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SETTING INVESTMENT POLICY FOR LIFE INSURANCE COMPANY PRODUCTS

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In depth considerations with emphasis on "interest sensitive" products

- Pricing objectives and their relationship to investment returns
- Flexibility of product design/investment strategies
- Intermingling of the actuarial/investment roles
- Specific product considerations
 - Permanent products
 - Annuities

MR. JAMES J. CAREY: Why is this topic on the agenda today? Well, anyone who reads Newsweek, Business Week or Time is aware that there is a revolution taking place in the financial services industry. When one looks at that revolution, it is clear that no segment of the financial industries business is untouched. Securities firms are developing new and varied products. Also involved are banks, thrifts, credit unions, and insurance companies. So the revolution is not just taking place within one particular segment of the industry, but in every segment of the industry.

Also, another aspect of the revolution is that there is really no part of the business that is left untouched; no aspect, from purchasing through manufacturing, through marketing, through distribution. Many people do not think of the purchasing function as being a major insurance company function. But consider the purchasing decisions that are being made with respect to systems and to reinsurance. These two purchasing decisions are certainly being impacted by the change in the financial services industry.

The change taking place within the industry is being driven by a number of factors. Some of them are related; some of them are independent of one another. In putting this talk in context, it is useful to reflect on them, those factors being inflation, technology, an increasingly sophisticated consumer, deregulation, and finally the many new competitors entering the business today. One of the other forces for change which not many people have talked about are the consultants to the insurance industry who have served as catalysts. When considering the development of the Universal Life product, for example, much of the initial design work and the promotion of that product was being done by consulting firms. Also, when considering the merging of the financial services and the blurring of the institutional lines that separate banking from insurance from securities, much of that was driven by a number of the major consulting firms that were consulting to those various industry segments.

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Of particular interest to us is the impact that the revolution in financial services is having on the explosion of products being offered. Insurance and annuity products are becoming increasingly investment oriented. However, some have been developed without the proper integration of the investment function with the actuarial function. In the past, we have not been focusing as much as we should on the investment risks inherent in the products that we were putting into the marketplace. Unfortunately, we have seen the impact of that. A number of companies have been having substantial problems. Many major problems being experienced have been the result of not clearly thinking through how to support guarantees built into products through the development of an appropriate investment strategy.

Today the panel members will discuss how we might inbed the investment expertise that is resident in each of the companies we work for into the product development process. That is really what this whole session is about.

MR. BRUCE D. BENGTSON: I started as an actuary at Minnesota Mutual Life where I was involved with product development activities ranging from a One Year Term product to their Adjustable Life product, which I would like to think is a forerunner to Universal Life. After 9 years there I joined Touche Ross. I have been a Consulting Actuary with them since 1980.

First of all, I would like to give an overview of why there are so many people in this room this morning. It is primarily a result of the consumerist movement. If we take a look at what the consumer--whether a policyholder or a field force--is demanding in terms of a product, we will find that they want to see an unbundled, understandable, or transparent product. That consumer would also like to see a high interest rate. Now whether that particular interest rate actually is being credited after subtracting mortality charges and loads is not quite so obvious. Also the consumer wants to see a competitive value in his product. The competition is no longer only the Whole Life policy illustration. The consumer is going to compare the product to non-insurance company products. So consumer demands are the key to why we are looking at interest sensitive products.

With an unbundled product, it is more difficult to pay an adequate level of agent compensation and retain a profitable product. This is a very real situation in the marketplace. Once a product is unbundled and the consumer sees that he will earn 10%, but will also be charged an up front load of 20% of premium in the first year, a serious problem arises. The marketplace reality is that with too much front-end load, it will be difficult to sell a product unless there is a specialized market which can be addressed. What is needed in the marketplace is a product that will sell. Also, the product must be one which the investment department can invest for and the administrative staff can administer. Finally, after all is said and done and the business is no longer on the books, hopefully a company's surplus has been increased by the sale of this product. These are very real problems that the Actuary needs to address in his role as a product developer. It therefore becomes important that the actuary serve as a coordinator and foster communication between the investment personnel, the marketing personnel, and the actuarial function.

Whether the product being developed is Current Value Whole Life, Universal Life, Single Premium Deferred Annuities (SPDA's) or Flexible Premium Annuities, there is a need for the up-front involvement of the investment department. This is particularly so in today's environment, where interest rates are extremely visible and a company must come up with a positive point spread between what it will credit and what it will earn. The investment department will certainly want to see a model of the expected cash flow generated by the product. If ten year interest rate guarantees are being considered, investments must be selected which will support that kind of a duration on the guarantee. The investment department will need to have information necessary so that they can coordinate the investment strategy with whatever indexes may be built into the product. Finally, financial futures and hedging strategies can be used to provide a low investment risk but a positive point spread between what is credited and what is earned.

A number of years ago it was a relatively straightforward process to design a new Whole Life product. We would fiddle around with the dividend scale a little bit, and maybe increase the policy loan interest rate to give ourselves protection, but basically the product was designed with a dividend scale that was somewhat mysterious and not particularly obvious to the purchasers of that product. With today's Current Value Whole Life products on the market, what is seen is a quoted interest rate. A number of companies will also show the mortality charges, both in terms of those that are guaranteed and those that are anticipated. This results in a more complicated problem in terms of product design. This Current Value Whole Life product may or may not have an interest rate index and in fact it may have dynamic policy loan provisions. Now when this product is being developed it is very important to prepare models and asset shares that are dynamic in nature, as opposed to simply one or two static scenarios that show the product will make money over twenty years. A number of scenarios that can model the anticipated cash flow are needed. The actuary must deal directly with the investment department in structuring the most appropriate investment strategy. With the advent of personal computers and a number of software packages that are available, the ability to model different scenarios is much greater today than it has been in the past. By trying different scenarios and different cash flow models, the investment department can get a much better perspective on the level of investment performance expected in a Current Value Whole Life product.

