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OPTIONS AND FUTURES—A TEACHING SESSION

Moderator: JAMES A. TILLEY. Panelists: ROBERT W. CRISPIN, DAVID M. DUNFORD**. Recorder: DAVID P. JACOB****

MR. JAMES A. TILLEY:

This is a teaching session on futures and options. It will be conducted in the format of a panel discussion. We are planning to leave some time at the end of the session for questions from the floor.

The subject of futures and options is very topical. Legislation and regulations enabling life insurers to begin using these instruments have been passed in several states now. After a bond market rally in 1982 and fairly stable fixed income markets in 1983, interest rates have risen significantly this year. There is considerable controversy among economists, split in some cases along party lines, as to whether the recent spike has reached its peak or whether the rate rise will continue. It is in this type of environment that it is essential to hedge the general account against the C-3 risk posed by single premium deferred annuity (SPDA), universal life, structured settlement, and guaranteed interest contract (GIC) products. We shall discuss how financial futures and options can be used to this end.

Unfortunately, as I found out yesterday, Mr. Burton will not be here today to speak to us about options. After our panelists have presented their remarks about futures instruments, I will speak briefly about options and how they can be used to hedge the risk of disintermediation. I will use some of the same slides that I used at the annual meeting in Hollywood, Florida last year and I apologize to those of you for whom my remarks will be somewhat repetitious. Our panelists may then have additional comments about options before we turn to the floor for questions.

MR. ROBERT W. CRISPIN:

I am very pleased to be here today to talk with such an outstanding group. You may be thinking that you are going to hear an actuary joke but I will not tell one as long as you promise not to tell any investment people jokes.

I avoid any stories about actuaries and ask you to do the same about someone such as myself because I sincerely believe that the time that our respective operations can function independently of one another is well

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behind us. Our two groups -- along with the marketing people -- must clearly join forces in order to develop the kind of products that are going to be successful in a rapidly changing financial services world. It is difficult enough for insurance companies to compete against each other, but with the inroads that banks and securities firms would like to make -- in fact already have made -- in our business, it is absolutely imperative that we work together toward a common goal. I hope that what I have to say today about financial futures will be a starting point for the actuaries in the group to talk with the investment folks about how these newly created instruments can be used beneficially.

When Mr. Tilley, our moderator, asked me to be on this panel, he told me that he was looking for someone who has some "real-world" experience in the realm of futures and options. I guess I fit that bill, since my company, Capital Holding, through a number of its subsidiary life insurance companies, has been involved with financial futures since late 1981. In that time, we have learned a great deal about the futures market and I would like to state unequivocally that running simulations or model portfolios is a poor substitute for getting your hands dirty with a live program. Though the basic elements of financial futures are really quite simple, some of the nitty gritty items, such as basis risk, convergence, hedge ratioing and variation margin are really the keys to a successful futures program.

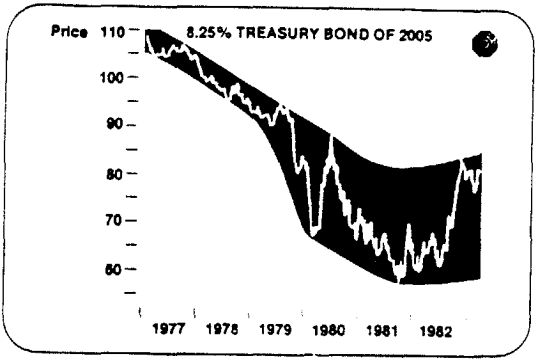
I will deal with some of those items today and will be pleased to answer any questions you may have about these or any other items on your mind. I will also spend some time describing some real-world applications of financial futures and the current status of accounting for futures, as well as the tax implications of their use.

One final introductory comment; financial futures are not, never were, and never will be a panacea for investing. They are tools, and only tools. There are many things futures can do but there are some very important things futures cannot do which many uninformed people think they can.

Since my own experience involves interest rate futures, I will confine my remarks today to those instruments.

What is an interest rate future? First, it is really nothing more than an obligation to buy or sell a security at some point in the future. It is an obligation to buy the underlying security (take delivery) if you are "long" (or own it), or it is an obligation to sell or deliver the item if you are "short." There are futures on Treasury Bonds, Treasury Bills, Certificates of Deposit, Euro-dollars, Ginnie Maes and now even stock indices.

Why interest rate futures should be of any interest to us in the first place is evident in Slide 1. For this and other slides I am indebted to the Chicago Board of Trade, where 70% of all domestic interest rate futures are traded. Note the incredible volatility of interest rates that occurred over the time period shown. To give you some perspective: In one year, 78-79, Treasury Bonds lost 30%; 1981 saw values decline 30% only to be reversed by a gain of 33% in 1982. It is this kind of volatility -- once associated only with common stocks -- which has triggered the tremendous growth of interest rate futures.

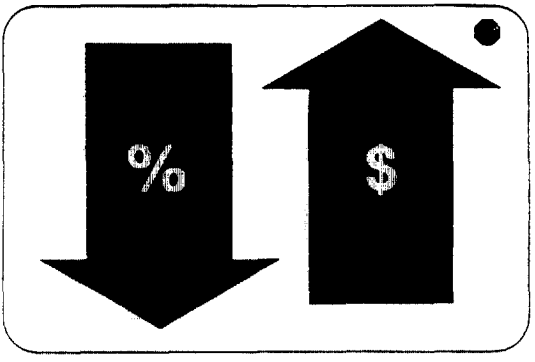


Let us look now at the quotation for futures that you can pick up in your Wall Street Journal every day. The first column entitled "months" shows that the contract months are June, September, December and March. If you move over to the column which says "settle" these are the prices at which the various contract months settled at the close of the previous day. Specifically, the June contract closed at 72 points even. Since the face value of the contract is $100,000 each full point is $1,000 and, therefore, 72 points is $72,000. The minimum price fluctuation -- or as it is called "tick size" -- is a thirty-second of a point, or $31.25. In other words, the minimum value that the contract can move up or down is $31.25. On this particular day the June contract settled at 22/32 in price lower than the previous day's quote. At a price of 72 the approximate yield to maturity for this instrument was 11.64%.

FUTURES PRICES

Months	Open	High	Low	Settle	Change	% Yield
Jun 83	72-21	73-22	71-29	72-00	– 22	11.64
Sep	72-16	73-14	71-19	71-22	– 20	11.69
Dec	72-06	72-30	71-11	71-13	– 20	11.74
Mar 84	71-24	72-17	70-29	71-00	– 20	11.81
Jun	71-14	72-18	70-20	70-22	– 19	11.86
			Volume	85,980		
			Open Interest	149,874		

Financial futures seem more complicated than they really are. Simply put, if interest rates fall then Treasury bond cash prices will rise and obviously financial futures will also rise in price. Slide 3 helps to show the commonly known inverse relationship between interest rate and price.

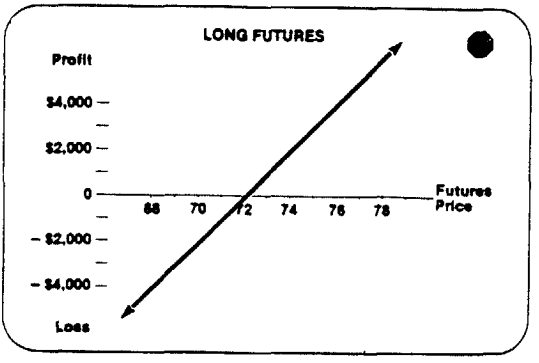


Slide 4 shows what would happen if you were to buy futures -- in other words, go long - at that $72 price I mentioned a minute ago. If you were a speculator you would do this if you expected interest rates to fall. If you were right and the contract moved to $74, you would make a profit of two full points or $2,000 on your original investment of $72,000.

