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**PRACTICAL ASPECTS OF  
MANAGING INVESTMENT RISKS**

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                  DALE B. WOLF  
Recorder: OWEN WHITBY

- o Portfolio restructuring, including bond swaps
- o Reinsurance
  - To restructure liabilities
  - Purchasing blocks of business
  - Coinsurance
  - Financial reinsurance
- o Hedging strategies
- o Product mix strategies

MR. JAY A. NOVIK: Fred Carr said earlier that risk is your enemy. Hopefully, this panel will help you deal with the enemy.

MR. DALE B. WOLF: I shall set a framework that will be the basis of discussion for our other speakers. Diane is going to talk about reinsurance as a practical means of managing risks, and Norm is going to talk about some very specific risk control techniques. Let's think about the impossible task we've taken on as an industry in our investment processes and managing of investment risks. If you look at the investment component of our products alone, leaving out expenses and mortality for now, I believe that as an industry we've decided that we know how to beat the investment market, and that sounds to me like an

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impossible task if you believe that the market, in the generic sense, is a predictor. There are certainly some theories on that.

In any event I think most would agree the market is efficient and arbitrage-free. In that case, the market would impute certain prices to our products, and those prices would reflect generally the yield curve, quality spreads, risk/reward relationships, and also the value of any options that we may hold versus options we granted, and so on. It's important to know what the market's assessment of that is, but as an industry we've said we can do better than that, and I think that's a really impossible task that we have challenged ourselves with. Well, how do we do that? There are a couple of ways we believe that can be done.

One certainly would be that the options we bought or the ones we've sold are not efficiently priced, and I would grant that as a possibility from time to time. Certainly the world of insurance buyers is not necessarily an efficient market in terms of the exercise of options. So perhaps there is opportunity there for getting a real deal either through the sale or purchase of options in our contracts. The second way we're saying we can beat the markets is in managing fixed income investments. In the sale of insurance products backed mostly by fixed income instruments, we're establishing a fixed income portfolio and managing it. And by crediting rates to our customers, that in effect say the market is wrong, we are saying we can beat the market; and the way we can do that, we believe, is by superior performance in the management of fixed income investments. Whether the industry can really differentiate itself through investment performance is open to discussion, especially when you begin to realize how large a share of the fixed income market we really are. But I guess that's what we're going to do. We're going to manage fixed income portfolios to beat the market. We're going to make money on options that are either cheap or rich, and we're going to sell or buy. Well, how do we do that? I guess the only way is to accept additional risk, and clearly what we're here to talk about is the way to manage that risk.

I'm not sure that I would agree that risk is your enemy. We all must believe that risk is our opportunity. If it really is the enemy, we would just try to eliminate it, and that obviously would not make any money. How do we handle the incremental risk to achieve the incremental return we believe we can? The real task is not reducing risk, because you can always do that. The real task

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is managing the taking of additional risk, because that's the only way we can make money. One of the ways is by dealing with mispriced options in product design. I submit that this probably is a product design issue. The mispricing of options in the asset arena for all intents and purposes doesn't exist. It's through our liability and product design that we have the opportunity to either write options in the contract that we believe our buyers are unsophisticated enough not to arbitrage, and/or accepting options ourselves from our customers that we believe are very valuable compared to what our customers are willing to sell them to us for. I was really intrigued by Mr. Carr's statement earlier, "Don't let marketing people design products." I might add to that, "and price."

The second way of beating the market in fixed income investments, is also one where we have to take additional risks. And I just ticked off some of the risks which I think are part of the game. You have to be playing somewhere in this list if you have decided that to support the prices the market needs, you're going to beat the market. Liquidity premium. That may be real. I wouldn't necessarily argue with that. There may be extra return to be earned there. Interest rate bets. I'm not sure about that one. Credit exposure through diversification management. Certainly, Fred Carr believes that credit exposure through diversification management is where incremental return can be achieved. It is probably true that the markets analyze individual credit risks and the charges or prices reflect that, and through diversification you can actually make some money. Currency risk. We haven't done much work with this, but I think you're seeing more and more of this in the currency markets. Morgan Stanley has recently come out with several hundred million dollar issues of both Australian and New Zealand denominated currencies, and we're beginning to see this as a new arena to go into to take some more risk and hopefully make some more return. Tax risk. Some of us learned our lesson on tax risk a few years ago, and there may not be as many opportunities to do that, but it's clearly one of the areas where we may choose to take additional risk. Equity risk. We have thought of these businesses, portfolios, and products as backed by fixed income instruments. That's not necessarily the case. If one has the stomach and appetite to stand the volatility inherent in an equity backing for these products, one ought to be able to generate superior returns over time.

The whole key in what I've outlined here is to honestly evaluate the expected incremental return from taking one or more of these risks, and to honestly

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evaluate our ability as a company or as an industry to add incremental value and hence achieve incremental return. In addition to that, of course, I hope we evaluate the risk of being wrong. How much surplus do we have? How much risk can we tolerate? What happens if things go badly? In doing that it's probably reasonable to look at a distribution of probable returns if you're taking incremental risk in a mismatched interest rate bet area. What are your outcomes? Can you tolerate that? Then buy insurance where you can't accept the consequences of being wrong.

