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**PRICING AND INVESTMENT PHILOSOPHY FOR
INTEREST-SENSITIVE PRODUCTS**

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What techniques are companies using to maintain compatibility between investment practices and pricing assumptions for interest-sensitive products:

- o Segregated assets
- o Use of options/futures
- o Asset/liability matching
- o Market value adjustments

MR. DALE B. WOLF: The basic message of my discussion this morning is the concept of maintaining compatibility between investment practices and pricing actions, which is more than just a technical problem. We often tend to think of it as such, but I want to focus on it as a two-fold problem -- first the business management problem, and second the technical problem. I'll touch on both but certainly the first few remarks that I'll share with you focus on it more from a business management problem.

Why is maintaining investment and pricing compatibility so important?

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First, it is essential to carrying out our business objectives. I'll talk a little later on business objectives, but suffice it to say that unless the pricing and investment assumptions and practices are compatible, something is going to give. Either unquantified, misunderstood risks will be taken or profit objectives will not be achieved.

This compatibility is also essential in order to not concentrate business risks. It is interesting to watch the daily competition in the GIC market. Some companies have rates that are guaranteed for a very short period of time; others have longer guarantee periods, and so on. My experience has been that more often than not, when rates are guaranteed rates for a longer period of time, we end up selling business when the markets go against us, and losing the business when it would be in our favor. This is just an example of the general problem. It may become apparent through selling a certain length of contract, in selling a certain type of liability characteristic, or a number of other factors.

Accountability for results -- again I want to talk more later about specific accountabilities and measurement tools, but I believe that unless the investment and pricing practices are compatible, there can be no common understanding of what is expected and when results deviate from the expectation. As a result, it becomes very difficult to monitor unacceptable performance and make adjustments.

So how do we get to compatibility in our investment and pricing assumptions? Clearly, this starts with establishing the clearest and most open channels of communications possible between the two areas. If your investment people don't understand how your products work, and if you hide from them the risks inherent in those products, such as lapse risks or policy loan risks, then the ability to achieve this consistency of practice will be diminished. Conversely, it is essential that product actuaries understand investment alternatives and techniques, as well as know what motivation there is for portfolio managers and what constraints those people are operating within. I cannot overemphasize the importance of this communication link. At my company, the Travelers, we have established both formal and informal communication channels in our pension area that operate very efficiently. There are a variety of levels of management

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committees that oversee the specific results and practices of each of our guaranteed products, not in quarterly review sessions, but rather weekly working meetings. On a more tactical level, there is daily communication between the people on my staff and the people in the investment area. We are not in the same department, but we recognize that our business is one.

In order for this communication to work effectively, and to be able to achieve pricing and investment compatibility, the fundamental point is the need to start developing and agreeing upon the statement of business philosophy. As you are probably aware, in the investment management business, the first part of the manager's job is to sit down with his client and help him understand his investment objectives, risk tolerances, and so on. I don't believe it is any different in the management of our guaranteed product portfolios. In developing this business philosophy there are several questions that need to be answered, and I think these need to be answered and understood jointly by both actuarial and investment personnel. What are our profit goals? How are they expressed? Are we talking about margins as a percent of assets? Are we talking about return on required capital, or some other measure? Clearly these are questions where a pricing actuary should have the most input, but they are also part of the understanding and management of the total business structure.

Another point -- what is our risk-taking posture? This is very critical. Does the strength of an organization and/or its tolerance for risk dictate some sort of cash matching strategy, a duration matching strategy, some degree of mismatch exposure, high or low credit risk exposure, short term interest rate calls, long term interest rate forecasts and so on? Clearly, there must be a common identification with the risk taking desire and ability of the enterprise. If this is not communicated and understood, I can assure you that investment actions will not follow pricing assumptions or vice versa.

Not unrelated to the first point, although perhaps a separate question, is our tolerance for a severe drought in sales. Are we really willing to not be competitive for substantial periods of time because someone has come into the marketplace with very aggressive rates? We don't like to talk about that, explicitly, but it is a question where we need to understand what our company's position is: will we buy business if we have had favorable results in the

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past, or if we are not willing to tolerate uncompetitiveness for some substantial period of time?

Another question -- what is our philosophy with respect to federal income tax? Is it passed along to our clients? Are we willing to write business at very small margins for the tax advantages to the corporation? Again, this is one of those that is primarily a pricing and business question, but I believe it's part of the basic philosophy of our business which must be clearly understood.

Once these business philosophies are understood by both parties, it's only then we can really talk about the specific tactical investment practices and techniques and how to reflect those approaches in terms of our pricing. It is very important to review each of these tactical approaches in terms of our overall business strategy objectives. Many of the techniques I am going to review here are used by companies in the GIC business, but I think you will see the applicability of these investment practices and pricing assumptions in your business.

First, I want to spend just a minute on the concept of segregated assets. Certainly, by this time, the topic has had a great deal of discussion. The ability to implement investment strategies consistent with business goals requires that there not be constraints upon our activities from other businesses. This is where the need for segregated asset portfolios has arisen. In the old days, an insurance company's general account had so many businesses in it that nobody could really dictate an investment posture. As a result, almost every business had suboptimal economic decisions. I would describe the segregated asset pools as catalysts in achieving our objectives. I would also take time to point out, however, that creating segregated asset pools for the sake of having them can be counterproductive. At one point in our company we had so many asset pools that they actually interfered with an efficient and well-managed investment process. There are certainly constraints imposed by trying to manage an asset pool that is suboptimally sized. It is important that if common investment objectives and techniques are available across a couple of businesses, there is no need to segregate those asset pools.

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A major area where a variety of techniques are used to maintain compatibility is in the area of profit goals and risk-taking tolerance. One of the key risk exposures we face in the GIC areas, for instance, has been the initial investment rate. A sale is made on the assumption of certain rates, and margins are thin enough that if it takes a week or two to find an investment, fluctuating investment rates can wipe out profitability. I think companies have dealt with this in a number of ways. One of the key changes that has occurred, of course, is the shortening of the quotation period for GICs. Right now in our company, our competitive GIC products have a one-day quoting window, and I don't mean one day from today to tomorrow, I mean from 10:00 a.m. to 2:00 p.m. That really is an action we've been forced to take on the liability side to try to deal with investment risk problems.

Another way to deal with this initial rate risk is through hedging. Certainly many companies are taking many approaches to dealing with this. I think some companies are purchasing futures at a point in time when a sale is made to lock in a specific yield level until such time as a permanent investment is found. At that time (hopefully, if the hedge ratio is calculated correctly), the offsetting gain or loss on the future will compensate for the change in yield on the underlying investment, and amortized over time, everything will work out beautifully.

Others are doing similar things, but in the cash market. Some investment strategies are such that the portfolios have a fairly heavy cash position and at a point in time some of that cash may be moved into treasury securities temporarily as a similar kind of hedge.