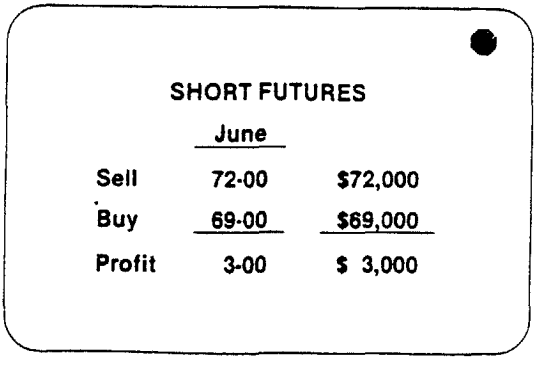
LONG FUTURES

	June	
Buy	72-00	$72,000
Sell	74-00	$74,000
Profit	2-00	$ 2,000

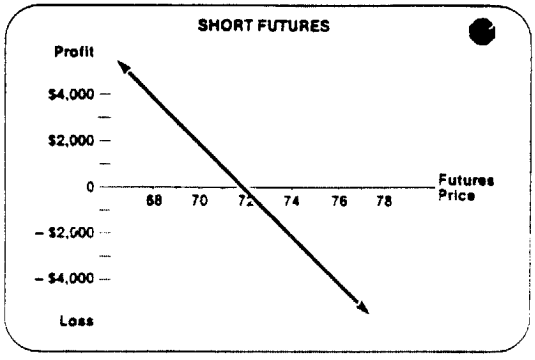
Slide 5 graphically shows the relationship between profit and loss in the movement in futures prices. Nothing particularly complicated here.



In the case just shown we went long futures, but let's flip it over for a minute and look at shorting futures, which you would do, if you expect interest rates to rise. If you short a June contract at $72, you agree to sell the underlying Treasury bonds to the purchaser at the end of the contract period for $72. But, in the meantime, if rates rise and the value of the contract falls by three points to $69, you will make three points of profit, or $3,000 on your original $72,000 investment.



The final slide in this section, which is simply a mirror image of the slide shown in the case of being long, shows that you would make money as futures prices fall and lose money as futures prices rise. Unlike options, the gain or loss is linear.



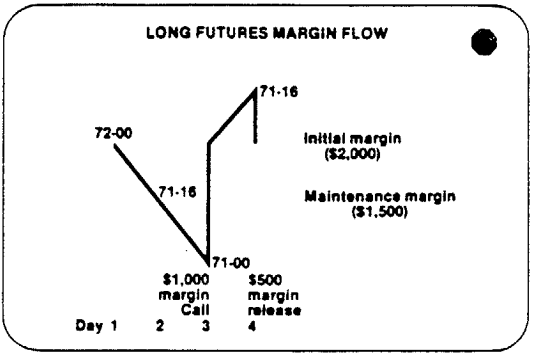
One word of caution, though. Even though the diagrams are not complicated and the principle behind futures is simple, please remember that you have to correctly predict the direction of interest rates if you play futures from the speculative side. If you are wrong, using futures can be very, very costly. Later in my talk I will discuss the difference between hedging and speculation, which is why a lot of people are concerned about futures and why regulations have been slow in permitting the use of futures and options.

In both the long and short examples we mentioned a price of $72 but this is not the amount an individual pays to establish a futures position. A person only puts up a "good faith" deposit or what is commonly called margin. This is different from stock margin, which is a partial payment to purchase securities and an actual transfer of property occurs. In the futures market, margin is deposited by both the long and the short and serves as a good faith deposit to ensure contract performance. There is no transfer of property. As an aside, note that for every long there is a short.

For Treasury bonds the initial margin is $1250 per contract or $1000 depending on whether you are a speculator or a hedger. It can be met with cash, Treasury bills or other qualifying securities. Once that initial margin is established, no additional funds need be deposited unless the account balance falls below what is called the maintenance level.

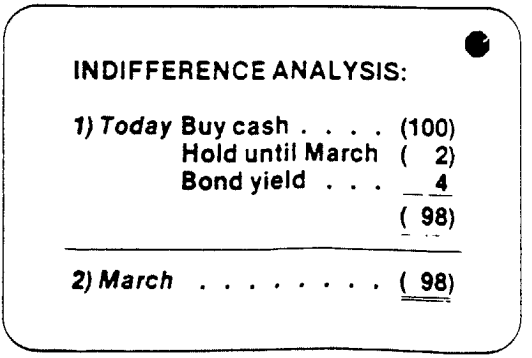
Now let us look at a specific example. On day one, you purchase a contract at $72. On day two the future closes at 71-16/32 but no additional margin is required because the investor's margin balance did not fall below the maintenance level. But on day three prices decline

further to 71 at which point the investor would have to post enough margin to move back to the initial margin level. On day four the margin is released as the futures price rises from 71 to 71-16/32.



Margin rules are designed to provide for the integrity of a contract and are usually set to cover the maximum potential loss. Right now during a trading session, the daily price limits are plus or minus two points from the previous day's close.

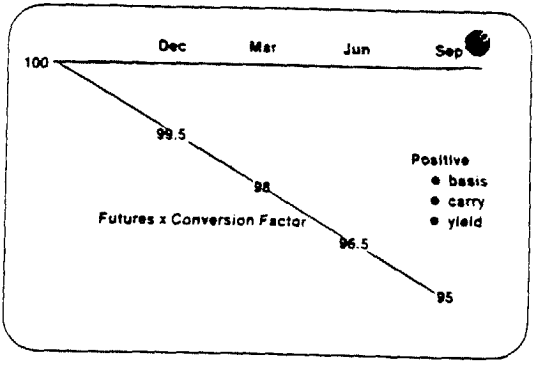
These next few slides deal with what, to me, is the critical element of a financial future: how it is priced. It is this issue which has led to a lot of misunderstanding and bad investment decisions.



