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MARKET VALUATION OF LIABILITIES

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With *FAS 115* now requiring many insurers to mark at least some of their invested assets to market value for balance-sheet presentation, the time to grapple with market-valuation techniques for liabilities is at hand. This session will explore the current state-of-the-art in marking liabilities to market.

MR. DOUGLAS C. DOLL: Our first speaker is Ed Robbins. Ed is a principal in the Chicago office of KPMG Peat Marwick. His areas of expertise are life insurance actuarial studies, company taxation, and financial reporting. Ed has been the chairperson of numerous panel discussions and workshops on these topics at professional actuarial meetings. Ed joined KPMG Peat Marwick in Chicago in 1984. He has more than 25 years experience in the life insurance industry, including more than ten years with Pan American Life Insurance Company as the chief actuary for its Latin American operations.

Ed is currently a member of the Committee on Life Insurance Company Financial Reporting of the American Academy of Actuaries. He is a past member of both the Society of Actuaries Education and Examination Committee and Continuing Education Committee. Ed is also chairperson of the subgroup for the Academy Task Force on Fair Value of Liabilities. Ed will talk about the appraisal group of methods for developing the fair value of liabilities.

Kin Tam is an actuary in the actuarial department at MetLife. His work involves corporate modelling, cash-flow testing, Regulation 126 filings, and investment research. For the last few years, he has been active in the Society's credit risk study on private placements and commercial mortgages. He has recently joined the ACLI working group on *FAS 115* and has jointly submitted a proposal on market-value liabilities. Kin is going to talk about the option-pricing approach to the market value of liabilities.

Bob Butsic is an assistant actuary and associate vice president at Fireman's Fund Insurance Company. Bob is a casualty actuary. His responsibilities include actuarial applications of finance, profit management, risk-based capital (RBC), and pricing model development. Ed is a member of the following Academy committees: the Task Force on Property/Casualty RBC, the Risk Margins Task Force, and the Fair Value of Liabilities Task Force. He is on the Editorial Advisory Board for the *Actuarial Digest*, and he is a five-time winner of the Michelbacher Award for the best paper for the Casualty Actuarial Society discussion paper program. Bob is going to talk about application of fair-value liabilities to casualty products.

MR. EDWARD L. ROBBINS:

***FAS 115* BACKGROUND**

By now most of you have heard of *FAS 115*. In a nutshell, *FAS 115* requires that most debt and equity instruments held by an enterprise be separated into three categories: held to maturity, trading portfolio, and available for sale.

Some assets are excluded. Policy loans certainly are excluded, as are residential mortgage loans and commercial real estate loans. Generally those are the biggest exceptions from *FAS 115*. Most other debt and equity instruments are in *FAS 115* and are subject to those rules.

Held-to-maturity assets are "business as usual." Value them at amortized value. But the ability to sell them has been severely restricted. Trading portfolio assets are to be valued at market. Any market-value fluctuations on your trading portfolio go directly into GAAP earnings. The lion's share of the *FAS 115* assets will be the available-for-sale category and that's our primary concern. Available-for-sale assets must be valued at market for balance-sheet purposes. However, it's business as usual for GAAP earnings. The excess of market value over book value or vice versa goes directly to a separate component of shareholder equity.

Whenever you give a presentation in front of many actuaries, you must be very careful when using nonqualifiable words such as, *all, never, and none*. Let me just say that, in my experience, available for sale is the largest category of *FAS 115* assets in most companies.

The major objection from the life insurance industry to *FAS 115* is that it requires market valuing of assets, but it leaves liabilities alone. The rules for liabilities have not changed.

Dick Robertson, in a recent paper that he put into one of the professional journals, said something like a bad accounting rule should not influence the sophisticated investor. Then he went on to say that not all investors are sophisticated, and therein lies the problem. I have here a newsletter from an investment banking firm. I'm not going to say it is unsophisticated. It is sophisticated, and it admits that *FAS 115* gives quite illogical results to an insurance company's net GAAP book value, but it says things such as the following: "We are more favorably disposed to those companies which allocated around 50% or more of their portfolio in held to maturity while managing predominantly interest sensitive books of business." It goes on to name many companies. "This implies products with very good persistency, surrender-charge features, a balanced product offering, controlled distribution, and a well-matched portfolio, all other things equal." You may agree or disagree with what it is saying, but it's important to see the perception of the analysts and the investment banking houses.

To complicate things a little bit further, in January 1994 the SEC thought that this was indeed a problem with the tremendous amount of unrealized gains in most companies' portfolios. Some companies had adapted *FAS 115* early and had large increases to their GAAP book values as a result. This caused the SEC a lot of concern that there might be some substantial overstatements of GAAP net worth on

company balance sheets. The SEC expressed the view that a valuation allowance should be used to offset that large increment to the balance sheet.

What is a valuation allowance? The SEC gave a very short dissertation. It was something like, what would your deferred acquisition cost (DAC) be if you included unrealized gains and losses in your expected gross profit stream for *FAS 97* purposes? What you have is, from an actuarial point of view, the difference between your primary DAC and what I call a shadow DAC. The shadow DAC takes into account unrealized gains and losses.

Why is this being talked about in a presentation on fair value of liabilities? I'll tell you why. Shortly after the SEC made its announcement in January 1994, a Salomon Brothers article basically said that this shadow DAC eliminates much of the problem of fair valuing of liabilities. The industry probably no longer has to deal with that issue. This was a somewhat simplistic statement. An actuary would consider it wrong for perhaps at least two reasons. The first is that the assets of a company can consist of far more than assets supporting *FAS 97* products.

