial techniques. In doing so, we have found their insights to be entirely consistent with existing actuarial practice and helpful in confirming the appropriate assumptions for use in liability fair valuation.

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Liberty Rings in 1st Annual Investment Actuary Symposium

by Max J. Rudolph

The voters of America should have visited Philadelphia to find some expert counters. While the world's focus was on Florida and "chads," the first Investment Actuary Symposium was held November 9 and 10 just up the street from Independence Hall. The seminar was held the day following one detailing the Unified Valuation System and was sponsored by the SOA, AAA, CCA, and CIA. Four of the session time slots had three different options, which allowed participants to attend topics of interest to them. The day-and-a half seminar started with an economic review by Bharat Nauriyal, Ph.D., of Nationwide. Craig Merrill Ph.D., from BYU, reported on some valuation models that are being considered by the UVS team. Alton Cogert, CFA, CPA, gave an entertaining review of current issues for investment managers, including investment performance and rating agency issues. The first breakout session featured M&A implementation issues, derivatives, and fair value of liabilities.

Peter Jones, FIA, provided an interesting comparison with UK methodologies over lunch, followed by a discussion of investment strategies, led by David Ingram, FSA, from M&R and Steven Huber, FSA, CFA, from Aeltus. The second breakout session ended the first day, with discussions covering fair value accounting, option pricing models, and liquidity.

The second day featured two breakout sessions and an opportunity to "Ask the Experts." Investor relations, risk position reports, and variable product guarantees were discussed at the first breakout session. Performance measurement, modeling assumptions, and interest rate models were the topics for the final breakout sessions. The distinguished group of experts included Peter Jones, Alton Cogert, Bob Reitano, FSA, from John Hancock and George Silos, FSA, CFA, from New York Life. The discussion ranged from UVS to embedded value and beyond.

While a brief review like this one can't give you an in-depth understanding of the topics discussed, it can give you a flavor for the direction of this recurring seminar. Hopefully, the sessions were valuable to attendees and repeat participants will value the meeting for the networking possibilities as well as the educational benefits.

Thanks to Tony Dardis, FIA, ASA, CFA, for coordinating the meeting and providing excellent kickoff and closing remarks. Many thanks also go to the planning committee, which included Tony, Syed Ali, Steve Craighead, Peter Hepokoski, and David Vanden Heuvel. If you have any ideas for topics or speakers during next year's seminar, let someone from this group or the Investment Section Council know. Please turn to page 12 to begin reading the first of a number of articles in this issue from presenters at the first Investment Actuaries Symposium.

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