To make things a little more complicated, Universal Life came along. Instead of being able to rely upon a fairly uniform stream of premium income, now the effects of the discretionary ability of the policyholder to pay in additional funds or even stop paying funds without triggering a policy lapse must be considered. This makes the need for cash flow modeling even greater. Also, as we move forward in time and find these blocks of Universal Life business aging, we will have the additional need to consider the impact which premium flow changes and benefit changes may have on the investment strategy necessary in order to continue to earn a positive point spread. As a final point on Universal Life, a major concern is the fact that the up-front cost of designing and installing a system to administer this product can be one of the most significant cash flow considerations. Even though it is not directly related to the policyholders' crediting rate, the very real need to purchase or

install expensive systems can have a very dramatic effect on the overall cash flow model that should be used in the pricing process.

Another life insurance product that is very interest sensitive but, in a sense, transfers the risk back to the policyholder, is the Variable Life product. This particular product is one in which cash flow modeling can be done, but the important thing is that now the burden of the investment risk is going to be shared with the policyholder, or in fact borne by the policyholder. Therefore, even though the product is interest sensitive, it is a bit easier to handle from the investment side.

We are all aware that the Single Premium Deferred Annuity product sold in the non-qualified market, typically through stockbrokers, is a very investment oriented product. Therefore, when designing a product of this nature, it is extremely important to get the actuary, the investment manager, and the marketing executive communicating with one another. The communication between the investment, actuarial, and marketing functions is so critical to the success of that product that it cannot be over-emphasized. This is a product where it is obvious that what is needed is a positive spread between the investment rate and the crediting rate as well as a minimum amount of asset risk. When developing the SPDA product, the various aspects of the product design should be reviewed with the investment department, so that, when considering interest rate guarantees, they can give some feedback as to whether or not those guarantees are reasonable. For example, to offer 15% guaranteed for 5 years when the marketplace is at 13% might indicate that maybe this product should not be sold for a few months. It seems obvious, but it may be desirable to actually get the investment people there in the same room with the marketing people in order to have a little more credibility when telling the marketing people that it cannot be done. Or, when the marketing people come in with an idea to index a product to prime or some similar market rate, it is also very helpful to have the investment department present so that the problems associated with such an index can be discussed.

Finally, we might get into the advantages and disadvantages of bail-out provisions. The actuary can tell the marketing staff that the regulatory environment in several states virtually prohibits such a provision. But the bail-out provision is one that the investment department needs to be aware of too. In the process of going through cash flow modeling, if there is a trigger that is 75 or 100 basis points below the initial rate guarantee, that can be very critical information for the investment department. When looking at, for example, a three year or a five year guarantee period with a possible bail-out without any surrender charge, then it is important to model different scenarios. I cannot over-emphasize the need for coordination, with the investment department right in there at the front end, to help keep in check some of the marketing department's less profitable design concepts. Tied into this is the need for the actuary to communicate the impact of statutory reserve requirements, GAAP reporting requirements, and tax regulation, so that all of the parties involved in the product development process are aware of some of the potential profitability impacts of certain product design features.

Getting into a product that is just a little more complicated--a Flexible Premium Deferred Annuity--we add a new dimension in the cash flow model, the discretionary premium. Again, it is important to have a model available

that is flexible enough so that cash flow projections that will be useful to the investment department can be generated. For example, if the investment department sees the stream of investable funds in the model alter significantly, they might do some planning to handle such a dramatic change in cash flows. We also find that with the Flexible Premium Annuity product there will be the need for a sophisticated system, and its development might have a significant impact on the cash flows from the product. With respect to Variable Annuity products, where the investment risk is borne by the policyholder, it is important that the investment department be aware of the general nature of the liability. Another aspect of annuity product development relates to immediate annuities or the annuitization of the deferred annuities. Some surveys were conducted with various major brokerage houses which indicated that a little more than 30% of the Single Premium Deferred Annuity purchases were made by parties with the intent to eventually annuitize that product. Now that particular event, while not necessarily generating an immediate cash flow, will be something that should be considered when designing the product, particularly with regard to the type of investment strategy that could be followed if 20% - 30% of the product will be turning into a payout in benefit annuity as opposed to a cashout surrender.

In closing, I would like to discuss a couple of the product design problems and pitfalls that I have been close to and have seen in other enterprises as well. The most common problem is the lack of input from the investment department when a product is being designed. That is, the product is designed, the sales material is prepared, it starts like gangbusters, money starts to roll in, and then the investment department finds out that they have a real problem in trying to generate a positive spread, given the overall investment policy. Another common problem is that only the initial profit spread is considered. Looking down the road several years to when assets start rolling over, the issues related to maintaining a positive spread often have not been adequately addressed. Also, financial models that do not properly recognize the investment risk associated with some of these products are often used. For example, the tacit assumption that the compound interest rate will apply to the coupon cash flow as well as the principle can lead to some disastrous results if interest rates turn down. On the other side if interest rates go up and there is a substantial shortening of liabilities, there may be the possibility of liquidations without protection against a decrease in market value. Also, in designing a product that is indexed, or which has 3 year or a 5 year rate guarantee period, the difficulties in tailoring an investment strategy which will cover that kind of product must be addressed. Issues like this should come up when a product is being developed, not after a large volume is on the books. In today's environment, with these interest sensitive products, the investment strategy is a key to the success of a product. If the crediting rate must be reduced to 10.5% when everybody else has 11% because of a particular provision in the contract, there will be a real problem with the field force, as well as with the policyholder. The coordination, again, during the design of the product is important. What we are trying to achieve is a product that is sellable, that has a reasonable asset risk, and that has an adequate profit spread. We have a reinvestment risk if rates go down and we have the market value risk if rates go up. In some of the subsequent discussion we will see that sophisticated investment strategies and investment instruments are available to help us achieve the balance between reasonable

profit and reasonable investment risk.