Another general risk area where business philosophy may dictate investment practices and pricing responses is the key area of the approach to mismatch. I mentioned before that varying degrees of match can be assumed by various companies, and you never quite get a revealing answer from the competition as to exactly what people are doing. But I think that there is quite a range of assumption of risk versus a match position. Certainly the cash match, and by that I mean the exact matching of the liability flows to the asset flows at every point in time, is very difficult to implement and will restrict available investment alternatives. Also, it is probably not very compatible with an

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aggressive business posture. And again this is one of the points where we first have to understand what our business philosophy is. This conservative approach will probably not produce returns as competitive as some of the other alternatives.

Probably the most common approach used in the matching area is some degree of duration match. There are a number of ways different companies have used to achieve a duration match. One of these is the classic barbell approach, where a cash position is maintained to offset longer fixed rate obligations such that the total duration for the portfolio is matched (or not matched, as the business philosophy may dictate) to the underlying liability portfolio. It is pretty effective generally, though there are certainly constraints in terms of needing to be able to have a certain liquid position in the portfolio in order to rebalance, when circumstances dictate. Also, there are some inherent risks, such as a shift in the yield curve and also call risk, which I'll mention a little later.

Alternatively, futures can be used to adjust the portfolio duration. This demands some creativity if you're a New York company under New York law. Conceptually this is one of the most efficient ways to adjust the portfolio duration, with quite low transaction costs and without disturbing the underlying asset portfolio that you've chosen to invest in.

Another technique, one that I don't believe is being used very much yet, is the use of interest rate swaps. This is a fascinating approach to risk management. There are many advantages and disadvantages to other risk control mechanisms, but I would encourage you to try to get some understanding of how the interest rate swap market works because it certainly can have some applicability in our business. I should point out that most of the things I've talked about are various techniques for achieving risk control, and the relative efficiency or inefficiency of any of these at a point in time may provide certain opportunities for arbitrage. Arbitrage could be used to enhance the profitability of the portfolio or to improve the competitiveness of products. This depends upon the ability of an enterprise to be in a position to actively manage its portfolios.

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Another general risk area where a variety of techniques has been used to manage risks is the area of exposure to callability. Certainly the events of last year have brought to light the need to manage this risk. There are a variety of ways to try to deal with callability. The most effective is to insist on full call protection, which is likely to be an unrealistic goal. It is certainly likely not to produce maximum returns for competitiveness. How far one deviates from full call protection is a function of one's business philosophy as to risk taking. One of the most often used techniques is the use of discounted securities. While there may be no explicit call protection in these securities, the lower coupon rates suggest that refunding is not likely to occur or will occur only if there is a substantial drop in interest rates, and even then presumably there will be time to anticipate that and adjust the portfolio through active management. Theoretically, one could also quantify, with an options pricing approach, the value of the call option at any point in time and purchase offsetting options for the portfolio to offset that risk. A more likely approach is an evaluation in establishing asset duration of the impact to call, or likelihood thereof. I suspect that much of this is done, however, on somewhat of a discrete basis, that is, either assuming your assets are called or not. With quick changes in interest levels, this strategy may not react very well when interest rates pass through the underlying coupon rates of the asset securities.

In the area of mismatching, similarly a number of approaches are viable. The techniques for actually implementing the mismatch are very similar to those we discussed in terms of achieving a match. Actual securities purchased can be mismatched or options/futures techniques can be used, or interest rate swaps can be utilized.

Another area where consistency is important is the area of credit risk. Clearly this is a key element of one's business philosophy as to how much expected return and competitiveness are to be achieved by the taking of credit risks. It is again key that the actual credits used line up with the risk tolerance and that there be a clear understanding with the pricing actuary of what levels of credit will be utilized. The assumed spread on underlying assets, if not realized or if eaten away by unsatisfactory credit results, again can erode expected profit margins very quickly.

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On the liability side of the equation, there are also a number of risks that we have to manage. In the GIC area probably the most obvious of these occurs when we write a lot of business to employees savings plans, where employees have the option of depositing money during the window period and where the amount of that input is uncertain and must be predicted, and so risks are taken by the insurance company at the point of sale. It is a very difficult problem; it is in effect an option in the hands of the employee (whether or not to deposit his money), which you should try to anticipate. There must be a common understanding of what this risk is, what the investment strategy is going to be in the company and what remedial actions will be taken if experience deviates from expected. Whatever actions are to be taken on the investment front, again, must be reflected in the pricing of the product. Either the total return on assets must be adjusted for insurance costs or the price to the customer must be adjusted for an insurance charge for this particular risk.

We have talked about the importance of compatibility between investment practices and pricing assumptions. We have talked about the fact that this needs to begin with a statement of common understanding and agreement on business goals and objectives, and I mentioned a few specific areas where investment techniques and pricing assumptions have to be consistent among themselves in the group pension area.

Why doesn't this all work? I think there have been a few barriers in achieving this, one of which is clearly competitive pressures. Generally, when sales are not good somebody takes the heat -- depending on the organization, maybe the investment people or the pricing actuaries. But this pressure tends to lead to unrealistic optimism about what results can be achieved from an investment process. Or, it can lead to unrealistic optimism about actual results in the liability areas. Closing our eyes to key risks and actions is ultimately a poor answer to competitive pressures. Another barrier is poor communication. It's hard to overemphasize the need for it. You really need to think organizationally within your company about ways to address this situation, and we have found that reassignments have worked very well. A third barrier is the lack of consistent motivation. One of the results that has to be achieved from an understanding of business objectives is how results are going to be

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measured. There must be common measurement tools for the success or failure of an effort.

If the pricing actuaries are graded on profitability and sales volume and the investment professionals are rewarded for buy and hold investment strategies with no credit losses, it is unlikely that a business will succeed. The rewards system for the people involved in this business has to be consistent across the disciplines.

In summary I believe that compatibility between investment practices and pricing assumptions is one of the key challenges we face. I believe first and foremost this is a business management problem as well a technical one. As actuaries we tend to be interested in understanding and solving technical problems; but until we have a management process in place that leads to regular and open channels of communication and consistent statement of business purposes and measurement of results, all the technical solutions in the world are likely to produce continual disappointments.

MR. MICHAEL G. REILLY: Several years after their introduction, individual interest sensitive products such as SPDAs remain the hot properties that contribute generously to the sales growth of many companies. That's the top line. The downside of all this is a substantial C-3 risk that many of us have ignored in our rush to bring attractive competitive products to market. But we can't ignore that risk any longer. Not only must we deal with what has already been sold, we are still out there selling, and we have to cope as best we can. My topic concerns how companies are managing these product lines and what techniques they are using to assist them.

In the last few weeks I have spoken with actuaries at nine other companies who are active in the deferred annuity business. In addition to my own company, New York Life, these companies include Allstate, Equitable, Horace Mann, IDS, John Alden, John Hancock, Kemper, Metropolitan and State Farm. My first question was pretty basic. Does your company use a designated asset portfolio or segmentation of general account assets to support deferred annuity liabilities and to allocate investment income? All 10 companies in this study said yes. Moreover, from follow-up discussions with companies it seems that these

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designations are generally pure designations of actual assets, not just artificial allocations of investment income of total company assets made using cash flow models.