There are five points that I wanted to make in starting this off. (1) We have to understand what it is we're selling. We really have to understand what the market says the value of our products ought to be in terms of what interest rate they ought to get, how much the options are worth, and so on. (2) Be reasonable as a company and as an industry about our capability to add value in each of these risk areas. (3) We might evaluate and then pick the ones where we honestly think we can add value through our particular expertise. (4) Quantify the risk that we have taken on, not only in terms of how much profit we think it's going to add, but also what happens if we're wrong about our capabilities. (5) Buy insurance against the adverse outcomes in the areas where we don't think we can afford to take that particular risk. I think Diane and Norman are going to talk about some of those specific ways that we might buy insurance to protect against the risks.

DR. NORMAN E. MAINS: When I was invited to participate on this panel, I was asked to give a brief summary of the speech or a title that was appropriate. I came up with the name, "Creating Synthetic Assets and Liabilities with Futures and Options." When I thought about that again on the plane, I decided that makes it sound a lot more grandiose than it really is. Using the futures and the options markets and dealing with what are called synthetic securities is a lot less complicated than most people think and less complicated than many people would like you to believe. They're really not that hard to understand. I'm going to give you an idea of why the markets price the way they do, try to keep everything in a very simple nonquantifiable approach, and then show how you might use these instruments in an application that I think should be relatively germane to everyone, because it certainly is something that's done very actively in your industry.

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I'll begin by talking about derivative securities. Right away, I've thrown you another curve. First I said synthetic, and now derivative. It all sounds very complicated, but what we're talking about is either a futures contract or an option contract. The term, *derivative*, signifies nothing more than that the price behavior of that particular instrument is very much a function of whatever obligation it is based on. So, a treasury bond futures contract, for example, is a derivative product of treasury bonds. That's very simple. A stock index futures contract or an option on a stock index is nothing more than a derivative instrument on the stock index itself. It really is a very simple idea.

I want to briefly give you an idea of how these things are priced in the paper. I suppose many of you open up the *Wall Street Journal* daily, and you may happen across the futures and options page. You see there a listing for various contracts: wheat, gold, etc. for various contract months at different prices for different contracts. Why are they priced at that particular price on that particular day? It's very simple. The whole idea of a derivative contract, a futures contract, is based on the notion of a cash and carry transaction. What do I mean by that? You simply buy the underlying instrument. Let's take gold as the example. You buy 100 ounces of gold in the spot market. You finance it by borrowing money, and at the very same time that you're long in the spot market, you go short the futures market against it. Then you hold it through the life of the futures contract and deliver the spot market position, the 100 ounces of gold, into the contract at its expiration. So, you started with nothing, you bought 100 ounces of gold, you borrowed money to pay for the gold, you held it for one year, you delivered it into the contract, and therefore you end up with no position again. How, from that very simple cash and carry transaction, can you figure out what the price of the futures contract should be?

Well, let's say the price of gold is \$500 an ounce, and you're going to hold it for one year. Basically, the price of the forward contract is going to be the amount it's going to cost you to borrow money for one year. You do have the additional expense of insuring the gold and storing it somewhere, but in the case of gold the cost of actually *doing* the insurance or the storage is so minimal that you can almost forget it. The basic cost of a futures contract on gold one year from now is nothing more than the spot price adjusted up for the cost of borrowing that amount of money over a one-year period. So, what I suggest

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that you might want to do tomorrow morning is open up the *Journal* and look at these prices and you'll see that a one-year gold futures price is simply about 6% above the current spot rate because the short-term interest rate is approximately 6%. That's the idea behind every single futures contract. They're not all that mystical.

It gets a little more complicated when you deal with treasury bonds. In the case of gold, it's a nonyielding asset; you buy it, you get nothing from the gold except that warm feeling in your heart for one year, and then you deliver it into the contract. In the case of a treasury bond, you buy it in the spot market and then you earn interest. You get the coupon interest over the year that you hold it, and then you deliver it into the futures contract. So, in the case of an interest bearing security, like a treasury bond future or a Standard and Poor's stock index, where you have a dividend yield, you must adjust these forward prices for the fact that you're getting something over this period. Let's say you own an 8% bond, and you're financing it at 6%. That gives you a net profit of 2% over the year, and what you'll see is that if the current price of the bond is \$100, then the one-year forward price will be 2% below that at \$98. So, it's really a very simple concept that underlies these things, but people have come up with esoteric terms like derivative securities that tend to put some people off as to what they really are.

