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THE INFLUENCE OF INVESTMENTS ON PRODUCT DESIGN

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Panelists: SHANE A. CHALKE
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Recorder: MARK W. GRIFFIN

An important consideration with many new products is whether the product design translates to a feasible investment strategy, which provides not only sufficient yield but also acceptable performance in various interest-rate environments. This panel will discuss how, over the last decade, the designs of a number of products have evolved in such a way that they are more compatible with available investments. This discussion will include:

- How specific products have evolved and why
- Will the trend continue?
- The role of regulation
- Implications on educational requirements for actuaries
- Other issues

MR. MARK W. GRIFFIN: I will be both the moderator and the final panelist for this session. The other panelists in order of appearance will be Phil Polkinghorn and Shane Chalke. Phil is a principal at Tillinghast in Hartford. Following Phil will be Shane Chalke, President of Chalke, Inc.

MR. PHILIP K. POLKINGHORN: I'd like to give you a little preview of what I'll talk about. I'm going to start by briefly introducing the topic of bringing assets into the product development process. I'll talk about why this process is important, what the opportunities are for companies, and then end with a few brief examples of cases where it's been done. The other panelists will talk more about things like measurement. I won't get into how to measure the impact of bringing the assets into the product development process.

I think the consideration of which assets you're going to use for a particular product should be a part of the project from the very beginning. You need to build your products to fit the assets available to back those products. I think there will be opportunities to build assets that fit products. Actuarial standards of practice now require you to mention in your report to management what consideration you gave to the asset side; what sort of cash-flow testing did you do? I think for a few months, these reports are going to say that we didn't do any, and then the reasons why are going to be very creative. But over time, that will be sort of a red flag. I think that more and more people will start to consider cash-flow testing in the product development process. I think that will lead to some opportunities because then we can begin to build the products considering the assets and, as you'll see later, build assets with products in mind. I think this brings into play a number of opportunities for insurance companies.

The first opportunity is bringing assets into the process may give you a marketing edge. A particular asset may be a little bit sexier in an insurance wrapper. The market potential for some of the assets currently being sold outside the insurance industry is huge. And if you can take an asset that's popular and make it just a little

bit sexier by putting some insurance or annuity attributes around it, you can pick away at that market share. These attributes can include things as simple as a higher distribution allowance. On the side of risk control, perhaps you have assets that are out there or perhaps there are assets that haven't yet been created that will control risk better for your products. When you measure your risk/reward positioning (which after all is the whole purpose of cash-flow testing in the product development process), it is to say, "What's my expected return and what's my downside risk?" You may find assets that produce better risk control.

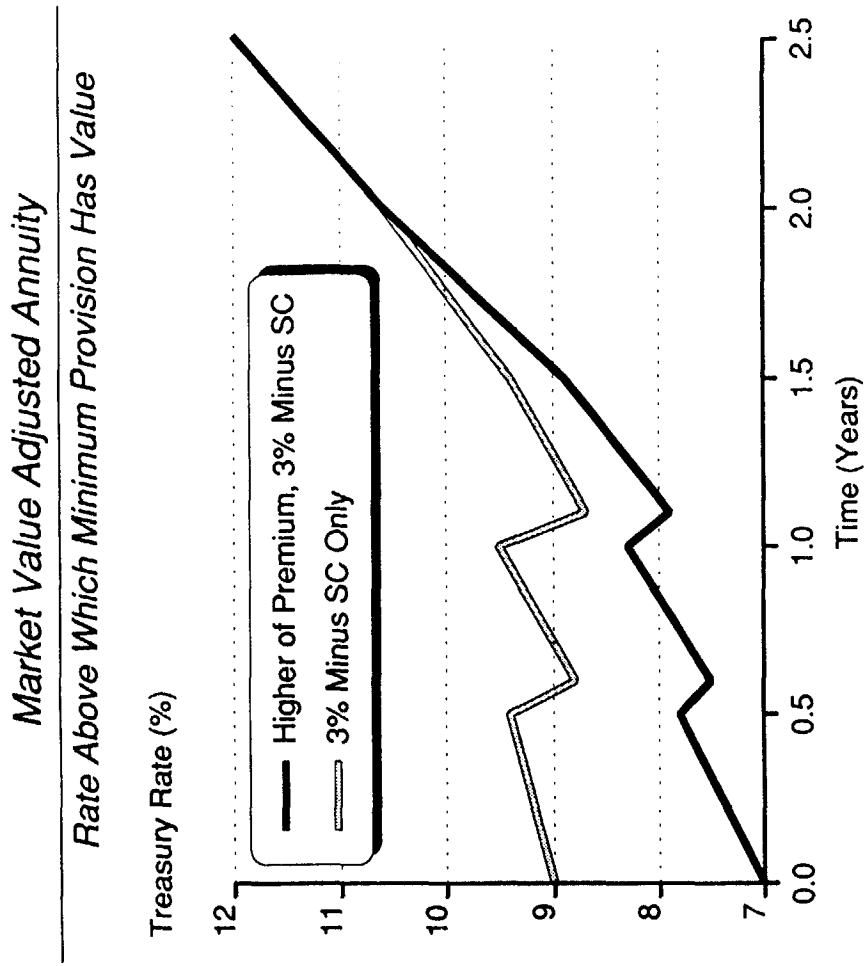
Now one of the common complaints, after going through this process, is you identify some assets that perhaps give you a good risk positioning, but you find that they aren't out there in the market in sufficient quantity. Well the asset community is creating more and more assets. And if there's a market demand, you shouldn't just stop at that point and say, "Well, there aren't enough of these types of assets around." Go to the investment banks. Chances are, if there's a significant enough market, you can create this type of asset.

How do you get started? I think that there's a significant educational process involved here. Right now, some of our asset gurus in the industry are sort of woefully in need of greater understanding of the liability side: How do products work? What sort of markets do we traditionally try to serve? What are the product features that are very important? So we need to get the product people to work with them to give them a greater understanding of what they need in terms of product. And the product design experts probably are even further behind in understanding how different assets work and what sort of opportunities exist in terms of creating products around assets. To date, probably more work has been done in fitting assets into existing products. I predict that there's going to be some opportunity in the future in fitting the insurance products around different types of assets.

Well, this process is not without risks. We'll talk a little bit about the risks. First of all, if you do something really different, all pioneers take risks. The first person to come out with a particular product that is drastically different from all the competitors will receive criticism. People will think that you're sailing off the edge of the earth. There's also another risk when you try to do something new, and that's the regulatory risk. Chart 1 is not meant to be representative. Any resemblance to actual events or situations are purely coincidental. Most of the work has been building assets to fit our existing products. In the process of building new and innovative products to fit asset features, I think you run into a significant regulatory risk because we all know what happens when you come up with something new and different and untried.

I'd like to make a few assertions about this process. I think that for some of the reasons mentioned, finding assets to fit products will be the smoother road. It's probably the road that's been the most traveled so far, although all of us haven't gone down it. I think it will be well traveled in the future, not just because of actuarial standards that indicate that you should consider these things, but because there are opportunities to improve the profitability and strength of your company. Those who don't consider these opportunities will lose out in the long run. I think we've been quite fortunate in the past several years. We've sold significant volumes of investment product in a generally gently declining interest-rate environment. Most

CHART 1


Market Value Adjusted Annuity
Rate Above Which Minimum Provision Has Value
Treasury Rate (%)
12
11
10
9
8
7
Higher of Premium, 3% Minus SC
3% Minus SC Only
0.0
0.5
1.0
1.5
2.0
2.5
Time (Years)

of the problems that we've seen have been C-1 risk problems. That doesn't mean that we're immune to C-3 risk problems. I think we could very easily see companies in trouble were interest rates to jump dramatically today.

Building products to fit around existing assets is going to be tougher. I think first of all it requires us to understand the market for those types of assets and be a little bit more creative in determining an insurance or an annuity wrapper to provide a similar sort of product. Certainly as I mentioned earlier, that sort of avenue will have more challenges. It'll have more regulatory pitfalls. In building insurance products to fit the assets, we have many more restrictions in terms of what we can do currently. My current belief though is that with the present financial difficulties in the insurance industry, regulators will be more open to changes in product design that help to provide sensible benefits from insurance companies. These changes are things like market-value cash outs instead of book-value cash outs.

On the asset side, we seem to have a freer hand. On the asset side, it seems to be demand that creates the determination of whether or not you could have a particular type of asset. If you want just a piece of an asset and there are enough people who want just that piece, the investment community will strip it out and sell it. Consequently, I think the rewards may be greater for people who take this latter route. It's going to be less well traveled, but there will be more challenges. But if you're able to do it successfully, you'll get higher profits.

I'd like to discuss a couple examples of what I've just been talking about -- building products to fit assets and using assets to fit products. The first is what I'll call a market sensitive annuity. It often goes by the name market-value adjusted (MVA) annuity modified guaranteed annuity. And they sometimes look different. So I use the term market sensitive annuity to apply to all of them generically. You might have the pure modified guaranteed annuity that has a MVA that doesn't have a floor and often is considered to be a registered product. You have products that have a floor value that the MVA won't pierce. I'm glad I'm not a lawyer so I don't have to opine on whether it's a registered product or not. But many people are taking the position that it's not a registered product. And if you look at that sort of product, it sort of looks a lot like a zero-coupon bond. If you have a 10-year interest guarantee and if you decide to surrender before the 10 years is up, you're subject to market-value risk due to changes in interest rates. Well, when I first thought about that, I said, "Is this really a product to fit an asset?" It really sounds like one. The stockbrokers were going wild with zero-coupon bonds to fund educational needs. And this sort of fits. Or is it really an asset to fit the deferred annuity product that we all know has significant disintermediation risk? I think it's the latter. I kind of wish it would have been the first, that it was a product to fit an asset. That would have meant we were being a little bit creative. The latter implies we're being defensive.

Well, suppose that we have a market sensitive annuity, and it does have a floor. Typically when performing cash-flow-testing analysis for market sensitive annuities with a floor, we find that as you would expect, you're open to some disintermediation risk for anywhere from 18-24 months after issue. Obviously with a long guarantee, it might be a little bit longer period because the true market values are more sensitive to interest-rate changes. But one of the things that someone should do in looking at this is at least measure the risk, measure the cost of that floor. Then

you can make a number of decisions. You can absorb the cost but price for it. You can buy puts to hedge against the cost, and you can build that into your pricing. So you can either accept the risk and know what the expected cost of it is, or you can go out and cover the risk in the market. And covering the risk in the market is where knowledge of available assets will really help the product design people.