I believe that this response is indicative of several things. First, it begins to show the widespread recognition that one investment policy is not appropriate for all lines of business within a company. Different lines and major products within those lines have different investment needs. It also shows a trend in large and medium companies, at least, toward multiple separate business units within a company. The concentration of measuring results in many companies, including my own, on a line-of-business basis for a major product within that line points out that perhaps some opportunity may be lost to companies which are just measuring their assets and liabilities on a line by line basis and not for their companies as a whole.

Now that companies are setting different investment policies for different lines or major products, the next step may be where companies construct sets of scenarios to determine their reinvestment and disintermediation risk for the company as a whole. Clearly the worst case scenario for the company is going to be decidedly less than the sum of the worst case scenarios for each line.

There is extensive use of some sort of asset and liability cash flow testing and modeling, as indicated by answers to my next question -- does your company use asset/liability cash flow scenario testing and modeling for deferred annuities? Responses were yes for eight companies, no for two companies. Eight of the ten companies used this technique to manage their deferred annuity business. However, the purpose and the extent of this varies widely. For example, as indicated in Exhibit 1, while most of these companies use these techniques to determine and evaluate appropriate investment policy and for determining appropriate reserve levels and as support for actuarial certifications to state insurance departments, less than half use them in the initial product design stage to initially price policies and to set current interest rates.

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Exhibit 1

For what purpose?

a.	Initial product design/development	4
b.	Pricing, including explicit charge for C-3 risk	3
c.	Determining current interest rates	4
d.	Determining and evaluating appropriate investment policy	8
e.	Valuation purposes, determining appropriate reserve levels and support for certifications to insurance departments	7

The frequency of the use also varies widely. As shown in Exhibit 2, only two of the ten companies that we spoke to do cash flow testing under different interest rate scenarios as frequently as four times a year. This may indicate how much time and resources it takes to do this analysis and the time it takes to have the respective asset and liability models updated to reflect actual experience.

Exhibit 2

How frequently do you do asset/liability cash flow scenario testing and modeling for deferred annuities?

At least quarterly	2
2-3 times per year	3
annually	2
less frequently than annually	2

Most of the companies that did cash flow testing and modeling felt that, "broadly" speaking, their assets and liabilities were durationally matched. I

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did not try to define "broadly", and I'm not quite sure what this response indicates. If I had asked the question, for a product like an SPDA with a contingent set of liabilities, "Are there reasonable and plausible interest rate scenarios where your assets and liabilities would not be matched?", I suspect most of the answers would have been yes.

One last question about asset/liability cash flow modeling pertained to convexity. Very few companies measure convexity (or some equivalent measure of the rate of change in asset and liability durations with changes in interest rates) as part of their analysis -- only one out of ten. Perhaps companies feel that they test a sufficient number of interest rate scenarios in their own cash flow modeling work and know from the different scenarios how their assets and liabilities behave with changes in interest rates.

Moving on to other techniques of the companies surveyed, apparently very little is being done currently to lessen the C-3 risk using security hedging devices such as futures and options. Only one of the ten companies that we spoke to used this in its deferred annuity portfolios. Perhaps this is a response to the current regulatory environment in different states and also reflects the current lack of familiarity in different insurance companies in regard to these techniques.

On the other hand, seven out of the ten companies are actively managing their asset and liability portfolios and engaging in active trading of blocks of assets for deferred annuities. A traditional investment policy for insurance companies of "buy and hold" seems to be gone at least for now, for interest sensitive products like SPDAs.

Our moderator, Marty Ruby, had suggested that we spend some time on the implications of the current lower interest rate environment that we are now experiencing. Even though interest rates are generally lower, it seems that there is a perception in the marketplace that higher volatile rates have been replaced by lower volatile rates. The volatility is still with us. Even companies with short memories remember the sharp increase in interest rates in the early 1980s.

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The need for analysis of the risk reward relationship in interest sensitive products is ongoing. Company managements that finally got religion are not going to unlearn these items. Compare this with the price of oil. When oil prices rose after the 1973 oil embargo, the American people became more energy efficient. When prices dropped, although they may drive their cars more, they're not going to remove the insulation from their houses.

Procedures that company management has put into practice are going to stay there. In addition, various state insurance departments are making changes that will require more asset-liability modeling, and the concept and role of valuation actuary is being continuously shaped and defined.

In examining our deferred annuity line of business and our cash flow testing for our inforce block of deferred annuities, we at New York Life have found that our worst case scenario was when interest rates move down for a period of time, as they have now, and then shoot back up again and stay there. This scenario produces the greatest losses because when interest rates decline, corporate refinancing accelerates, higher coupon corporate bonds with little or no call protection are called, and mortgage pools such as GNMA's are repaid at a faster pace. To the extent that companies have such fixed income corporate bonds and mortgage pools in their asset portfolios, a company may have a sizable positive cash flow to be reinvested at a time when rates are low. If interest rates increase, the company will be left holding assets which have suffered sizable losses in its market values. That is the bad news.

The good news for us is the onset of generally lower interest rates; first, our profit potential has increased due to the sizable amount of realized and unrealized capital gains in our asset portfolios. Second, the probability of significant investment losses in this line have decreased because the earnings rate on these new funds are currently significantly lower than our portfolio earnings rate. We have a sizable margin in how much interest would have to increase before we suffer significant investment losses.

Another bonus of lower interest rates is that other complimentary products with less investment risk for the company begin to look more attractive. As Exhibit 3 indicates, we, as well as other insurance companies, have noticed a

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significant increase in the sales of variable annuity and combination fixed and variable annuity products. Although many companies have had variable annuity products with modern designs, that is, back-end loads, for some time, sales of this product are beginning to accelerate. Interest rate guarantees on SPDAs are down to single digit numbers, down several hundred basis points from just a year ago. Variable annuity considerations that would have been invested in stock and bond separate accounts would have appreciated 20% or more in the last year. The herd instinct mentality has meant that more people are currently interested in variable annuities even though most of the appreciation in the stock market may have already occurred.

Exhibit 3

Do you currently also have a variable annuity contract?

Yes	8
No	2

If so, have you noted a trend toward variable annuity sales becoming a larger percentage of your new annuity business?

Yes	7
No	1

Although there were substantial differences in the policy design of the different annuity products of the companies that we spoke to (for example, some of the companies only offer one-year interest rate guarantees while others have multiple sets of interest guarantees ranging from one, three, five, and more years than that), nevertheless, none of the products of the companies that we spoke to involved front end loads; instead, they have back-end loads that generally vanish over a period of time, and all face the significant C-3 risk associated with guaranteeing book value on withdrawals.

We asked the different companies to describe in general their interest crediting philosophy. We limited the choices to three. First, one rate where the rate credited on new business is the same as the new rate for inforce business that was coming off a guarantee. Second, a two rate philosophy where new

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business is getting one rate while the inforce business, which is again getting a new interest guarantee, is getting perhaps another rate. And the third is a multiple set of rates which is rather like a many different investment year method way of crediting interest, so theoretically, every year of issue would be getting its own rate. As can be seen from Exhibit 4, the answers were fairly evenly divided among the three choices.

Exhibit 4

Which best describes your interest crediting philosophy?