Options are a little more complicated, simply because the option characteristic is one of giving the investor almost all of the upside and limiting the downside. So, instead of having a normal distribution where you can make a lot or lose a lot, you truncate half of it. It's that truncation of the return distribution that makes the option a little bit harder to price. But it's really not all that tough. Some of you in this audience may have seen the Black-Scholes option pricing model. The first time you look at it, it's very imposing; but once you begin to use it, you discover that it really bases itself on five factors, and the only one that you don't know in advance is volatility. So, it becomes much simpler than it appears on the surface. Once you make an estimate of volatility, you can calculate an option pricing using this model because you already have the other inputs into the equation. Incidentally, options and futures are very similar in the way they trade in the market because, if you are long an option and short a put on the same underlying contract, that's functionally equivalent to being long

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a futures contract. Therefore, options and futures obviously have to move in a very certain characteristic way of one to another.

The options and futures markets have grown very rapidly over the last few years. I looked in the paper this morning and made a rough estimate that the volume of trading for financial futures, which I will define to be interest rate, stock index and foreign currency futures, is from about \$150 to \$200 billion every day. The market didn't even exist eleven years ago. How is it that this thing has gone from nothing to this massive amount of trading in eleven years? Well, it's obvious that these instruments must offer something to market participants or they wouldn't be using them. What I want to emphasize here is that they are vehicles that offer the several attributes that should make your jobs as investment managers easier, and that's why they were adopted as much as they were. The first users of treasury bond futures contracts were the dealers like Citibank, Morgan Guaranty, Salomon Brothers, Drexel Burnham; firms like this that are natural longs. If you are a dealer in wheat or treasury bonds, for example, you have to have an inventory yourself on a regular basis, and that makes you a natural user to be on the short side of the contract to hedge yourself on the price risk of the underlying obligations. It was through the adoption of these contracts by dealers that the markets have grown so that now not just dealers but also insurance companies, mutual funds, pension funds, commercial banks, savings and loans and so on are all very active users of the markets.

Let's stop here for a second and make sure we're all in agreement as to exactly what I mean by a synthetic security. By that I mean that if you want to be long, say treasury bonds, it is functionally equivalent simply to be long a treasury bond futures contract. Now, there are some slight differences. You need to know exactly what the contract specifications are and you need to know how that relates to the underlying position that you want to hold. But that's the whole idea of a synthetic; it's a substitute for the spot market transaction. So, you would use futures contracts or options contracts as substitutes for dealing in the actual spot market.

Why would you want to use these substitutes? Well, there are several reasons that immediately come to mind. One is liquidity. I've just mentioned how much the markets trade; how active they are. This allows you as an investment

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manager to participate by using the futures markets or options in which you're able to transact in much easier amounts, with either lower transaction costs or without paying such a large price concession to the actual trading. You might, for example, want to buy \$100 million of a certain long-term treasury bond that is not a particularly active issue. You will find that as you go into the market and attempt to get offers for that security, that as the dealers themselves learn that there is a large buyer, suddenly the quote screens will show the offers going up and you will end up paying a higher cost as the information spreads through the market that there is a large buyer. Another way of doing this would be simply to buy the securities synthetically. You buy a futures contract. You can transact it much more quickly at a lower cost and then as you want to replace the synthetic security with the actual security, you can buy them in on a much more extended basis and do it without paying such a price concession on the particular issue. This is really what we're talking about when I use the term synthetic security.

Let me give you another example. There is a three-month Eurodollar deposit contract that trades in Chicago. It's the principal short-term interest rate contract, and you might want to be long one-year Eurodollar deposits. You've got a three-month futures contract, but what you want to be long is one-year Eurodollar deposits. You simply can create a one-year Eurodollar deposit by going long the first four futures contracts in Eurodollars. So, for example, right now that would be the June, September, December and March 1988 contracts. When you purchase those four contracts, that's functionally equivalent to having a one-year Eurodollar deposit, and if you look at the yield relationship between those four contracts and one-year deposits, you find that it's relatively tight. If it isn't very tight, what happens? Then there's an arbitrage opportunity, and that's why futures markets and option markets stay efficiently priced. When the Eurodollar contract first started, very few international banks were using futures and options; and, for the lack of large volume, the futures contract traded about one hundred basis points higher than did the underlying deposit market itself. This was an opportunity that several large banks seized; they were able to gain 100 basis points arbitrage by using the futures contract rather than the underlying spot market contract. As they came in, they brought the market back into line, and now the arbitrage is really not there any more. The market has become much more efficient. The point I'm trying to make to you is that the synthetic securities may offer arbitrage opportunities



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initially, but as the markets get deeper and more liquid, they tend to move on almost a one-to-one basis with the underlying markets. So, liquidity is certainly one reason to use them.