The third example that I'd like to take you through I think is a little bit more innovative, and I think a number of you have seen products that advertise returns that are linked to the return of the Standard & Poor's (S&P) 500 Index. When you first look at this, you might say, "How on earth can you provide a return in an annuity product or a life product that's linked to the S&P 500 Index?" Well, the typical structure is the product has a guarantee of principal plus some low rate of interest, plus a certain participation percentage in the S&P 500 Index. As an example, suppose the market would like guarantee of principal plus some portion of the upside in the stock market. You could offer a 3% guarantee plus say, 60% participation in the S&P 500. How do you invest to back this? If you think of an interest-rate environment where interest rates are generally 8, 9 or 10%, and you receive a deposit of $1,000, you don't have to invest $1,000 to back a 3% guarantee. So you invest less than $1,000 to back a 3% guarantee, and you have money left over. The amount of money you have left over can be used to buy options in the S&P 500 Index. Now obviously as interest rates flow, you can buy more or less of those options. So typically the participation in the S&P 500 Index will float over time, and the company would declare a participation percentage at the beginning of each period. I've just described using two investments that are generally available in order to produce this kind of product and to invest prudently. There are also packaged combinations available on the street where the market provides exactly that: a certain guaranteed return plus a rate of participation in the S&P 500 Index. Not only are there packaged products available to do this, but also for a given price, you can have different levels of guaranteed return and different levels of participation in the S&P 500 Index. My understanding is that there are pros and cons to each approach. The packaged asset may be a little bit less liquid. On the other hand, it may provide less of an increase in your Mandatory Securities Valuation Reserve (MSVR). So there are a number of considerations there.

And then finally, I will use an example that Mark had in his article, "A Guide to Convexity Shopping: Part II Corporate Bond Warrants," in the July 1991 Investment Section Newsletter, *Risks and Rewards*, covering the use of warrants for products with significant reinvestment risks. I think we're starting to almost trip over examples where we can pull together greater product knowledge and asset knowledge together to reduce risk, increase profits and in certain instances, create products that we never would have dreamed would have existed a couple of years ago. I hope that we can generate some discussion in the question and answer period on potential opportunities for building new products around existing assets or building assets to back our products.

MR. SHANE A. CHALKE: I'm going to say from the outset that I have a little bit of hesitancy about the title of this session. "The Influence of Investments on Product Design" really sounds to me like it's painting a picture that is very restricted on the investment side as to what kinds of constructs we can put together. It's necessary

that products react to the investment side of the house. I think that's a little bit of an inappropriate picture for this day and age.

Phil Polkinghorn mentioned several instances of types of products where they were designed or conceived around particular investment-funding vehicles. In the larger context, I believe, these are isolated instances. Market-value annuities and equity-indexed products are very profound examples, but they're not pervasive. Smaller, less profound examples of the influence would be gradual migration over the past 10 years from portfolio-crediting strategies to marginal or investment-generation-based strategies. But even these are not earthshaking influences from the investment side to the product side. In fact, there really hasn't been a strong influence from the investment side to the product side. Furthermore, there may not be, on the surface, a particular need for influence from the investment side to the product side. We're not in an environment where it is difficult to construct funding vehicles to match particular product designs. We live in extremely well-developed financial markets. The variety of funding vehicles is absolutely immense. It is possible to appropriately invest behind almost any set of obligations.

The financial markets are so creative and so well-developed at this point that it's possible for us to assemble a collection of asset vehicles that exhibit almost any behavior that we desire. We can put together combinations of assets that produce payoffs under literally any circumstance with any timing. Because of this, does the product design actuary really need to design products to specifically match certain investments? On the face of it, perhaps not. The influence will come in a profoundly different way. And that is, it is not the necessity of designing products in certain ways to match with investments, but rather what the financial markets tell us about the cost of certain product designs over the next perhaps five to ten years. In fact, it's probably more the technology of finance than finance itself that will have this influence. And it will be through this influence of financial technology that product designs will change most rapidly. Just looking through the program for this meeting, there are six papers recognized for the *Transactions*. Four of them deal more with financial technology than with the classical actuarial technology. There might be as many as four papers dealing with option pricing in particular. It's this paradigm, this different way of viewing the world, that I think will have the profound influence on product designs.

I'd like to start with a quick look at this financial paradigm, this method of viewing the world. Also, I'd like to take you through a short example of how the financial technology can be used to evaluate product designs in a more robust fashion than we've typically done in the actuarial community. And through this example, I will show you a glimpse of what I feel the impacts will be over the next few years. I'll begin by talking a little bit about option pricing. We'll start with this to provide a very short overview of what option pricing is. I'd like to demystify it because couched in mathematical terms or actuarial terms, option pricing technologies conceptually are really very simple. However, there's a great deal of mysticism surrounding option pricing technology and finance theory in general. The practitioners and that side of the house are just as bad as actuaries in trying to mystify their profession. So I'd like to break it down just a little bit into its simplest concepts.

People who practice in this discipline may be somewhat shocked when I say that the option pricing theory does nothing more than calculate an expected value. As actuaries, we understand expected value. It's a very simple concept. However, when you start getting into the trappings of option pricing theory and some of the terminology that's used, it gets very fuzzy very quickly. Option pricing models really do nothing more than calculate expected value. I have here (Chart 2) a very simple picture of cash flows from a noncallable bond, a nonoption-laden asset. I am showing basically three courses of interest rates. Interest rates go up or they stay the same or they go down. Whether interest rates move upward or downward, the cash flows remain the same.

It's a fairly simple exercise. If doubt comes and your entire probability spaces are identical, it's fairly trivial to calculate expected value. My expected value is the outcome that's predetermined along any of the paths. I don't particularly need option pricing models to deal with things like noncallable bonds that don't have options. But when I look at one of the simplest forms of an option-laden asset (Chart 3), a callable bond, and the interest rates rise, I can tend to predict the path or the course of cash flows. When interest rates stay stable, I again think I can predict (at least based on eco-nomic incentive) what the cash flows will be. When rates drop, I can predict to some degree the course of cash flows. In fact, there is powerful economic incentive to call the bond when its rates drop.

What option pricing models attempt to do, for assets such as these that have imbedded options or even pure option assets, is to calculate an expected value of the present value of the cash flows. This is very very simple. There's really not a lot more to it than that. But what do we need to do to calculate an expected value? Here's where it starts to get complicated quite quickly.

In order to calculate this expected value, we need several things. We need a probability distribution. We need to make an assessment as to the likelihood that interest rates or term structure in general takes any particular course. We need a method of estimating what the borrower behavior will be in different courses of interest rates. And we need a method of encapsulating this process into a present-value calculation. It's here where things get a little bit more complex, but by and large, option pricing models all contain these four phases. We start with the probability distribution itself, which in option pricing terminology is known as an interest-rate process. Just a little bit of a fancy term for probability distribution of interest-rate movements. The second phase, the predictions of how borrowers react we call behavioral models. That is, how the borrowers behave under different economic circumstances. And last, we have the expected value calculation itself.

Now again, this is fairly simple. Where does option pricing get complex? Obviously it's complex because literally tens of millions of dollars have been spent on option pricing models and option pricing theory. Well, it gets complex when we begin to create more credible probability distributions, more credible interest-rate processes that meet certain behaviors, and those that exhibit certain properties which map well to the market itself. It gets complex when we begin to fit the process to actual market prices and when we try to design numerical methods. So, we need something less than a fully organic computer to wait for the calculation and the result.

CHART 2

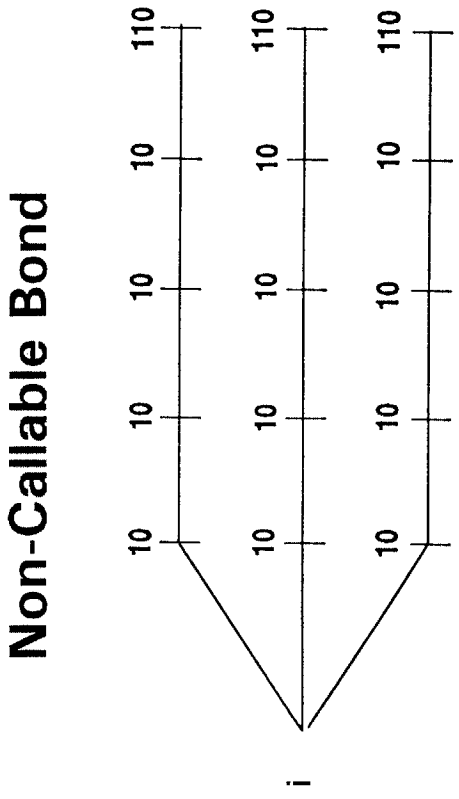

Non-Callable Bond
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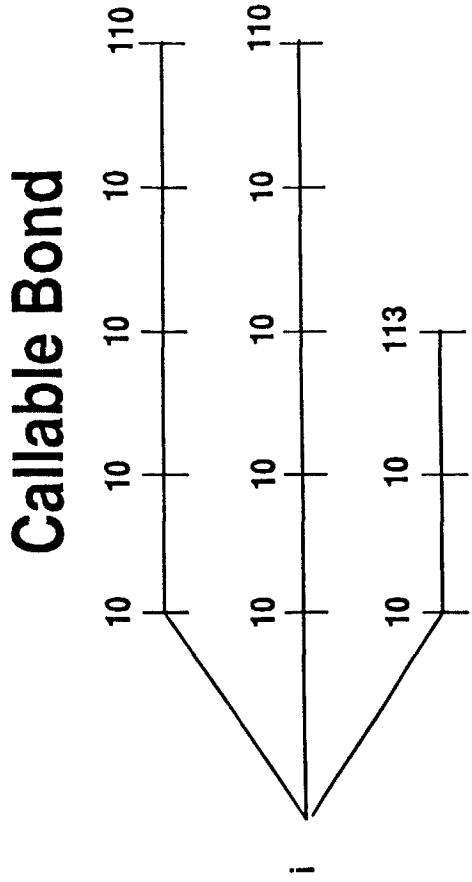
CHART 3



This is where it gets complicated, but the fundamental process shouldn't be scary. It is straightforward. You work out an expected value. This is not profound.