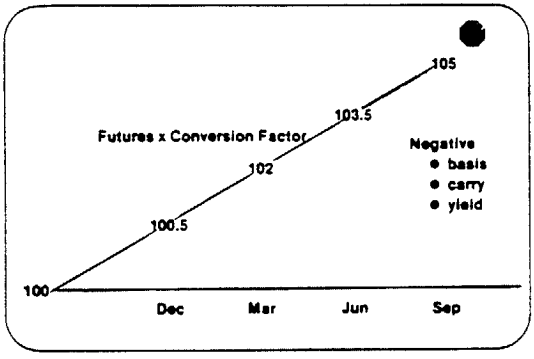
Slide 9 provides what is called an "indifference analysis." If you were offered the choice of buying a Treasury bond today at $100 or buying the March future at $98 and taking delivery of that security in March, which would you choose? To answer that question, we have to look at the basis or the difference between the cash price and the adjusted futures prices. At this point, I will not complicate the issue by defining adjusted price but I would be pleased to deal with it in the question and answer session. In this case it is plus two. This basis reflects the cost of carrying the deliverable security. Let us assume this is November and it is four months until the end of contract period. If you are an arbitrageur, you could borrow money to finance the purchase of the bond today. If you can finance that purchase at 6%, it will cost you one-half of a percent a month to carry the bond. Since you carry it for four months it will cost you two points. The yield, however, is one percent per month since it is a twelve percent bond. So during the time you hold the bond you will earn four points. The net cost of buying the bond in November and holding it until March is $98. This cost is the same as the alternative of buying March futures and taking delivery of the twelve percent bond in March at the price of $98. Therefore, you should be indifferent since both of these alternatives offer the same result. But if you say that the futures were at 98-4/32, you would sell the expensive future and buy the cheaper cash security for an arbitrage profit. In summary, if you purchase the bond in November, you have a positive cost of carry because the bond yield is greater than the financing rate. This is reflected in the futures price being lower than the cash price of the twelve percent bond. When you look at the futures price in the paper you will note that futures prices get progressively lower the further out in delivery months you go because long-term yields are higher than short-term borrowing costs.

It is often assumed that prices of bond futures contracts reflect expectations of future long-term interest rate. As you can see, this is not really true. The price of bond futures contracts really reflect different expectations of carrying costs, that is, short-term interest rates.

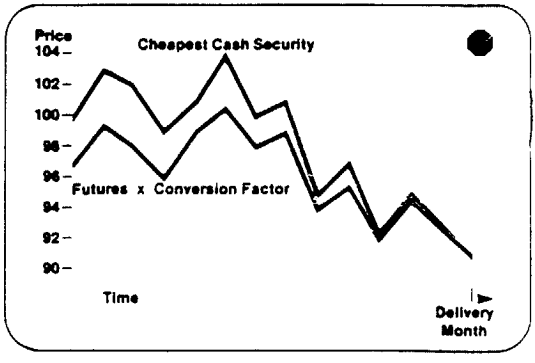
Slide 10 shows deferred future prices below cash prices, but this is not always the case.



Slide 11 shows a case where futures prices trade above the cash price. The situation arises when short-term rates are higher than long-term rates -- that is, when we have a negative yield curve. Then there is a negative carry. This happens when the buyer of the bond has to finance his purchase at a higher rate than the bond actually yields.



Slide 12 summarizes this pricing mechanism. Forget for a moment what the cheapest cash security means. If you are interested, I will spend some time on that later. But please note that as time progresses toward the delivery month the relationship of cash to the future narrows, and narrows to a point where they equal one another at the delivery date. This process is what we call convergence since the prices converge to one another and occurs because, as time progresses, the cost to carry in dollars lessens to where there is obviously no cost at the delivery date. During that time, however, some, such as our good friends at Morgan Stanley & Co., will monitor the relationship between cash and futures prices. If cash to futures gets out of line they will either buy or sell the cash security for a locked-in profit. The important thing to understand is that the basis reflects the cost of carrying the security and that cost may either be negative or positive.



I spent a good deal of time talking about the futures pricing mechanism and now I would like to give you an example of why it is so important. Assume today that a single A long-term utility bond can be purchased at 14% and your firm is interested in hedging that bond to protect principal in the event interest rates rise. If, beyond that, someone says, "Let's protect principal and at the same time deliver that 14% rate," be wary! Practically, one might try to accomplish that by buying the cash instrument and selling an equivalent amount of the June futures contract short. If you do that, would your realized return for the period be 14%, something higher, or something lower? It will be something lower since it will cost you more money to buy in that contract at the completion of the contract period than you have agreed to sell it for, due to this positive yield curve environment and the process called convergence, which I have just described. I will not go into the math, but, suffice it to say that the asset you have created is a synthetic short-term asset which will yield the carrying cost plus the quality cost plus the quality spread differential between the quality of the asset you bought and Treasury bonds. One of your brethren, Mr. Girard, said it better than I have. At a recent Society meeting, he said, "Contrary to what is sometimes believed, one cannot use futures to sneak up the yield curve because futures prices reflect the yield curve structure." In other words, one cannot create a short-term asset that produces a long-term yield. Another expert, Mr. Kopprasch of Salomon Brothers, puts it this way, "If an investor purchases an instrument that is deliverable under a futures contract and then sells that contract, he has effectively shortened the maturity of the security." Both are saying the same thing. You have created a new asset whose maturity reflects the contract month selected and whose return will reflect what securities with like maturities yield in the marketplace. Using my own language, there is no free lunch.

I cannot stress enough how important it is to know the basics about futures before you can determine whether there are uses for them in your company. I believe there are but you will need to decide that yourself. Let us look at some examples. The first example flows directly from the futures pricing mechanism. Remember, we said that if you hedge an existing bond position with a financial futures contract you are creating an asset whose maturity will reflect the contract month. Suppose you are in the GIC business and you are not able to find a ready supply of three-year merchandise to match against your three-year liability. You can create a synthetic three-year asset by buying whatever maturity asset you desire and shorting against that an appropriate number of contracts in a delivery month three years from the present. The yield created will be that of a three-year instrument and although there are some important items such as what will happen between the relationship of the asset you buy and the futures you use in that period of time you have created a synthetic three-year asset. Futures contracts effectively do not go beyond three years so the ability to use them to create a synthetic five- or ten-year asset in this manner does not exist -- at least at this point.

A second example is to hedge an existing pool of long-term assets if you are worried about interest rates rising. Let us say you own $100 million in 30-year bonds, you are concerned that rates may rise a significant degree, and you would rather not undertake a sales program either because of a liquidity of the assets sold or the transaction cost involved. You

could short futures against that existing pool and be protected if rates rise. Obviously, should rates fall that decision would have been a costly one since what you have created then is a short-term asset and short-term assets will perform poorly compared to long-term assets in a falling rate environment.

A final example would be to use futures if you believe that rates are going to decline and you have guaranteed a certain rate on known cash flows to be received in the future. You can protect yourself against that yield decline through the purchase of futures so that, should rates fall, the futures would increase in value and would allow you to make your guarantee. Conversely, should rates rise you will lose money on your futures, but you will eventually be able to invest those cash flows in the then higher rate environment. You come out at the same place.

I would like to spend the last few minutes of my talk describing the current tax and accounting treatment of futures. Under the Internal Revenue Code, the tax treatment of futures is very different from that of other investments. In the Economic Recovery Tax Act of 1981, futures are treated as follows: (1) There is a mark-to-market treatment; (2) There is no difference between a long and a short; and (3) 60% of gains and losses are treated as long term in nature while 40% are treated as short term, regardless of the holding period. Consider the case where you have shorted a future at 70, rates rise, and at the end of the period the future is now worth 65. The tax treatment, even if that period is less than one year, would be 60% of the five dollar gain as long in nature while 40% would be short term. The maximum tax rate on the total gain (for an individual) is 32% - 20% of 60% plus 50% of 40%. At the end of the year, all your futures contracts will be marked-to-market even if you do not sell them, the underlying premise being the daily margin rules. Even though most of this group, including ourselves, use futures from a hedging point of view, we would not want to be considered hedgers from a tax perspective. To do so would put the assets being hedged into the category of ordinary course assets, with any gains treated as ordinary income.