MR. WALTER J. BLASBERG: I have been with Continental for about 10 years. I am sure many of you know the company and recognize it by its logo, the soldier. But Continental is primarily a property and casualty company and not a life company. It is the 7th largest property and casualty company in the United States and our assets exceed \$9 Billion. 80% of these assets back up our property and casualty business. Total assets of our life companies are about \$1.4 Billion, or 15%. Two years ago we were a much smaller life company, but in 1982 our Board of Directors authorized a major commitment to the life insurance business. For several years our domestic life investments were about \$100 Million, but in 1982 they started growing. The source of this growth was twofold. First, we acquired some companies with existing life business and secondly, we introduced a number of interest rate sensitive products into the market. The sales for these products have been extremely strong. The end result has been that in a little over 2 years our life insurance company investment portfolios have grown almost 600%. My job is to oversee the taxable fixed income investments of the corporation. This responsibility includes all of our life assets. As a practical matter, at the beginning of this growth period Continental had no dedicated life investment staff, no up-to-date life investment policy, and certainly no systems support to deal with the sale of interest sensitive life products. This situation represented a wonderful opportunity to develop an investment policy which would set the life companies off on the right foot and help them to avoid a number of the problems which Mr. Bengtson has discussed and also a number of the problems that life companies have suffered over the last decade. Today I will describe our investment policy and our strategies which we have implemented to deal with Single Premium Deferred Annuities (SPDA's).

At this point, it is important to differentiate between investment policy and investment strategy. Investment policy deals with the broad guidelines that an investment manager must follow when investing life company assets. Usually these broad guidelines are approved by the Board of Directors. Investment strategy, on the other hand, deals with the way an investment manager goes about investing his client's funds using the policy guidelines as a constraint. For example, investment policy might state that no bonds below BAA quality are permitted in the portfolio. However, the investment manager might feel that higher quality bonds offer better relative value in today's marketplace. So, he might decide to use U.S. Treasury Bonds as an alternative until such time as he felt that the BAA, or the lower quality bonds, are more attractive.

Now that I have made this distinction, I would like to talk about our policy--the policy that we have set up in order to deal with our varied life products. Simply stated, the first policy item is that we are not taking any big bets. We don't want to have our company exposed to the big bond losses that have occurred in the last 10 years and which are, I suppose, occurring even now. We do not believe in speculating with policyholder's money by trying to forecast interest rates. Therefore, this no bet policy means that, to the extent possible, the duration of our bond portfolio must be matched with that of the insurance portfolio.

The second policy item deals with default risk. Again, when I think of default risk I think of the quality restrictions we put on the portfolio. We have a policy of not investing in bonds below BAA quality. That means that we don't have any interest in investing in "junk bonds". I'll be coming back to this issue of quality several times during this discussion.

Liquidity is included as another policy item. There are two aspects that must be considered when looking at liquidity. The first has to do with the maturity of the bonds. Many people associate liquidity with the presence of sufficient cash equivalent investments which are easily liquidated to meet unexpected cash flows. This is very important but I put less emphasis on it today if our assets and liabilities are well matched. The second aspect of liquidity has to do with quality. Even in times of economic stress, active and liquid markets are maintained in treasury bonds and other high quality corporate debt. Lower quality debt, private placements, mortgages, real estate and things like that, trade only by appointment in distressed markets. Often when they do trade, we find that there are substantial discounts to what we would consider to be their fair or reasonable value. Since new investment strategies require more portfolio turn over, and cash flows are more volatile, adequate liquidity is essential. An adequate amount of both short term investments and high quality investments is required to handle this kind of problem.

The last policy item deals with segmentation of the general account. We look upon segmentation as a major constraint and a source of discipline for our investment managers. The product lines of our companies have already become extremely varied in investment requirements and we feel it is necessary to divide the liabilities into different categories and, in some cases, individual policy types so that we can properly analyze them and construct the correct investment portfolios. Once this is accomplished, investment portfolios which are dedicated to each of the liability components and which optimally meet their individual investment requirements can be constructed. In addition, it is very important to develop tracking systems. These tracking systems must be developed to analyze the individual segments as the premiums begin to flow in and as the policies age. Tracking systems allow us to change our portfolios as business conditions warrant. Later I will be describing one of our tracking systems.

Our first policy guideline says that we must match the duration of our liability with that of our investments. As you know, duration is calculated by a present value weighting of future cash flows. For this reason, when developing investment strategy, cash flow is the most important consideration. If the cash flow patterns of the liability are known, as well as the profit targets, it is easy to find an appropriate investment portfolio. In developing investment strategy for our SPDA policies we had a very difficult time determining who was responsible for producing these expected cash flow patterns. I expected that it would be the actuary's job. That is how we do it in the property and casualty companies. But, when I first received the projections, I realized that they were not adequate for our needs, and our needs were to construct dedicated investment portfolios for these liabilities. The problem was that too much of the projection depended on what happened in capital markets as policies aged.

This is because the characteristics of our insurance liability were very highly correlated with the bond market. We felt that since knowledge of capital markets is involved, that the investment manager absolutely has to get involved.

In order to help my investment people with this new role, we have developed a chart which differentiates life company products by cash flow type. This chart helps us identify what the roles of the product actuary are and what the role of the investment manager is. The first cut on this chart divides life products into two categories. Category A includes those policies in which the holder assumes most of the investment risk. In this case the cash flow investment is not as crucial to us. Category B requires cash flow projection because the insurance company has the investment risk. We call the products in Category A Group 1 products. These include Variable Annuities, the savings portion of Universal Life policies, and those which are invested in mutual funds. These are the pass-through policies which have been mentioned. Most investment managers would welcome the migration of life insurance products into this category, because it rewards us for what we consider our traditional domain, which is investment performance.