I'd like to introduce you to just a little bit more terminology. Perhaps I can give you a few more variations of these components of the option pricing model, but first I'd just like to give a little bit of context before I start talking about product development. With respect to interest-rate processes themselves, we've all heard about binomial lattice, trinomial lattice. These are the more state-of-the-art interest-rate processes that involve Markov Chain analysis. The leading edge at the moment is chaos models of interest rates. It was interesting to me to learn about how chaos models are put together because actually there's really no such thing as a chaos model where we can simply model systems that are so complex that when you look at them with simpler systems, they look chaotic. But that's a whole science in itself. That is the direction that Wall Street is moving with option pricing models.

There are many behavioral models: the way people act towards bonds; the question of whether the bond is called or not; when we speak of sinking funds, is the sink accelerated; when we address mortgages, will they prepayment analysis? These are all behavioral model issues of one type or another. Many different assumptions are made for different kinds of cash-flow streams ranging from perfect deficiency to explicitly inefficient behavior. As we apply financial technology to liabilities and the products that we design and sell, we're dealing in the realm of profoundly inefficient behavior. If our policyholders behaved efficiently, we wouldn't have nearly so many companies left as we do now.

Consider a binomial lattice (Chart 4). In the discounting the expected value calculation, by and large, option pricing models reflect the fact that, if you receive a dollar in a high interest-rate environment, it's worth less than if you receive a dollar in a low interest-rate environment. This demonstrates that there is a discounting mechanism, and we have a path dependency. The state of the universe that results in a payoff has direct influence on the value of that payoff today.

Option pricing models do many things. The obvious output of an option pricing model is price. It is also sometimes known as option-adjusted value. What we're trying to do is simulate market price.

We use several different measures to describe a stream of cash flows other than simply the price. You've heard these terms quite a bit: option-adjusted duration (OAD) and convexity. These seem complicated based on the terminology, but to mathematicians, and some of us are mathematicians, it's very simple. OAD is nothing more than the first derivative of price with respect to interest rates with a negative sign in the front normalized by price. Convexity, the second derivative, has no negative sign in the front. Negative signs in the front of duration are needed only so that you can get a positive result on the duration of bonds. There is really no other reason other than that historical context. An extension of these measures keep the way price behaves and of the way the cash flows react is sometimes known as the price behavior curve. It is much easier to use to explain duration and convexity. Here's an example of price behavior curve for a noncallable bond (Chart 5).

THE INFLUENCE OF INVESTMENTS ON PRODUCT DESIGN

CHART 4

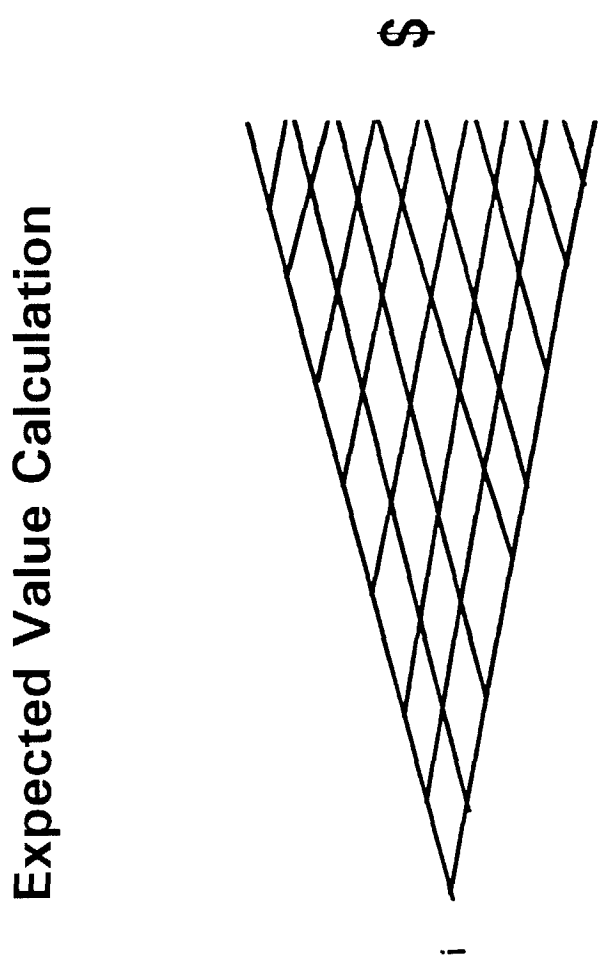


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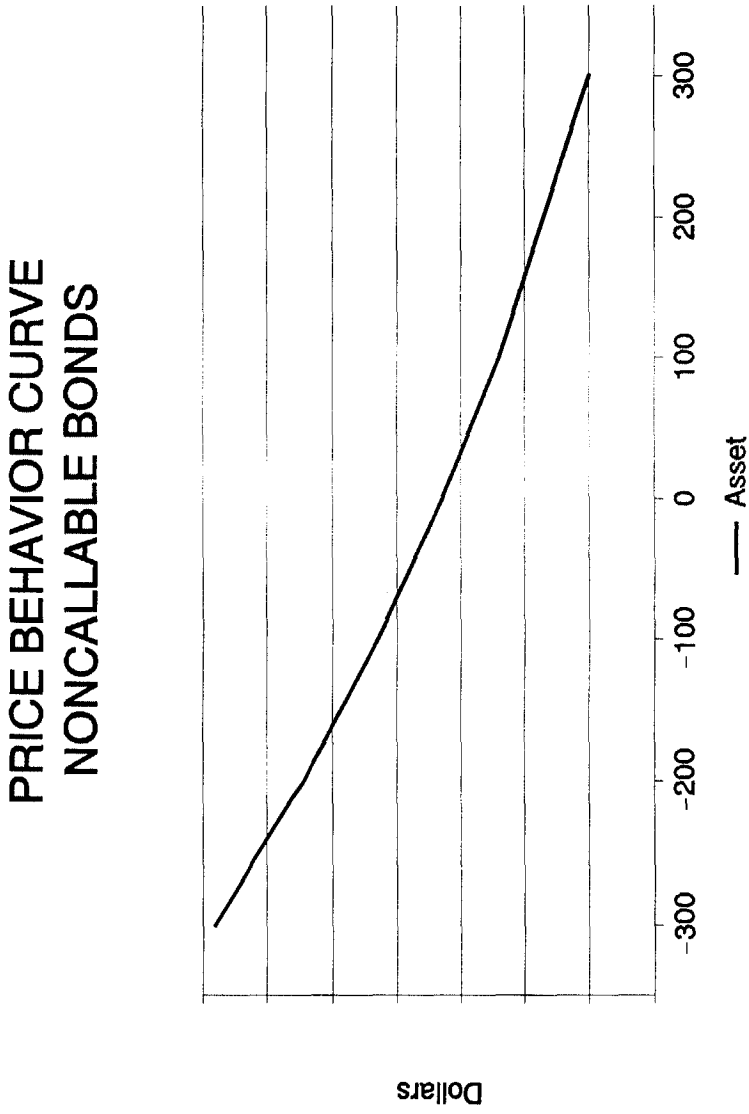
CHART 5


PRICE BEHAVIOR CURVE
NONCALLABLE BONDS
Dollars
300
200
100
0
-100
-200
-300
Asset

Many variations of this kind of technology exist. This is a simplified case where we look essentially on the vertical axis at the price or the market value of the bond, and on the horizontal axis we'll look at interest-rate shifts upward and downward. What's very useful about this concept, or price behavior curve, is that we can explain duration and convexity quite easily. Duration is the slope of the curve at any point and convexity is the second derivative of the function. If you're explaining it to your board of directors, you say, if it's curved upward, it's positive convexity, if it's curved downward, it's negative convexity. Then everyone understands it. This is a very powerful tool to analyze the behavior of assets. We can apply this tool to products and to the product development process to reach some fairly profound results.

Now what do we have to do to apply this paradigm, this method of looking at the world, to insurance products? Well, the interest-rate process is the interest-rate process, and products react to the same external environment that everything else reacts to, although the environment is filtered in different ways. There are different forms of competitors and so forth, but the environment is the environment. The discounting mechanism remains the same. But what's very different about the application of option pricing for liabilities versus assets lies in the behavioral models. With most assets, the behavioral models are fairly simple, but the research behind them is not simple at all. There are megabucks in research as well. However, the concept is a little bit simpler. If you're dealing with mortgages or borrowers, one of two things can happen. They can make their mortgage payment, or they can move and buy a different house. There's not that much range of alternatives. With most bonds, you call the bond or you don't call the bond. We're dealing with behavior generally across one single parameter. With the liabilities that we write, we deal with behavior in a broad number of areas. Here is just a small list (Table 1) of the kind of options that we write in our products and the kind of behavioral models that we must create in order to properly analyze the insurance products that we sell. Of course, heading the list is the one that everyone concentrates on: the lapse option. We concentrate on lapse behavior fundamentally, but there are plenty of other ways that policyholders can behave and irritate insurers. The policyholders' behavior must be analyzed in order to properly accomplish this type of analysis.

TABLE 1
Liability Cash Flows

1.	Lapse
2.	Withdrawal
3.	Preferred Withdrawal
4.	Loan
5.	Preferred Loan
6.	Transfer
7.	Premium Performance
8.	Bailout
9.	Window
10.	Increase/Decrease

How we utilize this type of analysis is many-fold. First, there is the most talked about application of option pricing, and that's the asset/liability management field. When we manifest asset/liability management in terms of price behavior curves, we get some

very nice pictures. This is a typical in-force universal life portfolio (Chart 6), where the line on the bottom is our shape or the price behavior of our liabilities, generally of positive convexity. The line on top is the behavior of assets. For many insurers, there is some amount of negative convexity. This makes for a fairly disturbing picture. If you consider the difference between those lines to be economic surplus (sometimes called market value of surplus) we find that it gets erased pretty quickly with slight interest-rate movements. This is a typical case and fairly disturbing. Most insurance companies don't want to see this picture. But in a classic asset liability theory, which is now 19 or 20 months old -- almost history, our goal is to change this picture into something that looks a little bit more like Chart 7. This is asset/ liability management.