Although you do not want to be considered a hedger for tax purposes, I am sure all of you do want to be considered such for accounting purposes. Last July the Financial Accounting Standards Boards (FASB) released an exposure draft titled Accounting for Futures Contracts. Since then, the board has received comments from interested parties and plans to issue final regulations sometime during the second quarter of 1984. Under the proposed regulations, when you enter a hedging transaction you will need to identify the items being hedged and state that you believe that the movements of the hedged item and the hedging instrument will be highly correlated. If you so qualify as a hedger, then gains or losses on your futures will adjust the carrying basis of your bond. For example, suppose you bought a bond at $100 and hedged that bond with futures contracts. Should interest rates rise and your bond depreciates in value by ten points and your futures increase in value by ten points you would adjust the carrying basis of your bond to $110 and amortize those ten points over an expected holding period. Should your futures not move as much as your bond, however, a condition arises which we will call ineffectiveness. Then, the difference between the movements may have to be treated as a

current period item. For those of us in the insurance industry who are in the unique situation of having two separate income items, that is, gain from operations above the line and gain including realized gains and losses on securities below the line, there still is a question where the ineffectiveness amounts will be charged.

In conclusion let me summarize my main points:

- Financial futures are a tool, not a panacea.
- The pricing of interest rate futures is determined by the yield curve, not by expectations for interest rates.
- The primary uses of interest rate futures in our industry are to adjust portfolio duration and by so doing, to reduce the risk of interest rate changes.

MR. DAVID M. DUNFORD:

The growth in the financial futures markets both in terms of size and liquidity has been rapid by any standard of measurement. From the initial trades in 1977 the markets for T-bond futures contracts have grown to the point where the underlying market value of bond futures traded is twice the market value of Treasury bonds traded on a daily basis. The broad range of possible strategic uses of financial futures in portfolio management indicates continued rapid growth over the foreseeable future.

The role of financial futures as a strategy tool should be viewed within the total process of portfolio management. The goal of portfolio management is to achieve the maximum investment returns for the predetermined appropriate investment risk exposure. Futures are important investment instruments which contribute to incremental return by facilitating strategic portfolio moves and by controlling risk in a timely, cost-effective manner. My comments during this session will cover four areas: (1) the valuation of a future; (2) the general strategies and techniques for maximizing portfolio return and the role financial futures can play; (3) the current regulatory constraints; and (4) a number of applications for Treasury bond futures in portfolio management.

First, let us look at the valuation of a future . Assume that an investor holds a given amount of cash and wishes to have all the cash invested in Treasury bonds today. The investor has two alternatives. The investor may either buy the bonds today and hold the bonds for the time period, or the investor may hold the cash equivalents and buy futures for the equivalent amount of bond exposure. In the second alternative, at the time the futures expire the investor will be delivered the Treasury bonds. Since the investor ends up holding the bonds in each of the two alternatives the returns obtainable from the alternatives must be equivalent.

The appropriate pricing or valuation formula for a futures contract can be derived. In the first alternative the investor would receive the capital gains or losses on the bond plus coupon income:

$$\text{Return}_1 = \text{Bond Price at Expiration} - \text{Current Bond Price} + \text{Coupon Income}$$
$$= T_E - T_B + C$$

In the second alternative the investor would receive capital gains or losses on the future plus interest on the cash holdings:

$$\text{Return}_2 = \text{Futures Price at Expiration} - \text{Current Futures Price} + \text{Cash Return}$$
$$= F_E - F_B + R_f$$

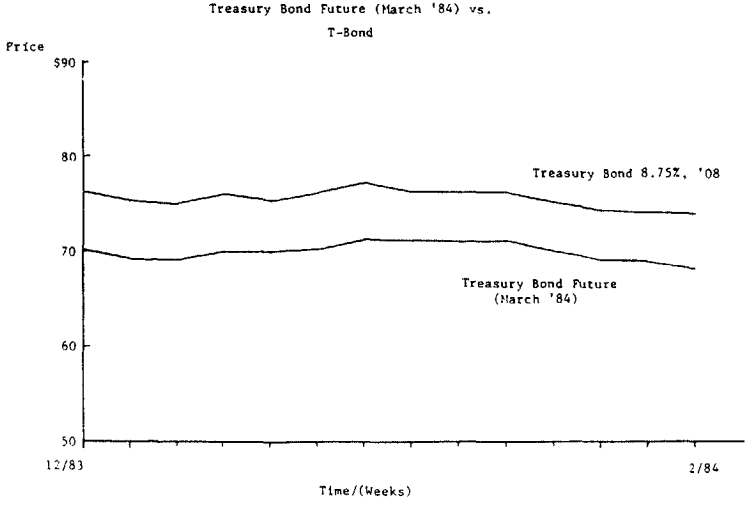
It is important to note that the price of the bond (T_E)will equal the price of the futures (F_E) at the point of expiration.

Equating these returns and solving for today's price of the future (F_B), one obtains this relationship:

$$F_B = T_B + (R_f - C)$$

Today's futures price equals the price of the bond, plus interest obtainable on a risk-free basis over the life of that contract minus the coupon income expected to be received on that bond. If we combine the last two terms, cash return minus coupon, the direct arithmetic relationship between the price of the future today and the price of the bond is apparent. As one moves the other should move.

The future is an equivalent proxy to the Treasury bond. Owning a future is equivalent to owning a certain amount of bond exposure. Chart I offers a view as to how the price of a Treasury bond has moved over the time period from November, 1983 through March, 1984 versus the price of the March 1984 Treasury bond contract. The two lines are virtually interchangeable. The chart indicates how very close the prices of the two instruments have been to each other. The area in between the two lines represents where there has been a difference between the bond price and the price of the future. Differences have and will occur. On average, however, it can be expected that the futures price will be a very close proxy to the price of the bond. Owning one is essentially equivalent to owning the other.



I now turn to strategies for maximizing portfolio return. There are four general techniques or strategies for maximizing the return of a portfolio -- passive, active, insurance, and implementation.

Passive strategies are of two types. One type of passive strategy or technique involves diversifying across asset classes by adding additional asset classes to a portfolio. Return can be enhanced by this strategy due to the nonperfect correlation of the asset classes.

A second passive technique involves diversifying within an asset class. Adding representation in additional segments of homogeneous securities within an asset class adds return to risk benefits similar to adding additional asset classes. The segments within an asset class do not always move in the same direction at the same time and diversification benefits can be derived accordingly.

The general strategy of active management can also be broken down into two areas. The first is the selection of individual securities or groups of securities that are believed to be mispriced. A second active strategy with potentially greater portfolio impact involves asset class selection. This involves shifting the asset mix of a portfolio toward the more attractive or undervalued asset class.

A third general technique involves insurance strategies. The portfolio benefit of insurance arises from two sources: (1) the ability to shape the return patterns of the portfolio to more precisely reflect an investor's utility function, and (2) the potential to advantageously buy or sell insurance that is mispriced.

Options perform this insurance function. All option activity is some variation of this. A portfolio manager buys insurance if options are purchased and sells insurance if options are sold.

Applications of option buying strategies include buying put options on securities in a portfolio and buying call options with a small portion of a portfolio's funds and holding the remaining assets in cash equivalents. Application of option selling strategies include overwriting or selling call options on securities held in either an actively managed portfolio or a more passive index fund.

