

**RECORD OF SOCIETY OF ACTUARIES
1990 VOL. 16 NO. 2**

**MEASURING INTEREST MARGINS --
PART 3 -- MEASURING REQUIRED INTEREST**

Moderator: CHARLES P. ELAM
Panelists: FREDERIC W. CORWIN, JR.
PETER B. DEAKINS
W. RANDALL PALMER
Recorder: CHARLES P. ELAM

This session will address the various factors to be considered in determining the required interest margins for interest-sensitive life insurance, annuities and GICs. Panelists also will comment on the practical considerations for managing the risks in these types of products.

Topics will include:

- o What is an interest margin?
- o What are the considerations in determining required interest margins?
 - Anticipated default rates
 - Reinvestment risk
 - Contribution and withdrawal options
 - Strategy for resetting crediting rates with interest-sensitive products
 - Capitalization requirements for underlying investment strategies
 - Extent to which other margins are available to support these risks/costs
- o How are companies controlling the reinvestment risk with GIC business?
- o What techniques are being used to manage the crediting rates for interest-sensitive business so as to maintain the required margins?
- o Do information systems provide enough detail to separate experience for different blocks of business within the same segment?
- o How has actual experience tracked the pricing models?
 - How sensitive have default rates been to the business cycle?
 - How sensitive have contributions/withdrawals been to interest rate fluctuations?
 - Have certain crediting strategies with interest-sensitive products been successful in dampening the sensitivity?

MR. CHARLES P. ELAM: For this session we will look at the various factors to be considered in determining an appropriate interest margin, as well as the practical aspects of managing the experience over an extended period of time.

Pete Deakins of Milliman & Robertson will begin with a general overview, after which Rick Corwin of John Hancock Mutual Life will discuss the subject as it relates to GICs. Randy Palmer of Merrill Lynch Capital Markets will wrap things up by focusing on embedded options and the challenge they pose in determining the required margin.

Pete Deakins, our first speaker, is with the Philadelphia office of Milliman & Robertson, Inc. He has been with the firm since 1980. His area of expertise is life insurance company consulting -- including product development, asset segmentation and

PANEL DISCUSSION

asset/liability management. He also has a considerable amount of experience with financial projections and profitability analysis. From 1983-1987 he worked extensively with the rehabilitators of the Baldwin-United life company subsidiaries. His experience certainly qualifies him as an expert on our subject.

MR. PETER B. DEAKINS: In discussing the whole issue of required margins, there are a number of questions we need to ask. I'm going to discuss some of the more provocative ones. For a long time I've felt that the way actuaries price insurance products in general, and interest-sensitive products in particular, is just not right. I'm going to try and ask a lot of questions about what the interest margin means and what your goals should be. I don't think there's a universal answer, even for a particular product or company. I don't think you can say you always want to earn 175 basis points over what you credit. I think there are a number of issues you have to bring into this.

First of all, you have to look at the marketplace. If you're in a situation where the market's crediting rates are generally down, then you ought to take advantage of that by making a higher than normal spread. If market rates are high relative to what you can get on your investments, you have to deal with whether you should let the market go by or take some market share at a loss. I think all of these issues need to be dealt with when you decide what your required margin is.

The required margin will vary depending on the amount of interest-rate risk you're taking. If you anticipate a spread of 150 basis points when rates are level but only 50 basis points if rates move, that's very different from being assured that you'll get 150 basis points under all scenarios. This can have a big effect on what your margin should be.

I think you also have to take into account how you're going to reset your rates. Your strategy may be to hold a rate regardless of whether the market rates go up or down. That has a definite implication for what your margin should be. If your strategy is to lag a rising market and follow a falling market, that has another implication. If you're going to be a bait-and-switch or teaser-rate company, that has another.

All of these things are critical factors in determining what your margins should be. You can't set your required spread in a vacuum. You really have to come up with a strategy for how you're going to cope with the marketplace, because the marketplace is going to do ugly things to you. You have to be prepared for that. You just can't do this by saying you're going to get a spread of 175 basis points. You have to determine how you're going to attack the market, or whatever else you're going to do. You have to have a well-defined, thought-out plan for how you're going to respond to what happens in the marketplace relative to your own investments and products. Similarly, you have to deal with issues such as policyholder equity and goodwill.

Your profit is essentially maximized by the lowest crediting rate that doesn't drive away all your business. It doesn't take a genius to figure that out. You have to deal with some other issues, however, one of which is how good you are going to feel as a company if you get a reputation of ripping off your policyholders. That's fine if you're in a run-off situation, but if you want to sell new business you may be doing tremendous

MEASURING INTEREST MARGINS -- PART 3

damage to your franchise value. You need to address all these issues when you develop a crediting strategy.

Of course, policyholder options will be a critical factor in what you do with your crediting rates. You can obviously be more aggressive when your policyholders have high surrender charges and little ability to get their money out without a penalty. You should also take into account your own perspectives as to future interest-rate volatility. A spread of 150 basis points may look attractive if you think interest rates are going to be relatively stable. It may look very unattractive if you think interest volatility is going to be high, like the early 1980s when rates were going all over the place. High volatility like that is tremendously damaging for most of our products.

There are a few additional items on the asset-side to consider. For example, there's the call option. If your bonds are all currently callable, you have a much different perspective on what your required margin is than if you have all noncallable bonds. If you have all Government National Mortgage Association (GNMA) bonds, you have a tremendous prepayment risk. This gives you yet a different perspective. Similarly, anticipated default rates must be considered. The more volatile you think your defaults may be, the more cushion you need to build into the margin. Then there's reinvestment risk, which seems to get lost in the shuffle a lot of the time.

With the typical single premium deferred annuity (SPDA), the ideal investment strategy has a duration of one to two years, and this presents a real problem. You'll probably have a hard time getting access to attractive money with 1-3 year maturities. Even assuming you can now, what about a year or two from now when the initial investments mature? Obviously you're going to want to reset the crediting rate at a comparable level relative to the market. Basically, you're taking a lot of reinvestment risk when you effectively match your SPDA, and a number of other kinds of risk when you don't.

The extent to which other margins are available to support these risks is certainly a factor. One of the reasons I wanted to mention this was to emphasize that everything has to go into your decision. You need to distinguish between required margin, target margin, and the margin you can actually get on a given day. Your goal as you manage the business should always be to get the highest margin you can, consistent with such things as the market share you want. On a day-to-day basis your long-term target margins may have a very minimal impact on your decisions. Your long-term target margins really indicate how you're doing on the bottom line. They're what you look at on a yearly basis as you evaluate things overall, but the day-to-day decisions are based on much simpler choices.

One of the things that this gets into is marginal costs versus average costs. I think as an industry we need to start thinking in terms of our college economics and consider marginal costs versus average costs. It's mind-boggling to me that as an industry we do almost all of our pricing on an average cost basis. If you remember your college economics, the first thing your professors did was tell you what a waste average cost was and how important it was to focus on marginal cost. Yet everything I've ever done since I've been in the insurance industry has been focused on average cost.

PANEL DISCUSSION

How does actual experience track the pricing models? A lot of companies state a strategy, and then they don't really stick to it. More often than not this is because they fail to think through what it means. You have to think through very carefully whether or not you're really going to stick to your strategy, otherwise you'll reach very erroneous conclusions about the profitability of the business.

As to how sensitive policyholder contributions and withdrawals are to interest-rate fluctuations, we've found that they've been highly sensitive. Unfortunately, there's not a ton of good experience. The Society of Actuaries is sponsoring a study to get more experience, and even though I'm intimately involved with that study I don't hold out high hopes for having much in the near future. I think we're setting a base for the future though, and eventually we'll have good experience. Generally speaking, we've found that policyholders are very sensitive to interest-rate fluctuations, particularly if they don't have a surrender charge. The surrender charge seems to drive policyholder decisions as far as withdrawals go.

You really have to ask yourself what your pricing study means. Basically, you have to do a pricing study and determine the initial target spread. This does not mean you need to earn 150 basis points every year, because in my mind you'll never have a year where you exactly earn your pricing spread. In one year you'll earn 120, and the next year you'll earn 180. I think you're doing yourself a disservice if you set an absolute target.