A more complicated application of this technology lies in product development and product design. It is highly possible to take the actual products that we create, and analyze them through this framework without the asset portfolio.

We can consider it to be just one giant cash-flow stream. We want to analyze how this cash-flow stream behaves. Chart 6 is a typical universal life portfolio, after I've sold it, collected some premium, bought some assets. Now I have an asset curve and a liability curve. It looks as if my economic situation gets a little worse when interest rates rise and gets a little worse when interest rates fall. This is not a good situation. What would we expect a price behavior curve of a universal life product to look like just before we sell it? Well, if the in-force portfolio declines in value in either direction of interest-rate movements, it would be reasonable that we'd expect a price behavior curve of a new product to look like Chart 8. This is an actual price behavior curve of a universal life product. The curve has value above the zero line at today's level of interest rates. Notice that the value of that entire mechanism declines as interest rates rise or fall.

This is, again, a somewhat scary picture. How do we make this useful? Well, this technology really shines when we begin to analyze the variations in product features that are not well captured by traditional actuarial viewpoints or technology. I'm going to use as an example a universal life product with and without preferred partial withdrawal provision. And just to define my terms, I consider preferred partial withdrawal provisions to be the ability to withdraw money up to some limitation without a surrender charge. If I look at universal life with and without preferred partial withdrawal provision and graft the price behavior curves together, I see something that looks like this (Chart 9). The curve on the bottom contains the option. The curve on the top does not contain the option. I can make a couple of observations that make nice intuitive sense. When is a preferred partial withdrawal option valuable? Well, it's valuable when you have economic incentive to withdraw money. And you have economic incentive as a policyholder to withdraw money when your insurer is not crediting you a market-driven rate of interest. That's most likely to happen when interest rates rise. When interest rates fall, it's very easy to credit market rate of interest. When interest rises, insurance companies face the dilemma that we've been talking about for as long as I've been in this industry.

You either raise your credited rate and lose margin, or you leave your credited rate low and suffer excess lapses. So we see that the difference between those lines increase as interest rates rise. That's a nice intuitive result. Of course, the option

CHART 6

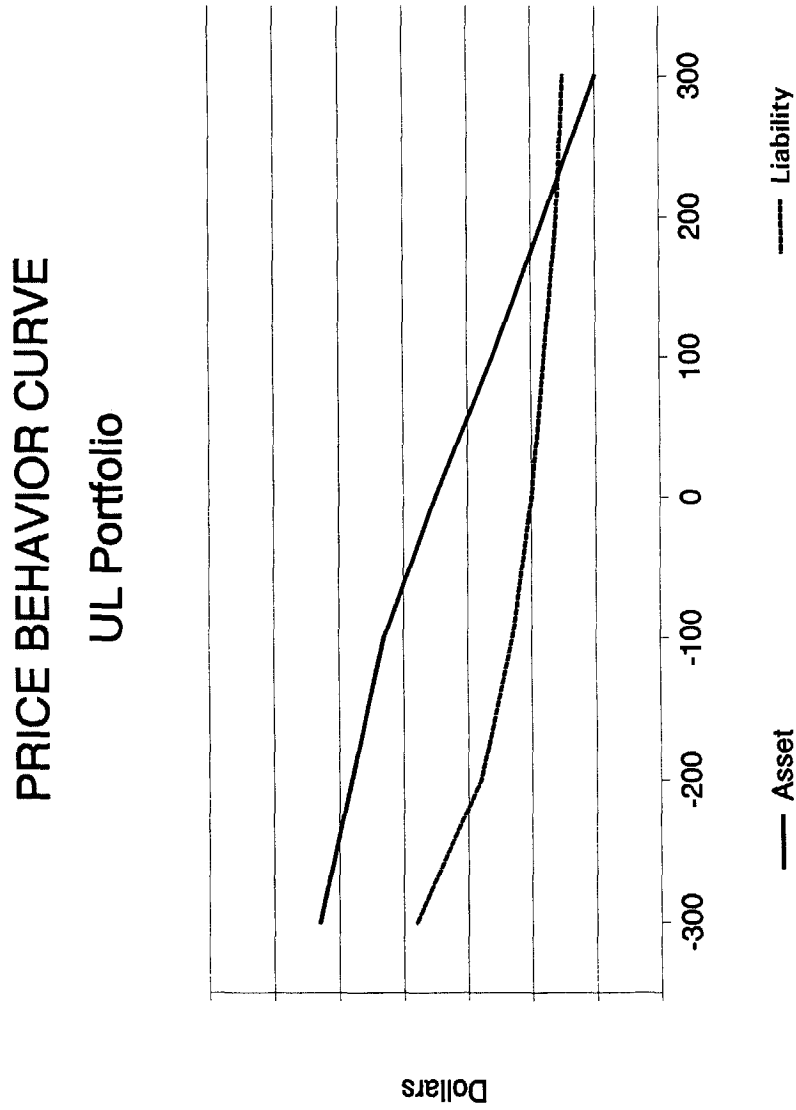
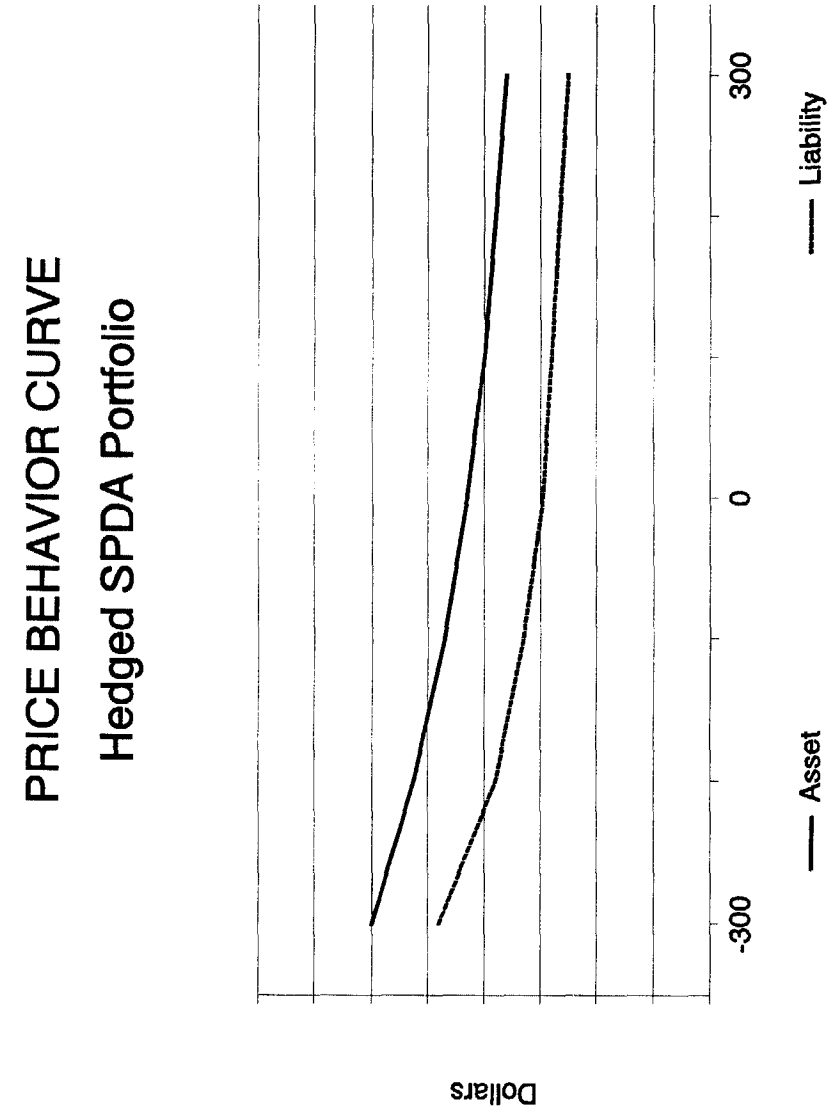

PRICE BEHAVIOR CURVE
UL Portfolio
Dollars
300
200
100
0
-100
-200
-300
Liability
Asset