The fourth and last general strategic category for maximizing portfolio returns involves implementation. All the strategies and techniques encompassed in the other three general categories - passive, active and insurance - have to be implemented. There are costs, both observable and unobservable incurred during implementation. The costs perhaps are higher in the active and insurance categories due to higher portfolio turnover characteristics. The contribution a strategy or technique makes to maximize portfolio return is net of implementation costs. There can be considerable friction or loss of return depending upon the amount of activity which may be necessary. Some portfolio moves or strategies may not be worth making, or the expected returns may not be capturable because of implementation costs.

Strategies in this area have revolved around particular trading techniques, primarily passive in nature. Considerable work has been done in these trading strategies with transaction costs minimized to a significant extent.

A second method of implementing strategic judgments and techniques involves futures. We believe that this is the important role that futures can play in a strategic sense in a portfolio. Futures offer an alternative means to buy or sell bonds or to increase or decrease bond exposure. In order to better understand the return advantages which would accrue to utilizing bond futures, a closer look at the costs of implementation and the alternative ways of implementing portfolio strategy is warranted.

There are four costs which would be incurred during the implementation activity. These costs are best illustrated by way of a simple example. Assume that we wish to increase a portfolio's exposure to Treasury bonds by $70 million. There are two methods to do this. One method is to buy $70 million of bonds in the bond market. A second method is to buy $70 million of equivalent bond exposure through purchasing Treasury bond futures. Assume that a T-bond future is currently selling at 70. One future is therefore equivalent to 70 times $1,000 or $70,000 of bond exposure.

The first cost is commissions. If we assume that the average price per $100,000 par T-bond is $70,000, a purchase of $70 million of bonds under the first method involves buying 1,000 bonds. If we further assume a commission rate of 2/32 per bond the method would involve total commissions of $63,500. The second alternative is to buy $70 million of bond exposure by purchasing futures. Given in our example that each future is equivalent to $70,000 of common stock exposure, then 1,000 futures contracts need to be purchased. The commission to buy 1,000 contracts is one half the round trip commission of $30 per contract, or $15 times 1,000 contracts for a total commission of $15,000. Commissions are reduced 76% which represents significant savings by choosing the method utilizing futures.

A second cost is market impact. This cost is less observable than commissions and more difficult to measure. The purchase of $70 million of bonds can be expected to have an impact on the price level of the bonds. We may have to pay up two or three thirty-seconds in order to actually purchase the bonds. The market impact of buying 1,000 T-bond futures contracts can be expected to be less because of the greater relative liquidity currently observable in the futures markets.

A third cost, even less observable, is time. Because of the size of our program it can take time to buy $70 million of bonds - time during which our strategic opportunity may erode and the portfolio may be at an investment risk level different from targets. Given the relatively greater liquidity of the futures market, it is likely it would take less time to purchase 1,000 futures contracts than it would to buy $70 million of bonds.

The fourth important cost is perhaps the least observable of all - the cost of disruption. If the first implementation method of buying actual bonds is chosen, the $70 million must come from somewhere. Perhaps, the $70 million is coming out of an equity asset pool either from the same portfolio or from a portfolio run by another manager. Such a large withdrawal from one pocket and deposited into another will cause significant portfolio imbalance for some time period. During that time, the portfolios will not exactly reflect the investment judgments of the managers. The result would be a probable loss of at least a portion of the incremental return expected from these investment judgments. The second method using futures does not require movement of funds of such magnitude. Potential disruption and loss of incremental return is accordingly minimized.

The four costs of commissions, market impact, time and disruption can be significant drains on portfolio performance. Futures offer an alternative for strategy implementation and cost minimization.

Now I will cover the regulatory issues regarding the activities of life insurance companies. We are regulated on a state-by-state basis. Even though each state may have its own specific regulatory statutes, New York law has been considered an important determinant of life insurance company investment activities. Because a large amount of life insurance business is done in or through the State of New York, and because other states use New York law as a guide to their own statutes, the regulations of New York are key.

Until a new bill was enacted in September of 1983, New York regulations as interpreted by the Insurance Department had prohibited the use of futures in any manner by a life insurance company. They were considered to be speculative. Insurance department guidelines were issued within the last few weeks which serve as the final interpretation and explanation of the 1983 bill.

As indicated in the 1983 bill, a life insurance company -- not a casualty-property company -- may enter into "bona-fide hedging transactions." A hedging transaction is defined in the recent guidelines as "a purchase or sale of a future or option entered into for the purpose of reducing the risk of market fluctuation and which is intended to be a substitute for the sale or purchase of an underlying obligation." This definition strongly indicates the need to specifically identify the security being hedged and the hedging instrument. The term obligation refers to bonds, debentures, notes and other evidence of indebtedness. Stock index futures are clearly still prohibited. The law also specifies that these bona-fide hedging transactions may not aggregate to more than 2% of the total admitted assets of a life insurance company. Finally, the duration of the hedge cannot exceed one year.

The new regulations appear to allow certain hedge transactions. First, to hedge the receipt of a deposit or liability. The problem here is that it takes time for funds to be invested in the fixed income market, time during which we are exposed to the risk that rates may fall before we can invest the total deposit. An alternative approach is to immediately buy interest rate futures to hedge a decline in interest rates and then sell the futures as specific fixed income instruments are actually purchased.

A second example is a loan commitment. The insurance company is exposed to the possibility of a rise in rates between the date of the commitment and the date of loan completion. If interest rate futures are sold on the date of the commitment, then much of this exposure to rising interest rates is hedged.

A third hedge involves the sale of a specific fixed income asset for investment purposes or a group of assets to fund a large, sudden withdrawal. The risk is that interest rates will rise before we can actually complete the sale, hence, realizing a lower price. We can hedge against a rise in rates by selling futures against the assets today and repurchasing the futures as the sale of the assets are actually completed.

Applications which would not appear to meet the definition and are, therefore, prohibited include maturity gap management. We may wish to reduce the duration or interest rate exposure of a general group of assets in order to more closely match the maturity structure of the assets with the maturity of liabilities and hence, reduce the disproportionate effects which interest rate fluctuations would have on asset and liability valuation. This is easily and quickly accomplished by selling interest rate futures.

Also not considered a hedge would be other examples of portfolio management activity. For example we may wish to change the asset mix of the portfolio to reflect judgement on the intermediate-term movements in the capital markets. Perhaps we wish to raise stock exposure and lower bond or fixed income exposure. This can be done by buying stock index futures and selling an equivalent amount of bond futures -- an efficient method still prohibited by New York Law.

So far we have considered general account application. New York regulations specify that separate account investment activities are subject only to ERISA. There are a number of strategies or techniques where utilizing futures offers implementation advantages and incremental returns to separate account portfolios. The following discussion reviews three such applications. While not exhaustive, the three are representative of the types of strategic uses of Treasury bond futures in portfolio management.

The first application involves a Treasury bond fund, a passive management strategy. A superior method of constructing a bond fund involves buying T-bond future contracts. A numerical example will illustrate the construction mechanics. Assume we wish to structure a bond fund of $100 million and that the current price of the T-bond future is 70. Each contract is therefore equivalent to a bond exposure of 70 times $1,000, or $70,000. To gain exposure of $100 million in bonds, one could immediately purchase 1,429 T-bond futures contracts, or $100 million divided by $70,000.