- | | |
|---|---|
| a. one rate, new business and inforce get same rate | 3 |
| b. two rates, one for new business and one for inforce? | 4 |
| c. multiple sets of rates | 3 |

Following up on this, we asked what was the most important indicator in determining credited interest rates. As you can see from Exhibit 5, we have one honest person in the survey, and that was the person who said that what the competition is crediting is the most important. Seriously, we did learn that at least for deferred annuities, and this may not apply to universal life insurance, as far as new business is concerned, companies believed at least in a large part that they were crediting rates on new business based on what they could earn currently in the market place.

Exhibit 5

Which item is *most* important in determining your crediting interest rate?

- | | |
|---|---|
| a. Earnings rate on new funds | 4 |
| b. Asset portfolio earnings rate | 1 |
| c. (a) for new business
(b) for inforce business | 4 |
| d. What your competition is crediting | 1 |

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We also asked how many times during 1985 did the company change the interest rate that it credits on new deferred annuity contracts. This was somewhat of a bi-modal distribution as shown in Exhibit 6.

Exhibit 6

Approximately how many times during 1985 did you change the interest rate which you credit on new deferred annuity contracts?

0 - 2 times	zero
3 - 5 times	4
6 - 8 times	1
9 or more times	5

Before I conclude, I would like to talk about how the regulatory environment has an impact on the relationship between investment policy and pricing of interest sensitive products. SPDA products became very popular in the early 1980s at a time of inverted yield curves. Companies could invest relatively short and still meet their investment needs without incurring sizable investment risk.

When traditional yield curve slopes returned, the investment strategy became more of a challenge. Many companies did not recognize the sizable amount of risk that they were assuming. Some companies chose to remain on the sidelines. Other companies developed group type deferred annuities which do not guarantee book value on withdrawals. Hartford Life and other companies took the lead in encouraging the development of model NAIC regulations for modified guaranteed annuities and now, modified guaranteed life insurance. These types of contracts provide guarantees on the growth in cash value on maturity of the guarantee, but the interim cash values are subject to market value adjustment formulas. The assets of such contracts are held in a separate account. The current NAIC model regulations would revise the model law of variable annuities and variable life insurance to permit these kinds of contracts to be sold.

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Similarly, the state of New York passed legislation in 1985 which revised the nonforfeiture laws and valuation laws for annuities. These changes will permit individual deferred annuity contracts with market value adjustment formulas to be sold in New York. This law requires that these contracts contain market value adjustment formulas which can both increase as well as decrease cash surrender values of a contract upon withdrawal. This is different from the typical kind of market value adjustment that you see for GICs, which generally only decrease the cash value.

It is also probable that both general account and separate account type products will be permitted under the new law. New York is currently considering similar legislation for life insurance. One of the other features of the New York annuity law changes is a change in valuation requirements. Although regulations are still being drafted, it is expected that New York will permit lower minimum annuity reserves than the current requirements if certain conditions are met, including the annual filing of an actuarial opinion and memorandum acceptable to the department on the adequacy of the reserve levels under a range of future scenarios of interest rates. Conversely, if an acceptable actuarial opinion and memorandum is not filed, the regulation will, in all likelihood, provide that additional penalty reserves must be held in addition to the current requirements.

MR. ARTHUR L. REBELL: The topic that is defined for me relates to techniques to maintain compatibility between investment practices and pricing assumptions. From my perspective, times have changed in the years since I first started talking to insurance groups. At that time, before swaps were even around, futures and options were a new topic, and I would talk to people about the contracts and what could be done with them. I would spend several hours trying to describe the ways insurance companies could use the new tools. And actually, I must tell you that I've been very disappointed in what has happened. I'm seeing more use of what I'll call risk transfer vehicles, in such areas as corporate finance and leverage buyouts, than in the pricing of insurance products. I remain convinced that the best natural place for these in a whole variety of imaginative applications is the interest sensitive product area of insurance companies. While that area has grown, the use of these tools really has not.

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Given the purpose of our discussion, I'm less concerned about special techniques and more concerned about the philosophy behind the techniques; the real topic is risk management. From where I sit, very few people are using options or futures or swaps. Some people will tell me there are regulatory problems and while it's true that they exist, these are also cop-outs. I have not spent a lot of time with regulatory bodies, which I used to do, because the support that was coming from the industry was really not great. In a meeting there might be some people from the legal department, who did not know much about these tools. There was no real understanding of how these tools might apply to the kind of products that I think we're talking about here. Mike said he did a survey, and one out of ten companies said they were using futures. I suspect that if he broadened that survey to 100 companies, maybe he'd get a second, and maybe he wouldn't. If the number of companies using futures is small, the number using them effectively is perhaps even smaller. So at the risk of being an outsider, what I'd like to do is talk about what I see happening in the industry, recognizing it is the point of view of an outsider who has watched the evolution from the outside for a few years, and see if I can offer some thoughts.

The real problem that Dale alluded to is the level of competition in the insurance business, which means as a practical matter that precise asset-liability matching and other risk avoidance strategies are simply not practical answers today. The use of any kind of risk control tool has to be understood in that context. The real value of any tool should be an attempt to first understand, segment and manage these risks that are acceptable and those that are not. For example, we have recently worked in one context with people who had variable liabilities and fixed rate assets. They wanted to manage the risk. Their decision was to put a cap on the variable liabilities. Recently, caps have been a good alternative. As you go through different periods, some things work better than others because of market forces. You could buy, a few weeks ago, a cap about 300 points above a LIBOR rate for two years at maybe 50 or 60 basis points. You can build this into pricing products. For example, "if I think interest rates are going to go down, at least I've got an upper bound -- I'm willing to take a certain amount of risk. It's a segmentation of a risk, and the willingness to pay a price to have that specific risk. Some of these tools can be used for that, but we don't see much of that happening.

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Risk management is the key, and that key is tied into volatility. As yields have come down, I would have thought the amplitude of price swings would have narrowed dramatically. It really hasn't happened. The volatility is very high and maybe that's going to continue. I think that should make all of you much more nervous than you would have been before. I am, because the value of products that require risk management has gone up dramatically. And with the volatility staying high, it seems to me that, even without trying to be an economist, when rates are cut in half, there's a better chance for them to go up over time than go down. Now it may well be that the next year will be a very favorable one for interest rates -- I don't really know -- but I do know that there certainly are many economists who will say that over the next few years the chance of rekindling inflation, etc. is very high. If that's true, there is obviously more than a zero statistical probability that interest rates could go back fairly aggressively; whether that occurs in six months or three years almost doesn't matter.

Now, if competition requires investments at risk, you can't just get a fee for providing insurance products. The first question is who should measure the level of risk -- who should be assigned that responsibility? I think that one of the things that has happened is that nobody has assumed that job. Part of the problem of deciding on an acceptable level of risk is deciding how that risk should be managed and measured. Some people point out all the problems of measuring a credit analysis and all sorts of problems, all of which are true. But risk can be defined within limits and bounds. There's no such thing as precision, but I frankly get tired of people constantly telling me how something can't be precise, when what they're not doing leads to a much greater imprecision. It's a question of narrowing the scope of the unknown or the unmeasurable to boundaries that you feel comfortable with. The most important questions, therefore, are what should the tolerance of risk be and who will control the implementation of it?