The second reason that this doesn't really solve the problem is that the DAC would have to be very close to full recoverability for it to really do a lot of good in this area. The extreme example is a company that has a very small amount of deferred acquisition cost, a very small amortization percentage. This is not a good fix for that kind of situation.

ACADEMY TASK FORCE ON FAIR VALUE OF LIABILITIES

We're left with the fact that the SEC instruction doesn't really value liabilities to market. It doesn't fix the problem and so the Academy Task Force on Fair Value of Liabilities was formed, headed by Jim Hohmann. The Fair Value of Liabilities Task Force consisted at first of three subgroups and a coordination group. The three subgroups represent three methodologies. Eventually the reports of the three subgroups would be consolidated into one paper. There is the option-pricing-methods subgroup, the appraisal-methods subgroup, and the secondary-markets subgroup. The secondary-markets subgroup found that there was very little to talk about and was soon disbanded. Right now the two operating subgroups are the option-pricing-methods subgroup (Bob Reitano is chairperson) and the appraisal-methods subgroup (I am chairperson).

The rest of my presentation focuses on the appraisal-methods approaches that we're considering. I thought I would give you the benefit of our research into this area. First I'd like to speak to the three charges given to the subgroups: (1) Define the major categories of methods and their attributes under the subgroup caption. (2) Develop coherent discussions of the major issues that surface under each method. (3) Speak to each method's strengths and weaknesses.

I'd also like to speak to what our charge does not include. This is to remain a scholarly effort, and that means we're not to enter into the area of what FASB or the SEC might or might not approve at this point. Also, we're not expected to be advocates for the particular methods that we're describing.

"APPRAISAL METHODS" SUBGROUP—FOUR APPROACHES TO FAIR VALUING LIABILITIES

Now that the stage has been set, let's talk about the differing approaches that my subgroup has taken. We've developed four approaches to fair valuing liabilities for inspection and comparison. There's one author for each of the methodologies. Let me take a moment to frame the approaches. The first method, and frankly the one around which we're building the most material right now, is the so-called classical "actuarial appraisal" method. Simply put, it's the market value of assets, less the appraisal value of the block of business in question.

The second approach is the interest maintenance reserve (IMR) approach. Most of you know about the IMR under statutory accounting that came in as of year-end 1992. The concept here is that every time you have an interest-related capital gain from the statutory point of view, a realized gain, you offset it with a contra-asset that amortizes over the remaining life of the asset that was sold. The GAAP approach to that is somewhat similar except you do it with any type of gain or loss rather than simply interest-related gains or losses on fixed investments, and you also do it on unrealized gains or losses. It takes off from the statutory approach and goes a little bit further.

The third method, the market-yield-adjustment approach, is really two similar methods that just differ slightly in their structure. The first variation is to simply take a ratio of market value of assets to the book value of assets supporting your liability line, and apply that to the book value of your GAAP liabilities. Some would say it's simplistic. The second approach is directionally the same. It was written by Dick Robertson in 1993. It basically gets liabilities at book, if asset market value equals asset book value, and GAAP liabilities have market-value adjustments in the same direction as GAAP assets.

The fourth method is called the deferred policy acquisition cost method and it is the shadow DAC approach all over again. We explored this method only because some people seemed to think that this solved the market-value-of-assets problem. It's important to pay attention to people's perceptions; therefore this fourth methodology was included.

By the way, it's possible to prove under certain ideal circumstances that the shadow deferred acquisition cost method doesn't do a bad job. The set of assumptions is something like this. If the earnings rate is equal to the DAC amortization interest rate, if the amortization premium percentage is equal to 100% (that is, if the product is borderline recoverable), if your period of reversal of any unrealized gains reverses during the DAC amortization period, then it's not a bad approach to a gross premium valuation. The SEC's shadow DAC methodology is of a larger scope than meets the eye, mainly because mutual company GAAP is imminent and the deferred acquisition cost offset approach to unrealized capital gains and losses would bring in dividend-paying products of mutuals.

The responsibilities of the subgroup are divided up so that each of the methods was the responsibility of one author. I was in charge of the deferred policy acquisition cost method. Authors had to pledge not to fall in love with our respective

approaches, to stay out of an advocacy attitude. Believe me, that was not difficult with the deferred policy acquisition cost offset method.

In terms of the next steps, we have drafted a first cut of the report of our subgroup. It is confidential to the task force for the moment, but let's briefly run again through these four methods and talk about their relative strengths and weaknesses from an academic as opposed to a political perspective.

Appraisal-value strengths: It will show the net worth of a company that is close to the appraisal value, forgetting things like value of future business. It really has the strongest tie to the market value of the company as an asset in its own right. It has the strongest tie between the right-hand and left-hand sides of the balance sheet. It's based on long-established, well-established actuarial techniques. Doug Kolsrud is the author of this, and he's very happy with its linkage to pricing approaches. Of course, it recognizes the cost of capital because the appraisal value of the block uses a risk-rate discounting approach.

Appraisal-value weaknesses: It is subject to a lot of actuarial judgment. The values are dependent to a great extent on statutory liabilities and required surplus. Is that proper? Also, to some extent, it ignores the matching of revenues and costs that traditional GAAP methods espouse.

IMR-approach strengths: It is consistent with the historical view of buying and holding assets that match with liabilities. It may be the simplest of all approaches so it is easy to do.