Suppose for instance that interest rates drop 200 basis points, and you drop your credited rate 100. You may think you're beating your target spread by 100 basis points. While this may be true, you should probably be doing even better. While you're beating what you expected to achieve, you're falling short of what you could achieve by 50 basis points. When I think of target spreads, I think in terms of the rate you get on what you've invested in versus what you have to credit to a policyholder to bring him in the door. From that point on, you need to manage the crediting rate at the lowest level that you're comfortable with, and that doesn't drive all the policyholders away.

Unfortunately, after you've set the initial target spread, one of two things will probably happen. First of all, your target spread will seldom result in a crediting rate right where you want to be in the marketplace. Some of the time you may find that the market will tolerate a spread in excess of your target. For example, your formula may say credit 8.50% but the competition's at 8.25%. When that happens, you have a lot of easy choices to make. You can credit a higher rate and attract a lot of business, using rates that you feel comfortable with in pricing. On the other hand, you can lower your rate and get a higher spread than what you originally anticipated, without jeopardizing your position in the marketplace.

When the spreads you're actually able to achieve exceed what's required, it's a great day and decisions are easy. For most people, however, these days are few and far between. Probably the more typical situation is going to be when your target spread exceeds the amount you can actually get. Your crediting formula may say you should credit 8.25%, but when you look around, you find everybody is at 8.75%. That's when you earn your money. Anybody can deal with a target spread that produces a rate higher than the

MEASURING INTEREST MARGINS -- PART 3

marketplace. When the opposite occurs, you really have to think about it hard. That's when you have to deal with issues like maintaining your market presence.

As an actuary, your inclination is to credit 8.25%. If you do that, you may not get anything. That's fine if you don't want the business. And that's essentially what I think is right, although you have to modify it a little. In most marketplaces you can't just disappear when things get bad, and then come back when things get better. It's not like selling corn or something. People want to buy from somebody who's perceived as being a player and a part of the marketplace. So, if you're at 8.25% and the marketplace is at 8.75%, you may decide to go to 8.75% to maintain your credibility as a market player. At the same time you try to avoid getting very much business, because it's not attractive.

It's important that you plan ahead and decide how you're going to handle this, because you're going to be in this situation a lot. If you look at what happens with the investment marketplace, it moves pretty quickly. Every day it's a whole new set of rates. If you look at the insurance marketplace, it moves much more slowly. Inevitably, you're going to find there's a lot of days when you can't support a competitive crediting rate with an investment strategy you're comfortable with.

The second thing that will happen is your outlook on interest rates will change. This means you may need to go back and redo your pricing study. In determining your original spread, you had to make certain assumptions as to the volatility of interest rates. That was based on a particular view of interest rates. A few years later, something is bound to happen in the marketplace and your view will change. If you feel the volatility has changed significantly, you'll need to go back and review your pricing study. You may need to come up with a new target spread. You can't just have a target spread that's static day after day for five years. It has to be a living, breathing thing that changes as your view of the marketplace changes.

I've alluded to a lot of pricing issues. The investment environment changes more quickly than crediting rates. A corollary of this is that the products can be profitable one day and unprofitable the next. Your ability to move in and out of product lines quickly is critical. This may be more a matter of taking a low profile one day and a high profile the next. When you perceive that a particular market is under-priced, it's useful to be able to move out of that product. Ideally you'd like to move out of it altogether, but at the very least you need to be able to take a lower profile.

One of the things that this means is your annual planning process has to be different. Almost every annual plan I see is based on getting a specified amount of sales. That's everybody's goal, and the marketing people go ape when you say you're going to cut the rates because it's not good for business. They won't be able to make the plan. Well, the only reason you want to make the plan is for profit. Very few of us are in this just for market share. Actually, a number of us appear to be in it for market share, but most of us are in it to make money.

Your annual plan should be expressed in terms of selling so much profitable universal life or so much profitable deferred annuities. If it's not profitable, you've got to be

PANEL DISCUSSION

willing to shut it down, or slow it down. You've got to be able to go in at the end of the year and say we only sold a third of what was in the plan, it's all profitable business.

This is so fundamental, and yet you have to wonder if anyone really believes it. If the plan calls for \$150 million of new premium, nothing says it's \$150 million of new profitable premium. It's just \$150 million of new premium. The actuaries then work like crazy to come up with an excuse to credit rates that don't make sense, making a bad situation worse. We need to change our whole focus and say we're going to sell profitable business. Once we do that, it just changes our whole perspective.

You then begin to see the relevance of marginal costs. The more variable costs and less fixed costs you have the better. You are forced to deal with problems like having a huge department to issue and administer universal life or annuities or whatever. When you don't sell anything, you still incur all those expenses. When you focus on writing profitable business, you really have to start dealing with things like excess capacity and marginal versus average expenses. One of the excuses for focusing on absolute sales goals is the need to cover the existing overhead. If that's the case, that's fine. However, you need to address that in a manner more consistent with sound economics. Granted economics is not easy to apply to insurance, but you've got to do it.

One of the things I think you need to do is be market driven as opposed to spread driven. When I say market driven, I don't mean always credit the market. Rather than saying you need this spread or that spread, your goal should be to sell the most profitable business you can, given the constraints the marketplace puts on you. So, you should develop a plan as to how you're going to react to the market. If the market is here, what are you going to do? If the market is there, what are you going to do? Sometimes making your spread on an earned rate basis may mean you're doing a terrible job. If rates are down 400 basis points and you aren't making twice what you priced for, you're not doing a good job.

Basically I think that's what we saw a few years ago. When rates came plunging down, a lot of people in the industry said this is great, we're making our margins. In reality they should have been making twice their margins. There they were with all these 10-year assets and one-year liabilities, and they were content with just making their margins. They should have been making a lot more than their margins. On the other hand if rates go up, you really can't expect to make your margins. It then becomes a matter of keeping your losses to the lowest level. I believe we need to change our whole focus.

When we do a pricing study, we need to have assumptions about what will happen with investments. We need to recognize that the bonds are callable, and that they get a certain spread over Treasuries. We need some assumptions about how to generate a set of random interest-rate scenarios. By making explicit investment assumptions, we can project what our profits will look like under various scenarios. Once we look at things in this way, our perspective changes totally. For one thing it becomes quite evident that profits will most likely not emerge as a level spread. You begin to examine what they will be under specific interest scenarios. You begin to see that what you invest in affects the volatility of your profits.

MEASURING INTEREST MARGINS -- PART 3

I want to go quickly through an example of what I mean by marginal pricing. Marginal expenses should drive your day-to-day decisions, while average expenses should drive your global strategies, e.g., should you be in a particular line of business or not.

Suppose your insurance company is considering launching a CD annuity. The incremental fixed costs associated with the product are \$500,000. The critical question you want to ask is, what level of sales is necessary to justify that expenditure of \$500,000? That's how you get away from average costs to overhead versus marginal cost. How many dollars of sales does it take to make this whole thing work?

In order to answer this question, you have to ignore the overhead expenses. While you take them out of the profit study, you don't actually ignore them forever. You'll bring them in later. You then develop a present value of profits for a \$10,000 sale. By dividing the present value of profits per dollar of sale into your fixed costs of \$500,000, you determine how much in sales you need to make the product work. Using an approach like this, you can bring the marginal cost issues into the picture.

MR. ELAM: Our next speaker is Rick Corwin, Second Vice President at John Hancock Mutual Life Insurance in Boston. He is responsible for the pricing of GICs and single premium annuity contracts for qualified plans. Rick joined John Hancock in 1969 after completing a number of rotational assignments. He spent eight years in the group insurance area, and has been in group pensions since 1983. He will examine our subject from the perspective of GICs, his area of specialty.

MR. FREDERIC W. CORWIN, JR.: As Phil mentioned, I work on GIC pricing. My comments are focused on GICs, they will also apply to a number of other products.

A GIC, like an SPDA, is a fixed-income vehicle with some features that I want to briefly review. Employees who contribute to a defined contribution plan often direct a portion of their contributions into a GIC. Depending on the restrictions of the plan, they may switch their account balances among different investment alternatives. They can also change the amounts which they contribute. The participants essentially hold an interest-rate call option on the plan contributions.