Category B/Group 2 products are the more typical insurance policies like Whole Life, Term Life, and Immediate Annuities. In this case we expect the actuaries to evaluate the cash flow characteristics for these policies. With this information, once we have it, we feel that we can segment our general account and make the investments by the reserve categories which are established for these particular policies.

Category B/Group 3 policies are the SPDA's and the interest sensitive products that everyone has come here to hear about. In this case, cash flow projection is extremely important. The investment manager has to be heavily involved in the process. I think it is appropriate at this point to again highlight how important it is that the product actuary and the investment manager interact. We cannot operate within a vacuum. It is only through understanding what is happening through sales, what will create lapses and cash flows, etc., that we can actually put together an investment strategy which works.

Next, I would like to examine a strategy for interest sensitive products and look at a model which we have developed for a "plain vanilla" SPDA. This was developed by a portfolio manager in my department and was done on an IBM PC. As most of you are aware, a one year SPDA offers a one year fixed interest rate guarantee. Thereafter a new rate is set annually. It has withdrawal penalties of 7% the first year and those usually scale down each year thereafter. It has a 100 basis point bail-out provision and usually a minimum policy size of \$5,000. The ideal asset structure to match a one year SPDA liability would be one year bonds, because we think one year SPDA's must be viewed as a series of one year liabilities. However, to be competitive, the one year guarantee rate must be high. It must be higher than the rate we can earn by investing those premiums in one year bonds. So, to achieve more yield we have to buy longer bonds. But this investment strategy violates our first policy guideline, which states that we must match assets and liabilities. When we violate this policy the first question that comes to mind is, "Are we making a big bet here?" To answer this question, we have resorted to simulation modeling

strategy violates our first policy guideline, which states that we must match assets and liabilities. When we violate this policy the first question that comes to mind is, "Are we making a big bet here?" To answer this question, we have resorted to simulation modeling using the computer. Some of the other questions that we need answered by this modeling process are "What is the profitability from this product going to be?", "What should our crediting rate reset strategy be?", "What initial guarantee rate should we offer?", and finally, "How will lapse rates affect our profitability?" I'd like to describe the model before I outline the results.

Although developed internally, our model draws heavily upon techniques that Mr. Bengtson and others introduced to us. I believe the terminology used to describe this model is "asset share". On one hand, the model tracks the insurance company's liability to the policyholders. It credits interest to the annuitants on a quarter by quarter basis over 10 years. On the other hand, the model tracks the asset portfolio over 10 years. Interest earnings, capital gains, and withdrawal penalties are credited to the assets. Any administrative expenses we incur, or borrowing expenses (if the liability becomes unfunded), or capital losses, are then charged to the assets. Since investments are always marked to market, profit in this model can be measured at any point in time by subtracting the value of the liabilities from those of the assets.

An important feature of this model is that the driving force behind it is interest rates. We developed 16 corporate bond yield curves for short term interest rates ranging from 4% to 20%. These yield curves are used to select and evaluate bonds for the portfolio. In addition, a series of 10 year interest rate scenarios have also been developed.

The model uses two methods to reset the crediting rate on the policy anniversary. The first method attempts to minimize lapses by allowing the crediting rate to float upward. In this case lapses are 5%. The second suppresses the crediting rate as interest rates rise. In this case we use a simple exponential formula to predict lapse rates. Lapses accelerate as the interest rates rise. In some cases they become so high that a complete unfunding of the liability occurs prior to the end of the 10 year period. It is very important to test these crediting rate methods in tandem with our investment strategies. We have found that corporate bond portfolios with maturities of 3 years, 5 years, or 10 years generally offer the best results. For the strategies tested, there is no foolproof method of turning a profit on a one year annuity. Secondly, in those scenarios where interest rates rise quickly and dramatically, the SPDA writer will lose money. Three year bonds don't provide enough yield to compensate for their lower risk, and 10 year bonds are probably too risky.

So, five year bonds, together with the strategy which allows lapses, seems to offer the best results. Eight of the nine scenarios produced a respectable profit and only one produced a loss. The five year bond strategy with a no lapse crediting strategy is also attractive but the one loss scenario was significantly larger. The result of this is that we have committed our investment strategy to a five year bond portfolio. However, we have not yet selected the crediting rate reset policy, as we have not really had to deal with rising short term interest rates.

I think that we are going to be faced with that problem pretty soon.

There were two other questions we wanted answered by the model. The first was what the sensitivity of profitability to raising or lowering the initial crediting rate is. The second was what the sensitivity of profitability to lower lapse rates is. The effect of reducing lapse rates was to improve the results slightly in all cases. I would have been more heartened by larger effects on profitability since I think we have assumed high and what I think are conservative lapse rates.

The next item is the indexed SPDA with a 5 year floor guarantee. This is our largest selling SPDA product. The policy has the following major features: It guarantees the policyholder a minimum crediting rate for 5 years. Secondly, the crediting rate is indexed to the 90 day Treasury Bill rate. For the first two and a half years, if that T-Bill rate rises above the minimum, the full T-Bill rate is credited to the policy. For the second two and a half years, if 80% of the T-Bill rate is greater than the minimum, then the higher rate will be credited. Withdrawal penalties in this case are 7% for four years, declining thereafter. This is a much more complex design and it leaves the investment manager in a quandary. The simple investment strategies which we tested in the one year model don't resolve the problem that this policy poses. My reason for using this policy form in the discussion is threefold. First, to show how contemporary investment technology, such as immunization, is being used in conjunction with SPDA's. Secondly, to show the importance of systems which track the policy cash flow during the life of the policy. Third, to initiate a discussion of options. (Those would be options that the insurance company is granting to the policyholder and options that the insurance company can purchase to offset its risks.)