Second, you're able to execute futures and options transactions much more anonymously than you can in the spot market. When you use the futures markets, no one knows who you are and what you're doing, so you're able to disguise larger transactions very easily. Finally, there may also be a price advantage to using the forwards, the futures or the spot market, and you may want to avail yourself of that opportunity. I'm referring to different kinds of arbitrage between the spot and the futures. I'm going to expound on that idea to give you an example that I think should be relatively germane to you. We want to distinguish here between a low-risk arbitrage and what I consider to be prudent risk management arbitrage. Dale mentioned in his comments that we don't want to totally eliminate risk, because the return is in part a reward for bearing that risk. You want to be managing the risk. You don't want your institution, your company, at risk where you're not in control of it. This is, of course, the thesis of the insurance industry -- the pooling of risk. The ultimate objective of the example I'm going to show you is that it is an arbitrage, but not by the strict definition of arbitrage when you take Economics 101. The professor will say that there's a price and a price disparity with no risk at all, and that by undertaking the arbitrage, you'll bring them back into line. That's true, but most of us probably are of the opinion that price discrepancies can last for a considerable period of time, and in fact need not be totally taken out of the market. So, the example I shall use here is one of controlling risk to achieve your objectives rather than totally removing risk. It's probably worthwhile also to distinguish between risk and speculation. Speculation is the creation of a risk, with a game or payoff associated with it; whereas in the management of risk, the risk already exists and then you seek ways of managing it.

In this example we shall be talking about creating synthetic assets and liabilities using futures and options. We're going to look at both sides of the balance sheet. Hopefully, you will be able to see how this might fit for your organization. We're going to buy high-yield bonds on the asset side, and then we're going to fund these with indexed certificates of deposit (CDs) or indexed guaranteed investment contracts (GICs) on the liability side. This is nothing more than asset-liability management. I will not spend much time talking about the

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merits or the demerits of the high-yield bond market. We could discuss for a considerable period of time whether it is or is not junk, but let's just simply say that high-yield bonds are the securitization of private placements. To a lesser degree, they are the securitization of bank loans. So, they're risk that people in the insurance industry have been dealing with for the last thirty or forty years, and their principal attribute now is that they are a security and most of them are offered in the public market. With that caveat, we'll begin by looking at a portfolio of high-yield bonds. It's important to stress the word *portfolio*. I'm not talking about buying one or two or three issues; I'm talking about buying a diversified portfolio of high yield bonds. How many issues do you need to be diversified? If you believe the academicians, which I never do, it usually takes about ten to fifteen securities to get a reasonably well-diversified portfolio; and, if you truly want to minimize that type A versus type B risk they taught you in statistics, you probably want to have at least twenty or maybe even twenty-five securities. So, that's what we're talking about in the high-yield portfolio.

Corporate bonds trade at a spread above treasury bonds or treasury notes. What is this spread a function of? It's really two components. One is the credit risk. We can assume that the U.S. Treasury is not going to go bankrupt. They may debase the currency with inflation, but they're not going to go bankrupt. Whereas with a private credit, you do run the risk of the obligation not paying off and so you have a credit premium. In addition, most corporate obligations have either call provisions or sinking fund provisions that allow the obligation to take on many aspects of an option. This is the second corporate component of the spread. You're being compensated for the credit risk and for the option characteristic that the corporate bond might be called away from you. Over a five or six-year period the spread has ranged from as low as 180 basis points to as high as about 650 basis points, and on average it's about 350 to 400 basis points. This is the compensation you're getting to own this portfolio of high-yield bonds. Now, the idea with this synthetic asset and liability hedge, is that we're going to hedge up the asset side and the liability side and see if there's anything left over in the form of a net gain to the company. So, starting with this, we'll now look at hedging the high-yield bonds.

Drexel Burnham is closely associated with the high-yield market and our futures and options group has spent a lot of time looking at high-yield bonds. We have

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concluded that the spread between treasury and high-yield bonds, or a diversified portfolio of high-yield bonds, can be thought of as having three separate components. (1) An interest rate risk; obviously the treasuries themselves can go up and down, so you've got an interest rate risk. (2) An equity risk; you'll find that many of these high-yield bonds will perform as much like common stocks as they do bonds, and you can in fact take a large group of bonds and segregate them into ratings. You've got triple A, double A and so forth, and then you correlate those to interest rates and to stock prices. What you'll discover is that a triple A bond has a very high correlation to overall movements in interest rates and a very low correlation to movements in stock prices, and as you move down the rating category, the interest rate component will go down and the stock equity component will go up. So if you get down to a triple B or a Ba credit, you will find that movements in stock prices will generally explain as much of the movement in the prices of a high-yield bond as the movement in interest rates. (3) In addition, there is the credit risk element. We have spent a lot of time looking for relationships to things such as "flights to quality," and how one can pick those things up. Those are the three components that comprise the hedge. When you put together this hedge, you're trying to get the head side of the portfolio to move in fairly close approximation with the underlying spot market interest instrument; the relationship is not perfect. No one is claiming that it's perfect, but there is a correlation of about 85%, which is pretty good, and over time they generally tend to move together. That's really the key. If you can find something in which you have some degree of confidence that they move together, then you can use that as your hedging vehicle. Our results suggest that a diversified portfolio has a correlation of about 85%.