One primary difference between a GIC and an SPDA is the ability of the participants to withdraw amounts from the GIC, either for investment in another option within the plan or for use outside the plan. Participant withdrawals from the GIC are paid at book value, regardless of prevailing interest rates, and without any surrender charge. This is an interest-rate put option. I'd like to look at both these features in more detail.

Let's begin by taking a look at interest margins. Very simply, the interest margin is the difference between the gross interest rate available on investments and the net rate guaranteed under the contract. This difference consists of deductions for expenses (including investment expenses, as well as administrative and acquisition expenses), risk charges (including charges for asset defaults, prepayments or call options and participant contribution and withdrawal options), and profit requirements.

PANEL DISCUSSION

As for the risks, I'd like to classify them into two categories, those that are sensitive to interest-rate movements, which you can think of as C-3 risk, and those related to quality considerations. Looking first at interest-rate sensitivity, we have three types of risk from embedded options. With each of these options, interest-rate movements can generate losses for the insurer. Interest-rate volatility is a major component of the risk. As interest rates decline below the strike price, the value of an option increases rapidly.

We avoid the prepayment risk by purchasing only noncallable assets. Since that's not practical, prepayment risk must be covered by a risk charge in the form of a yield premium. Option model can be used to price the call feature. A key assumption in valuing the option is the interest-rate volatility, which represents the expected range of movement in interest rates. In high volatility, interest rates fluctuate more, creating opportunities to profit from rate movements. Greater volatility increases the price value of the option, requiring a greater deduction from the gross yield on the assets.

On the liability side participants have an option to contribute more or less to the plan, regardless of which way rates move. As with the asset call, if rates move down, we expect to receive more contributions for investment at lower rates. This risk is also a call option. Additional deposits may come from switching of investments within the plan and from redirecting new contributions.

The opposite occurs as interest rates move up. Participants can withdraw their funds at book value by switching their GIC balances to other investment options and by redirecting new plan contributions away from the GIC. This is a put option. Increased interest-rate volatility will create opportunities for participants to gain and the issuer to lose. It doesn't matter which way rates move, the opportunity is created in both directions. If rates go up, we lose. If rates go down, we lose. High volatility always works against us.

To take advantage of rate movements, participants need to react. We know that their reactions to interest-rate changes are not efficient. Some participants will react quickly to take advantage of rate moves, others will wait until it is more obvious. A few will never act. Restrictions within the plan may inhibit withdrawals and switching between the different investment options. These exercise inefficiencies can be modeled with an interest-rate corridor, which requires 50 or 100 basis points before participants react and exercise their options. This inefficiency is true for contributions as well as withdrawals. Here's some illustrative risk charges for various combinations of interest-rate volatility and exercise efficiency.

**Risk Charge for Book Value Withdrawal Option on a 4-Year Compound GIC
(Using 1% Corridor)**

Exercise Efficiency	Interest Rate Volatility	
	12%	17%
5%	8bp	19bp
10	15	36
25	33	72
50	55	111

MEASURING INTEREST MARGINS -- PART 3

This illustrates how rapidly risk charges must increase with higher volatility and greater efficiency. For my company, we have found calls on private placement bonds to be about 75% efficient, based on experience over the last three years. The inefficiency is attributed to business reasons. For contributions and withdrawals, the experience for 1987, 1988 and 1989 has been favorable. This should be true for all companies, since interest rates have not moved substantially and have generally been below plan rates.

Consequently, it has been difficult for differences between actual and expected contributions to generate significant losses. This favorable recent experience should not lead us to think that our risk charges are excessive. High interest-rate volatility could easily resume, leading to experience losses. Articles in the press discussing GICs may encourage participants to think more about how their savings are invested, and this is likely to increase exercise efficiency.

Declining rates since the early 1980s have made it difficult to estimate antiselection risk in all of our interest-sensitive products. One readily available source for estimating individual sensitivity to interest-rate changes in a declining rate environment is prepayment data on high coupon GNMA's. We performed a regression against the prepayments on 13% GNMA's for 1984 through 1989 and found that prepayments increased almost 9% for every 100 basis points decline in mortgage rates. This is on top of a base prepayment rate of 3%. Some companies use proportionate responses to the standard GNMA prepayment data, based on the financial sophistication of their respective customer groups. This technique should work well for most interest-sensitive products.

Interest rates have varied widely over the last 15 years. After the Federal Reserve System changed its policy in 1979, interest rates soared and interest-rate volatility became significant. Whether expressed in basis points or as a percent of interest-rate levels, volatility was very high during the 1980s. Obviously, the effect is greater as rates move upward. The combination of high volatility and increasing interest rates can lead to losses on withdrawals. Even though volatility has been lower recently, it can always increase. Pricing must cover the risk of high volatility for the full duration of the contract. While volatility has declined from that in the early 1980s, I caution you not to assume low long-term volatility.

Now let's focus on quality. For logical reasons we usually associate quality with our asset risks. They're generally the biggest ones we have. Default experience varies appreciably with the quality of the investment, and C-1 risk has been recognized for some time. I'm sure that everyone here attempts to assess an appropriate risk charge for the default risk. What may be less obvious is that there should also be an appropriate equity base to support the degree of default risk in the investment portfolio. Many companies use different C-1 risk capital factors for all investment grade bonds and another one or two for below investment grade bonds. Other companies assess different capital requirements for each investment quality rating.

At John Hancock we feel the latter is the appropriate course. We vary the risk capital and force each investment to earn an incremental return adequate to support that capital. We do this before we calculate a yield that can be credited to a customer. In

PANEL DISCUSSION

this way we feel confident that we're being compensated for any extra investment risk that's been assumed.

So, the first impact of quality on profit margins comes from asset quality. The second comes from liability quality, a concept prevalent in finance theory but one that actuaries generally haven't incorporated into pricing. Our pricing is designed to ensure an adequate return on capital to support the four basic risks, C-1 through C-4. Financial quality is the ability to withstand financial risks. The greater this ability, the higher the quality of the firm. The clearest indication of ability to support risks is additional risk capital, which provides a cushion against financial shock and bankruptcy.

The capital asset pricing model is a financial market approach to pricing quality. Investors need an incremental risk premium to assume additional credit risk. As debt issuers via our GIC and SPDA contracts, we may be forced to pass such a premium back in the form of a higher crediting rate. On the other hand, we may avoid this by holding additional capital to support the risk. We must, however, recognize the cost associated with such capital. If additional risk capital is used, then we need to earn an additional profit to achieve the desired return on equity (ROE).

ROE comes from two sources, return from the investment of capital plus the profit margin earned on the business supported by the capital. The following formula can be used to determine the after-tax ROE:

$$ROE = ROS (1 - T) + \frac{PM \times (1 - T)}{E}$$

where	ROS	=	Investment Return on Surplus
	T	=	Tax Rate
	PM	=	Pretax Profit Margin (Basis Points)
	E	=	Equity (as a Percent of Assets)

Let's assume a block of business has a 5% equity base and a profit margin of 63 basis points. Using a 10% pretax investment return and a 34% tax rate, the total ROE can be calculated as follows:

$$ROE = 10\% \times (1 - .34) + \frac{63 \times (1 - .34)}{5\%} = 15\%$$

We can turn this formula around, of course, and solve for the profit margin required to achieve a specified ROE. We can also derive profit margins for various combinations of capitalization and ROE. All else being equal, the higher the equity base the higher the profit margin must be to meet the ROE objective. In the rate-sensitive GIC market, this has serious implications. There's no theoretical justification for spreads being different from the bond market. Unfortunately, this isn't the case, and I doubt that the SPDA market is any different. Spreads prevalent in the real world are far below those typical in the bond markets. Perhaps this is because we have not thought about the importance of earning a return on the capital necessary to provide financial quality. For our customers this is wonderful. They get extra quality at no extra cost.

MEASURING INTEREST MARGINS -- PART 3

Actuarial pricing techniques can establish a target surplus requirement for each product, based on the four risk categories C-1 through C-4. The result is that each company assessing risk in the same way will price for a return on equity using the same risk capital base. This will lead to uniformity in pricing, to the extent that everyone has the same ROE target. Real differences are, however, justified and should be acceptable to our customers, given our different abilities to support our risks.