The advantages of such an approach to constructing a bond fund are many. First, the benefits due to lower transaction costs have been mentioned previously. The low commission rate on futures trades and the high level of liquidity in the futures market offer the potential for significant cost savings.

A second significant advantage of the futures approach to bond fund construction is that there are no coupons to reinvest. Periodic rebalancing of the index fund due to coupon income is not required. The futures approach does not involve the receipt of coupons. As indicated in the comments on valuation, the coupon income is already within the price of the future.

A third advantage arises from the investment flexibility of the cash equivalents. Incremental return can be achieved by creatively investing the cash in instruments other than T-bills.

A second application involves controlling the duration of a bond portfolio. This application primarily involves implementing an active bond market judgment. Assume that a portfolio manager has a moderately positive outlook for the bond market and wishes to raise the exposure of the portfolio to the market, or raise the portfolio's duration, in order to take advantage of this. An example will illustrate the alternative methods of implementing this strategic decision. Assume that the manager has a $20 million portfolio and that given the bond market judgment the resultant target duration for that portfolio is five years. Assume also that the duration of the bond component is 4.4 years and that bonds currently represent 95% of the portfolio with the remaining 5% in cash. There are two methods to move the portfolio to the duration target of five years. One method is to sell a number of the lower duration bonds and buy an equivalent amount of higher duration bonds. This procedure maintains the bonds at 95% of the portfolio but raises the bond-only duration to perhaps a number such as 5.3 years. The result would be a portfolio with a duration of five years.

The other approach is to buy an appropriate amount of Treasury bond futures to increase the duration of the portfolio. Under the pricing assumptions used in the previous examples and assuming the T-bond has a duration 8.4 years, one need only purchase 28 T-bond futures. The appropriate number of futures to purchase (X) results from the equation:

($19 million x 4.4) + X x ($70,000 x 8.4) = $20 million x 5.0.

The advantage of controlling duration by using bond futures are the following: (1) The target duration of 5.0 years could be achieved almost immediately and the portfolio would then be constructed to reflect the desired investment judgments; (2) The transaction costs would be considerably lower particularly since the turnover could be very high in trading the lower duration bonds for the higher duration bonds; and (3) The optimal bond mix would be maintained. This last advantage is extremely important. Presumably, the bond component with a duration of 4.4 years represents the optimal mix of undervalued bonds. By selling low duration bonds and buying high duration bonds the portfolio manager most likely is adding bonds which are less undervalued to the portfolio. The manager may be giving up the potential incremental return from the bond selection judgments. This loss of incremental return is avoided by achieving the portfolio target duration through buying bond futures.

A third, and very exciting, application involves asset allocation, or the active judgment of stocks versus bonds. The situation may be that a fund

or a large portfolio wishes to change its stock and bond mix to reflect current investment judgments. A specific example of this application is illustrated in the following table for a $300 million fund:

Asset Allocation Application

	ACTUAL MIX	TARGET MIX	NET CHANGE
Stocks	70% ($210)	65% ($195)	-5% (-$15)
Bonds	30% ($ 90)	35% ($105)	+5% (+$15)

Assume that the actual mix today of a $300 million portfolio or a $300 million pension fund, is 70% in stocks, or $210 million, and 30% in bonds or $90 million. Assume also that the portfolio manager's or plan sponsor's investment judgment of stocks versus bonds called for a lowering of stock exposure and a raising of bond exposure. The new targets are 65%, or $195 million, in stocks, and 35%, or $105 million, in bonds. In order to achieve the target, one would have to sell $15 million of stocks and buy $15 million of bonds.

There are, again, two ways of implementing this strategy. The more traditional way would be to actually sell $15 million in stocks in the market and to buy $15 million in bonds. The alternative way of using futures would be to sell the equivalent of $15 million of stock exposure by selling stock index futures and to buy the equivalent of $15 million of bond exposure by purchasing Treasury bond futures. If it is assumed that one stock index future is equivalent to $85,000 of stock exposure and one Treasury bond future is equivalent to $70,000 of bond exposure, this would involve the sale of 176 S&P 500 stock index futures contracts and the purchase of 214 Treasury bond futures contracts.

There are important advantages to implementing an asset allocation investment judgment through this approach of using futures, in addition to the advantages of lower implementation costs and more immediate implementation. The first is that disruption is minimized. If this $300 million portfolio is actually a total pension fund whose assets are held in portfolios run by a group of external investment managers each specializing in either stocks or bonds, a transfer of $15 million from the external stock managers to the bond managers would be required. A large withdrawal such as this in the stock funds with a large deposit in the bond portfolio would result in some momentary disruption. An imbalance would exist in those portfolios for some period of time. By taking the approach of using futures to implement the stock/bond decision the external managers are not impacted. They need not even know of the activity that is occurring. The futures can be managed outside the multiple manager structure.

A second advantage is that less funds need be involved to alter the asset mix. This is due to the leveraged nature of a futures contract. Assume that the manager of the $300 million fund wishes to alter the stock/bond mix over time to reflect active stocks versus bonds judgements. The mix

may be altered within a ±10% range around some long-term normal mix, such as 70/30. The asset allocation changes using the futures approach could be accomplished with approximately $7 to $8 million of cash necessary for margin requirements while $60 million would be required to alter the portfolio 10% using solely the approach of buying and selling stocks and bonds. A large portion of funds can, therefore, remain available to the specific security selectors with the result that additional return may be generated.

A number of the potential portfolio applications for using Treasury bond futures in a strategic sense in portfolio management have been reviewed. Utilizing futures facilitates the implementation of a strategy or technique within a portfolio to maximize returns and benefit the owners of the portfolio's funds. Futures add to the incremental return of a portfolio through lower commission costs, immediate implementation of the portfolio strategy, a lower market impact or cost due to execution and finally, minimization of the disruption within the portfolio.

Treasury bond futures and bond options play a key portfolio role. They offer a means to reduce exposure to unintended risk and to manage risk in a timely, cost-effective manner. They are a very important instrument within the spectrum of investment instruments available to effectively manage portfolios.

Mr. Tilley:

I am going to introduce some terminology with respect to options by an example. It is an example that I used at the annual meeting in Hollywood, Florida. I am going to be focusing on put options. Among the option instruments they are perhaps the most useful. If all one could do were to buy or sell put or call options and could not do anything else, which would be most useful for the kinds of risk that insurance companies generally face today? Buying put options, I contend, is the answer. That is an extremely unfortunate answer, considering the first stage of New York legislation. One cannot at this time buy put options. It is just not permitted.

There are many other ways to skin a cat, however, and I will mention a few of those. It is perhaps too bad one has to use other ways. Whether it is too bad or not, of course, is always a function of one's vantage point. From my vantage point at an investment bank it is not necessarily too bad.

I would like to concentrate on an example of hedging disintermediation risk for SPDAs. I mean this as a generic example. In other words, what this example shows is more or less equally applicable to a universal life or a traditional whole life portfolio -- that is, any situation where there is a significant possibility of a run on the bank when rates rise sharply.

I assume that there is an existing portfolio which has the characteristics shown here as of the beginning of 1983.

- Analysis/Assumptions
  - On 1/1/83, a block of SPDAs has following characteristics:

Assets

—Book value: $101.7 million

—Market value: $96.8 million

—Average maturity: 6.41 years

—Average coupon: 12.35% B.E.