By building an immunization capability into the model, the duration of the liability can be calculated as interest rates are rising and lapses are occurring. This calculation indicates which portfolio transactions are necessary to match the new duration of the liability. We are using this technique for our investment strategy because it has greatly reduced the range of results and it has brought them within acceptable bounds. The dynamic aspect of this immunization strategy makes it absolutely essential that the model be updated regularly to effectively manage the bond portfolio. A few of the many items we track on our investment systems are gross premiums by day and by week, withdrawals, annuitizations, agent commissions, the float on agent commissions, the average policy guarantee rate which is adjusted for changes in the index, and the factors necessary to evaluate the bond portfolio such as its yield to maturity and duration.

The last thing I wanted to discuss is options. We all know that insurance companies are granting more and more options to their policyholders in an effort to stay competitive. In this case the policyholder owns two things. His base investment is a floating rate investment. He also owns a 5 year call option, which pays off any time the floating rate falls below the minimum guarantee. From our viewpoint we have offset this liability by purchasing bonds with a 5 year duration and then constructing a call option which pays off whenever the index rate rises. Although this kind of option is not listed on any exchange, we use a strategy which duplicates the position. Our model incorporates this option by treating the cost as an upfront expense. Exercise proceeds

are treated as future income items.

To conclude I would like to discuss a few ways that we are putting money to work in today's bond market. A tremendous number of different investment vehicles have been introduced in the last few years. Many of them are just as innovative and complex as the insurance products that have been discussed. We use a good number of these investment alternatives and investment people are very good at coining names for them. Everyone has heard about them. But the biggest need is to find adequate high yielding medium term debt. Since insurance company liabilities have shortened, medium term corporates have become our core investment holding. There are some problems associated with this kind of paper, however.

The first problem has to do with options again. Often the investor has granted an option to the issuer of a debt instrument. Corporate bonds have call provisions which allow early redemptions and this is the kind of option we are talking about. For example, 7 year corporates have 5 year calls, and 10 year corporates have 7 year calls. You can look at call risk in this case as reinvestment risk. When interest rates fall, the bonds get called away and the investment manager is faced with reinvestment at lower rates. This situation disturbs the portfolio because it causes it to become out of balance with the corresponding liability. Unfortunately there is no perfect solution for this problem. Regulation does not permit us to buy all kinds of options. But there are some newer types of investments which we can use which offer a partial solution to the problem. Zero coupon bonds and original issue discounts can be purchased. Zeros are non-callable and they offer an additional advantage. Since no cash coupons are paid during the life of the bond, all income is reinvested at the bond's initial yield to maturity. Consequently, Zeros have found a home among our other portfolio holdings and it has helped us balance the duration and the call risk.

The second problem has to do with the need for high yield. Consider the relationship between yield rates on 10 year Treasury Bonds and 10 Year Single A Industrial Bond. The spread between the two is at the low end of its range through May of 1984. This is very surprising in view of the pattern of relationships which can be observed relative to absolute yield levels. Spreads generally tend to widen as rates rise. Well, rates are rising, and rising rather dramatically. In fact, they are probably getting close to the highs seen in the 1981 and 1982 period. But yield spreads are narrowing. You might want to know why this is happening. I do not have all of the answers, but one of them might be that huge federal deficits result in a large supply of treasury issues being offered on a regular basis. In addition, insurance company liabilities and financial intermediary liabilities are all shortening, increasing the demand for medium term debt. And lastly, until recently, corporate cash flow has been rising and their financing requirements were lower.

During 1980 to 1982, corporate bond issuance was very high. However, in 1983 the issuance plummeted. With respect to 1984, I'm sure that many of you probably saw the article in Sunday's New York Times which was headlined The Risky Trend in Business Borrowing. This article contained some interesting statistics. The first one was that new corporate debt has been rising at an annual rate of 31% since the beginning of the year. This is three times the normal rate for this stage of the recovery.

\$50 Billion of potential supply has been registered to come to market. One half of all of this debt is short term and it's issued at rates usually below 11%. The remaining 50% is represented by long term issues. Here is the rub: 75% of the long term debt is floating rate debt, so it is really no surprise that corporate yield spreads in the medium term are still so narrow. Corporations still are not issuing. The frightening part of this situation is that it raises the specter of C-1 risk, default. Business has a new vulnerability in this case. If interest rates rise, or if they continue to move up rapidly, the financing costs of these corporations will soar, which could provoke a wave of bankruptcy. And when one thinks about this in relation to the current banking crisis that we are experiencing, it is even more frightening. So the question is, "What does the investment manager do?" Well, at Continental we have a larger component of Treasury issues than normal, and we are waiting for our spreads to widen out. I think, on the bright side, it looks as if we could afford to wait awhile. I do not know how bright you think this is, but competitive pressures in the SPDA market have substantially lessened. I think consumers themselves are concerned about quality now.

MR. JAMES A. TILLEY: My part of this panel discussion involves pointing out how contemporary or modern investment technology can be used to forge risk control links between the product design and pricing process and the basic investment strategies that are needed to insure financial soundness. I would like to point out during the presentation that the new investment instruments and the new techniques do not create vastly more attractive risk return possibilities than existed without them.

Except for the structured settlement and the immediate annuity business, the key to matching assets and liabilities is not lining up the asset and liability cash flows point by point along the time line, but instead matching up their sensitivities to changes in interest rates. The mystery behind futures, options, and modern portfolio management theory disappears as soon as you start to think of all of those as tools to control the duration of the asset portfolio. The starting point for deciding which of those tools should be used is to ask the question, "How do my liabilities behave as interest rates change?", and then, "How can I create and manage a portfolio of assets to behave in this same way?" Once you answer those questions you may choose to ignore the answers, but at least you would understand the risks of doing so.