A related question is who pays for errors. Who pays if there's a real problem in the industry? It's clear that at some level the regulators have to be concerned about that. In talking to regulators they are particularly concerned about what can be done if you have poor investment results. What do you do with a mutual company if its results are very poor? Do you fine

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the company? It's very difficult to regulate some of that. The fundamental dichotomy is that greater volatility and greater competition require more flexibility, but the public interest may be perceived as requiring more control. Environments that change very fast are difficult for regulatory bodies to keep up with. Regulatory problems do already have some inhibiting effect upon the risk transfer techniques, whether futures or options, are used. It's really almost a matter of chance as to what techniques you can use, because of a law written 50 years ago. As an ultimate irony, the state of New York will allow insurance companies to sell but not buy calls and puts, while California will allow insurance companies to buy but not sell them, and, while I think the state of California is clearly right, both states can't both be right. You have this problem to cope with. So regulation is difficult in these areas, and I don't think the industry has done enough to work with the regulators.

I have a fundamental question. What really is an insurance company? Is an insurance company a pool of dollars belonging to shareholders or mutual holders where the management is, to some undefined degree, entitled to risk policyholders' money for the potential benefit of owners? That's what the regulators have expressed sometimes. Or is the company designed to charge what should be charged for the insurance risk being covered? I think that if everybody was forced to measure risk more properly, you'd probably see higher prices. I haven't heard anybody tell me that the rates being set for their policies are those that they would set if in fact there weren't competitive problems. So if there were a better risk management system throughout the industry, wouldn't that eventually lead to more rational pricing?

The Property & Casualty companies do provide some interesting analysis here. Casualty insurance rates have gone up dramatically in the last year or two, and the industry is doing a good job of pointing the finger at lawyers talking about how settlements have gone up, which they have. I don't think anybody would argue, except people in the legal profession, the fact that we've become a very litigious society, and that in many cases jury awards are not what we would like. But recognizing that, and even recognizing that investment yields have come down, don't we have to ask whether the competition for cash flow in the P&C business over the past few years forced lower premiums and perhaps

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inadequate reserves? I think so. I think if you asked people you would see that that was certainly a big part of it, that there's some catch up going on. And who's paying for those mistakes? I think the rate payer is. Maybe the rate payer got a break before, but he's paying for it now. Why is that particularly fair? Why do we have so many business enterprises being forced into various kinds of difficulties and public parties being forced into substantial disruptions because of what, at least in part, in my view, is an overly competitive atmosphere? You don't have the same kind of short cycles that they do, but to me there's an analogy to be drawn, which is that, over time, growing competition for cash flow and the lack of discipline in pricing poses a potential burden upon society.

I worry about the volatility and lack of measurement and control over it on a broader spectrum -- and I include Wall Street in this. When I hear of a firm having multi billion dollar option portfolios, I get a little nervous because I don't know how that firm really measures its volatilities. In fact I would say that with the volatility in interest sensitive products, which you are involved with, in many ways you're no different than some of the firms. You have to try to analyze risk, not quarter-by-quarter but almost day to day. It's hard, but I think that you're more and more becoming like an investment company in terms of volatile products with different kinds of mismatched assets, perhaps more complicated because of the insurance part of it.

But I do see the beginnings of a lot of analysis going on. For example, I sit on the investment committees of a P&C company trying to measure the insurance cycle against the investment cycle, to decide whether the company should take a more risk aggressive policy at a particular stage of the cycle. So, analysis is starting, but it's not made much progress.

The key thing in any management is who is going to do it, who has responsibility for anything you want to get done. Here lies one of my complaints. In most companies it's very undefined. Conflicts between marketing and its realities, product design, and actuaries can lead to a lot of talk and really not to much else, particularly when over the past few years everybody has done well with the most fundamental speculation which is maturity mismatching.

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It seems to me that the question before this group is simply: are the actuaries the appropriate people on whom to put the real responsibilities for managing risk and presumably doing something about it? It seems to me that there is certainly beginning to be some activity saying yes, that's right. I understand that the NAIC is passing guidelines which will require some cash flow studies, and though they may not be as exacting as I'd like, nevertheless, it is a beginning. I also understand that New York, for example, has new rules that require certain types of cash flow analysis and from what I see it seems that actuaries are being pushed into this. Why? Because with your training and thought process and the way you look at the other parts of the product construction, it makes a certain amount of sense. However, I think that there clearly is a problem because, by training, I don't mean investment training.

I enjoyed Dale's talk and I think that, without knowing him very well, to some extent his knowledge has to be a product of the time he spent in the investment department at the Travelers to get some sense of what really goes on in the world of investment, how imperfect it is, how judgments are made every day, how in reality the management of an investment sensitive portfolio is not a static thing. It's changing daily. I think that kind of thing, spending time in an investment department, is very good. I don't know how common it is. I suspect that it's not. I also don't think that you can expect a portfolio manager to manage the risk. And that's because what we are talking about here is almost an audit function, almost like looking over somebody's shoulder and saying, "Look, I really can't tell you what you should invest in. But on some basis that we've worked out you're outside your bounds of risk." I look at the risk we take in our government department I really don't care whether they're long or short. I may have a view on the market and I don't really care whether they're long bonds, short bonds, arbitrated, long futures, short calls, I look at reports to give me some sense of the total risk we're taking, and it's their job to be on the right side of the market and to have their positions in line. But if we were to lose more money, then I have problems. That's that kind of job we're talking about. Let the portfolio manager decide what he wants. But get a system where you have a sense of tolerance of risk and say, "Hold it, too much risk."

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You clearly have to look at the effect of certain changes in levels of the market on net worth. As an outsider, that's where I come from. Is this company sound in the risks it's taking? Is it taking too much risk for me as a policyholder, as a member of society? Is there too much risk against the real net worth? (I have a lot of trouble with things being carried at original cost when that's not reflective of today. It doesn't tell me much of anything.) You have to understand and price all your options. I am happy to tell you that we have some clients who are active in the window GIC business who have been very active in the call market and they have done very well. But I shudder to think of what would have happened over the past two or three years if they had written those policies and had not taken into their pricing assumptions the options that they were granting. Because, while the tolerance for employees deciding how much money they're going to put in is unclear, it does vary with interest rates. So you may miss in your precise analysis, and you may have to make adjustments, and you may not make them exactly right, but you certainly are a lot closer to the mark.

You have to have several cash flow scenarios, as is being suggested by the NAIC -- you can't do it in a static environment. When I first came to Wall Street, bond research was looking at yesterday's balance sheets and calculating all sorts of ratios. That's great. But unfortunately, we're living in the world of tomorrow, and the world is full of where are we going from today, and where would we be if something happened. Yesterday is very interesting, but it's historical, and we're managing risk for today and tomorrow, not for yesterday. So you need to constantly update -- it can't be a passive arrangement.