IMR approach weaknesses: The amortization of the contra-asset is based on the life of the assets rather than on the life of the liabilities. This was a major issue in statutory accounting, too, because the concept of the IMR under statutory accounting was that it would essentially adjust liabilities to market, but you had to use the surrogate life of the asset instead of the life of the liabilities because that was what was readily available. There are severe allocation issues to try to amortize an IMR-type item on the life of the appropriate liabilities. An additional consideration that is not going into the report: it's probably counter to the SEC direction and it probably won't fly.

Market-yield-adjustment-method strengths: It is fairly consistent with current GAAP accounting; liabilities go back to GAAP book when market value of assets is at book value. It is directionally right and relatively simple to implement.

Market-yield-adjustment weaknesses: It may be accused of being a bit too simplistic and therefore the old concepts of gaming and manipulation may be coming in. The person who wrote this part of the paper thought that there might be an unnecessarily strong linkage to the specific asset portfolio as well. There's a constituency that thinks that one of the desirable characteristics of market valuing of liabilities is to separate them from the underlying assets. This was a major issue in the hearings preceding *FAS 115*. Some respondents at the hearings thought that there should be no linkage between the assets and liabilities and others thought there should be linkage between the assets and liabilities when you market value liabilities.

Deferred-policy-acquisition-cost-method strength: It's already there, it's already required. Isn't that easy? That was one of the major strengths of the deferred policy acquisition cost method. There is no explicit recalculation of current liabilities. You leave them alone. It's susceptible to fairly reasonable approximation efforts. If you look in the March 1994 *Financial Reporter*, there are some good approximation methods to that shadow DAC that might work out for you.

Deferred-policy-acquisition-cost-method weaknesses: It is difficult to ensure consistency of practice and there's a statement presentation issue. Can you use a net GAAP liability approach to market valuing of liabilities, in other words, putting the DAC as a negative on the right-hand side of the balance sheet? Is that appropriate?

Just as a wrap-up, we're focusing on the balance sheet at first in our write-ups of this paper. We're not really dealing with income statement presentation issues, issues of how to calculate deferred taxes, and probably more issues that we don't appreciate at this time. That's where we are at the moment. Stay tuned.

MR. KIN O. TAM: My presentation is based on a joint paper with Tom Ho and Alex Scheitlin. Tom Ho, who is in the audience, is president of Global Advanced Technology and is coauthor of the renowned Ho/Lee model. Alex Scheitlin is a fellow actuary at MetLife, who got me interested in the subject in the first place.

The paper proposes a market-sensitive performance measure for internal reporting. Why internal reporting? Whatever the external reporting basis is, a market-value balance sheet seems to have a place internally in asset/liability management.

THE PROBLEM OF MARKING LIABILITIES TO MARKET

Traditionally, insurance companies value both assets and liabilities at book, with a few exceptions. When an asset is permanently impaired or not in good standing, it is often written down to market.

But an asset can lose value long before it is written down. Also, interest-rate movement can cause assets and liabilities to diverge in economic value, while their book values are held firmly in place. So market readings can help an asset/liability manager to gauge his position or risk exposure before the economic reality sets in and a corrective action is needed.

On the asset side, marking to market is nothing new. Portfolio managers like to manage on a total-return basis by marking to market periodically. This is facilitated by a secondary market for liquid assets and relative valuation for illiquid ones.

The same is not true of liabilities. The search for a market-value balance sheet often gets bogged down over liabilities. No one favors carrying assets at market and liabilities at book, but many relegate the whole liability question to others. So the problem is liabilities. It is a problem compounded by divergent views on how to mark liabilities to market.

FOUR APPROACHES TO DISCOUNTING LIABILITY CASH FLOWS

So what are some of these divergent views? Four views in the same genre are cited below. There are other genres as well, but the four in this genre have one thing in

common. They all use discounted cash flows but at different discount rates. The four views are as follows:

Marking liabilities to market—discount at:

1. Asset yield
2. Going rate (on the Liabilities)
3. Treasuries
4. **Treasuries + required spread (pricing spread)**

One view is to discount at a market yield on the asset portfolio. A second view is to discount at a going rate on the liabilities. A third view is to discount simply at current treasuries. Finally, a fourth view, our own, is to discount at treasuries plus the original pricing spread, which we call the required spread.

In the presence of three discounted cash-flow methods already, why do we propose a fourth? We think it better satisfies a few basic premises.

So what are these premises? We want to value the assets and liabilities in a market-sensitive way. That is a given. We want to value them independently. This is to avoid circularity and to ensure the proper attribution of performance to assets and liabilities separately. We want to tie performance goals to the pricing of the liabilities. The reason is basic: if we charge $80 instead of $90 for the same liability, the performance goal ought to be higher. We want to avoid any strain at issue. This way we won't handicap the liability value relative to the asset value from the very start. Finally, we want the liability value to match observable prices. In particular, it should start at the premium at issue and converge to the final cash flow at maturity.

If these are deemed to be desirable characteristics, then they should be the criteria by which to judge any proposed methodology including our own.

EXAMPLE OF A SINGLE-PREMIUM CONTRACT WITH NO OPTIONS

We are going to illustrate our proposal with a bare-bones example. In this example, we assume no expenses, no life contingencies, no embedded options, a single deposit, and a single payout in exactly two years. But simplicity is no reason to make light of this example. Insurance companies have billions of dollars in single-premium contracts with no embedded options.

A two-year bullet guaranteed investment contract (GIC) is a case in point. In this example (Chart 1), the deposit is $80 at time 0; the payout is $100 at time 2. We need to make two interest rate assumptions. At time 0, the two-year spot rate is 10%. At time 1, the one-year spot rate is 9%.