Although this is not a teaching session on futures and options, it will be very useful to briefly review the characteristics of futures and options instruments. The best way to do this is to look at the gain/loss patterns as a function of interest rates and the patterns that develop as a result of interest rates changing from the time business is put on the books to some point in the future. One of the reasons this is the best way relates to the previous questions and the fact that a sensible investment strategy cannot be developed unless it is known how the liabilities are changing. So one is really looking at gain and loss patterns there, and that is the way I would like to start.

If a bond was actually purchased, and interest rates went up, the price of the bond would go down. Its market value would go down. If interest rates go down, the price goes up. That is exactly what happens with a long position in futures. A long position in futures, in a sense,

is a different way of buying a bond. It is really nothing more complicated than that. If one is worried about how to effectively administer a program, then considerations relating to such things as variation and margin become important. But in thinking in terms of the risk control possibilities, the way to reconfigure the sensitivity to interest rates of a bond portfolio, this is all one needs to know about a long position. With a long position, as rates go up, you lose, and if rates go down, you gain. It is symmetric and two sided. The gain/loss pattern for a short position in futures is exactly opposite to that of the long position. Futures positions are highly leveraged since as interest rates change, the value of the futures contracts change as much as if the underlying bond was actually held. On the other hand though, only a very small amount of money was put up, known as the initial margin, to establish the position, as opposed to paying for the whole bond.

Recall for a moment the formula for duration of a bond portfolio. Apart from some trivial factors up front, all the meat is contained in a ratio; it has a numerator and denominator. The denominator is the market value of the portfolio and the numerator is itself a ratio; it is the change in the market value of the portfolio for a given change in interest rates, divided by that change in interest rates. So the most sensible interpretation of duration then is a measure of the price sensitivity of an underlying asset or underlying liability, whatever it is that one is measuring the duration of. Armed with that interpretation of duration, it is clear that if a long position in futures is established against a portfolio of bonds and mortgages, the portfolio duration will be lengthened. Why would that be? The bonds and mortgages by themselves have whatever duration that this formula would suggest, and because a long position in futures is just a substitute for buying more bonds or mortgages, what one is really doing is increasing the price sensitivity of the portfolio to a given change in interest rates. If the portfolio would have depreciated a certain amount without taking the long position in futures for a given interest rate change, once the long position is taken it will depreciate more. That is greater price sensitivity and same direction, and so one has lengthened the duration of the bond portfolio. Conversely if a short position in futures is established against the portfolio of bonds and mortgages the duration will be shortened. That is because the gains and losses developed on the short position futures are opposite in direction to those on the underlying bonds and mortgages and so they offset each other. The price sensitivity of the portfolio is reduced as is the duration of the portfolio.

This is a very important property to remember. Futures can be used (and I am not saying they can be used legally this way, at least not in all jurisdictions) to lengthen or shorten the duration of a fixed income portfolio. On the regulatory scene it is unfortunate that the use of futures to control portfolio duration appears to be precluded by Regulation 111 in New York. I will ignore this practical observation for the very simple reason that I think it is only a matter of time before it changes. Also, many here are not bound by New York regulation. The regulatory environment of other states, particularly California and Illinois, is very different and does not preclude this use.

It might be worthwhile to explain exactly what a call option is. A call option is an instrument that gives its holder the right to buy the underlying instrument, such as a bond, at a specified price, anytime up to

the time the option expires. The specified price for which the underlying instrument can be bought is known as the exercise price or the strike price. For example, suppose a bond is trading at 90 in the cash market and a call option has a strike price of 80. The call option gives one the right to buy the instrument. If purchased in the cash market it would have a price of 90, in my example. With the call option it could be purchased for 80. That is obviously a very valuable instrument. A bond can be purchased for 80 through the call that could otherwise only be purchased for 90 directly in the cash market. Therefore the call is better worth 10 at that point, and that is all it would be worth if the option was near expiration. It would be worth just a little more than that if there was some time to run in the option. What is important to note about the shape of the gain/loss pattern of the call option is that the holder of the option has no obligation to exercise the option if the price of the underlying instrument is less than the exercise price. So, in my example, if the cash market instrument would be trading at 70, that is less than the strike price of 80 and the option is not very valuable. But the option is exactly that. It is an option--a right with no obligation. One is not forced to exercise it at a loss of 10. Therefore, there is no loss, and there is a one-sided, asymmetric picture. There are gains if it is in the money, but no losses other than the premium initially spent if it is out of the money. So this is a one-sided, asymmetric pattern quite unlike that which we saw for futures, which was two-sided and symmetric.

The call options provide gains when interest rates fall, but do not cause large losses when interest rates rise. They can therefore be used to lengthen the duration of a portfolio, just as a long position in futures could. But the lengthening occurs only if rates fall, because we have an asymmetric picture here. In a similar fashion, the put options can be used to shorten the duration of a portfolio, but the shortening occurs only if interest rates rise.

The duration shortening properties of put options and short positions in futures suggest that they would be highly useful in managing the disintermediation risk that arises from traditional policy loan features and from non-market value adjusted cash surrender values. These features exist in Universal Life and various other forms of interest sensitive life products, and in Flexible Premium and Single Premium Deferred Annuities. The difficulty in implementing such risk control strategies lies in forecasting how policyholders, and agents or brokers who sell the policies, will react to rising rates. In other words, as policy loan and cash surrender rights become more valuable, which they will if interest rates rise, will the policyholders, either alone or when encouraged by the person who sold the policies, then exercise their options to disintermediate against you? Unfortunately, there are no hard and fast answers to this question and historical experience may not be much of a guide. Therefore, the task becomes one of sensitivity analysis over a range of likely policy loan utilization and lapse rates to determine how much option protection would make sense for the portfolio. This is why the kind of modeling that we have heard about today from Continental is so important. There may be no way to approach the problem without doing modeling of this sort.