So, in hedging, what is it that you're trying to do? If you have a treasury bond and you're long a treasury bond, and then you short a treasury bond future against it, basically you have reduced the duration of your original treasury bond down to the functional equivalent of a three or six-month instrument. When you own treasury bonds, and then sell futures against them, you're shortening the duration of the combined portfolio; and if you do it properly, it will then yield you approximately a three-month treasury return. The idea of hedging up the high-yield bond portfolio is to move the duration down to something commensurate with commercial paper, but we want to see how much of the credit premium that you got from the high-yield bonds will remain down here at the short end of the portfolio. So, what we're trying to do is to see how

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much of the credit premium you get once you put the hedge on. Our results suggest that it works pretty well. If your high-yield bond portfolio is yielding about 11% or 11.5%, we have found that, if you hedge this thing up, you then end up getting a yield of about 8.5%. Well, 8.5% is a lot better than the three-month treasury bill. So, with the idea of that credit premium out there in the high-yield bonds, you're not going to get all of it if you hedge it. But our results suggest that you can capture a good portion of it.

Consider this example of an actual portfolio that was brought to us at the end of January 1986 by an insurance company willing to be our guinea pig. The overall return of not hedging over this period from January 1986, through the middle of March 1987, was a return of about 21.5%. In this particular period if you hadn't hedged at all, you'd have been better off. You don't want to hedge if you know it's going to be a bull market. The problem is that you don't know if it's going to be a bull market. This happened to be a period in which bond prices in general rose, although I should point out that it was a period in which the spread between treasuries and high-yield bonds actually widened. There was the Ling-Temco-Vought bankruptcy last summer, and then there were some well-publicized problems with insider trading last fall; and so it was a period in which the spread generally widened.

Suppose you just took all of the bonds in your portfolio and asked your local rocket scientist to calculate the weighted average duration of the portfolio, and then hedged it on the basis of duration using just treasury note futures or treasury bond futures. When we did that over the same period you got approximately a 6% return, which was approximately what treasury bills yielded over this whole period. So, by hedging it on a certain basis, you gave up all of your upside potential and took in the short-term 6% rate of interest.

Now let's see what happens using the risk-adjusted hedge model that we developed at Drexel. (I'm being a little circumspect as to exactly what the model is comprised of because hopefully everyone is going to be interested enough that they're going to call me up and want to find out more about it. It is proprietary for our clients. We're not going to say that this is the black box and you just give us the bonds and we'll hedge it up for you. But futures contracts and options are relatively homogeneous and one could use a discount broker as well as us, and so what we have to offer hopefully is this hedging model that

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seems to work.) The result from our group was that the hedged return of the bonds over this particular period was a total return of about 12.25%. These were the actual results for a portfolio. The insurance company is extremely happy with it and they are in the process of expanding the program. With other portfolios or in other circumstances you might not do that well.

That's the asset side. Now we'll move over to the liability side. We're going to talk about something that's received a little bit of notoriety lately. It's a fairly new idea, but it too is nothing more than a synthetic. The idea is for an indexed CD. Those of you who are located in and around the New York area know that a major commercial bank in the city about a month ago announced an indexed CD. If you bought the CD from them, they agreed to give you a certain participation in any upside of the Standard and Poor's (S&P) 500. They indexed the CD on a major stock price index and in this case it was the S&P 500. You need not confine yourself to equity indexed CDs. You can do it on gold. You can do it on crude oil. You can do it on soy beans. What you need from an issuer's standpoint is an active options market so that you can hedge yourself if the market goes up. I'll give you several possibilities that you might hold as a commercial bank.

On a one-year term CD you would pay the purchasers no interest and you would give them 75% of the upside of the S&P 500. What happens if the S&P 500 goes down? Nothing. They simply earned no interest on their CD and they obviously didn't participate in the upside. Suppose they would like to get something from their money. So you agree to pay 2% interest and 45% of the upside. This is exactly what Chase Manhattan is doing. They are offering their depositors the possibility of participating in some of the upside of the stock market in return for taking a lower rate of interest up front on the CD. In our example the cost to the issuing institution is 6%, and by changing these configurations you can offer different terms depending on what depositors want.

Since most of the people in the audience are representatives of insurance companies, let's look at it from the standpoint of a guaranteed investment contract. We'll lengthen out the term a bit because this is one of the attractive features. The longer the term, the longer you can give the GIC holder participation in the upside potential. In the previous example, on a one-year term with no return you could give only 75% of the upside on the S&P 500. But, in the case of a

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four-year term, if you give no interest, you can give 135% of the upside of the S&P 500. Or on a 2% basis you can give 95%. How you figure out exactly how much you can give the investor depends on how the current market is pricing an option. You, as the institution, would want to buy S&P 500 options or gold options or whatever, as your hedge against the particular instrument going up, so that your GIC holder could in fact participate in it.

Now let's look at the whole thing when we combine it. We're back to both sides of the balance sheet. We know that on the asset side, the first thing you do is purchase the diversified high-yield portfolio. You then hedge the high-yield portfolio with an expected return of, let's say, 300 basis points over T-bills. The example I showed you before did considerably better than that, but let's be conservative and assume that you can in fact capture 300 basis points. Then you have an expected return of about 8.75% assuming a 5.75% T-bill. Then you move over to the liability side and you issue an equity, let's say a one year CD, and you give them these three different opportunities. Finally you want to hedge yourself with an "all in" cost of 6% on the liability side.