The same information is now in table form. The asset/liability values over the life of the contract are posted in adjacent columns in Table 1. On the right, the relevant spot rates at each point in time are posted. We have dispensed with any value that has no bearing on the example.

At time 0, the asset value is clearly $80, the premium being just received. At time 2, the liability value is clearly $100, the amount of the liability about to be discharged. But how should we define the market value of the liability at time 0 or at time 1?

CHART 1
A 2-YEAR 'BULLET' GIC

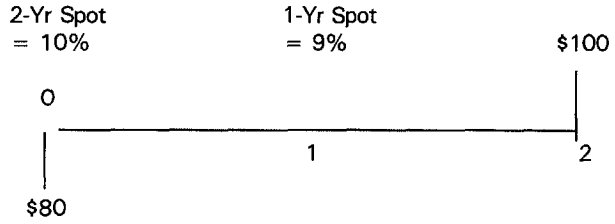


TABLE 1
IN SEARCH OF A (MARKET-SENSITIVE) LIABILITY VALUE

Time	Asset Value	Liability Value	Spot Rate at 1 Yr.	Spot Rate at 2 Yr.
0	$80	?	-	10%
1	-	?	9%	-
2	-	$100	-	-

First let's try discounting at treasury rates at all times. In that case, at time 0, the two-year spot rate gives a present value of $82.64, which exceeds the price of the GIC by 2.64. We have a discontinuity at time 0.

How well does discounting at treasuries fit all the premises for a good methodology? Well it does mark to market, and it does value the liabilities independently of the assets. But it incurs a loss right away ($2.64 to be exact). And once you have written off that loss, the liability value ceases to have anything to do with the original price. So this method does not link performance to pricing.

So much for discounting at treasuries with a zero spread. Now let's turn to our required-spread approach. We have seen that discounting at the spot rate at issue does not reproduce the price of the GIC. But you can always add enough spread until it does. In this case, the required spread is 180 basis points.

	Required Spread (Spread off Spot Curve at Pricing)
Present value cash flow (PVCF) @ 10%	= $82.64
PVCF @ (10% + **Spread**)	= $80.00
=> **Required Spread**	= **1.80%**

Once established, this required spread will be fixed and added to treasuries at all times for the purpose of discounting future cash flows to mark the liability to market. This is illustrated at time 1 by the one-year spot rate of 9%. So the liability value at time 1 is equal to the present value discounted at (9 + 1.80)%, which is $90.25.

Defining Liability Value (LV) @ t

LV(t)	= PVCF @ (Spot(t) + Required Spread)	
LV(0)	= PVCF @ (10% + 1.80%)	= $80.00
LV(1)	= PVCF @ (9% + 1.80%)	= $90.25
LV(2)	= PVCF	= $100.00

Let's see how well this constant-spread approach meets the premises. It certainly marks to market (through the usage of the spot curve, 10% at time 0 and 9% at time 1). It links the liability value to the original pricing (through the required spread, which is fixed once and for all at pricing and used again and again in any future valuation). It avoids any strain at issue (by the very definition of the required spread as the spread to reproduce the price). It matches market prices whenever they are observable, at issue and at maturity. Finally, it is clearly asset independent. After all, we have not made any reference to assets. In fact, we have said nothing about what the assets are and what they are earning.

The required-spread approach is really a simple idea. But, as the old Shaker song goes, "Tis the gift to be simple."

A SINGLE-PREMIUM CONTRACT WITH EMBEDDED OPTIONS

So far, we have defined the required spread for a single-premium contract with no embedded options. Now let's generalize the concept to a single-premium contract with embedded options. In this setting, the required spread becomes the required option-adjusted spread. The algorithm is as follows:

- First you generate a number of interest rate paths (using, for example, a binomial lattice with an arbitrage-free model of treasury yield-curve movement).
- Then you project the liability cash flows along each path (using, for an SPDA example, a lapse function to reflect the interest sensitivity). Thus, the cash flow can be longer along one path and shorter along another.
- Then you add a constant spread to the series of treasury yield curves along each path.
- Then you calculate a path-specific present value of the liability cash flows along each path.
- Then you average among all paths to arrive at the mean present value.
- Then you see if the mean present value matches the price. If not, you adjust the spread and repeat the process iteratively until you find the spread to equate the mean present value to the price.

The spread so derived is called the required option-adjusted spread (ROAS). Of course, this is directly analogous to how you would come up with the option-adjusted spread on a callable bond. And herein lies an important point, namely, the need for consistency between the asset valuation and the liability valuation. The meaningfulness of a market-value balance sheet depends on this consistency.

Once you have derived the ROAS at pricing, it becomes a fixed spread to be added to treasuries along each path in the binomial lattice in marking to market in the future. It is the same idea as before, only involving more computations. Using an SPDA example, the paper tracks the performance of a hypothetical portfolio over time, culminating in an elaborate performance attribution.

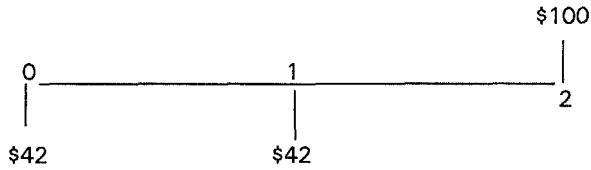
A RECURRENT-PREMIUM CONTRACT WITH NO OPTIONS

So far, we have generalized the methodology from a single-premium contract without options to a single-premium contract with embedded options. Now what about recurrent-premium contracts? This extension is not in the paper, but the question has been put to us more and more.