In other words, the GIC market should be much more reflective of differences in capital than it is. It's clear that the rating agencies expect a certain capitalization rate or leverage ratio, based on the company's asset and business risk profile. It has become relatively common to hear complaints that the rating agencies are forcing us to hold more surplus than we think we need, but do we then demand a return on that additional surplus in our pricing? Do we charge our customers for our higher financial quality, which is achieved by holding additional capital? The competitive data on GICs say no.

It's also clear that the rating agencies value additional surplus above and beyond what our target surplus formulas produce. Moody's actually publishes a risk-adjusted capital ratio for its peer group companies which compares actual surplus levels to a required target. The required surplus factors are calculated for each company based on a study by Richard Kischuk, which has been published in the *Transactions*. The rating agencies will be the first to confirm that one ratio alone doesn't explain quality. It's admittedly a subjective process based on a close understanding of each company's business.

At John Hancock we've been trying to quantify the role of this additional capital in explaining quality ratings, thus far without great success. We have, however, pinpointed several important quality factors that aren't specifically included in Moody's analysis. The other factors that we came up with are total company size, quality mix of investment grade bonds and nonproblem mortgages and the degree to which the business is participating. Other factors might include quality of management, unrecognized asset appreciation, operating strategy, and sales distribution network. We've discovered a high correlation between most of these variables and quality ratings. We have yet to quantify a statistical relationship between additional risk capital and ratings that works well across the 40-company peer group.

We have, however, proven to ourselves that additional capital plays a role, namely in the market's assessment of financial quality. We have a clear idea of the capital required above and beyond our risk assessments to maintain our ratings. We work to maintain that capital buffer, and we price for a return on that capital in our GICs. Our customers are much more aware of quality differences in the wake of the thrift debacle and the collapse of Drexel Burnham Lambert Inc. The market should bear a quality differential now, and we should capitalize on this opportunity.

Just to recap, the interest margin must provide for a high interest-rate volatility over the life of the contract. In addition, it must provide for the desired ROE on both the target surplus for the business and the extra capital associated with the quality rating of the company. Recent events have demonstrated that customers will no longer take insurance company guarantees for granted. Consequently like the bond market, pricing of

PANEL DISCUSSION

guarantees will ultimately reflect the underlying quality of capitalization in the issuing company. The pricing actuary must take this into account.

MR. ELAM: Our final speaker is Randy Palmer of Merrill Lynch Capital Markets. Randy joined his company's Insurance Strategies Group in New York last year as Vice President, assuming research and product development duties for U.S. and Canadian life companies. He specializes in investments and asset/liability management. His prior experience includes over six years with North American Life Assurance Company, where he was involved in the design and pricing of individual life insurance and annuity products. Randy will focus on the topic of embedded options, an area he has done considerable research in at Merrill Lynch.

MR. W. RANDALL PALMER: My focus is going to be on options, both on the asset and the liability side of the balance sheet. By this I mean options that are important in terms of their effect on the overall level of interest-rate risks. The approach that we take at Merrill Lynch to measure interest-rate risk is to extend the techniques and methodology developed for assets in the capital markets to the liability side of the balance sheet.

When we talk about options, we're referring to interest-sensitive cash flows on both the assets and the liabilities. For example, with SPDA liabilities the policyholder put option is really nothing other than the fact that, if interest rates go up and the crediting rate doesn't follow along on his SPDA, then he's likely to take his money elsewhere. On the other hand if interest rates go down and his crediting rate becomes more competitive, he will be less likely to take his money elsewhere. The cash flows both in and out of the block of liabilities and assets are sensitive to the level of interest rates. As I mentioned earlier, option risk is really part of interest-rate risk.

When we measure interest-rate risk, there are a number of different ways that we can look at the value of options. The traditional approach has been to look at multiple scenarios to determine the distribution of profits. Naturally we at Merrill Lynch tend to approach this subject much like any other capital market issue, where we are concerned with market values. In measuring interest-rate risk, we look at the market values of both the assets and the liabilities. In this context, interest-rate risk becomes the risk of losing the business equity due to interest-rate changes acting differently on the assets and liabilities.

For example, if your assets are a lot longer than your liabilities and interest rates spike up, your equity is going to take a big hit. The drop in the value of your assets will be significantly more than the drop in the value of your liabilities. If you have no intention to sell a block of assets or get rid of a block of liabilities when interest rates change, you may ask why you would want to look at the market values. Certainly market values are appropriate when you're actually planning on disposing assets or selling a block of liabilities.

Market values are, however, relevant even when you have no intention of disposing assets or selling the business. As interest rates change, so do the underlying risks. This is handily reflected in the market value approach on a present value basis. If interest

MEASURING INTEREST MARGINS -- PART 3

rates fall and your assets and liabilities get out of line, the present value of the reinvestment risk you're exposed to is encompassed in one number. We have a complete measure by looking just at market value changes.

The principle that we apply is to take the traditional capital markets methodology of valuing assets and extend it to the liabilities. The options embedded in the liabilities consist of the interest-dependent cash flows. We really have two overall measures, which are different ways of looking at the same thing. One measure is to look at the net changes in market value equity of the block of business, i.e., the net difference between the market value of the assets and liabilities. Then there is the option-adjusted spread, which is really nothing other than an extension of traditional actuarial principles to measure the expected cost of the options on both assets and liabilities.

I'm sure most of you are familiar with duration and convexity. Duration is simply the first derivative of the price of either the assets or liabilities. Convexity refers to the second derivative. By looking at duration and convexity, you can quickly get a sense of what your exposure to interest-rate changes is. Duration alone is sufficient for relatively small changes in interest rates, but convexity should be included for broader changes.

I'd like to begin with a little bit of background on the development of the option pricing models. The models were developed on the capital markets side. They were originally used to value the options on fixed income instruments. As these debt instruments came to include more and more embedded options, the capital markets had to come up with an approach to value them. It had to be consistent with the market prices. The option models had to be carefully tested to make sure that they were on track. The key point here was that our yield-curve generator had to produce an arbitrage-free model.

There are basically three steps. The first step is to generate your interest-rate paths. Next, you generate the cash flows along each of those paths. Finally you have to discount them all back to get your market value price. This is done separately for both the assets and liabilities. To begin with, you need an initial yield curve. You also need a volatility assumption. As Rick pointed out, volatility is a crucial assumption in looking at the value of options. Basically the higher the level of volatility, the higher the value of options on both assets and liabilities.

Another critical factor is the spread assumptions. In essence, your assumptions provide probability distribution functions for yield curve changes and asset spreads. The interest-rate path generator provides arbitrage-free interest-rate scenarios based on the assumed volatility. To apply this to the liability side, you have to generate your liability cash flows along each of the paths. This requires an assumption as to the degree to which policyholders will efficiently exercise their options.

Relative to call options on corporate debt instruments, liability options are inefficiently exercised. For example if there's a 200 basis point differential between the crediting rate on your SPDA product and what your policyholder can get by going elsewhere, there's a certain number of policyholders who just aren't going to go. Some of them won't go

PANEL DISCUSSION

even under a 300 basis point differential. This represents an inefficient exercise of the put option that's been granted.

Basically a Monte Carlo approach is used to generate cash flows along each of the paths, both for your inflows and your outflows. While this may sound complicated, it's actually quite similar to the more traditional pricing models. It just takes the process a step further by extending the concept of present value to options. A key assumption, of course, is the degree to which the options are exercised. This is factored into the lapse function, since it reflects the put option that allows the policyholder to surrender at book value when interest rates spike up. As Pete pointed out, there's not a lot of research on interest-sensitive lapses at this point in time, but the Society has started up a task force to study this.

Once you have all the inflows and the outflows along all of the interest-rate paths, you then discount them using a specific option pricing technique to get a price. You can tell, all of this is extremely computer intensive. Even so, it can be done on a PC. After millions of calculations, you end up with one price for the liability. Then you shock the initial yield curve and repeat the process. You end up with a series of prices for both the assets and the liabilities. Then you look at how the prices change in response to interest-rate changes. This gives a measure of your exposure to interest-rate risk.