CHART 7


PRICE BEHAVIOR CURVE
Hedged SPDA Portfolio
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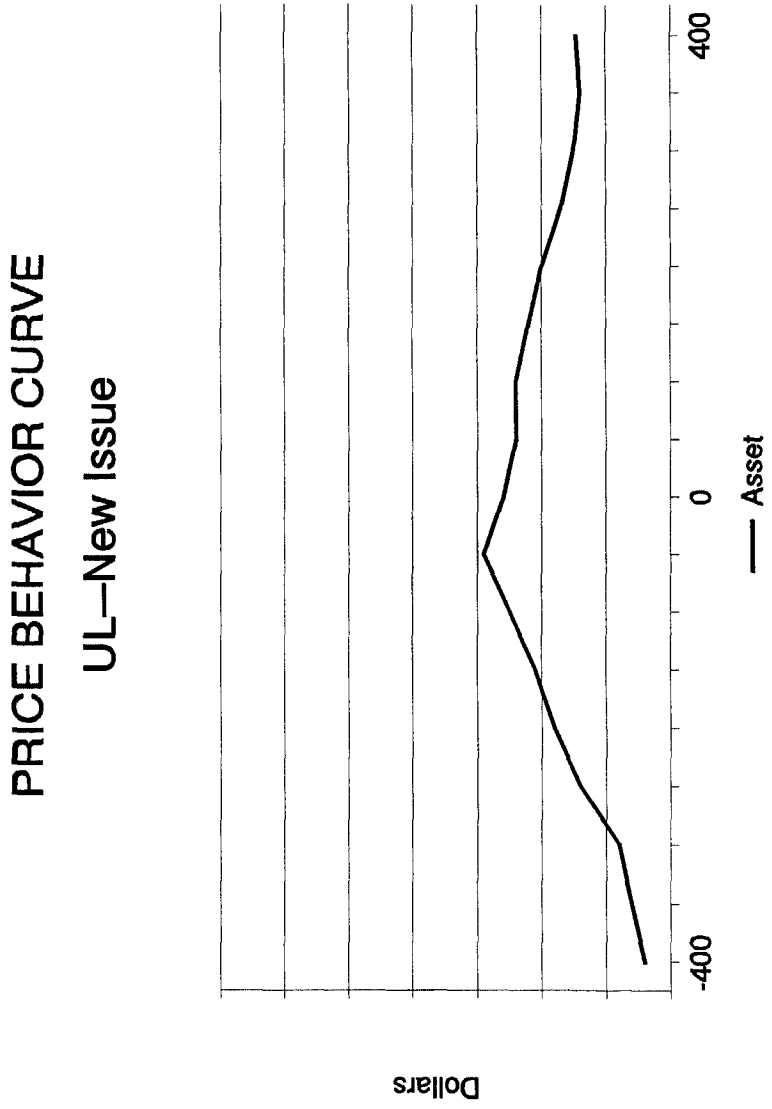
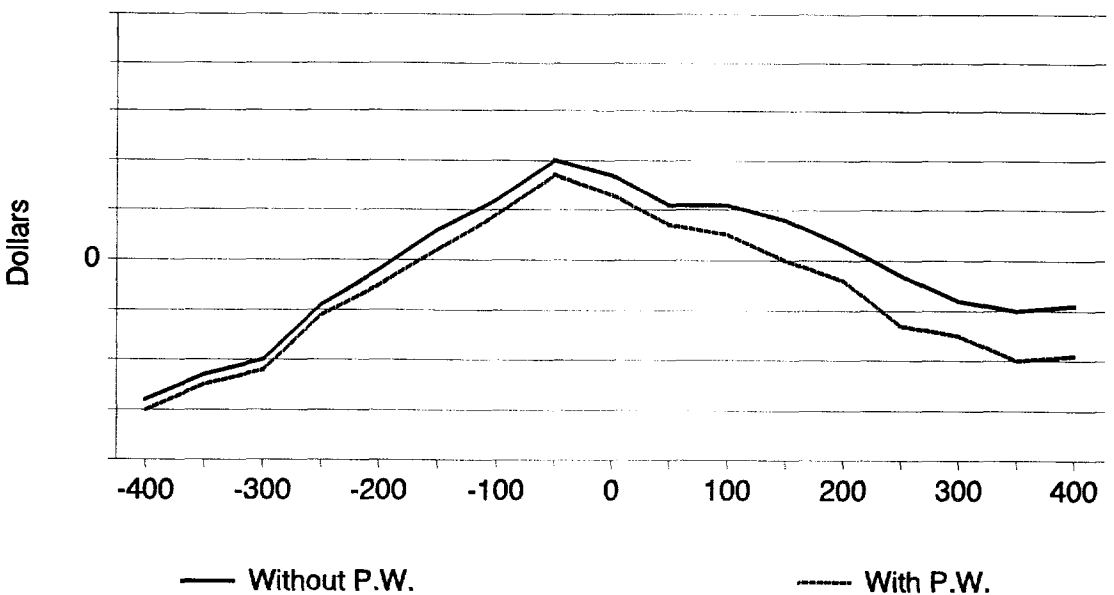
Asset
Liability

CHART 8



PRICE BEHAVIOR CURVE

UL—New Issue



never loses value entirely. Options are always valuable until they're expired. So you see the lines approach each other on the left-hand side.

What do we do with this? Through this technology we can begin to actually price this option, to find out what this option costs us. The method that we use of doing this is to look to the capital markets and discover what the cost of the difference between those two lines is. There are many methods of doing this. We tend to use interest-rate derivatives, which makes guys like Mark Griffin very happy. This is an extremely powerful, useful tool when you begin to measure the cost of these options because we can buy the flip side of this option in the market. You can just go buy it. You can buy literally, as I mentioned earlier, any set of payoffs in the market today. And if you want something that doesn't exist, find three friends that also want it and it will exist very quickly.

So in this case, the difference between these two lines actually happens to map very well with an interest-rate cap. Here's a price behavior curve for an interest-rate cap (Chart 10). This again has a nice intuitive result. When its rates rise, we need to keep our accredited rate marketlike or market driven. So we need a little more money when interest rates rise. And that's exactly what interest-rate caps do. They're actually upside interest-rate insurance in a sense. If I overlay this interest-rate cap, this vehicle, and overlay these cash flows on top of the universal life with the preferred partial surrender provision, I get not quite, but pretty close to parallel behavior (Chart 11). So I've simulated going to the market, paying some money, and neutralizing this option or fully funding this option. I can use this to price this option.

Now this is all very nice, but how do I make this practical in the sense that I can lead my management to a decision as to whether to include this option in the product or not? There are several ways of doing this, but our particular method is to characterize the cost of the option in terms of multiples of production necessary to pay for that option. So we would generally graph it in this format (Chart 12). We would have the option-adjusted value of the product with the option and option-adjusted value of the product without the option. We'd draw these two curves with production on the horizontal axis and the option-adjusted value (OAV) on the vertical axis. We could draw a horizontal line across the graph and drop the intersections down. And we can make a statement that in economic terms, X amount of sales without the option is worth Y amount of sales with the option. What we've done is converted this to a macropricing style exercise. This is a very powerful way to begin to make rational decisions about product design features.

I do believe that this methodology will have a very far-reaching impact in the coming years on the way that we put products together. Contrast this to the traditional method of dealing with product options, where a certain decrement rate is assigned to an option election and it is priced as if it were relatively static, without paying full attention to the economic incentive that we inject into the product by the existence of the option.

I'd like to conclude with what I feel is a bit of a broader issue. When I was talking about the options that we write within the products, I mentioned that the first option that we concentrate on is the lapse option. Why is that? Why is that so important to us as an industry? I think the reason that it's so important is that we are forced