Liabilities

—Account balances: $100.0 million

—Average surrender charge: 5.24%

—Average credited rate: 11.20%

—Current competitive SPDA rate: 12.00%

On the asset side, the book value is $101.7 million. Interest rates have risen since those assets were put in place because the market value of the portfolio is less than book value. On the liability side, the account balances are $100 million. That is book value. This is an SPDA portfolio where business has been put on the books over a period of time. At this stage in its life, the average surrender charge for the portfolio is roughly 5 1/4%. And, the average credited rate to all the liabilities in the portfolio is 11.2%. I am not saying that every policy is necessarily being credited at the same rate -- there may be various generations or blocks of business. The current (by current, I mean as of 1/1/83) environment is that competitive SPDA rates are about 12%. Actually, not too far from today (5/3/84).

What is most important about this next table is the way it is organized because it suggests how one ought to analyze the problems of one's exposure to disintermediation and how one ought to approach the problem of setting up a hedge strategy.

Interest Rate Increase	Lapse Rate To Be Hedged	SPDA Amounts Cashed Out			Offsetting Hedge Gain Required
		C.S.V. Liability	B.V. Asset	M.V. Asset	
0.0%	—	—	—	—	—
0.5%	—	—	—	—	—
1.0%	—	—	—	—	—
1.5%	7.5%	7,494,432	8,098,498	7,324,150	170,282
2.0%	15.0%	14,988,864	16,196,996	14,379,763	609,101
2.5%	20.0%	19,985,151	21,595,995	18,824,269	1,160,882
3.0%	25.0%	24,981,439	26,994,994	23,105,680	1,875,759
3.5%	27.5%	27,479,583	29,694,493	24,961,168	2,518,415
4.0%	30.0%	29,977,727	32,393,993	26,746,664	3,231,063
4.5%	30.0%	29,977,727	32,393,993	26,275,338	3,702,389
5.0%	30.0%	29,977,727	32,393,993	25,816,025	4,161,702

In the leftmost column I show possible interest rate increases to which the portfolio of business can be exposed over a six-month period. You will notice that I looked at some fairly dramatic increases, all the way up to 5% (500 basis points). What I show in the second column are the associated lapse rates. If interest rates go up 25 basis points, you do not have people ready to spring and fly out the door, especially if there is a surrender charge. So we would not expect to see any lapses until interest rates rise by some threshold amount; in this particular case, I will assume it is about 1.5%. Actually, that is not really an assumption. The way I have worked it out is that the cash surrender value would actually be less than the market value of the assets until interest rates rise this high. So, apart from an unamortized acquisition expense problem, you would be in position of financial gain if people surrender and you pocket the surrender charges which are more than enough to cover any market value changes.

In the second column I also show lapse rates leveling off at about 30%. Now we could argue for a long time about what the second column really means. Is it truly one's best guess? Does it really reflect the impact of your distribution system? Is your product sold through a career agency system or is it sold through a nationally recognized retail brokerage firm? What is the profile of your marketplace? Is it the upper income slice of the population or is it middle-income America? All those things are important, but even after analysis, this may be the lapse schedule you choose to adopt. You may choose to leave some exposure. For this example, these are the lapse rates I am going to try to hedge.

The next three columns compare the cash surrender value of the liability for the piece of total liability that is being lapsed. If one compares the market value of the asset column against the cash surrender value of the liability, column, you will notice that the market value of the assets is less than the cash surrender value of the liabilities after rates rise by at least 1.5%. You are in a loss position. And whether you adopt a pay-me-now or pay-me-later approach -- in other words, whether you stand tough with your SPDA rates and do not redeclare them at higher rates to hang on to funds but pay people as they leave, or whether you declare higher rates -- you in effect are going to realize the kind of losses that are shown by the difference between the cash surrender value of the liability column and the market value of the asset column. The difference between those is shown in the last column.

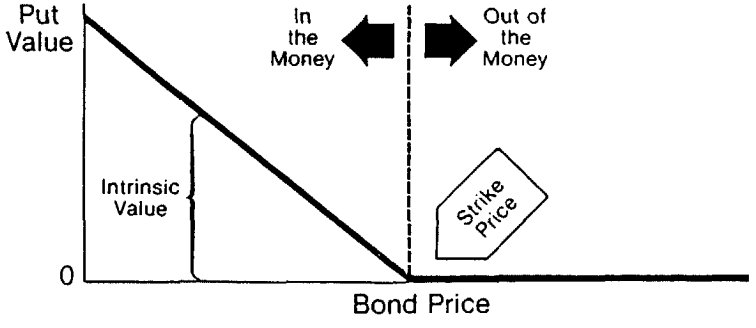
If one believed that these were the lapse rates that would actually occur, he could try to put some transaction in place that would produce gains exactly equal to the losses in the last column. Then the combination of hedging transaction plus the losses that would have developed in the underlying portfolio will net out and the financial situation will be fine.

I want you to note a few properties of that last column. First, we do not need to start developing gains until interest rates rise by a threshold amount, in this example about 150 basis points. I have shown dashes (zeros) in that last column up to the 150 point rise. Then, we need to start producing gains to offset the losses, and we need to produce an increasing schedule of gains.

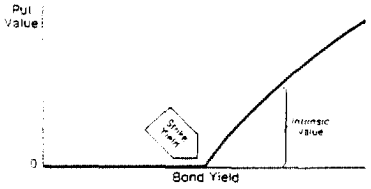
This is precisely what a put option will do for you. Let me just take a few moments to talk about put options. A put option is a contract which gives the purchaser of that contract the right to sell a security. There is no obligation as with futures. When you buy a future, you have an obligation to buy whatever underlying bond the seller of the future is permitted to deliver. You can close out your position and remove that obligation, but if you hold it to delivery, you have an obligation to buy the bond. If you sell a future, you have an obligation to sell an appropriate bond, if you choose to deliver. You can get out of that obligation by reversing the transaction, but if you hold until delivery, you have to deliver. That is not the case here. With an option you are given a right.

Let us consider an example. Suppose a particular bond is selling for $70 and suppose further that a put option gives you the right to sell that bond at $80. $80 is known as the strike price or exercise price. If you choose to exercise the option and sell the bond, you are going to be paid $80 for it. Now, if you are holding the option and the security is worth $70 the option is fairly valuable. You can sell an instrument that is worth $70 for $80, because the option gives you that right. Therefore, the option has to be worth at least $10.

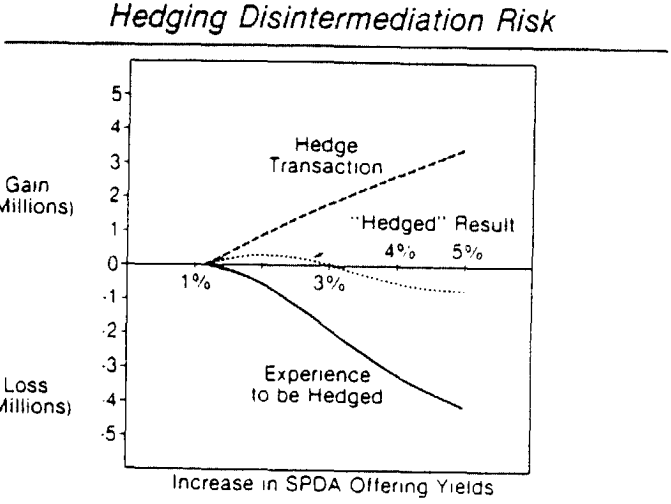
That is what I am trying to show in this graph. I show here the value of a put option against the underlying bond price. You can see that the option starts to develop instrinsic value when the bond price drops below the strike price of the option. It can do that anytime during the period which you can exercise the option. Then, it is said to move into the money.