Clearly, this amounts to looking at insurance products as securities, and as I mentioned earlier it is consistent with the capital market approach. The value of this type of approach is that you can really get a better handle on the option exposure, relative to doing a handful of scenarios and getting ranges of results. The objective is to take calculated, heads-up-eyes-open risks as opposed to blind ones. I'd like to go through an example of a company that's been blindly taking significant interest-rate risk with its SPDA product for quite some time. In a way this is typical of the industry.

I have slightly disguised the company to protect the guilty, but as you can see (Chart 1) it's a fairly typical product mix. The business is mostly concentrated in the three- and five-year interest guarantees. A few products have bailouts, but most do not. A fairly

CHART 1
SPDA Portfolio Liability Summary

Guarantee Period (policy years)		Bailout Provision	Account Value (\$ millions)	% of Total
Initial	Renewal			
1	1	Yes	20	2
3	1	Yes	30	3
1	1	No	80	8
3	1	No	440	44
5	5	No	430	43
Total			1,000	100

MEASURING INTEREST MARGINS -- PART 3

typical surrender charge structure exists. You can think of this as your typical billion dollar SPDA portfolio, primarily sold through a brokerage network.

Here's a summary of the assets (Chart 2). This is where we get into the interest-rate risk exposure. Of course, the primary exposure on an SPDA contract comes from the put option, where the policyholder can surrender at book value. There's also an implied call option with the contract's guaranteed interest rate. However, for contracts with a typical guaranteed interest rate, the value of this option is quite small. In the rest of this case study I'll focus mostly on the put option exposure of the liabilities.

CHART 2

SPDA Portfolio Asset Summary

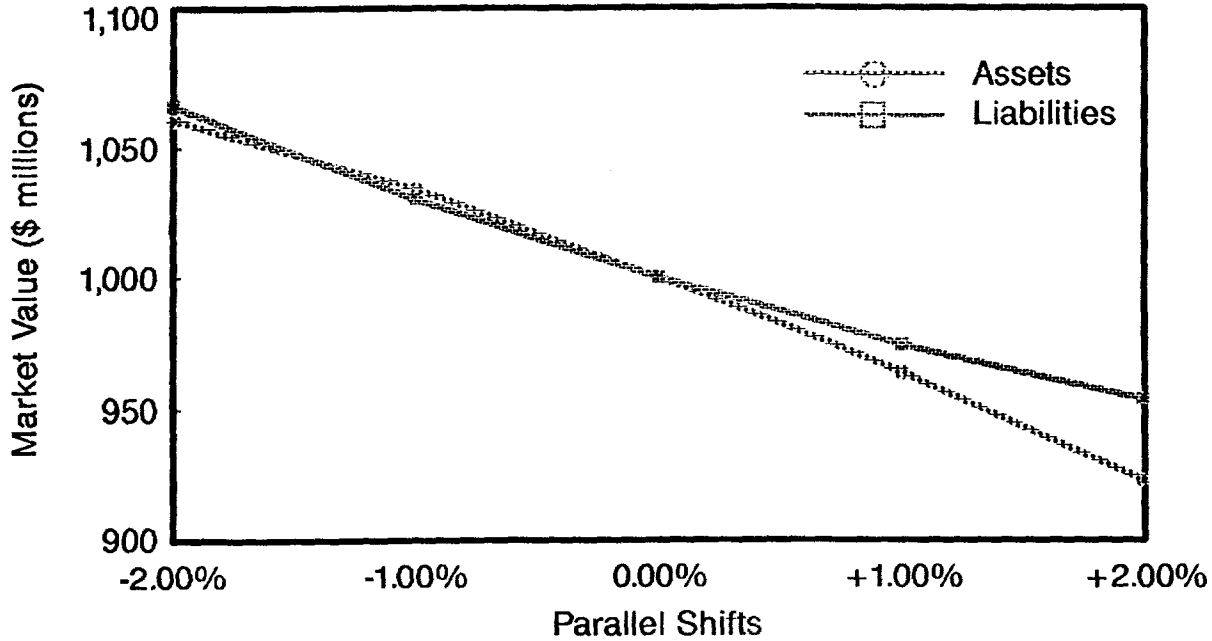
Asset Type	Approximate Book Value (\$ millions)	% of Total
CMOs	260	26
Non-CMO Mortgage-Backed	390	39
Non-Mortgage-Backed	350	35
Total	1,000	100

On the asset side the exposure comes from the fact that virtually two-thirds of this portfolio is in mortgage-related assets -- including GNMMAs, mortgage-backed securities, and collateralized mortgage obligations (CMOs). There's a very significant call option exposure here because of the prepayment risk on the mortgages, although it is inefficiently exercised.

The primary risk exposures are the call option on the assets and the put option on the liabilities. In the asset market, you do get an extra spread for options. If you lend money to someone, and you grant them certain options, you'll get an extra spread for that in return. Interestingly enough, on the liability side you often grant all kinds of options to the policyholder. Many of these options are very valuable, but typically there's no extra spread charged to the policyholder. Even so, both types of options have costs associated with them. There's an expected cost, and depending on what you do as far as hedging, a specific cost will actually be realized.

Here is the result of applying all this pricing technology that I talked about earlier (Chart 3). You have the liabilities and the assets. We looked at parallel shifts in the yield curve to get the sensitivity. That's a very typical measure of sensitivity. If you look between zero and minus 200 basis points, you see that the assets and liabilities actually cross over each other. I should mention here that we set the assets and liabilities equal to each other at the start. There's certainly a separate consideration of interest-rate risk exposure on your surplus, but our focus here is on the interest-rate risk exposure due to any mismatch that might be present between the assets and liabilities.

EFFECTS OF YIELD CURVE SHIFTS ON MARKET VALUE OF ASSETS AND LIABILITIES



MEASURING INTEREST MARGINS -- PART 3

At the far left-hand side of the graph, the liabilities are actually in excess of the assets. They start out equal, and then we shock interest rates both ways. They're less than the assets for a while, and then they cross over above the assets in either direction. It's hard to tell from the graph, but the slope of the assets and the liabilities is such that the assets are actually concave, pointing downward. This is what we call negative convexity. The liabilities are concave upwards, and have positive convexity. What I've done in the next slide (Chart 4) is blow that up and look at the difference between the two, as well as the net effect on surplus (Chart 5). Remember, we're starting from zero surplus here because we're ignoring the interest-rate risk on surplus.

The picture is not very pretty. If you invest longer on your assets than your liabilities, you might think that your primary exposure is that interest rates go up. Actually, because of the effect of the options on both the assets and liabilities, you're heavily exposed either way. As interest rates increase with instantaneous shocks to the yield curve, you will have significant hits to surplus. For a 200 basis point shift, you may have as much as a 3% hit to surplus. For a company that's carrying 5% target surplus, this kind of a shift in interest rates could wipe out 60% of the surplus for a line of business on a market value basis.

If assets are longer than liabilities, you'd expect to have nice gains as interest rates drop. Well, it works that way for a little bit, but then the options drag the surplus back down, producing a loss position on the other side. For those of you who are familiar with option terminology, this is a typical picture of what's called a short straddle position where you've issued both calls and puts.

This illustrates why the previous picture of the surplus occurs. We are basically revealing the option-adjusted duration on both the assets and liabilities. Initially we start out with the assets about a year longer than the liabilities, which is not a terrible mismatch by most standards. As I said, two-thirds of the investments are in mortgage-backed securities with prepayment options. As interest rates go up, fewer mortgages are prepaid. People who have a locked-in 30-year rate on their mortgage are not going to prepay if they have to refinance at 300 basis points higher than they started. The asset duration actually increases substantially as interest rates go up.