What can be said about whether to use puts or short positions in futures to hedge the risk of disintermediation? The answer to the question really depends on where the best value lies, how liquid the markets are for those various hedging instruments, and whether the liability's interest rate behavior is symmetric or asymmetric. Transaction costs are generally lower for futures than options, and the futures markets are currently more liquid than the option market. That is two votes for futures. If the policy can withstand lower declared rates when interest rates fall, that is, if there are no bail-outs or multi-year guarantees, then futures are probably the better vehicle. That is because there is a two-sided situation. If the crediting rate can be lowered as interest rates fall, and if it would have to be raised as market rates rise, then the portfolio has very little principal risk and is essentially able to be current. In this case, the two-sided hedging effects that one gets from a short position in futures would make a lot of sense. On the other hand, if the portfolio duration needs to be shortened only when interest rates rise and the liabilities shorten (in other words if there are multi-year guarantees or it is a declared rate product, but there is every intention of keeping the initially declared rate in place for a long time if interest rates are stable or go down), then put options would make more sense. That is because the risk is one-sided. However, even in this situation, futures can be used very effectively by progressively increasing the short position in futures as rates rise, turning the portfolio more into a cash equivalent (closer and closer to duration zero), and by covering the shorts, taking the hedge off, as interest rates come down to the level at which the policy sold, or drop below that level. This method of dynamic adjustment creates a synthetic option. In fact, although no money is put up front to buy the option when it is created synthetically, the process of making dynamic adjustments in the portfolio will, in fact, spend an option premium. In other words, as the portfolio is adjusted (moving it to shorter duration as interest rates rise) a series of net losses is created. The process of dynamically adjusting this according to an option pricing formula will in fact add up to something very close to an option premium.

Earlier, an SPDA was described that has a guaranteed floor for 5 years and indexing to Treasury Bill rates on top of that. An appropriate strategy for that product is to place a large percentage of the funds, say 90-95%, (there is in fact a formula prescription but it is not a single number that always works) in intermediate term bonds and/or mortgages, and to buy interest rate put options with the rest. This means buying interest rate put options in perhaps the larger sense of creating that kind of protection. Maybe one does not go out and actually buy put options. Maybe one follows a dynamic short futures strategy or maybe a cash market trading strategy is used. The put options move into the money and gain value if interest rates rise. Of course, that is exactly what is needed to support the index. The intermediate term bonds give support for the floor rate that was put in place for 5 years. The floor in the index must be established at low enough levels, however, that sufficient funds can be placed in to the bonds and left over for puts to support each of them. If it is expected that one is going to offer as a floor the rate which could be maximally locked up and immunized to for 5 years, and place indexing on top of that, an option is being given away that has not been priced and the only way one will be saved is if interest

rates do not go up. In this case, with an indexed product, it is not a function of whether the policyholders exercise the option. They do so by definition because the product is indexed. If rates go up, the extra interest must be credited.

Call options and long positions in futures are also useful. They are useful in controlling the risk of an increased inflow of premium and deposits on flexible life and annuity policies into investment buckets for which the guaranteed rate was established at some earlier time when the interest rates were higher. The main difficulty lies in deciding how much anti-selective cash flow should be hedged here, especially in a flexible premium policy where someone can still put in more money. A conservative view will lead to very costly option protection here against catastrophies which are quite unlikely to happen. It is probably best to point out, though, that this example is sort of pushing things, because this type of risk does not exist for any single premium policy and is generally rather minimal in flexible premium or recurring premium policies, because the insurer usually reserves the right to change the interest rate applicable to premiums not yet received.

I would like to point out that there is one thing that futures and options cannot do. They cannot turn a long term bond or mortgage into an instrument that has both minimal principle risk and a long term investment yield. There are several ways to prove that but it would not be useful to do so here. There are plenty of money managers who can vouch for its truth in practice. Some of them discovered it unhappily. Some of them knew it but decided to use these strategies anyway. Anyone who is interested in further discussion on this topic should refer to Mr. Richard Segal's presentation at the Atlanta meeting in April or to Mr. Robert Crispin's presentation at the Salt Lake City meeting in May of this year. I call attention to this because their comments bear on the feasibility of controlling interest rate risk for various of the indexed policies that are found in the marketplace today. In a nutshell, unless the index is a very short term one, or unless the long term rate is sabotaged by taking three or four hundred basis points from it, it is an essentially undoable problem. It is certainly undoable in the sense of a full hedge, point to point through time. One may be able to make arguments about averaging across interest rate cycles that work, but those kinds of arguments really must be resorted to.

In summary interest rate futures and options are valuable risk control tools for adjusting the duration of the asset portfolio to match the duration of the liability portfolio. If the adjustments are carried out in a one-sided or asymmetric manner, there is a net cost in the form of an explicit or implicit option premium, and that cost should be charged to the policyholder in the pricing of the product because that investment strategy would be adopted only if an option had been granted. If the adjustments are carried out in a two-sided or symmetric manner, there is no explicit cost apart from the so called cost of convergence, but there may be extra risk associated with the need for liquidity to meet margin calls, and with the difference in movement between the treasury markets and the corporate markets, or stated differently, between futures prices and the prices of the assets being hedged.