Let's once again use a stripped-down example. Chart 2 shows a two-year GIC with an initial deposit along with one other deposit, payable one year later. Deposit 1 and deposit 2 are $42 each. The maturity value is again $100. As before, we assume no life contingencies, no lapses, no dividends, and no expenses. These elements can be added, but they are not central to the discussion at hand.

CHART 2
TWO-YEAR GIC WITH TWO DEPOSITS
(RECURRENT-PREMIUM EXAMPLE)

Deposit 1	= $42	at t=0
Deposit 2	= 42	at t=1
Payout	= 100	at t=2



What should the liability value be at time 0? What should it be at time 1? To answer these questions, we need to add an assumption; namely, that the one-year spot rate at time 0 is 8% (Table 2).

TABLE 2
IN SEARCH OF LIABILITY VALUE

Time	Asset Value	Liability Value	Spot Rate at 1 Yr.	Spot Rate at 2 Yr.
0	$42	?	8%	10%
1	-	?	9%	-
2	-	$100	-	-

Once again, we would like to solve for the required spread from the initial pricing. But how? We now have two cash-flow streams in the future: the liability cash flow and the second premium.

At time 0, if we discount both the future liability cash flows and the future premiums at treasuries, we get a value of $43.76, which is in excess of the first premium of $42. But if we discount both cash-flow streams at treasuries plus a spread of 157 basis points, we reproduce the initial premium of $42. So let's make the required spread 157 basis points.

Solve for Required Spread @ Pricing
(Discount Cash Flow & Deposits @ Spot + Spread)

PVCF @ 10% – Present value future premium (PVFP) @ 8%	= 43.76
PVCF @ (10% + **Spread**) – PVFP @ (8% + **Spread**)	= 42.00

=> **Required Spread = 1.57%**

Why should we add the same spread to both the future liability cash flows and the future premiums? It seems somewhat arbitrary. Or is it?

Let's first try to think of future premiums as another asset. Because the cash flows *from this asset are paid by the contractholder, should we add a spread commensurate* with the contractholder's creditworthiness? I don't think so because the insurer has a recourse in the event of the nonpayment of future premiums. Then how about discounting future premiums at treasuries with no spread? The answer is not clear.

I didn't get far when I thought of future premiums as being an asset. But then I thought again. The key is to think "forward." Isn't the liability in this case made up of two contracts, an immediate contract, that which is associated with the first premium, and a forward contract, that which is associated with the second premium?

When we issue a recurrent-premium policy, aren't we selling in part a forward contract (or a series of them) to the contractholder? Just as we should think of policy loans and withdrawals as embedded options and price them as such, we should think of a recurrent-premium policy as a forward contract and price it as such.

How do we do that? To pay off the GIC at time 2, we would like to accumulate *deposit 1 for two years at the spot rate and deposit 2 for one year at today's one*-year forward rate, both with a spread, so as to pay off the GIC at time 2.

What is the one-year forward rate to mature by year 2? The answer is implicit in today's spot curve. By using two cornerstones of fixed-income pricing, replication and "arbitrage-free," we come up with the answer. It is simply the two-year spot rate accumulated for two years divided by the one-year spot rate accumulated for one year. Why? Because you can replicate a one-year forward by being long a two-year zero and short a one-year zero.

Mathematically, accumulating at the forward rate with a built-in spread is equivalent to discounting at the spot rate plus the same spread. Hence, if you view a recurrent

premium contract as a forward, you should discount both the future liability cash flows and the future premiums at the spot curve plus the same spread.

The pricing of this two-deposit contract is based on the idea of locking up a risk-free rate along with a spread on the second deposit, which is due only a year later. This reinforces the replication idea in four steps.

Rationale—Think 'Forward'

	Deposit 1 Accumulating for two years @ Spot + Spread
+	Deposit 2 Accumulating for one year @ Forward + Spread
=	Maturity Value

	Accumulating	**Discounting**
	$42 * (1.1 + \text{Spread})^2$	$100 / (1.1 + \text{Spread})^2$
+	$42 * ((1.1)^2 / (1.08 + \text{Spread}))$	$-42 / (1.08 + \text{Spread})$
=	100	=42

Accumulating @ Forward + Spread <=> Discount @ Spot + Spread

Locking Up a Return on a Future Deposit
(By Replicating a Forward)

@ t=0	Borrow 42 / (1.08 + Spread) to Mature @ t=1
@ t=0	Invest Deposit 1 + Borrowed Fund to Mature @ t=2
@ t=1	Repay Borrowing with Deposit 2
@ t=2	Pay Off GIC with AV of Deposit 1 & Borrowed Fund

At time zero, we borrow for one year a fund equal to the second deposit discounted at the spot rate plus a spread. (Borrowing for one year could mean issuing a similar contract to mature in a year). We immediately invest the borrowed proceeds for two years (not one year), to earn the two-year spot rate plus a spread. At time 1, we pay off the one-year borrowing with the contractholder's second deposit. The net cash flow at time 1 is zero, hence the hedging of the interest rate risk. Finally, at time 2, we pay off the GIC by the total accumulated value on the initial deposit and the borrowed fund.

The idea behind our definition of the required spread in this setting is simply this. Not only do we have to earn enough spread on the first deposit for two years, we also have to earn enough spread (in fact, the same spread) on the second deposit in the second year.