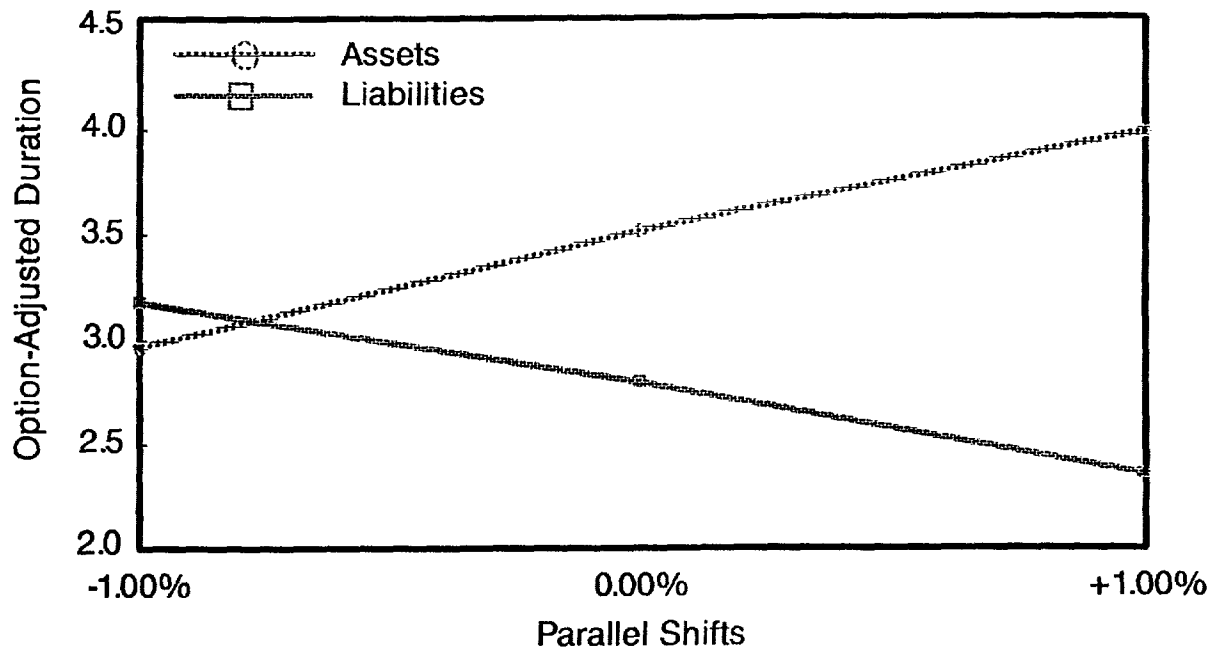
Similarly, as interest rates go down, more and more people prepay on their mortgages and refinance at lower rates. The asset duration drops drastically.

On the liability side, exactly the opposite occurs. As interest rates go up and policyholders are locked in for a three- or five-year guarantee, it becomes more and more attractive for policyholders to execute a section 1035 exchange into another SPDA contract.

As interest rates go up, you have to pay out more and more surrenders on your SPDA. The duration of your SPDA contract drops down substantially.

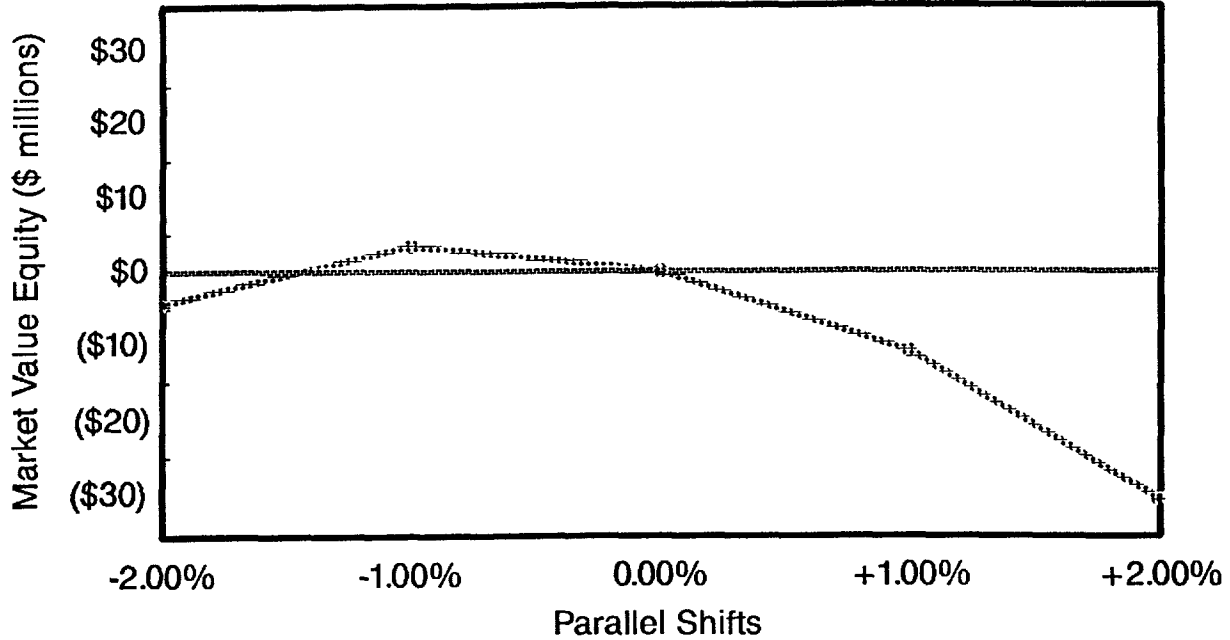
Conversely, as interest rates drop, you have fewer people surrender and the duration of the liability rises. Even before you get to a minus 100 basis points shock, the asset and liability durations have crossed over, and the liabilities are longer than the assets. As a

EFFECTS OF YIELD CURVE SHIFTS ON OPTION ADJUSTED DURATION



PANEL DISCUSSION
CHART 4

EFFECTS OF YIELD CURVE SHIFTS ON MARKET VALUE EQUITY



MEASURING INTEREST MARGINS -- PART 3
CHART 5

PANEL DISCUSSION

consequence, further interest rate drops hurt you. That's why you end up with that U-shaped curve.

Next, we're going to look at the effect on spreads using the option-adjusted spread, i.e., the actuarial expected value of the options that have been granted. We begin with the spread required by the company. This represents the difference between the earnings rate on the assets (net of investment expenses and default charge) and the rate credited on the liabilities. In our example, the company requires 185 basis points. Actually 75 basis points are needed to amortize costs, with an additional 25 basis points required for maintenance and other on-going expenses. This leaves 85 basis points of expected profit spread.

This company measured its performance on a static basis each month. The actual results were obtained by subtracting the average crediting rate on its liabilities from the average earnings rate on its assets. Based on this calculation, it was making its spread. Not only was it making its spread, but it had an extra 14 basis points. So, the company thought that it was doing pretty well.

However, we applied the option pricing technology to both the assets and liabilities, recognizing that the company had granted a number of options. If you give a waiver of premium benefit on a whole life policy, that has an expected cost associated with it even if you don't charge for it separately. In the same way, the options on both the assets and liabilities have an expected cost. The put option on the liabilities for the whole block was priced at 17 basis points. Because of the way the company selected its particular group of assets, the assets had an expected charge of another 30 basis points. From the option exposure on both the assets and liabilities, this company had 47 basis points of expected cost that it wasn't pricing for.

The key thing here is this is an expected value measure. If interest rates move against the company, the actual costs could be substantially higher than that. Unfortunately with options you don't have the law of large numbers working for you. With most risks, if you write a bigger and bigger block of business, actual and expected values will converge. It doesn't work that way with options.

Let's look briefly at where this company is on a spread basis now. Originally the company thought it needed 85 basis points to meet its ROE targets, after covering expenses. It thought it was getting 99 basis points, but it was ignoring 47 basis points of expected option costs. Actually, on an expected basis it was only earning 52 basis points, which is substantially below the required 85. If it had a 15% ROE target, it was down to perhaps 10%.

Now that we've outlined the situation, what can we do to lock in and control this option exposure? If interest rates move against us as they did in the early 1980s, we'd like to have some control over the results. As a financial intermediary, you want to meet your net option-adjusted spread targets, and have your asset and liability price movements exactly matched. If you can achieve this, you'll have a riskless profit flow. Whether interest rates go up or down, you'll just keep on pulling in your spread every month, every quarter, every year.