You've got to get into yield curve changes. You can really get hurt on maturity mismatches, but it's even more basic. A yield curve change in a very narrow band when you're talking about a lot of money can be significant. And, you have to look at credit changes. That's tough. How do you evaluate the potential for credit changes? The one that I have the most difficulty with is arbitrages -- you wind up with people thinking there's a small tolerance of risk and therefore taking enormous positions, and they can get badly hurt on that. Most arbitrages -- except when the markets are inefficient, and that happens, but let's assume that's not the norm -- are not arbitrages. I think most of them are just a different way of making a decision that, if the market

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goes up, this kind of position tends to do well, and when it goes down, this kind of position doesn't do well. With 90% of the so called arbitrages, you can take them apart and say that probably by buying 10% as many outright positions you put yourself in the same position. But people feel happy because they're doing arbitrages and brokers love it because they get 10 times as much business. But I think you really have to look at arbitrages, very carefully because they are very deceptive. Go look at the profit performance of some of the government bond dealers in the last month and see how many of them tried to arbitrage either the 10 year against the 30 year or against futures, and they got killed during the last refunding. Some of them will come out all right if they stick with it, but there are some enormous losses that a few firms took.

This active management of risk that I'm talking about is close to a full time job and it is a high level job. It's got to be somebody who can force a portfolio manager to react and force the marketing department to react. It takes a lot of acceptance by a company; it takes a lot of willingness on the part of top management; and it takes somebody who is in the position of being almost an internal auditor.

I mentioned before certain other areas -- such as leverage buyouts. We did some leverage buyouts where in the documentation we have provisions that require the company to hedge 45% of the average life of certain types of floating rate debt. And as the levels of LIBOR go up, the percent that they have to hedge goes up too. So we're saying "OK, we don't know if you could even do this deal if you had to pay a five year rate, but to the extent the deal can only be done with the three month rate, you have to ask yourself whether we have a leverage buyout company or speculation on interest rates." We basically looked at what we thought the cash flow was, at what point we would start getting nervous about the cash flow -- and the documents say as LIBOR hits certain rates you have to be X% hedged. You can do swaps, you can buy caps, you can do options, you can do whatever you'd like within a range, but there is a scale. You can only be at risk up to a certain point. And this worked out.

I worked on a financing over the past few months. We actually did the deal about two weeks ago, at what looks like a good time at least over the short

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run. But everybody was telling me whether we should wait a number of months to get the best rate. This is a 30-year utility financing. Everybody's got an opinion. If rates went down for three days then every fool knew rates would continue to go down forever, and if they picked up for a day then all the smart guys knew that we'd seen the lows. That makes life very difficult when you have to make the decision. But the interesting thing was that there was one proposal to postpone the financing for a year, basically do a short-term financing for a year and then do a long term financing -- the rationale being that short-term rates are lower and everybody knows -- right? -- that rates will be lower in a year. In order to deal with this we did an analysis of what you'd pay for a put. Let's take the short term rate. We would save 200 or 300 basis points, that's pretty clear. In the context of a 30-year financing, it may not be that big a deal, but certainly, if you're looking at next year's profitability, you're ahead of the game. Most people say it doesn't cost you anything, because rates will come down. But, what if they don't? Then they don't. There's a cost. I can't tell you precisely what a one year put on this 30 year bond would cost. One doesn't really exist on that particular instrument, but I can certainly come within a couple percentage points as to what it's worth. By the time we went through that exercise, we realized that we were talking about several million dollars. We did the deal two weeks ago because nobody was prepared to go out and buy a put, and that's what you have to do analytically. I see risk transfer vehicles becoming more and more important.

From what I see as an outsider, I'm concerned with the insurance companies managing their risk. If the actuaries don't do the job, who will? Nobody! That's what has happened. Who will set the guidelines? We won't always have periods where rates fall. Eventually from some level we are going to go back to rising rates, and you're much more sensitive to these things than you were four or five years ago. We know what happened four or five years ago. There were all sorts of pressures on the industry, and had rates not turned, I suspect that the industry would be in a much worse position than it is today.

We know the volatility on a daily or weekly basis, and if rates turn, and they will, there could be real problems in the industry, and the regulators will step in because they'll have no choice. They'll step in and they will begin to

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make all sorts of judgments. This will be bad for you because you're competing with other industries that are less regulated, and it'll be bad because regulators, by definition, despite being well meaning, will not understand the tools and will not always let you use something like an option. In New York, not being able to buy an option for products that contain options is almost unbelievable -- and I might add, to allow people to sell options, which is one of the riskier things you can do, is unbelievable -- at least to me. But nevertheless, they will do the best they can in these complicated areas, and you will be the losers. You will wind up having little flexibility and being allowed to do some things but not the things that would give you the best competitive position.

I don't think the use of these tools is difficult. I would hope that Dale would agree, having spent some time on the investment side, that it takes some time and commitment. You can't learn about futures by sitting in a meeting for an hour or two and having somebody talk to you and then going back to your company and finding something else to do. I can tell you there are a few companies that have used them, and they have been very effective. But it takes a time commitment from the top on down.

In summary -- you have to ask yourself today where would you be if rates changed, because everybody isn't going to be able to track to adjust to it. Where would you be? I think the risk is greater than it has been. I think the public has had the confidence to give the insurance companies a constant cash flow. The public had a little bit of doubt a few years ago but now has a lot of confidence in insurance companies. I don't know how deep that confidence is. I think that if you look past a lot of your own internal accounting, if you run into a situation where you had a negative cash flow for a while, you might have real problems. I for one would pay more for insurance. I don't want to see what happened in the P&C area happen here. I would pay more if I believed that the investment risk was being measured in a more accurate way -- I hope that that will happen, and I hope that many of you would see this as a role that you should be working towards -- one that I think you're being pushed into. Anyway, I would feel comfortable if many actuaries looked at this as an area of opportunity to expand on the kinds of things they're good at. I have had people tell me futures are complicated. I can't understand the formulas you

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actuaries put up on the board, but I can understand futures; it's simple arithmetic.

MR. FRANK S. AUSTIN: One omission in the discussion has been interest sensitive whole life. A CEO recently said there's a war going on out there with competitive interest rates. Although we're selling interest sensitive whole life (ISWL), we're generally a group of people who are very insensitive towards the investment risks that we're taking. Some of the techniques that were discussed here for SPDAs are directly applicable to universal life. I'd like to open the conversation with this issue.

MR. REILLY: Although it's been a while since I've looked at universal life, I'm surprised about how high the interest rates are. What I've seen is that while interest rates have moved down, people in the universal life area are pricing their policies based on what their portfolios are earning. They've perhaps taken a mismatch position, and with interest rates going down, they are passing on to policyholders effectively most of that excess over the new money rate. The problem with that is that they are not squirrelling that excess away and using that against the sharp times. If interest rates go back up they're going to have a very difficult time because the new money rates will be higher than the portfolio earnings rate and they won't be able to credit rates that are competitive in the market place. So I agree with you, they're probably taking an awful lot of risk.