Now that we have defined the required spread of a recurrent-premium contract at issue, how do we use it to define the liability value in the future? As before, we fix the required spread but let the treasuries vary in the future. Only this time we discount both the future liability cash flows and the future premiums and take the difference.

Defining Liability Value @ t

LV (t) = PVCF @ (Spot (t) + Required Spread)
− PVFP @ (Spot (t) + Required Spread)

LV (0) = PVCF @ (10% + 1.57%) − PVFP @ (8% + 1.57%) = 42.00
LV (1) = PVCF @ (9% + 1.57%) − PVFP @ (Spot + 1.57%) = 90.44
LV (2) = PVCF = 100.00

CONCLUSION

I have outlined our methodology in three situations: a single-premium contract, an embedded-option contract, and a recurrent-premium contract. Let me conclude by putting our methodology in perspective. Basically, what do we gain by it?

First of all, the proposed methodology is a market-sensitive system that can supplement such conventional performance measures as book-value accounting. As such, it can serve as an early-warning system for asset/liability management. It also enforces the consistent modeling between the assets and liabilities. The required asset/liability modeling in turn supports retrospective and prospective analyses. Retrospectively, it lends itself to an elaborate performance attribution, to such sources as C-1, C-2, and C-3 risks. Prospectively, it lends itself to the testing of pricing strategies on the liability side and portfolio strategies on the asset side.

In short, the system is a tool for making management decisions. It is worth pursuing for its own sake whether the external reporting basis is market or book.

MR. ROBERT P. BUTSIC: The reason I'm here is because I'm on the Academy Task Force on Fair Value of Liabilities. The reason I'm on that task force is because several casualty actuaries thought that if a fair-value-of-liability standard was going to be imposed on the life industry, that same type of standard might also be imposed on the property/ liability industry, and we could be stuck with a very unfortunate situation.

I'm going to discuss the fair value of liabilities, as this concept might apply to property/liability insurance, but you should notice that there are quite a few similarities with life products.

THE NATURE OF PROPERTY/LIABILITY LIABILITIES

I'll start by discussing the nature of property/liability obligations and how they differ from their life counterparts. I'll give a brief overview of current GAAP accounting practice regarding the liability valuations and then introduce a financial economics view of the problem. Finally, I'll talk about some very important GAAP accounting issues related to fair value for property/liability claims.

As you might guess from my remarks, I'm a fan of market-value accounting, at least in theory, but to avoid being too much of an advocate, I'll have to admit much work remains before we're going to see a successful implementation of fair value for liabilities.

Both property/liability and life insurance obligations can be characterized by their future cash flows. These cash flows, of course, aren't known with certainty, because they are contingent on future states of the economy, and the economy is, of course, very

difficult to predict. If these cash flows were known with certainty, we wouldn't have much of a valuation problem. In fact, none of us would be here, because there wouldn't be much demand for insurance.

The distinguishing feature of these liabilities, therefore, is the risks to the cash flows. Because the cash flows depend on the nature of the product, we can look at the basic product offered, stripped of any complicating contract features. For lack of a better term, I'll call this bare-bones insurance the "natural" product.

The natural product for property/liability insurance is indemnification against economic loss. The amount of loss is the major contingency; for a particular policy, it's highly uncertain. It could be anywhere from no loss whatsoever to several million dollars. Even collectively, when you add up many policies, especially for liability insurance, the amounts are quite uncertain. Because the timing of the loss payments is also unknown, the aggregate of unpaid losses, which we call the loss reserve, is subject to unpredictable levels of contingencies, such as future inflation, shifting legal standards, and so forth.

To give you some idea of the risk involved, our industry is now paying out billions of dollars for environmental pollution claims that were covered under policies written several decades ago. The coverage was never really contemplated when the policies were issued, but the courts have determined that the coverage applies retroactively. To have gotten it right, we should have established several billion dollars worth of extra loss reserves back in the 1950s or 1960s.

In contrast, the natural life insurance contracts have a known claim amount, but the timing is uncertain. However, in the aggregate, and that's to the extent that mortality tables work, the timing is fairly predictable. There just isn't much risk in the natural product. The risk comes in when you add the contract features, such as surrender provisions and interest rate guarantees. However, some features such as policyholder dividends, tend to reduce risk. Handling these embedded options is really the key to providing a fair valuation of life insurance liabilities.

In property/liability insurance, there are few embedded options. It's very difficult to think of a situation in which there is a meaningful embedded option. Risk is altered by establishing policy limits or deductibles to the basic contract. Also, by issuing participating policies or various loss-sharing features, such as retrospective rated policies, you can shift or alter the risk in that fashion. Before I leave this topic, I should mention that accident and health insurance is probably more like property/liability than life insurance with regard to the risk characteristics, so you might find my discussion here applicable.

LIABILITIES AND INVESTMENT RISK

I'll talk a little bit about investment risk because it permeates the analysis of fair value of liabilities. It's important to both industries but tends to be relatively higher in life insurance due to the higher leverage, the ratio of the assets to surplus. That leverage ratio is fairly low in the property/liability industry. When we look at the natural product for both types of insurance, we see that the investment risk isn't really a fundamental ingredient of the liability cash flows. For the most part, investment risk

can be eliminated if management desires, although competitive pressure might make this a difficult objective to achieve.

For valuation purposes, treatment of investment risk really belongs in asset valuation. Fair or market value of assets already incorporates the value or price, if you will, of the investment risk, but solvency analysis is really another matter. Here you're concerned with the volatility of future values of both assets and liabilities. However, valuation from an accounting perspective of financial-statement preparation is more concerned with expected values and not volatility.