MEASURING INTEREST MARGINS -- PART 3

Obviously, this is an ideal. Given the shrinking profit margins in the life insurance industry, the more realistic situation is that you're going to have to incur risk to achieve your targets. You have to use your investment and liability management skills to buy risk low and sell it high. Both Rick and Pete referred to the four risks, C-1 through C-4. For instance, with the C-1 risk of asset depreciation, you have to buy assets where the charge that the market assesses for the quality risk is actually higher than you think is appropriate. This amounts to judicious selection of quality risk on the assets. As for interest-rate risk, if you need to take risks here you'd better hope that you make the right bets.

Getting back to the scenario that we saw earlier where two-thirds of the assets were invested in mortgage-backed securities, the reason why the company went into that is because it looked like there were great spreads available in those types of investments. That was a way to meet that required spread of 185 basis points. Unfortunately the company was exposing itself to tremendous risk. Whether knowingly or unknowingly, it was taking a bet on the interest-rate market.

The ideal situation is to mark to market both sides of the balance sheet every month or quarter and see how you're doing. Pete mentioned that you shouldn't expect to actually make your spread every quarter, but you should track it. You might as well track it on a mark-to-market basis. In this way you can recognize the gains and losses relative to your target spreads as they occur rather than as typically happens with statutory accounting, where the gains and losses are spread out over many years.

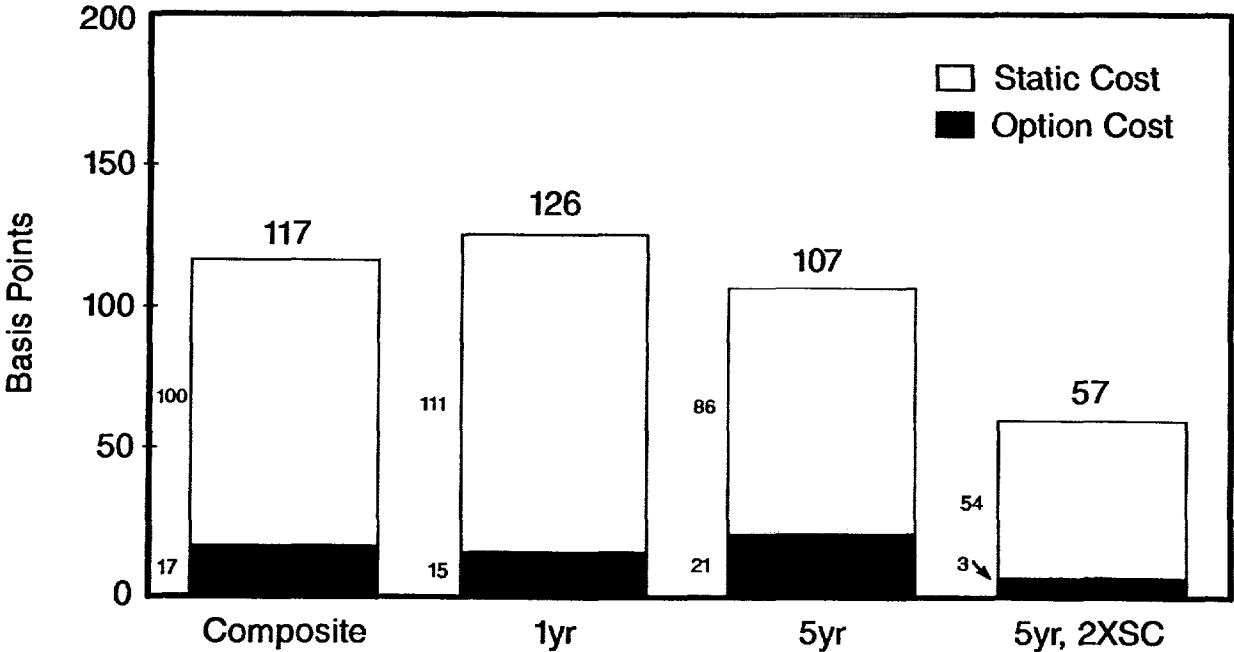
As for managing the risk posed by options, there are two ways that you can deal with this. You can manage your assets or you can manage your liabilities. Here are some suggestions of how you can manage your SPDA liabilities. Clearly, surrender charges will have a big effect. Your interest crediting strategy is absolutely critical in determining how the business will perform. The length of your interest guarantee periods determines the exposure you have to changing interest rates. Then there is your marketing strategy. If you're distributing through a brokerage sales force as opposed to a captive agency force, you'll have differences in terms of the sensitivity of your liabilities to changing interest rates.

Here is an example of some break-even, option-adjusted spreads (Chart 6). If you look over on the left-hand side of the chart, the 100 basis points is actually 185 basis points of total cost with an expected profit margin of 85 basis points. On a static pricing basis, 100 basis points was required to break even. Then we added in the 17 basis points for the options cost on the liability and considered that part of the break-even spread.

Now we can separate out a couple of the products. We have one-year and five-year guarantees. On the surface you would think the one-year would be better, but there's a difference in surrender charges between these two products in favor of the five-year.

However, with the longer guarantee period you have considerably more option costs. The expected cost of the option is actually higher on the five-year plan.

SPDA PRODUCT DESIGN ESTIMATED BREAKEVEN OPTION ADJUSTED SPREAD ON LIABILITIES



940

PANEL DISCUSSION
CHART 6

MEASURING INTEREST MARGINS -- PART 3

Compare the five-year product third from the left with the one furthest to the right, which is basically the same product with twice the surrender charge. Even on a static basis, if you double your surrender charge, you have a significant gain. You reduce your spread requirement because you suffer less of a loss from lapses. Interestingly enough, you also have a major drop in the options cost exposure. This has a simple explanation. If the policyholder has a put option to surrender when competitive interest rates are high, that option is pushed further out of the money (i.e., becomes much less valuable) if he's got a higher surrender charge. He has to get a bigger and bigger competitive gap to make it worth his while to move his money.

Perhaps the more traditional approach for managing option risk is to physically restructure your assets. The company in our case study could easily have said it couldn't afford to invest in mortgage-backed securities anymore. The option exposure is simply too much. It could have sold these assets and bought a new portfolio of securities. Of course, the transaction costs would have been very expensive. It might also have had serious tax implications.

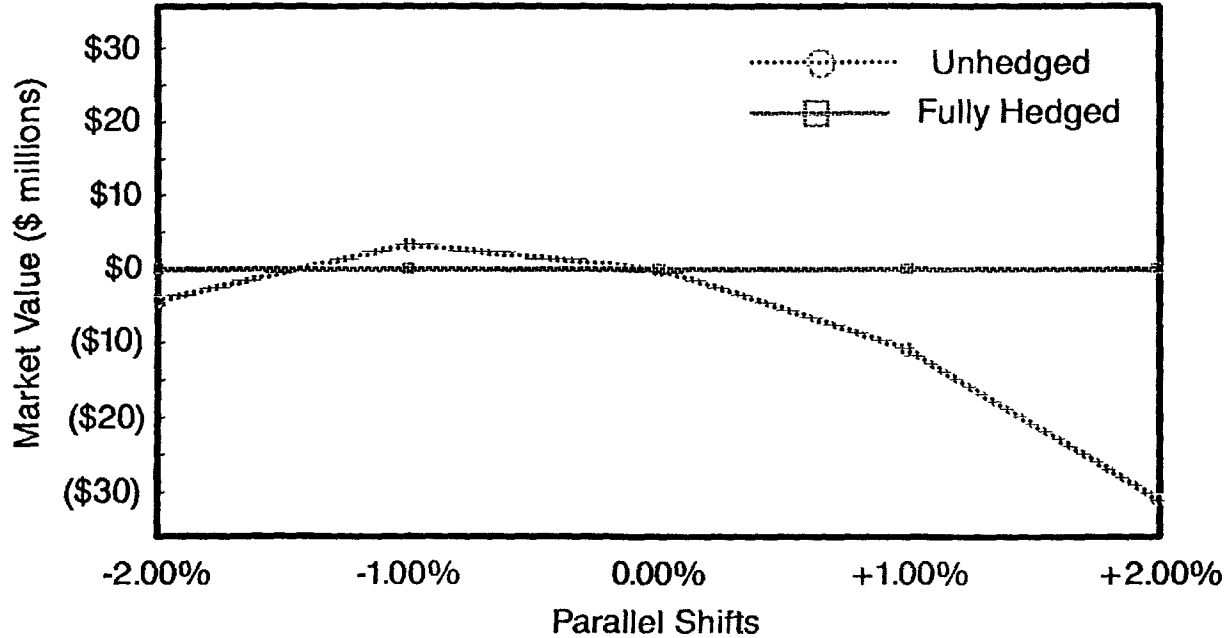
Another approach is to invest where you can get an extra margin, whether it's mortgage-backed securities or quality spreads, and then to purchase hedges to tailor the total portfolio characteristics to be what you want. You can still invest in whatever you want to invest in. This can be important. I know a number of insurance companies have developed particular niches in the investment market where they can pick up an extra 25 to 35 basis points. Naturally you don't want to desert those markets. You want to stay there and manage your risk on an overall basis.