CHART 10

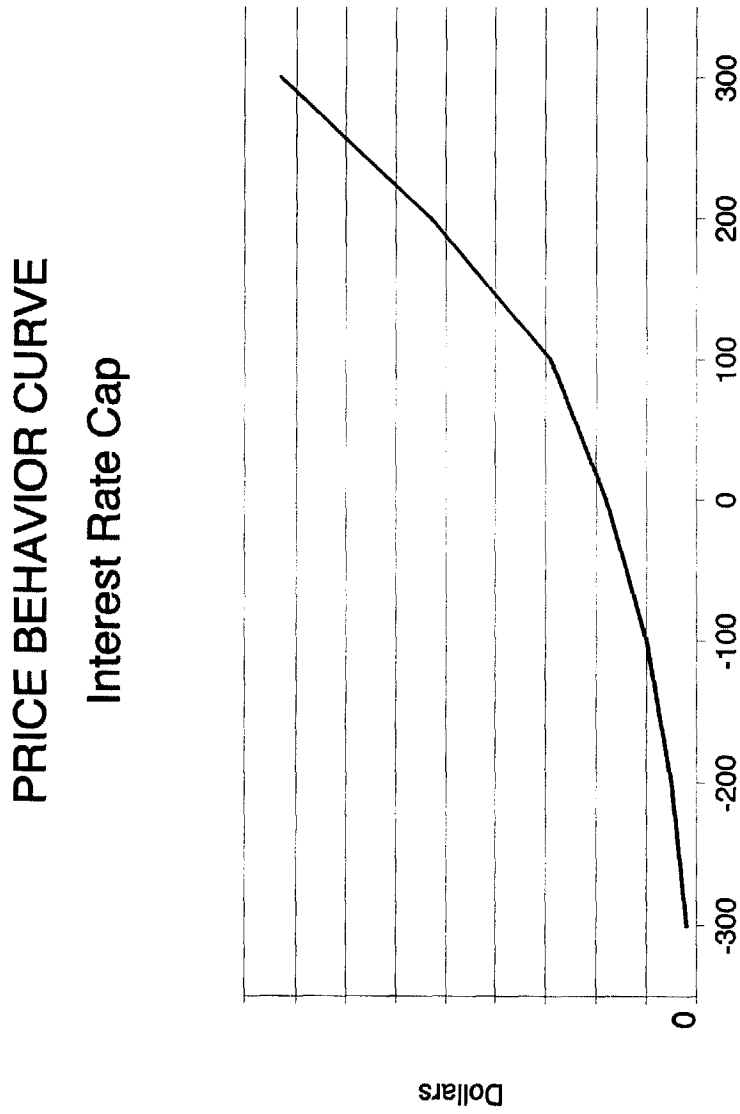

PRICE BEHAVIOR CURVE
Interest Rate Cap
Dollars
0
-300
-200
-100
0
100
200
300

CHART 11

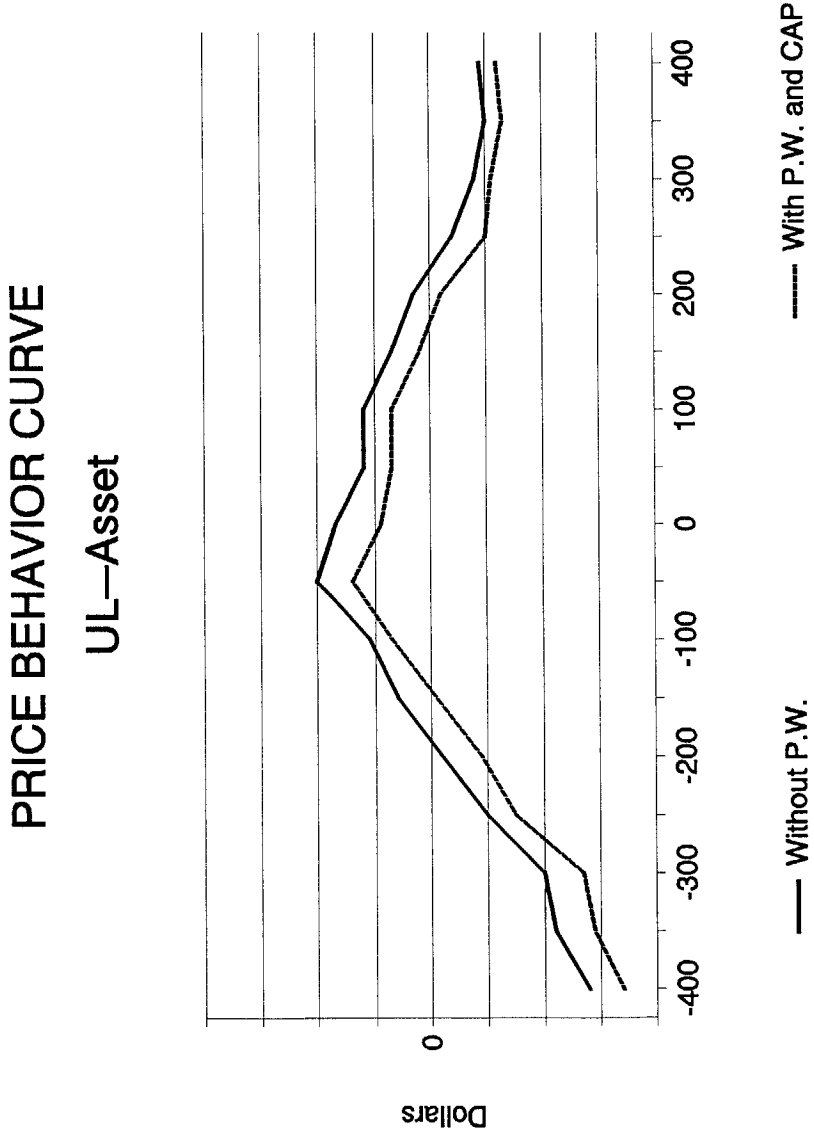
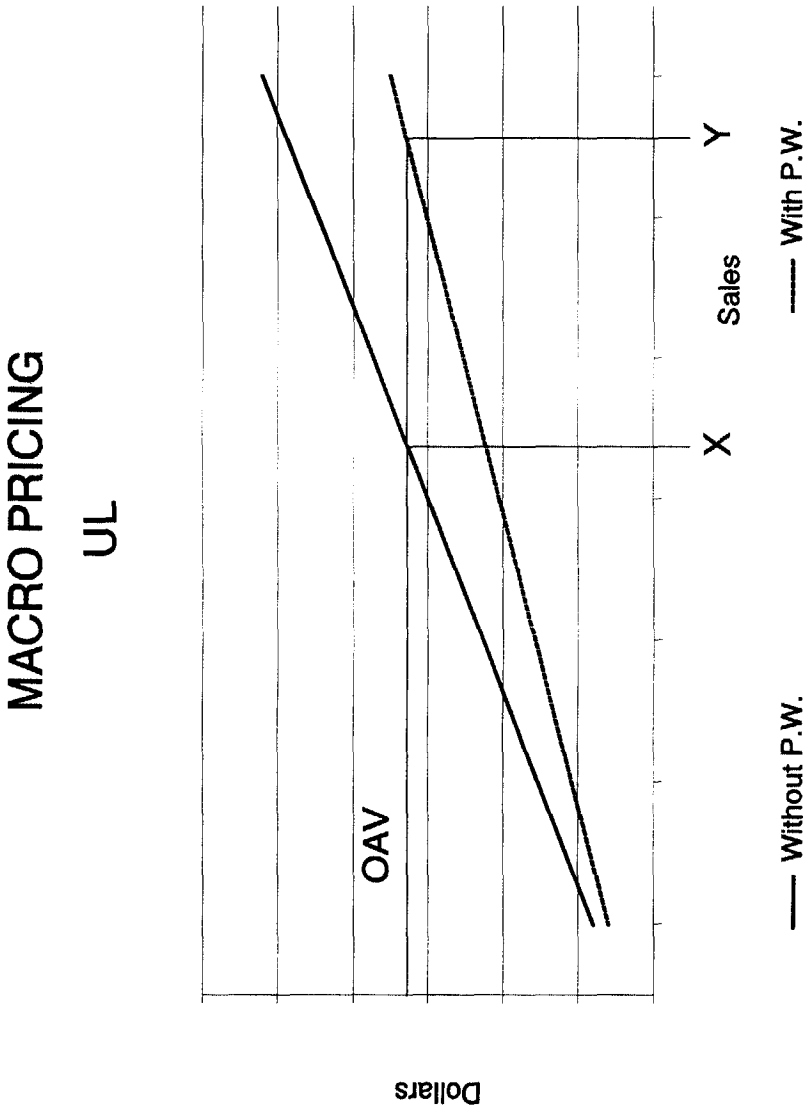

PRICE BEHAVIOR CURVE
UL—Asset
Dollars
0
-400
-300
-200
-100
0
100
200
300
400
Without P.W.
With P.W. and CAP

CHART 12



by law to write a very expensive option on the vast majority of our products. And that is the option to cash it at book value. How is this option characterized within the law? It's called nonforfeiture regulation. And I don't really mean to blame everything on the industry, just most everything. We are forced to write this option in most of our products. This was a very hot topic in the early 1980s after we just came off several years of very rapid option election. Somehow, in the past seven or eight years, people have forgotten about this as an issue. It's a very important issue to me. It will become more important as soon as we get a three or four hundred basis point click up in interest rates over an 18-month period. When and if that happens, it'll come to the forefront of the industry again. I wish this issue would not be forgotten. One of the things that will raise this issue prior to disaster is the application of option pricing technology to insurance products. You see, the first time you evaluate a product with and without this option, you are astounded by the cost, even with assumptions of grossly inefficient policyholder behavior.

If you assume anything like efficient behavior, then the option is just enormously destructive. What's quite unfortunate is that this option is not valued by the marketplace at nearly its true economic cost. Phil Polkinghorn had mentioned the market-sensitive annuities by company count. They're not a big share of the market. But by dollars of premium, they are an enormous share of the market. These products do not have this option. So that's my greatest hope in the next 10 years that this technology will cause the breakdown of nonforfeiture laws.

MR. GRIFFIN: The question that I had hoped to speak about was with respect to investments and product design. Which should be the horse and which should be the cart? I'm not sure there's going to be a single, clear conclusion. I'd like to speak about a couple of fairly straightforward strategies, what Phil Polkinghorn will classify as risk-control strategies. I hope the product features to be hedged are ones that you will recognize. The strategies I will present will show how a fairly straightforward hedging strategy -- just buying a package of options -- can closely mirror the liability side option.

My first example is the market-value adjusted annuity (MVA). I think the MVA is probably the most sensible evolution from the traditional single premium deferred annuity (SPDA). With a traditional SPDA, you have a fixed surrender charge like the one shown in Table 2. The product guarantees an interest rate typically for a year, or perhaps three or five years. The rates at which these products are sold probably tell you that you should invest at a maturity of anywhere from five to ten years. An actuarial risk analysis of the product, probably tells you that you should be investing an awful lot shorter than that. So there's a real problem here. If you invest short, you probably don't have the rate to sell the product. So it's a moot point.

My example is a five-year MVA product. A properly designed market value provision really does give you an investment target of five years. If you construct an investment strategy where you aim at X dollars in five years time, you will be fine whether the policyholder withdraws the money before maturity or stays in for the five years.

If you go to your investment department and say, "I want to offer this product and I want you to buy five-year corporate zeros to back it," they're going to say, "Oh gee, there aren't really corporate zeros out there." But at least it is a definite duration

TABLE 2
Example 1: Market-Value Adjusted Annuity

Guarantee	5 years at 6.80%
Asset Return	7.80% (5-year Treasury +0.80%)
Cash Surrender Values Is Greatest of	-MV Formula -3% Annual Return Minus Surrender Charge -Premium Paid
Surrender Charge Scale	7 6 5 4 3 2 1 0
Commission	5%
Commission Charge Back	100% for 6 months; 50% for next 6 months; 0 Thereafter

target. You can combine five-year coupon bonds with some bonds maturing a little bit later, and you will have a five-year duration and minimal yield curve reshaping risk. Relative to the traditional SPDA, the MVA gives you an easy investment target.

Now the only fly in the ointment comes with any minimum returns that are promised. As soon as you put in a minimum return of say, 3% minus the fixed surrender charge, or promise that you will always give the policyholder back his premium, then you have sold an option. This option is something that you have to deal with in addition to your straightforward five-year bullet investment strategy. The cash surrender value is the largest result of three calculations. The first cash surrender value calculation is your typical market value calculation where you look at the maturity amount at the five-year point and you discount it at the correct rate to calculate the market-value adjustment. The second calculation is a 3% return minus the surrender charge. The surrender charge starts at 7%, and decreases by one percent a year to zero. The third calculation is simply the single premium paid. So if you buy this policy and interest rates go to the moon the next day, you can always get your premium back. The commission is assumed to be 5%. The commission chargeback schedule that I have assumed is one where the issuer can recover 100% of the commission if a lapse occurs in the first six months, 50% of the commission if a lapse occurs in the following six months, and zero after that.

Chart 12 shows the rate above which the insurance company begins to have withdrawal risk. The line that I'm going to focus on is the bottom line. The bottom line represents the product with the market-value adjustment, subject to the higher of premium and a 3% return minus surrender charge. The prevailing interest rate at which insurance companies have risk starts pretty much at the level where you write the policy and rises with time. Treasury rates are on the left-hand axis, time is on the bottom axis. You can see that the bottom line rises quickly to the right. The waves in the line are caused by the commission chargeback formula, the fact that it's not continuous but has discrete jumps at six months and one year. I did the same calculation for the identical product, but with the return of premium provision removed. That is the higher line. It starts higher than the bottom line, but meets the bottom line around two years after issue. Dropping the return of premium provision moves the risk further out of the money and makes it worth less. Putting the higher of premium provision in has some value. We will discuss how much value in a little while.

Table 3 is an example of the analysis that I did to produce the chart. The calculations were repeated at different points in time, in this particular example the point in time is six months after the issuance of the policy. Half a year after issuance the 4.5 year Treasury rate is the pertinent rate. The first step is to value the assets at different interest rates. In my example the assets are assumed to be the net proceeds (single premium minus commission) invested at the time of issue in a hypothetical five-year zero-coupon bond at 80 basis points above the Treasury curve. The liability value is determined by applying the highest of the market-value formula, the 3% return minus the surrender charge, or the premium paid. You can see at this early date it is the premium that produces the highest value. The amount at risk obviously is the amount by which the liability value exceeds the asset value. That's what you stand to lose if the policyholder withdraws. At the six-month point in time, the risk begins just a little bit below 8% on the Treasury.