CURRENT PROPERTY/LIABILITY VALUATION PRACTICE

Having given a conceptual overview of liabilities and a bit of valuation theory, I'll turn to current property/liability practice for valuation of loss reserves—the real world. Economists refer to this affectionately as the "RW." Many of you are already aware of this, but if not, I'm sure you'll be astounded to know that current practice for property/liability insurers (with few exceptions) is to record their loss reserves at nominal or undiscounted value. That's like using 0% interest to value a life reserve. How would you like that as a standard?

The exceptions to a nominal reserve standard are lifetime workers' compensation indemnity payments (which are essentially like life annuities) and a handful of medical malpractice claims, but these liabilities are only a small percentage of the total liabilities of the industry. Generally, the statutory and GAAP accounting treatment is the same. Another exception, this is sort of an exception, is for determining federal income tax liability. There the accounting treatment is to use discounted reserves for all lines of business. This is fairly new and came into play after passage of the 1986 Tax Reform Act.

The rationale for nondiscounting is really a combination of historical events, some practical considerations, and inertia. Historically, claim durations in our industry were fairly short. Most of the business was property coverage; liability claims were settled fairly quickly because there weren't too many lawsuits. Fewer lawyers were in the economy and, until the late 1970s, we had fairly low interest rates. When you combine the low interest rates with short claim durations, you don't have much of a discount. It's hardly material. Then another reason for not doing it (I'm not sure I advocate it myself, and this is where there is a small nugget of truth) is that many in the industry viewed the amount of the discount as a risk margin. In other words, it was considered a provision for the possibility or likelihood that the reserves could develop adversely.

WHY CHANGE CURRENT PRACTICE?

However reasonable the historical rationale for using nominal or undiscounted reserves might have been, there are some fairly strong reasons for changing this approach. The U.S. Treasury has already adopted this so they've lurched ahead of us toward perhaps a proper or better economic treatment. One reason is that it is really good economics. The present-value model is standard, even for risky cash flows, and this is broadly applied across most financial institutions. It's really the standard for valuing assets.

Second, the property/liability industry has changed. There's now more liability than property, and this is becoming even more so. Loss durations can average ten years for some type of liability coverages. Third, interest rates have been fairly high since the 1970s so the potential amount of the reserve discount is material.

Because the amount of the reserve discount is material, this has created a whole new cottage industry of financial reinsurance. Companies are able to implicitly discount by trading their liability to a reinsurer, so the premium that they pay is equivalent to the discounted reserve. This leads to all kinds of problems in comparability among companies.

Finally, our reserve discounting for GAAP and even statutory accounting is inevitable. FASB has a long-term project to determine universal present-value standards for all enterprises. The initial presentation of the research that was released a few years ago is entitled, "Present-Value-Based Measurements in Accounting." If you're interested in the subject of liability valuation, I think it's quite a good background because it talks about issues that affect almost all financial institutions.

AN ECONOMIC VIEW OF LIABILITY VALUATION

I talked a little bit about the notion of the risk margin. To explore this concept a little further, we need to discuss some basic economic principles to evaluate risky cash flows, and these principles can apply equally well to assets and liabilities. First, identical cash flows over every possible state of the economy should give identical market values. It doesn't matter whether the cash flow is something you receive or something you pay out. If not, there are arbitrage possibilities. Thus, liabilities can be valued by using replicating asset cash flows. In particular, if the liabilities have no risk, they can be determined by the market value of a portfolio of treasury securities that can replicate all of the liability flows. Thus, the liability fair value equals the present value of the cash flows, using the treasury spot rates, and I believe that was demonstrated by Kin.

Generally, the fair or economic value of risky cash flows (by *risky* I mean systematic or nondiversifiable risk, and that's risk that doesn't also have option characteristics) equals the present value using the riskless interest rate plus a risk premium. The well-known capital asset pricing model is a classic illustration of that risk-premium concept. Here you discount risky cash flows from assets by using a U.S. Treasury interest rate base, plus a positive spread relating to the correlation with the asset cash flows with the market returns. A little bit later I'll demonstrate that the risk premium should be negative for risky liabilities.

Again, the financial economic view dictates that the insurer's asset portfolio isn't really relevant to a fair valuation of the liabilities. (This excludes the possibility that the contract features include specific investment-performance-related contingencies.) I recognize that this view departs from certain areas of current life insurance practice, but there are also some who would agree.

RISK MARGINS

As I indicated earlier, the risk premium for property/liability-type losses is usually negative. The economic justification for that is that it's proper compensation for the possibility that the amount will be greater than expected. I have a simple example to

illustrate this point. Suppose we want to make a deal with a reinsurer. We have an unpaid claim having $105 expected value when it's paid. It's risky so you can only look at its expected value. How much should a typical reinsurer accept for this risk-bearing transaction? If we can determine how much that reinsurer would accept, then that amount could be viewed as the fair value of the liability. We have a couple more assumptions for the simple example. We assume that the claim is going to be paid in one year, that the one-year zero-coupon treasury rate is 8% and that the capital required to support this level of risk is 25% of the fair value. Finally, we assume that the expected return on the capital used in this type of transaction is 20%.

The fair value of the liability is $100. The reinsurer receives the $100 as compensation for accepting the liability, then adds it to the $25 of capital that was contributed, giving a total of $125 of assets. This amount is invested at 8% and grows to $135 at year-end. At that point we subtract the expected $105 of claim payment, leaving an expected $30 in capital. The $5 growth in capital gives the required 20% expected return. If the actual loss turns out to be different from the $105, the return will be different, but that's just the nature of risk.