Now, what have you done? You've got 875 basis points on the asset side, not 100% guaranteed, but I think you can be fairly confident that the portfolio will earn something very close to that, and on the liability side you've fixed yourself in at a cost of 6%. You've picked up a spread of 275 basis points using this approach. We've shown how to hedge up both sides of the balance sheet and create synthetic assets and synthetic liabilities, and, by doing this on a relatively prudent risk management basis, not give away all of the return.

I'd like to point out that this is only one of what is now getting to be an almost infinite variety of products that institutions can use based on futures and options and similar obligations. Many recent MBAs and PhDs come out of their universities very well trained and comfortable in these kinds of obligations, and I think you're going to find that the market will become very competitive as everyone comes out with more and more new ideas. I would strongly suggest that you begin to look at some of these ideas, because futures and options have been around for only ten or twelve years, and in my business we are now where the automobile industry was in about 1920 or the computer industry was in 1960. The markets are getting very large. We're moving now to globalization of

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security markets, and the kinds of techniques I've discussed are going to be used increasingly.

MS. DIANE WALLACE: Dr. Mains, I must admit that I was quite awed by your presentation. The techniques you discussed must certainly be helpful in managing investment risks, but I confess I know too little to absorb what you've said the first time through. I look forward to reviewing the tapes!

Since I have now admitted that I have absolutely no knowledge about managing investment risks, I'd better tell you why Jay invited me to speak on this panel. I am here for those of you who share with me a lack of knowledge about options and futures and hedges and so on. What can you do to manage investment risks? Why, of course, pass them to your reinsurer. And I can tell you a little about reinsurance.

Reinsurance will be a solution in a relatively small number of situations, so I will devote an appropriately small amount of time to it. However, it can be useful at times. More and more of the products we're selling today depend on successful investment strategies to be competitive in the marketplace and to produce a profit for the selling company. And, after a fairly long period of level and moderate interest rates, except in recent weeks, companies are again becoming concerned about the possibility of disintermediation if rates should rise again. It doesn't take very long for market value declines to wipe out any possible gains that a company might realize from surrender penalties. So it is important for a company to be concerned about managing its investment risks.

With investment performance as much or more a factor in profitability as mortality, some companies have been looking to their reinsurers to help manage this challenge. Traditional coinsurance is the most straightforward way to accomplish such an investment risk transfer. The original company hands all the premiums over to the reinsurer. The reinsurer grants the original company an allowance to cover the expense of administering the business, and invests any remaining cash flow. When it comes time to pay the claims, the reinsurer simply reimburses the original company. In this arrangement, the original company knows fairly well at the outset what its expected profitability will be from the ceding allowance. The reinsurer, on the other hand, must manage the investments wisely in order to make a profit. The ceding company has effectively passed the

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investment risk (among others) to the reinsurer using the most traditional form of reinsurance.

This approach must, of course, be refined a bit when the product involves the crediting of interest at a changing rate. How does the original company know how much to credit its policyholders on a universal life policy, for example, when it is the reinsurer who is investing the funds? In order to avoid controversy, it is important to develop a method beforehand. One approach that I have seen work is that the original company and the reinsurer agree in advance to credit interest according to a formula based on a published index: T-bills plus a certain number of basis points, for example. If the reinsurer invests well, it keeps the difference; if not, the reinsurer eats the loss. This is an easy approach, but it may not allow the original company the flexibility it needs to reflect market conditions in its crediting rates.

A refinement to this may be developed in a second approach. I have seen this work as well. Assets held by the reinsurer to back the product are identified and segregated, in a trust account perhaps. The reinsurer promises to credit policyholder interest at a rate that is an agreed upon margin below the reinsurer's actual investment return earned in the account, but perhaps not less than some guaranteed minimum itself based on an index. In this type of agreement, the original company protects its policyholders from its reinsurer's poor investment performance, but allows the policyholders the benefit of all positive experience over the index. Of course, the reinsurer has given away its upside potential, so it will most likely charge more for the arrangement.

We've talked about how to make coinsurance work on interest-sensitive products, but what if the original company wants to keep and manage the assets itself? Most companies selling annuities and universal life today are really selling their investment expertise, and they don't want to give that function to a reinsurer. They believe they have the magic formula for beating the market. We've devised a reinsurance program that can help this company lower its investment risk as well. Incidentally, this treaty was originally conceived to allow companies to obtain surplus relief on interest-sensitive products. The New York Insurance Department had expressed the requirement that investment risk be transferred to the reinsurer in order for the surplus relief to be acceptable. So, we designed



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a treaty to pass investment risk, which is, of course, a form of investment risk management, the goal of this session.

The reinsurance is quite tricky to implement, because the reinsurer is relying on the ceding company's investment returns for the revenue it needs to cover its benefit obligations. Therefore, many safeguards and controls are built in to protect the reinsurer, while still leaving the ceding company flexibility in managing the portfolio.