TABLE 3
Example 1: Market-Value Adjusted Annuity
Six Months After Insurance

4.5-Year Treasury Rate	Asset Value	Liability Value	Amount of Risk
7.00%	$1,036	$1,000	$0
7.50	1,016	1,000	0
8.00	996	1,000	4
8.50	977	1,000	23
9.00	958	1,000	42
9.50	940	1,000	60
10.00	922	1,000	78

We will address this risk with European Treasury puts. With a put, the buyer has the right to sell a particular Treasury instrument at a specified yield. The European put is exercisable at one specified point in time only. The put takes on greater and greater value as interest rates rise. Buying puts to hedge this risk is a fairly straightforward strategy because it's really the put that you've sold with the minimum return feature of the policy. The buyer pays an up-front premium for this type of instrument to the broker. The buyer therefore has some credit risk with respect to the broker. So choose your broker carefully.

Table 4 shows the calculation at each three-month point in time over the life of the product. You can see that in each case the strike chosen mirrors the line on the chart. I've assumed, (and this is definitely an assumption, 10 different actuaries will make 10 different assumptions) that the amount of this put you buy is 15% of the amount of the policy. That's $150 par amount of put on a $1,000 single premium. I have assumed that for each three-month point in time a put is purchased that is exercisable on that date. This strategy provides protection against 15% of policyholders disintermediating in any three-month period of time. That's not to say that only 15% of your whole population is covered. To the extent that more than 15% of policyholders disintermediate in one quarter, the way to address that would probably be to sell some of the options with later expirations. This strategy is feasible because you then have a smaller population of people who can disintermediate against you in the future.

TABLE 4
Example 1: Market-Value Adjusted Annuity
Sample Hedge with European Treasury Puts

Time (yrs.)	Strike	Put Par Amount	Cost
0.25	7.40%	$150	$0.48
0.50	7.80	150	0.40
0.75	7.75	150	0.60
1.00	8.30	150	0.66
1.25	8.20	150	1.17
1.50	8.90	150	0.80
1.75	9.70	150	0.75
2.00	10.60	150	0.37
2.25	11.10	150	0.30
2.50	12.00	150	0.25

There are different ways to address this risk. One might argue that, especially when starting out with a new product, it's probably simpler to buy one put. If you buy one put instead of a series of puts, it probably makes sense to buy an American put, which is exercisable over a period of time. It is important when considering different strategies to recognize that, any time that you are selling an option that isn't at its exercise point, there are at least a couple of factors that are going to impact its price. Number one is obviously the level of rates at that point. Number two is the shape of the Treasury curve at that time, which may or may not have been part of your analysis of this risk. Number three is implied volatility in the fixed-income market. For example, implied volatility was very different before the Gulf War began than the day after the Gulf War began. Therefore, any strategy that you as an actuary come up with, and actuaries can come up with all kinds of strategies, must recognize that there are a number of important pricing factors.

The total cost of this option package, which I didn't list on the table, is a little bit less than $6 for this example. On a $1,000 single premium, I believe that translates to something in the order of 12 basis points or 0.12%. Obviously, this should be translated into your pricing. If you remove the return-of-premium provision the cost goes down into the $3-4 range, or a price of seven basis points, which is 0.07%. So the cost of a good hedge is not really as catastrophic as you might otherwise assume.

My second example is what I call a contribution window. I'm not going to get into as much detail here. This example applies to any type of product where the policyholder has a right to make contributions in the future (typically a one-year window) at today's terms. This feature exists in some flexible premium products, in a lot of GICs implicitly or explicitly, and in other products that you are more familiar with than I am. Future contributions at today's terms can be hedged if we know the amount and time of them. If you have someone who is committing some money and you know when it's going to arrive, how much it's going to be, the rate you're going to have to credit and for how long, then that type of arrangement can be hedged. The concern is the tendency for those contributions to increase if rates fall. Another risk this example doesn't address is the risk of those contributions decreasing if rates rise. These situations are both forms of disintermediation.

Let us consider the tendency for contributions to increase if rates fall. The first instrument, European Treasury calls, give you the buyer, the right to buy a particular Treasury instrument at a specified yield. Once again, it's exercisable at one point in time. For this right, you pay an up-front premium. A recent market level for an at the money European call, on say the five-year Treasury, was less than $1 per $100 of par amount. These instruments do not necessarily break the bank. At the money basically means that as soon as interest rates start to fall, the investment has some intrinsic value. The strike can also be below the starting five-year Treasury level.

Another way to address this risk of contribution windows is an American Treasury call. That's basically the same as a European Treasury call, except that they're exercisable continuously over that period of time. If you're buying a one-year instrument, you can exercise it at any point in time up to one year. With the European, you really only have the one day to exercise it. Of course, the price of an American call is higher than the price of a European call.

The third vehicle I wanted to include here is what's known as a double-up option, typically on a corporate bond. The double-up option is not the type of instrument that's typically found in a dealer's inventory. If you are interested in instruments like this, the best approach is to ask for them. When they become available, you will certainly get the call. The double-up option provides the same type of risk profile as the Treasury call. This option is sometimes written by corporations when they have completed a bond issue and they want to raise a little bit of extra money. By issuing bonds at this level, the issuer obviously doesn't feel that rates are going to go much lower in the short term. The buyer of the option gets the right to buy more of that same bond issue at par. These options are typically one-year American options, and they're on short- to intermediate-corporate bonds. Of course, there is credit risk attached with the bonds themselves. When these options become available, they should be better value than the Treasury instruments if for no other reason than if they weren't, no one would buy them.

To summarize on options, it's fine for the actuary to do the proper analysis, to decide which options have to be purchased, what they cost, integrate them into the product design and pricing, and so on. However, make sure that your investment department, once you buy options, is going to be able to manage them or at the very least be ready to exercise them. There are a lot of situations where insurance companies have bought options. The options sat in some file cabinet, and eventually the entity selling the options has said, "I wonder who owned those things and forgot to execute them." A lot of investment departments today are streamlined to look at new bond issues, decide what they'd like to buy and if so, how much. In a lot of situations, we even have trouble finding people within insurance company investment departments who have time to focus on bond trades or other issues that we wish they could focus on. So managing an option position or just plain executing these options when they come into the money is something that should not be lost sight of.

In general terms, I think the trend of investments influencing product design is a good one. I'm not sure that it should proceed to a point of absolute convergence, where you're just basically wrapping an insurance company's credit around an investment. That's pretty easy to copy. I know there are lots of sophisticated investments that

you can buy these days. But just about anything that you can buy somebody else can buy, too.

The other important point is that there are important educational implications here for the actuary, in general, and for the product design actuary and the financial actuary, in particular. It's more important for actuaries to understand investments. These days the word *investment* doesn't mean just your basic semiannual coupon corporate bond. It means some of these fancier things that you can use if you want to put together an airtight portfolio to back a particular insurance product.

MR. DAVID A. HALL: I couldn't help but think, Mark, as you were starting your talk and trying to decide which side was the horse and which was the cart, the investment side or the product side, that perhaps the state of the industry today is such that regardless of which side is driving that process, your view of the other side is very much similar to the view from the cart. As Phil Polkinghorn was starting his comments, there was a point that I wanted to make. Then Shane got up and did it for me. I think it's a mistake to try to design insurance products to fit an asset. I think that's a very convenient way to think about things. That's probably a view that's put forth by many investment people who say, "Why don't you build your products so that we can invest for them very easily?" But in effect, the products that we sell are designed to meet some need presumably. If they aren't designed to meet some need, then they probably haven't got a very good life expectancy. So I think the principal focus is to design your products sensibly so that they accomplish the need that they're designed to perform. That process may included providing some types of options that may be necessary and eliminating certain options that may be popular. And then you should fit your asset strategy to the product. This I think is where Shane was going. You can build anything on the asset side. You are given the nuts and bolts. The investment world is an erector set right now. You can build virtually anything, and there are always more pulleys and motors and all sorts of things invented such that you can construct an asset strategy to match anything that you want to. There are more efficient ways to do it and less efficient ways to do it. But there's a way to do it. Sometimes you find the cost doesn't make sense, and then you get into questions about, do you really need that in the product or what is the efficiency of exercise going to be? That's a good dialogue to get into. But I don't think that you should be building products to match an asset. I think you should be building products to match a need, and then building an asset strategy that makes sense in conjunction with the product need. I think if the industry goes that way, there's a very good future for it because you are now building a product that's designed to do what it's probably designed to do.

MR. POLKINGHORN: I guess I would have to agree with you. You can't disagree except to the extent that there are assets that meet needs of people desiring an accumulation, and witness variable annuities, which are nothing more than wrapping an insurance or annuity wrapper around existing assets. Granted you can't just take an asset and wrap your insurance company wrap around it and go out and sell it if it doesn't meet a need. But I guess I would maintain that there are needs or desires in marketplaces that we can serve that can be met with certain assets that are out there that we are meeting. But I agree with you.

MR. ALAN J. ROUTHENSTEIN: Just to follow up a little bit on that point, I think it's important to take into consideration your company's marketing niche, your strengths. As we all found out in the 1980s, a lot of insurance companies thought they could be financial services players and the synergies did not pan out. Even though a product might look interesting, if your sales force or your distribution system cannot sell it effectively from a competitive perspective or cost effectively let's say, it's just not going to work for you. I wanted to make one point and then ask a question to the panel. The point is that I do a lot of what Mark does, and I work with insurance companies. I've seen a lot of insurance companies who are not big enough to cost-justify option pricing, or have made a decision that that's not the way they want to go. These companies are going to continue with cash-flow testing and scenario analysis as a way to evaluate their liabilities and asset/liability mismatch. Option pricing points out the same problems that scenario analysis often points out: interest rates go up a lot, and interest rates go down a lot. It's clear you're not telling any SPDA actuary anything new if you tell him that if interest rates move up 300 basis points, he gets hurt. Insurance companies don't have to do option pricing to use hedging products to hedge against these risks. Very often a valuation actuary or the pricing actuary if he's involved in such cash-flow testing points out that there's a problem and makes the recommendation to the investment department that a certain amount of hedging vehicles should be used.