I would like to close with some comments about the use of contemporary investment technology in connection with investment pass-through products, such as Variable Life and Variable Annuities. Because all investment risk is borne directly by the policyholder, it may seem that any investment strategy is appropriate. I do not believe that to be the case. Consider a common stock separate account as one of the investment alternatives available to the variable life policyholder. It might be argued that policyholders who allocate funds to the separate account are consciously making a risky bet on the superior performance of stocks, and they know that this bet carries with it a significant possibility of loss. However, many policyholders might prefer to have been given a chance to invest in a common stock fund whose stated investment policy is to avoid losses and to then capture as much upside performance as possible. Stock index options and stock index futures, particularly the very actively traded S&P 100 options and S&P 500 futures instruments, can be used to achieve these results. On the Group Pension side of the business this type of equity fund is likely to become quite popular in 401(K) plans.

I hope I have convinced you that contemporary investment instruments and technology are immensely useful to your products. In fact, I'll go even further: In today's highly competitive world and rapidly changing financial service marketplace, it will not be very long before the institutions who learn to use these new instruments and techniques will rise to the top of the heap, both on a sales and on a profitability basis.

MR. CAREY: I would like to thank the panel discussants today.

In the time that we have left, if there are any questions that you would like to address to any of the panel members, we would certainly be happy to entertain those now.

ROBERT J. MATCZAK: Much of the discussion has focused on the single premium deferred annuity and measuring the duration of that liability, focusing on a lapse risk there. That is, lapses increase as rates go up, shortening the duration of that liability. In looking at a flexible premium annuity there is another risk, that is, will future premiums come in or not? My contention up to now is that flexible premium annuities should be viewed as just a series of single premium annuities. I would like comments from the panel on that.

MR. BLASBERG: From the investment stand point, the most important thing to know is what the likely cash flow is going to be on a flexible premium annuity. If one has an idea of what that is likely to be, at least within a range of possibilities, a couple of things can be done. Bonds can be purchased on a forward settlement basis to correspond with the cash flow. Also, an option can be purchased for at least part of that expected cash flow so that some of the rates that will have to be guaranteed during the window period and that have already been committed for have been locked in.

MR. CAREY: In addition, if one felt very certain about how much premium was going to come in, couldn't a forward commitment also be made?

MR. BLASBERG: Yes, it could be. As I said, we have done that with our SPDA's where we had an open guarantee period. When we first started

selling the indexed product, we had a three month sales period in which we left the window open. The rate which we were guaranteeing at that point in time was 11½, and we had a fairly good idea of what our intended sales were likely to be. So, in order to hedge that, we bought bonds on a forward commitment basis to correspond with the expected timing of those inflows. Secondly, we also bought some options in the over the counter market to hedge a portion of that risk. In those situations we paid a premium.

MR. MATCZAK: I would like reactions to it on the other side of the risk. You are adjusting the risk about the guarantee and the window period. If you keep that relatively small I think you can control that somewhat, just in your rate setting process. But, how about on the other side, having that additional option to the contract holder, the option to, within the contract, move from a 3 year fund to a 1 year fund or maybe a 1 month fund or a money market fund, and the impact on policy on that.

MR. TILLEY: You alluded to that problem for individual products by approaching it from the group side. If you are thinking of a typical GIC, unrestricted transfer rights are very bad, and if that is done on the individual policies, you have problems too. If one is talking about a tiering of various guarantee buckets, provided people are not let out of those until they officially mature, then what one has to do is manage the portfolio down to duration zero, to cash at maturity, or one is taking a risk. If one does otherwise, and the jargon on the group pension side is a class year plan, where every one year window GIC fund is a class year, and transfers among class years are allowed at will--that is a disaster. I sure hope that anybody who is designing Universal Life II contracts who wants to get all that sex into the contract takes a lesson from the group pension side before he goes anywhere. You could destroy the company in no time.

MR. KLAUS O. SHIGLEY: I would like to ask Mr. Tilley, having avoided the question of the regulatory ability to use futures and options, would you like to comment on the accounting problems with futures and options? Specifically as the new tax laws might affect the booking of gains and losses on futures and options, or whether those can be paired off against long positions or short positions in the real portfolio?

MR. TILLEY: What we are dealing with is an uncertain world here, but there is real cause for optimism that we will get the right treatment. What is not needed is a set of fixed rules which would require that if a short or long position in futures is taken, then when that position is closed out the gain or loss will be treated in some specified manner. It is a function of how the hedge is set up. If a short position is taken against a bond in the portfolio because it is fully intended to sell the bond, then the immediate gain or loss in the futures position ought to be paired against the capital gain or loss on the bond. If it is done as a sort of a duration hedge, then what is appropriate and what will be allowed is to write up or down the bonds based on the gain or loss that develops in the futures position, and therefore that gain or loss will emerge over the lifetime of the bond. It will be spread out or amortized.

MR. GREGORY J. CARNEY: I have a couple of observations. First of all,

present value of your assets flows equal to the present value of your liability flows is a necessary condition, but it is not a sufficient condition. You need to have appropriate assets along with it. Secondly, the panel today was working under the basic assumption that the product was priced properly. I would like to point out that notwithstanding futures and options and anything the investment department can or cannot do, nothing can make up for deficient pricing and for not considering the risks associated with the interest sensitive products.

MR. BENGTON: I could not agree more. To the extent that some of the risks can be quantified in terms of generating losses, the first step to actually designing the product and pricing it properly has been taken.

MR. ALLAN R. IRELAND: I am sure that the necessary precondition for using financial futures and options contracts is that there be a sufficient market for such contracts. Is there such a sufficient market in Canada for the use of the technology that has been referred to?

MR. TILLEY: I do not know what the futures market in Canada is like. However, you are absolutely correct in saying there must be depth in the market. I would question whether, if the entire U.S. insurance industry decided tomorrow, regulation permitting, that it wanted to hedge, would it strain the liquidity of even these markets?