The reinsurance covers a quota share of interest-sensitive products issued by the company. Under the terms of the agreement, the ceding company will maintain a segregated asset portfolio into which all revenues from the reinsured block will be invested and out of which all benefits will be paid. The securities initially in the segregated asset portfolio must have cash flows appropriately matched to the expected benefit outflows, as determined by a formula in the reinsurance agreement. A quota share of the segregated asset portfolio will back the reinsurer's obligations under the treaty. In each accounting period, the reinsurer's quota share of cash from coupons or dividend income and from asset maturities will be payable to the reinsurer for use in paying their share of benefits during the accounting period. If investment income and matured assets exceed benefits during the accounting period, the excess will remain in the segregated asset portfolio for reinvestment.

If the cash flow is less than the benefits during the accounting period, the reinsurer will pay cash into the portfolio to make up the difference. Any cash so paid will be recoverable by the reinsurer out of excess cash flows in future periods. This aspect protects the ceding company from having to liquidate assets under adverse market conditions, which is one of the major risks in today's products.

The company may continue the reinsurance until all insurance covered by the agreement is no longer in force. If it does leave the reinsurance in place, the ceding company is protected against the possibility that its assets will run out before its benefit obligations run out. This could happen, for example, if reinvestments were made at a rate lower than anticipated in the product pricing. Thus, the second major investment risk is also covered by the treaty.

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However, the company also has the option of early recapture. On a termination due to recapture, a terminal experience refund will be calculated. If the reinsurer is in a loss position, the ceding company will reimburse the reinsurer for any outstanding cash invested in the portfolio, accumulated at interest.

In order to induce the reinsurer to take on these risks, we created an incentive for the ceding company to manage the assets in the portfolio appropriately. To help accomplish this, the portfolio is set up in the amount necessary to cover 100% of the block, not just the quota share ceded to the reinsurer. Then, the reinsurer and the ceding company share pro rata in the investment performance of the assets. Since the ceding company has an interest in the results, it is encouraged to manage the assets appropriately.

Another wrinkle to protect the reinsurer was developed so that the ceding company would be allowed to trade assets freely. The ceding company can choose to leave all the purchased assets in the portfolio until they mature. If any asset matures for an amount less than its par value (for example, because of default), the reinsurer is charged for its full share of the capital loss. However, if the ceding company chooses to trade any asset before maturity, the reinsurer will not participate in the resulting capital gain or loss. If assets are traded, the portfolio will again be subjected to the asset/liability matching test, so that the reinsurer is assured that the trading did not affect the security of the portfolio. This provision gives the ceding company the flexibility it requires in its investment activities, while at the same time protects the reinsurer by forcing asset selection appropriate for the liabilities that the reinsurer has assumed.

The ceding company under this program truly passes investment risk to the reinsurer. If cash flow during any period is insufficient, the reinsurer must make up the difference. If total return over the life of the insurance contracts is insufficient to cover promised benefits, the reinsurer suffers the loss. The contract also balances this coverage with protections for the reinsurer which force good management habits on the ceding company. We think this is a nifty way to solve an investment risk management problem.

It occurred to me while listening to the last speaker that the investment risks now borne by the reinsurer through this type of contract could be minimized or

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possibly eliminated by taking advantage of some of the strategies outlined by Dr. Mains. A single, small company may not be of the size or sophistication to apply the techniques suggested, but many companies ceding to one reinsurer could together take advantage of the reinsurer's ability to apply hedging strategies to control the risk. I will be interested during the question and answer period to ask our guest from Drexel his thoughts on this idea. We might be able to create a new reinsurance product here!

MR. HOWARD H. KAYTON: Diane, I assume you're getting a fee for this reinsurance from the ceding company, but it also seems that it's going one way. If the pool is producing a profit, the ceding company could eventually transfer out and keep the profits. So, you're participating in losses but not participating in gains. Is that true?

MS. WALLACE: To a large extent that is true. The reinsurer would take into account in setting its pricing that it has very little upside potential, although the treaty could be structured to allow the reinsurer to participate in some of the upside if it were a particularly risky portfolio of assets. The control that the reinsurer has is in making sure that the initial portfolio is acceptable to it and at the least will provide sufficient positive cash flow to cover the benefit. Also, if the ceding company does choose to take back the business, it would have to make the reinsurer whole at that point because that would be a one-sided choice on the part of the ceding company. The reinsurer would never be allowed to terminate the agreement at its option.

MR. KAYTON: Approximately how much reinsurance have you done of this type of treaty?

MS. WALLACE: We have worked on four different reinsurance programs on this basis. It's just something new that we've started this year, so the volume is not great at this point.

MR. NICHOLAS BAUER: In listening with great fascination to Dr. Mains' presentation, I ended up with the impression that it's just too good to be true. A 275-point arbitrage with seemingly no risk is manna from heaven. I presume that there are risks attached and therefore I'd appreciate if Dr. Mains could

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balance up and point out some of the downside or problems that the company is undertaking in following the kind of strategy that is recommended.