Also, I wanted to ask the panel if you would be willing to share with us your experiences as far as the different types of insurance products for which companies use hedging strategies, and their prevalence.

MR. POLKINGHORN: I will answer the latter part of the question which was what types of products companies use hedging strategies for. I guess I've seen Mark Griffin's example of the MVA annuity with the floor go a couple of ways. I'm glad you asked that question because I think it's important to note that, while you can identify the cost of that option, the expected value, we haven't talked a lot about the risk. We've had clients who have played that both ways: clients who have gone out and hedged and other clients who have looked at not only the expected value of that option, but also looked at their risk profile. And they've decided to basically, as I guess Mark put it, charge the policyholder for it. They're selling that option to the policyholder there on the risk, but they're quite happy to take that risk now that they've measured it and they know what to charge for the option. So I guess that's the most common place I've seen it. But I've seen it go both ways in that situation.

MR. CHALKE: I would just like to add one statement to that. I think that conscientious hedging strategies are far more common, backing more annuity portfolios than life portfolios, as a result of the gestation of asset/liability management being focused originating pretty much on the annuity side. But counterintuitive to that, I think hedging strategies are needed more on the life side. Life products tend to be far more dangerous than annuity products in terms of asset/liability risk. This is a little bit counter to the course of regulation, and counter to what many people believe. People confuse aggressive competitors with intelligent competitors. And I would say that the annuity market has aggressive but intelligent competitors. The life market has maybe somewhat less aggressive but less intelligent competitors. The reason that I say that is, on the life side, there are many companies that feel they're portfolio-rate players. Portfolio-rate strategy is profoundly inferior as a company tactic, and we know this

through analysis and through experience. Many companies in a declining interest environment say, "Hey, we're portfolio-rate players. We can afford to pay above market rate," without recognizing that at the margin they're really just selling dollars for 95 cents. It's a great way to build volume that doesn't make profit very effectively. On the annuity side, if you felt you were a portfolio-rate player, you go out of business in about six weeks. It's a far more elastic market.

MR. GRIFFIN: I would agree with Shane that the asset/liability mentality began on the group pension side of a lot of insurance companies. It's now starting to drift across the hall to the life insurance and annuity people. I got a call almost exactly a year ago from a product development actuary, a fellow whom I had never met or talked with before, who phoned me up wanting to get some prices on options. I thought that was pretty astounding because I had never had that call from a product development actuary before. It was, in fact, an actuary who was designing a market value product very similar to the one in my example. He had figured out which options he needed to buy and how much of them he needed to buy. His motivation was that he wanted to charge the policyholder for the option. We have helped people through the analysis stage, who then as they've eventually started selling the product, have come back and started buying various puts at different expirations and at different strikes. I guess it's working, at least in a few places.

MR. MARK A. DAVIS: I'd like to disagree with something that was said by a person from the floor, that we should not design products around investments. I don't think that's true. The reason is because our business has been changing for a few years now. It's very much a spread business now. We are, as an industry, much less in the mortality risk business. If you think about where the growth in our industry is, you'll see that it's in annuities and GICs and contracts that are very investment sensitive. Life insurance is no longer the big player any more. I think the money that's out there is looking for a return on it. I think that if we can structure a product around an investment that gives the highest return that's what a lot of people these days are looking for. So I agree with Phil Polkinghorn that we really should try to develop products that we can wrap around assets.

MR. WILLIAM R. WELLNITZ: As a follow up to that, I don't see any disagreement between the two individuals. I think it's a matter of some philosophical foundation as whether we're selling death benefits or accumulation. But nonetheless, your market need is your market need. And we'll all sell to that. I have a couple of questions related to options. First, how are options carried on balance sheets, both statutory and GAAP? Do they appear at all? Is this just an expense item?

MR. GRIFFIN: Options are not an expense, they're an asset. With my first example of puts you would amortize those to their exercise date. I'm not aware if there's any difference between statutory and GAAP. I think it's pretty straightforward.

MR. WELLNITZ: If you're buying the option through a particular broker, you mentioned in your presentation the broker's credit risk that you ought to be concerned with. Does that mean, when you have particular diversification requirements either established by your board or by the state, that it's the dollar exposure in that particular broker that you need to be concerned with?

MR. GRIFFIN: Yes. But that raises some other interesting questions on, to the extent that you buy derivatives from a broker, how do you measure your exposure to that broker? With a lot of different instruments your exposure can change considerably when interest rates change. I think a lot of companies are grappling with this question right now. Suppose you spent a dollar on an over-the-counter option, that doesn't mean that your exposure to Broker A is always a dollar. Also, you have to think of all the different instruments where you have exposure to Broker A, Broker B, Broker C. What are the brokers rated, do you like the credit risk of the brokerage business, and so on?

MR. WELLNITZ: Let us say that your dollar bought you the right to buy $20 million of something at a particular piece. Is your exposure with that broker the $20 million promise or is the exposure the one dollar price.

MR. GRIFFIN: At that point in time, you have a dollar's worth of exposure to the broker. It's your right to buy that security at a certain price that has value. Suppose rates go down. The price of the call goes from $1, to $2 or to $5. Your maximum loss is not $20 million, it's the price of replacing the call option. So you do have exposure, but don't overcount it.

MR. WELLNITZ: A number of investment people whom I've talked to aren't really fond of option-type strategies in large part because they're paying somebody else to make money off of the transaction. They would much rather act so that if your concern is that rates might go up, then put more of your money short. That's just an oversimplification of the argument. How do you gentlemen feel about simply buying term structures in your portfolio so that you don't need to worry about synthetics?

MR. CHALKE: The question about buying short versus long can handicap you back into simply a durational issue. Where most of the issues that we face with insurance products and the options that we tend to write are at least as much convexity issues as durational issues. If you look in this price behavior curve context, what's the price behavior curve for cash look like? It's a pure flat horizontal line, zero duration, zero convexity. When we do have very short liabilities in many instances, we have odd convexity patterns that can't be attained simply through shortening your portfolio. If you wanted a perfectly matched portfolio, many times it will require a combination of cash and options. I have one further comment on the accounting. I'm certainly not an authority on this issue, but I've seen different accounting treatments from different companies of options, with the most common being straight-line depreciation. This brings to light a problem, and that is the accounting of pure options in the United States is different than the accounting of options that are embedded or tied to other assets. This is one of the reasons that companies will tend to buy the options that are attached to bonds rather than options that are pure and distinct. You get a fair bit of accounting bias with the pure options.

MR. POLKINGHORN: As I mentioned, we have seen people who have said there's a transaction cost associated with buying these options. The person selling the options is taking a certain risk. Are we willing to take that same risk? Before you make that judgment I think you have to sit down and analyze the risk, perhaps through cash-flow testing, to determine whether or not you're willing to take that level of risk. Through option pricing, determine how much do you need to charge for that risk. I

guess I'd submit that with book value SPDAs, it's a costly option. I don't know how closely I'd look at market prices for options because insurance industries have been selling policyholder options at under cost for years now.

MR. CHALKE: That's your best place to buy them.

MR. POLKINGHORN: We may analyze the risk and decide that we're willing to take that risk. We don't need to buy the options. We understand what may happen to us if we don't. We're going to build in an appropriate charge for it. We'll win or lose the same way that someone else would have won or lost in selling us the option.

MR. CHALKE: Actually, the cheapest place to buy these options with the funds backing annuities is investing them back in your own annuity product.

MR. GRIFFIN: I'd like to add a couple of points on that topic. We have found that a lot of people seem to like to buy options that are somehow embedded in a bond. If they know they need something, it just seems to be easier for them to buy a bond that has it stuck in there rather than to write a check for an option. A lot of investment people tend to run out of ink when it comes to writing a check for something that's not a bond. Some have gotten over it, some haven't. Unfortunately, if you know that you need to buy an option and you decide that you want to buy it wrapped in a bond, a lot of times the easiest bond to wrap it in is a government or an agency, or a bond that you otherwise wouldn't want to own. In that situation you're paying an awful lot of extra freight to have this thing stuck in a bond. That's something to keep an eye out for as you go through the various steps.

MS. KATHERINE C. COON: We've concluded we're too small for buying options to be practical for us. Are you seeing small companies buy options? And if so, what kinds of products and portfolios?

MR. GRIFFIN: That's a good question. I wish I had a really good answer for it. You might be surprised at the small quantity in which you can buy some of these things, before you dismiss them entirely. As I said, buying them without having the ability to manage them or to execute them is just a waste of money.

MR. ROUTHENSTEIN: I'd like to add to that, I agree with Mark that the small company is never going to be the lead buyer on an option. What we found at Merrill Lynch is that we've designed securities for large companies that tend to be bonds with embedded options in them, such that the security behaves like it's a liability. That will be for a $25 million type of amount. Where typically the issue is where it says we can extend it up to $100 million. After we get a lead buyer lined up, then the smaller companies might buy $5 million, as an example. If it's a structure designed to support an SPDA, then a smaller company will participate in the option market by jumping on at the end.

The other point I wanted to make is about accounting. I don't know if everyone understood the statutory accounting and MSVR treatment of derivatives. I'm involved with the Asset Valuation Reserve Committee, the task force with the NAIC. I can share just briefly with you what is currently being done as far as MSVR and what the committee's plans are with regard to the asset valuation reserve. On the

MSVR side, when you buy an option and hold this derivative instrument on the balance sheet, you hold it in Schedule BA rather than Schedule B. They don't qualify as bonds. Right now they're exempt from MSVR. The direction in which the committee is leaning with regard to hedging instruments is that, if an instrument is used as a hedge, it would not have an asset valuation reserve attached to it. I'm not going to get into all the details, but I'll happily share them with you individually. It actually goes both for equity types of hedges and for interest-rate hedges. They feel like the MSVR.

The best example is if a company is using a call option to hedge a call that it has written on a callable bond, the company is already holding MSVR for the par amount on the callable bonds. So that would be redundant to make the company hold additional reserves for reducing the risk for buying options to hedge the rest that the company already has. It looks like hedging instruments will get a favorable treatment. This approach is not written in stone yet. That's why I'm involved with a committee to make sure this concept doesn't get adverse treatment.