Let's look at the effect of hedging (Chart 7). We have retained the graph we saw before, with the tremendous surplus exposure to interest-rate changes. A new line has been added, however, showing the same total portfolio with complete hedges applied. Basically, all of the interest-rate risk has been hedged out. The next slide shows what did that (Chart 8). Here's just an example using the derivative types of instruments handled by the area that I work in at Merrill Lynch of a hedge to protect against a 200 basis points shift up or down in interest rates. All of these instruments extend over four years.

The nice thing about hedging is that it's not always buying. You can actually sell options, subject to appropriate regulatory constraints. You can sell options back into the market to help balance your portfolio, and that reduces the overall cost. You're buying with the money cap. A cap is really just a certain type of put option. So, you're selling a put option on the liability side, and then you're buying another slightly different put option on the other side. The net total cost starting at a \$1 billion SPDA portfolio is \$4 million, and that's even less when you spread it over the expected period of four years.

The hedge will need some periodic readjustments. Hedging is a dynamic strategy. You have to reevaluate every quarter or so and see where you are. Even with some fairly significant rebalancing costs, the total cost would be on the order of 20-60 basis points, depending on what actually happens. The key point here is that anything that you spend for hedging offsets other costs which you are already exposed to.

EFFECTS OF YIELD CURVE SHIFTS ON MARKET VALUE EQUITY: UNHEDGED VS FULLY HEDGED



942

PANEL DISCUSSION
CHART 7

MEASURING INTEREST MARGINS -- PART 3

CHART 8

One Sample Asset Hedge

Buy/Sell	Instrument	Notional Amount (\$ millions)	Initial Cost (\$ millions)
Pay Fixed	4 Year Swap	717	0.0
Sell	at the Money Cap	2,174	(52.5)
Buy	1% Out of the Money Cap	3,102	42.7
Buy	1% Out of the Money Floor	1,642	14.8
Net Total Initial Cost			4.0
Approximate Average Annualized Cost: 20-60 basis points			
Hedge costs should be charged against expected asset/liability option costs			

You have those expected costs on both the asset and the liability side from the option exposure. If you go out and buy a put option to hedge that exposure, that's not an additional cost. That applies directly against the expected cost that you calculated. What you've done is changed a variable cost into a fixed cost. It's important that you realize hedging is not an additional expense thrown on the top.

In summary, granting options on both the assets and liabilities has a cost for the insurer. If you ignore it, you can seriously underprice your business. Using the technology developed for capital markets, the exposure can be systematically measured. This allows you to get a handle on it and do something about it. Unless you lock in the option costs, all of your calculations represent nothing more than expected values. This is an area where you are really without the law of large numbers to bail you out. Depending on actual interest-rate movements, that cost can go up or down dramatically. You can control it with the assets, the liabilities, or a combination of both.

More often than not, you have more flexibility with the assets. To a certain extent you're limited on the liabilities because of market pressures. If you've been selling \$1 billion a year of traditional SPDA and people love it, you might not be able to introduce a market value adjusted product without devastating production. Some combination of the two can save the day.

MR. STEVEN A. SMITH: Mr. Palmer, in your closing remarks you talked about marking the liabilities and the assets to market every quarter. Do you have any good tips as to how to actually go about that? What do you really need? I can conceptualize how to do it on the asset side more easily than I can on the liability side.

MR. PALMER: As you point out, it's a lot easier on the asset side. The asset models have evolved over a period of time for all different types of securities, and generally they already exist. While you may not have the technology inhouse, it's available from your investment banker or wherever. On the liability side, things are just getting started and the process is far from perfect. While the models that I have discussed are fairly

PANEL DISCUSSION

advanced for SPDAs and GICs, they can't handle some of the more complicated products.

I think it's important to commit to the concept and then start to work towards it. That doesn't necessarily mean you should implement it companywide on all of your liabilities and assets. Maybe you'll decide to carve out a subsection and start to work on that. If you write SPDAs, they are an obvious choice. It's going to be a learning process. I think that's the key, just start and go ahead. Just to mention a particular company, Travelers has committed to this approach. It is really just getting started on the liability side as well, but on the asset side it has been marking to market for a number of years.

MR. DEAKINS: I would add one caveat. As Randy mentioned in his speech, it requires a leap of faith when you go to taking the market value of the liabilities. I'd really caution you on that front. I think the methodology has some application when it comes to evaluating how sensitive your assets and liabilities are to interest-rate risk. However, we have dealt on at least a couple of occasions with appraisal situations where the companies were developing market values of assets versus market values of liabilities. We noticed a tendency to dramatically overestimate the value of the company. All too often this methodology ignores the cost of capital and various other issues unique to the regulatory environment of the life insurance industry. These models come out of Wall Street, and you have to be careful how you adapt them to the insurance business.

MR. PALMER: I agree. I certainly did not mean to suggest that this was a total replacement for the more traditional actuarial analyses. It should be viewed as an addition to your existing arsenal of weapons, not a replacement.

MR. DAVID M. MORDORSKI: Randy, you indicated you were able to hedge away the interest-rate risk for plus or minus 200 basis points of interest-rate change. I believe you were using primarily caps in the process. I'm curious as to what kind of timeframe you were looking at. My experience in looking at caps is that if you want to go out very far, they become very expensive. Looking at an SPDA block over its entire life, I'm not sure it's really possible to use caps to hedge away the interest-rate volatility.

MR. PALMER: That's a good point. The key thing about the hedging strategy that I showed you is that it took out the interest-rate sensitivity using a hedge with a four-year life. As part of the hedging process, it's critical that you reevaluate the situation. It's a dynamic process. You can't just put a hedge in place and go about your business. No matter how good a hedge it is, it's not going to be perfect. If you're matched up on duration and convexity, you're still missing the third derivative, the fourth derivative, the fifth derivative and so forth.

There's always some aspect out there in the price change that's going to be different between the assets and liabilities. All you're trying to do is minimize that difference. Every quarter you have to reevaluate the risk. You have to look at where you are, and then do some fine-tuning on the hedges. If you thought you had a 10-year average life for a block of SPDAs, what you'd have is complete hedges put on every four years, with periodic fine-tuning.

MEASURING INTEREST MARGINS -- PART 3

MR. DEAKINS: I have a question for Randy. Have you looked at the intrinsic risks of the hedges relative to the risks of the asset/liability mismatch? One of my clients became quite concerned when it saw how much fluctuation there is in the swap market. I'm a little nervous with all of this stuff myself. Sure, if the market is static except for interest rates, the hedge works great. Have you ever looked at how volatile the hedges themselves are?

MR. PALMER: First of all, there's an aspect of credit risk with hedges. Somebody is standing on the other side of that hedge with an obligation to pay what's supposed to be paid when the time comes. That's an important consideration. As a counterparty to a swap or a cap, you want to make sure you've got a suitable counterparty from the standpoint of credit quality. Moving beyond the credit issue, the risks are more complex. Just as corporate bond spreads change over time, these markets respond in tandem with the overall financial markets. They each have their own unique quirks and can change as well.

That's why it's critical that you employ a dynamic hedging process. Probably the worst thing you could do is put on a hedge and then go home and sleep comfortably for the next three years thinking that you're covered. It's absolutely critical that you look at it on some periodic basis. The swap market might move slightly out of line with the Treasury market or the corporate bond market. That's the whole point of a periodic reevaluation. When you see things starting to get out of line, you have to adjust before you get into serious trouble.