DR. MAINS: One of the things I was trying to emphasize in my comments was that it was not a risk-free strategy, but that it was a managed risk strategy. I think the degree of the arbitrage that ended up in my example suggested that the risk associated with it made it attractive. Now, what could go wrong? On the liability side, very little. Your ability to hedge yourself when you issue liabilities of some kind of GIC or CD could encounter one problem: when you buy an option, you know everything except volatility. You can get changes in volatility that might raise or lower the cost of the vehicle. Let's say you buy volatility of 18% which just happens to be where the volatility of the Standard and Poor's futures contract has been thus far in 1987. If in fact your four-year period volatility averaged 22%, then your cost would be somewhat greater than the 6% that we used as our example. How much greater? Well, it might be say 6.5%. It might be at worst 6.75%. So, the risk on the liability side is essentially that of misestimating what the volatility is going to be. We've done a lot of work on this issue of volatility. Just out of mere curiosity on my own part, I went back and measured the volatility of stock prices for the entire 20th century; I like to look at things over very long periods to get an idea. The volatility that came out was 13.8%. This suggests that the longer the obligation that you are using in the GIC or whatever, the more likely the volatility is going to revert toward some sort of historical mean. So, from an operational standpoint, I would probably use some level of volatility that allowed a bit of a cushion, but certainly not too much cushion, because then you're basically just overinsuring. So, that's your main risk on the liability side.

On the asset side, you have a portfolio of high-yield bonds, and there's a very large and growing amount of literature, both academic and sponsored by various investment banking and commercial banking firms, that shows you the default experience of holding these credits. Your selection method could be that you choose a 20-bond portfolio with a long-run expectation of at most one of them going into default. So you could have two or three of the issues actually defaulting, in which case the risk premium that you would be earning, whether it be hedged or unhedged, would be diminished. So that is certainly a risk. You have the additional risk that the spread between the corporates and the treasury obligations will widen or narrow. I want to come back to the idea that Dale

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mentioned. When you're dealing with risk, you have to look at it as both your friend and your enemy. If the spreads move in while you have the hedge on, that works in your favor; and if the spreads move out, that works against you. So, you can't say whether it's going to be favorable or unfavorable. All you know is that your principal area of risk on the asset side would be the spreads changing in an unfavorable way, or having too great a default experience.

MR. ROBERT J. CALLAHAN: Diane, you mentioned working with the New York Insurance Department on this treaty. It's my understanding that, unless the reinsurer and the reinsured are affiliated, prior approval of reinsurance contracts is not required by the New York Insurance Law. It's also my understanding that Regulation 102 on surplus relief does not require the prior approval of any reinsurance contract which is not prohibited by that regulation. Yet you mentioned that you worked with the New York Insurance Department to get the New York Insurance Department approval. Was this approval voluntary on the part of the two parties if they were not affiliated with each other, and was the purpose that you could then go to other clients and say here is a product that will comply with New York's regulation?

MS. WALLACE: Thank you for your question, Bob. It was not my intention to imply that any particular treaty has been approved by the New York Insurance Department, and I apologize if I gave that impression. I only meant to say that the source of the idea for transferring investment risk was derived from conversations with the Department, who indicated that investment risk must be transferred.

MR. CALLAHAN: Once again, why if prior approval was not required, did you seek that prior approval?

MR. NOVIK: Approval may be a bad choice of words since it does have a more legal definition. This approach to reinsurance was discussed by Meyer Baruch last week at a meeting of the New York Actuaries Club. Rather than approval, we're talking about an approach that in concept will comply with 102, as opposed to some other approaches which the Department has indicated in concept will not comply with 102. Is that accurate?

MS. WALLACE: I hope that responds to your question.

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MR. CALLAHAN: Regulation 102 did not require prior approval.

MS. WALLACE: That's correct. I agree.

MR. CALLAHAN: To avoid being criticized after the fact, you sought to get Departmental clearance.

MR. NOVIK: Right. Rather than have a possibility of a large impact on surplus years later, I think there were conceptual level discussions to assure all the parties that the reinsurance program appeared to be in compliance with New York's requirements.

MR. CALLAHAN: There are companies who do seek a prior reading, even though they don't have to, so that they won't be criticized later on.

MR. NOVIK: Right, but we can't do that in concept. That has to be a very specific situation. We do not have any pen of approval of the New York Insurance Department on the program. But as I said, it was discussed by Meyer Baruch last week, and he indicated that this approach, if properly implemented, would in concept satisfy Regulation 102.

Dale, you mentioned that you were involved in GIC pricing. Can financial futures be effective as a method of testing GIC pricing? Can you look at the market as a way of validating your implicit options?

MR. WOLF: You certainly can, but the futures price is not necessarily the bench mark. I tried to point out earlier that in any of our products we're pricing, we really ought to be aware of what value the market is placing on the options, the interest rate forecast, and the credit spread. Before we start deviating from what the market says, an objective market assessment of all our pricing is absolutely fundamental. That is definitely the place to start. If you don't know how much you've really said, "I can add value to this transaction because I'm good at something," then you have not properly analyzed your financial risk as a company.