Notice that the fair value can be determined rather directly by just taking the present value of the $105 at 5% interest, giving $100. This happens to equal the 8% riskless rate minus a 3% risk adjustment. Or, equivalently, we could just discount the $105 at 8% and then add back in the $2.78 risk premium to get the result of the $100 fair value. Generally, if you're looking at cash flows over multiple years or periods, it's just generally easier to use the risk adjustment or haircut to the interest rate. In theory, the risk adjustment would be constant if the amount of risk is reduced uniformly as we get closer to the settling of claims, but the risk adjustment really depends on the stochastic risk behavior.

An important implication of the risk-adjusted valuation method is that profit is released gradually over time as risk is reduced. This makes sense because profit is going to be viewed as the reward for bearing systematic risk. This type of risk is revealed only with the passage of time. In the numerical example here, the expected annual release of profit will be 3% of each year's initial fair-value liability.

GAAP ISSUES ON RISK MARGINS

Now we're back to the real world (RW). Although the concept of risk margins is intuitively appealing from an economic perspective, there are some important practical and very thorny issues that need to be resolved for use in GAAP accounting. A major problem with the use of risk margins is that this might give an individual company considerable discretion in valuing the reserves, because the degree of risk should be company specific. Even if we could agree on generic risk margins by product line, there would still be significant variation by insurer within each type of product.

But the most critical issue, in my opinion, is that there is little guidance from current practice. So far this is mostly in the theoretical domain. The development of risk margins is a really new evolving area of research, and there's far from universal acceptance of the concept among property/liability insurers or casualty actuaries. Because the liability valuation is equivalent to estimating claim costs for pricing

applications, much of the best work on the subject is undoubtedly proprietary. To disseminate that type of information would bring up some severe antitrust exposure.

Even if we sidestep the issue of how to determine the risk margin, there are still some problems with implementing accounting standards for reserve discounting. The first problem is that the undiscounted reserve is very difficult to determine. Basically, the reserve is never right, and during the past decade the industry has been grossly underreserved. In very few years does it turn out that the industry's reserves are adequate, so we must be concerned with the overall level of reserve adequacy.

Even now most observers believe that the industry's aggregate reserves are currently deficient, so there is a major difficulty when companies might further reduce the value of the reserves by discounting them. No company that has currently inadequate nominal reserves is going to put its liabilities back up to an adequate level and then discount them, thereby admitting that the reserves were deficient. It will just take the deficient reserves and apply a discount to those reserves. There's really going to be a horrendous problem in making the transition from a nominal to a discounted reserve standard.

Another point is that many accountants will disagree that risk margins are necessary. For discounting of loss reserves, they would just require an unadjusted interest rate, whether it's a treasury rate or something else. But if we don't use risk margins, the discount is going to become even larger and thereby compound the problem with underreserving. Also, not using a risk margin would mean, in effect, the profit would be recognized up front and not as the risk is borne. This isn't a desirable accounting measure for a risk-bearing institution.

Suppose we've gotten to the point where we're either allowed or forced to discount property/liability reserves for GAAP accounting. We're still not done. We must select an appropriate interest rate and here we face the same issues as life insurers do. First, do we use the current market rate or the rate available when the liability is initially established? You might call that the vintage approach.

The current rate better matches the fair-value-of-assets standard, so if you didn't use a current rate and you fair valued the liabilities by using an older rate that was different, it would be very difficult to achieve the asset/liability matching that you want. However, the vintage method is common practice already, and it's easy to implement.

The second issue is whether we use a single interest rate for all liabilities regardless of how long in the future the claims are paid. The financial theory says we shouldn't use a single rate, we should go up and down the yield curve according to when the claims are paid. However, for property/liability insurers, the average length of time it takes to pay a claim is just a few years, so practicality might indicate that you use just a single rate.

Third, and this is a critical issue, do we use a riskless rate as the base and perhaps use a risk adjustment from that base, or do we use our own company's risky asset yields as the base? That seems to be the actuarial appraisal method. Financial theory dictates that we use the riskless rate, as I've indicated earlier, but tradition says to use

the risky rate. The problem with the risky-rate approach is that if you have two insurers holding identical reserves, they would show different values for those liabilities. That's not a very reasonable result from an accounting or economic perspective. Another more practical problem is that if you have a company with high-yielding risky assets, that company would show a really low value for its liabilities and would create a truly terrible result for public policy and regulation.

WHERE ARE WE HEADED?

To quickly summarize, there are several developments to watch as the fair-value drama unfolds.

FAS 115 has prompted some efforts to remove the asymmetry of asset/liability valuation. Because FASB most likely will not go back to book value for assets, we've got this panel. This panel, in turn, is a by-product of the Academy Task Force on Fair Value of Liabilities. This committee is trying to find, if feasible, some methods for determining fair value of liabilities for potential use in a GAAP standard for both property/liability and life/health valuation.

Another, longer-term group, of which I am a member, is the Academy Task Force on Property/Liability Risk Margins. We hope to produce some useful standards in advance of the FASB imposing some unwelcome ones on us.

Speaking of long term, I've already mentioned the FASB present-value project. I don't know when this will result in new accounting standards, but it won't be soon.

During the next few years, I anticipate that both the Society of Actuaries and the Casualty Actuarial Society will increasingly focus their syllabi and seminar contents toward economically sound liability valuation techniques. In turn, this education will pay off as these newer techniques become common actuarial practice. When this occurs I believe that accounting valuation standards will be reasonable and useful.