It is more useful for our purposes to translate from a bond price axis to a bond yield axis. In this case we see that a put option develops value when the bond's yield rises sufficiently. The point of this last picture is that it depicts exactly what we found we needed in the preceding table. We said that we needed to start producing hedging gains when the yield rose to a certain level. That level we should establish as the strike yield of the option. That is when we need to start producing gains. The option produces an increasing pattern of gains and that, too, is what we need. Now, we may not be able to solve our problems by buying one particular put. We may have to buy several different kinds of puts with different strike prices to get the right pattern of gain buildup. It turns out that in this particular example we found one put option that worked fairly well.



The final result is shown in the following graph of the value developed by the hedge against the losses that would have developed if you did not hedge. Summing the two shows that the hedge is fairly good.



The solid line coming down is just a graph of the last column of the preceding table. It shows the losses that would develop against interest rate rises if one did not hedge. The top line shows the gains that would develop from buying a certain number of put options on Treasury bond futures, and the line in the middle is the sum of the other two. Notice that it is fairly flat. There are mild gains for interest rate rises between 135 points and 300 basis points and mild losses beyond 300 basis points, but it is a very good hedge.

The "bottom line" in all of this analysis is, of course, what the hedge costs, what we do with the cost, and who bears it. In an SPDA, if you do not pass it through to the policyholder you are taking it out of surplus. That is not very good business practice. So it probably should be part of the pricing and you would have to assess what the average hedging costs might be over a full interest rate cycle.

It is unfortunate that typical hedging costs are on the order of 50 basis points. Do not take that as the magic number. They depend on how you hedge, how volatile the markets are when you are putting the hedge in place, and if the option is in the money, at the money or out of the money. The hedging cost depends on these many factors, but they generally range from 25 to 50 basis points.

These are very large costs. The SPDA market is not as competitive as the GIC market, but it is competitive and one usually cannot just find an extra 25-50 basis points in one's pricing. I am not necessarily implying that my story is a happy one, but it is a correct story nevertheless, and one that really ought to be understood. What I hope I have suggested here is that put option protection can be very valuable in protecting against the losses that occur from rising interest rates.

In the remaining time I would like to discuss other ways to create put option hedges. There are futures strategies that will accomplish it, and in fact, there is a trading strategy in the cash market that will accomplish it. I think that Mr. Dunford's comments about how futures instruments provide an efficient and nondisruptive way to accomplish one's goals are very valuable. The unfortunate thing is that Dave was discussing separate account applications. But he, as many of you are, is bound by New York law and New York does not yet allow the use of futures to adjust the duration of the general account. So, it would be useful to look at a trading strategy that alters the mix between money market instruments and bonds which can give you the same sort of results as a portfolio with put option protection.

Suppose for every bond there existed an actual put on the bond. What can we say about the duration properties of a portfolio consisting of bonds and puts on those bonds? Well, when bond prices are very high (interest rates are very low), the puts are out of the money and contribute nothing to the duration. So the duration of the portfolio is just the duration of the bonds. And actually, that is what you want for SPDA. When interest rates are roughly where they were when you sold the product, or lower, you are not worried about disintermediation. In these circumstances, the duration of the liabilities is probably intermediate in term. But, what happens when interest rates get high? The liabilities shorten. If rates are very high, the liabilities almost look like demand deposits -- that is, as if they had duration zero. The interesting thing is that a portfolio of a put plus a bond has exactly that property because when rates are high, the dollar-for-dollar movement of puts and bonds cancel each other. So there is no real price sensitivity to that portfolio and the portfolio behaves as if it were cash. Of course, it earns the short-term rate too. You do not get something for nothing. Actually, since yields are very high, you probably do not mind earning a short-term rate. What this means is if I adjust a portfolio of money market instruments and

bonds alone (no puts or futures) through time to achieve the duration properties I have described, I will have another way of creating put option protection for an intermediate to long bond portfolio. This, in fact, is the case. When interest rates are very low, I should hold only bonds in my portfolio. The duration is that of the bonds. When interest rates are very high, I have only money market instruments in my portfolio and the duration is that of cash -- zero. Those are the two limiting conditions. Everywhere in between there should be a mix of money market instruments and bonds. The trouble is that except in Canada and other places where you can amortize gains and losses in selling bonds over some considerable period you may run into surplus problems with your statutory statements.

We have about seven or eight minutes to take questions. I would like to do that now.

Mr. Victor Modugno: I have a question for Mr. Crispin. If the market moves beyond the two point limit on a future, are you locked in?

Mr. Crispin: Assume today that we are short futures at 70 and that the cash bond moves to 75 today from 70. The bond moves two. You are out of sorts by three points. If the next day, during the first minute of the trading day if the cash market does not move, the futures will have to move another two points of the three it still needs to move to get into equilibrium with the cash market. Now that is still short one. It has moved two and that continues to be the daily limit maximum. Now, if then the cash market goes up or down another great amount and you are further behind what will happen is that the Board of Trade will change those limits to get these prices into equilibrium. But on a day-to-day basis, you can clearly be out of balance. I should point out that a two point move on Treasury bonds every day for a number of days would be a wild market, and uncommon.

Mr. Tilley: Of course, what Mr. Crispin's comments show is that if it were theoretically right to lift the hedge to close out one's position in futures on a particular day, but you had run up against limit rules, you do not do it then. No one is forcing you to do it. It can provide some temporary inconvenience but it is not necessarily debilitating.

Mr. Marvin Fineman: I am afraid I have missed something that is pretty important. In your earlier presentation I think you said that the futures had a maximum maturity of about three years and not too much of that available but that you could fill in gaps on the one-year range pretty easily. If this is the case how could a portfolio's duration be increased from 4.4 to 5 years?

Mr. Dunford: There are really two different concepts that you are putting together. First there is the underlying instrument for the Treasury bond future. It is a bond with at least 15 years to maturity. The duration of the most deliverable instrument in the example was 8.4. Gaining exposure to that particular bond will then increase or decrease your portfolio duration. That is how in the example we are able to get from a 4.5 to 5 duration. In terms of the life of the contract, that will just indicate how long it is before you have to do the whole thing over again. The

contracts can be six, nine months, twelve months, some go up to three years, but as Mr. Crispin indicated the liquidity for three-year contracts is small. If you stayed with six month contracts, in my example, you would buy your 28 futures today and perhaps five months and 29 days from now you would go out and buy 28 more. You just have to keep rolling them over.

Mr. Crispin: You can look at liquidity by just looking in the newspaper. It will show the amount of open interest. You will see a rapidly diminishing amount of open interest as you go out to the three-year contract.

Mr. Tilley: In the options market the contracts do not go out three years.

Mr. Fineman: Doesn't that mean that the cost that you are referring to would have to be multiplied by the number of times you have to do that?

Mr. Tilley: No, I amortized the option premium over the life of the hedge. It is very important to do that, otherwise your observation would be correct. What I did was amortize the cost to buy the option over the six-month period that I was looking at.