MR. RUBY: I've been following universal life and ISWL rates for several years now, and it seems to me that a life insurance product, as opposed to an annuity or GIC, is certainly a much more complex product which has many more sources of profit other than just interest rate spread. You can rely specifically upon the cost of insurance charges, which frequently have a profit element loaded in them, and the expense loadings.

There is a combination of factors: there is the fact that interest rates have been coming down and people have been using this extra interest that they've been realizing, as Mike said, because they've had investments that were made in a high interest rate era and are now crediting rates in a low interest rate era. Another factor is indefinite life insurance accounting, particularly as

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it applies to these newer kinds of products, where the day when you have to recognize the financial liability of your product line can be put off into the future by deferring acquisition costs. Finally, there are the large capital gains that at least the early writers of universal life and ISWL have realized on their portfolios. When you wrap all these factors together there's a relatively small window of, opportunity for companies to credit rates that are much higher than just defined by current new money rates. Many companies are still above 10% in their credited rates, for any kind of reasonably rated security out in the marketplace today, it's hard to get a gross rate of 10%, much less the fact that you have a 150-250 basis point margin built into the pricing. When you combine all these things, this trend towards a higher than market rate is going to be squeezed out over time. We're seeing this process occurring already in the current market place.

MR. REBELL: With particular reference to what Mike said about people basically using up some of the good times, isn't it true that universal life products are less likely to be as rate sensitive, and therefore, in the future if there's a reduction in rates, you're less apt to have to sell some of the investments there than you would for SPDAs?

MR. RUBY: The sensitivity of universal life and ISWL is a sensitivity to the agent selling it more than to the consumer buying it. As an industry we've gotten in this trap of feeling that we have to offer rates, because of field force pressure, that are way above rates used by money market funds or banks or CD operations to attract funds. So it's more in the mind of the agent than it is in the mind of the consumer.

MR. REILLY: I'm not sure that I see an awful lot of difference between an SPDA and a single premium whole life or a universal life with a substantial amount of dump in. We sell our products through our field force, and I don't think they're the hottest money around, even with the changing rates because we sell them in amounts of \$10,000-\$20,000. By the same token, I don't see an awful lot of difference for annuities.

MR. ALAN G. MONTEMURRO: Has any effort been made or have any studies been performed to quantify the cash flow estimation risk for window GICs?

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MR. WOLF: I know we have our own studies at The Travelers. Obviously, that's not industry experience. But yes, we have accumulated about five years worth of experience on about \$10 billion of deposits, so there is a substantial volume in terms of the sensitivity of the window GIC deposits to changes in interest rates and other factors we have attempted to correlate the deposits to. That's an interesting subject because right now there is all kinds of industry experience on life insurance or life annuity mortality, while the behavior of individual participants in employee savings plans is certainly something we've not shared a lot of industry data on. I've talked to people in a couple of companies about the concept of a Society committee to share experience under employee savings plans. I know that a LIMRA group is being formed which is going to deal with group pension products and the information that's passed there. So I think that more and more information is going to be coming forth.

MR. MONTEMURRO: Will you give me a simple example of an interest rate swap?

MR. WOLF: If only you hadn't asked that it be simple. There are two parties to a swap. For example, if for some reason I own fixed rate assets and I would like to turn those into the equivalent of floating rate assets, I can enter into an interest rate swap. So what I will do is go to one of the investment bankers on Wall Street and I will agree to pay, say, 8.5% for five years in return for receiving, say, LIBOR flat for five years. Now say I have an underlying asset that is at 9%, and I am now agreeing to pay five years at 8.5% to my swap counterparty and I'm going to receive LIBOR for five years. So the net of those transactions is that I end up with LIBOR plus 50 for five years -- I get 9%, pay 8.5% and receive LIBOR for 5 years. That is a simple interest rate swap.

Many transactions that are being done in the swap market actually involve two swaps. It's a way to adjust duration. For example, if I have a five year asset at 9%, I agree to pay the investment banker 8.5% for five years and receive 8% for three years. What I have done is transformed the risk and durational characteristics of my underlying five year instrument into something more like a three year instrument, and at the end of the three year period I have in effect a floating rate security. So there's a lot that can be done

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with interest rate swaps. They have certain advantages. They have certain accounting advantages, and I certainly would not ignore that for the time being. They have some advantages in avoiding yield curve shifts. They have disadvantages versus other transfer instruments as well. There's a lot of material that you can get if you have access to some of the Wall Street concerns through your investment folks. Very interesting vehicles.

MR. RUBY: I have a question I'm wondering about. There's a rise now in what is called the securitization of many kinds of financial transactions. For example, credit card receivables are being securitized. Car loans, or other types of what had been up until now very non-liquid types of lending, are being packaged into securities and offered to the public. I'm wondering whether anybody on the panel or in the audience has had any experience with these, and what applicability that person might see to the insurance industry, especially with respect to interest sensitive products?

MR. WOLF: We've done some investigating into some of what I'll call asset backed lending. When you think about what you have to pay for a used car, or even a new car, if you go to a bank today and think about how that relates to some of the other two and three year investments that might be available, it certainly seems that there must be some applicability to our business, particularly in shorter-term investment areas where the traditional mortgage loans or private placements will not accommodate our needs at attractive rates. So, yes, I think there is a great applicability in asset based lending. Generally, I believe it requires some sort of a deal with the retailer; in other words, we don't want used cars stacked behind The Travelers when people don't pay on their obligations. There has to be an intermediary involved in terms of servicing the loans and so on. But in terms of the total package as an investment, I think they are very attractive. I think one of the problems that insurance companies have is they're not very good at or have not been specialists in asset based lending. So a number of companies have looked to become involved with other credit organizations, and although some of those deals haven't been worked out yet, we may see more of that. But they're very attractive. They tend not to be interest rate sensitive in terms of their refunding patterns, and the underlying loans are at spreads of 300 to maybe 600 basis points over the underlying treasuries. Even by the time you pay for the

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servicing and so on, you can achieve spreads to treasuries for these loans that are roughly 150 to 175 basis points, and that's very good for short-term securities.

MR. REBELL: Another aspect of that is there obviously is a lot more insurance and letter of credit business going on for people who are doing credit enhancements -- another side of that same picture. More and more insurance companies are getting into that field. They will guarantee a certain credit for two years to 10 years or whatever for a fee, which is of course no different than writing an option. I must tell you that these also are subject to competitive pressures and they are all over the lot in terms of pricing, but one of the questions that I wonder about -- and I don't really think this is a material part of many companies' business now -- is exactly how companies are measuring that risk and what they're doing to reserve for the possibilities that they could have some losses.

MR. EDWARD L. ASTRACHAN: I've worked for several companies and have never gotten the feeling, when the investment department was backing up interest sensitive products, that it was ever identifying a credit risk that we could subtract off. Given that one could get a couple hundred basis points by getting triple B bonds or private placements or whatever -- I'm pretty uncomfortable knowing how much to subtract off for credit risk, rather than just flipping a coin and coming up with some arbitrary number. I'd appreciate some comments on that.

MR. REBELL: Well, it's obviously hard to say. You do have the advantage that if you assume at any point in time that the market is reasonably efficient -- and of course the market goes through its cycles too -- you know that BAA is going to pay a premium of X amount relative to an A or AA or higher investment grade. So if you can put it in that context, basically the market will tell you, or at least provide a starting point, as to what the trade off is. Again, it's not perfect. The market sometimes pays too much for credit spreads, sometimes too little, it depends on the point you're in. People have been correct in terms of differential yields on junk bonds relative to the risk. You have to make some judgments, but at least you can start by getting a ballpark idea by looking at the credit spreads in the market. The big markets,

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whether they're for puts or calls or even the swap markets, are reasonably efficient, and are at least a place to start. If you're writing calls, ask yourself if your pricing is any more than a bet against what the other guy is paying, and why are you right. What is the implied volatility? Likewise, there are credit spreads that exist at any point in time. Maybe your feeling is something classified as BAA should be an A. That's fine, but understand that's your judgment. So I would start by looking at the market, and it'll give you at least a range and a parameter to work with.

MR. RUBY: I come at that a little differently because we see this area as one where we can add some value in terms of credit analysis and pick up some inefficiencies in the market. Many investment departments aren't really organized to do this, but you can get together the securities people and the private placement people who are very comfortable with looking at underlying risk and trying to quantify that on private placement loans. For some of the more exotic instruments out there that's really what you're trying to do, to perform your own credit analysis. If the market calls something a BBB risk, there may be something you can analyze about the company to give you comfort to say no, this is actually a better risk. I think this requires that the right people from the investment area get together and cross disciplines, if you will, between the securities trading people and the private placement people, that is, those who are relying more on the rating agencies for all of their information on credit worthiness and those who are going in and doing their own credit analysis.

MR. REBELL: That's really where the credit enhancement business of an insurance company can come in. If somebody has the sophistication to evaluate the case and put its credit behind it, it may be a lot cheaper and that's just another side of the same coin.

MR. WOLF: I might add that there are a couple of studies available, particularly as to experience in junk bonds. They've traced them back for at least 10 or 15 years, and there's some very good work in there, though not without faults. One of those studies, that just came out about a year ago, traces the history of junk bonds and what the defaults have been, measures them against exposure, and attempts to come up with some charges. I would caution you,

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however, that even if you come up with what the average default experiences have been, this will tie back to what your business philosophy is, what risks you are willing to take. Understand that if you decide that the lower quality credits have the most value over time, you are saying that your enterprise is willing to tolerate a greater standard deviation in results, and greater short-term swings in results. And that's something that you can't ignore because, clearly, if you do agree that over time these are the best values, you better be willing to handle those short-term fluctuations or you don't belong in the junk market.

MR. GUSTAVE LESCOUFLAIR: Have you ever considered buying discount bonds just to minimize the call risk for your GIC portfolio?

MR. WOLF: Yes. There are a couple of things about discount bonds I'd like to mention. In the past they have tended to trade on a pre-tax equivalent yield. I am uncomfortable with betting future profitabilities on what the regulators and legislators are going to do to our tax legislation. So I have been very reluctant to make discounts a part and parcel of our business due to the assumed benefits of tax advantages. Therefore, unless you are willing to do that, the straight up yields to maturity on discount bonds in general in the past have not been as attractive as have been available on current coupon issues. So that's one item. The other item has just been a supply question. With the size and the volume that we've been investing in over the past few years, the size of the market has been a problem.

Certainly, the concept makes sense. Again, as I've mentioned, I would caution that sometimes people buy discount bonds and then forget about them and think they're totally call protected. Certainly, the events of the past year have gotten some companies into some difficulties for having done that. The concept is not perfect, but it is a good idea if you can overcome those two items I mentioned.

MR. RUBY: We at one time were fairly heavy users of discount bonds. I really want to relate it to call protection because I think that, at Capital Holding, this is a big issue: looking at the call protection of various securities that we hold and weeding out the higher coupon securities because of our fear of

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them being called. One thing that we stumbled onto was that during this recent bond rally, which has been much more concentrated in treasuries as opposed to corporates, much of the reason for that disparity has been because of call protection. Of course treasury securities can't be called at all, so they're completely call protected, and the high coupon securities in some cases have barely moved at all. The yields on these have not been very volatile, they've just been in a plateau because of the fear of being called. Somewhere in the middle are the discount bonds, and we have certainly seen, this year at least, relative to the current or high coupon securities, that the discount bonds have outperformed the corporate market on average.

MR. REILLY: Toward the beginning of the year we swapped some assets in our annuity line to increase the call protection in our assets. When we were looking at the asset-liability problem we found out that the duration of our assets and liabilities was okay, but we decided to trade 20-25% of our assets, basically to give ourselves a lot more call protection, and some of what we bought were treasuries.

MR. LESCOUFLAIR: Are there any explicit methods used by any of you for pricing the call provision of a bond, just as any other option? I've heard of some people on Wall Street saying that, in fact, this can be done -- you can separate the call feature so that it's just an option, perhaps a long option, and you price it separately to make sure that you're getting a fair price for it.

MR. REBELL: There's no reason that it can't be done, because that's just what it is -- it's an out of the money option.

MR. RUBY: A more straightforward or conservative method is to price it to the first call date and see what the yield is on that, assuming it will be called and given it is a fairly high coupon security.

MR. LESCOUFLAIR: There's no method of separating the price of the call from the price of the underlying bond itself?

MR. WOLF: Yes, there is. The typical Black-Scholes kinds of options pricing methodology will work on bonds in splitting a bond into its two pieces, and you

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just have to make volatility assumptions. There a variety of other ways to do it, such as some of things that we were talking about in terms of modeling cash flows and so on. If you can develop a dynamic process that will model the behavior of securities under changing interest rates, you can implicitly model, in effect, the asset share as it behaves with respect to calls of underlying assets. You can create distributions of returns that take into account, or reflect, the callability of the underlying asset. But yes, you can also do it with the theoretical option pricing.

MR. NED A. BURMEISTER: I'd like to raise the question of convexity and how a few people are measuring it. We're starting that process. Could the panel discuss any tools available that they've had experience with in adjusting or managing the convexity of a portfolio?

MR. REILLY: I really can't help you in that area. We're not looking at it right now. Our approach has been that we have looked at a number of interest rate scenarios, so we know whether or not we're durationally matched to the current environment and also know under what environments our assets will be going in one direction, say shorter, while our liabilities are going the other direction, say longer. I think what you obviously need is to write down a formula for what the durations of your assets and liabilities are and then you can calculate it. We haven't used it.

MR. RUBY: We do calculate convexity or a similar measure monthly on our portfolio, and have found that as interest rates have dropped, duration, particularly in discount bonds, has gone up tremendously. So what has resulted is a more mismatched situation than we would like, and we are in the process now of correcting that situation. But I think it does bring up a good point that, while you may be matched or mismatched to the degree you'd like to be at any point in time, as interest rates change, if you don't continue to measure the duration of your assets and your liabilities, even though you're not changing your portfolio, you can find your durations getting all out of whack because of this convexity phenomenon. So I think it is important to get a handle on how your portfolio is changing with respect to duration versus interest rate change. It'll vary by the kind of securities you're holding in your portfolio.

