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## Session 48PD

### No Place to Hide—Consolidating Insurers' Exposure to Equity Market Risk

**Track:** Investment

**Moderator:** JOHN P. TOOHEY III

**Panelists:** SANDEEP BIDANI†  
JOHN P. TOOHEY III  
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*Summary: Insurers are faced with equity market risk in many unexpected places. Developing principles of enterprise risk management can help insurers identify, consolidate and control this exposure. This management trend cuts across traditional functional lines.*

*Presenters discuss tools for measuring and managing equity market risk within the diverse activities of a multiline insurer. Sources of risk include the following:*

- *Direct and off-the-balance-sheet investments;*
- *Fee revenue for variable products/asset management businesses;*
- *Guarantees in long-term savings product;*
- *Pension costs; and*
- *Access to capital markets.*

**MR. JOHN P. TOOHEY III:** I'm your moderator for today's session, "No Place to Hide—Consolidating Insurers' Exposure to Equity Market Risk." I'm fortunate to have with me today Sandeep Bidani from Bear Stearns and Linyi Zhang from Milliman USA. The Society asked me to refer the audience to the SOA Antitrust Disclaimer on page 10 of the final program.

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Let's begin with introductions. I work for AIG Global Investment Corporation (AIGGIC), which is a registered investment advisor; in other words, we manage money. The group I work in is called Global Risk Management, and one of our primary responsibilities is asset allocation. AIGGIC manages all of AIG's insurance company money worldwide and also manages third-party assets.

**MR. SANDEEP BIDANI:** I work at Bear Stearns in the equity derivatives group, and I've been covering insurance companies for the last seven years or so. I have a confession to make: I'm not an actuary, but I'll try to live up to your high standards. We certainly look forward to talking a little bit about risk in the markets today.

**MR. LINYI ZHANG:** I work in the Milliman USA life practice in Chicago. The majority of our work is mergers and acquisitions with some pricing work. I've been in the company for 2.5 years, and in the past year I have been involved in many hedging projects.

**MR. TOOHEY:** I'll begin with today's agenda. First, we will explain what we mean by "no place to hide." Then we will talk about identifying the different equity market risk exposures of insurance companies. Finally we will talk about how insurance companies can measure these exposures and means that they can use to manage and hedge these exposures.

Let's start with "no place to hide." It's been a difficult couple of years for insurance companies, and the equity market decline has been a big contributing factor. I've listed six ways that the equity market decline has impacted insurance companies. It has reduced capital, reduced earnings, reduced their dividend capacity, impacted their ratings, impacted their access to capital markets and impacted liquidity. The decline in capital has been most pronounced for the European insurers, which have held bigger equity positions on their balance sheets than U.S. insurers. The decline in capital has forced many companies to raise additional capital. It has prompted them to prioritize their risk-taking activities, and, in some situations, it has led insurance companies to sell noncore businesses. It has also greatly reduced earnings. For public companies, it has impacted the stock price. For mutual companies, it has impacted policyholders in the form of reduced dividends.

The third topic, dividend capacity, is a reference to the fact that insurance companies are structured generally as holding companies with insurance company subsidiaries. The way that the holding company gets cash from the subsidiaries is via the dividend mechanism from the subsidiaries, and the ability to pay dividend money to the insurance company parent is subject to certain statutory regulations in the jurisdiction where the company is domiciled. The decline in the equity market has impacted insurance company subsidiaries' ability to pay dividend money to the parent.

Many insurance companies experienced ratings downgrades in the past couple of years. Others have been compelled to take certain actions to avoid downgrades. On top of that, either the downgrade or the threat of downgrade has impacted new sales of certain products. Some insurance companies have even had to post collateral due to their reinsurance contracts or derivative contracts.

It's more difficult for companies to raise debt financing in the capital markets if their ratings get downgraded. On top of that, some reinsurers have had difficulty renewing or expanding their letter-of-credit programs with banks.

Finally, equity declines have put a strain on insurance companies from a cash-flow perspective, because sales of equities have produced less cash.

So how do you go about identifying equity exposures? We considered four categories. The first category is assets supporting insurance company liabilities. The second is insurance liabilities. The third is noninsurance exposures, and the fourth is correlation risks.

When people usually think of equity market exposure, they think of direct holdings of common stock on a balance sheet. Our definition is going to be a bit more encompassing than that. It includes common stock holdings, both affiliated and nonaffiliated, but it also includes other asset exposures. The first exposure that I refer to is securities linked to common stock. This could be in the form of structured notes that are owned by an insurance company, where an insurance company has an option-like exposure to the equity market. It could also be an asset-backed security, where the underlying special-purpose-vehicle trust holds equities in the certificates that are issued by that vehicle. The certificates are held by the insurance companies and have an exposure to the underlying equity collateral. The third is convertible bonds, which have equity warrants embedded in them.

Private equities are just privately held equity holdings. The primary means of realizing value from private equity investments is in initial public offerings in public equity markets, and if the public equity markets are in a decline, the value of private equity will likely decline.

Next are equity tranches of collateralized debt obligations (CDOs). What do I mean by CDOs? By a CDO, I refer here to any securitization of financial assets where the assets are put in a trust and the cash flows are allocated according to a scheme, typically referred to as a waterfall. The capital structure in a securitization generally has senior, a mezzanine, and junior classes (the equity holdings). The equity holdings will be highly correlated with the public equity markets.

Finally, below-investment-grade debt has a component that is tied to the equity market.

Most actuaries are familiar with insurance liabilities. Fees from variable products, e.g., variable annuities, are tied to the equity market as a portion of the assets are allocated to equity funds. Also guaranteed benefits in variable products depend on equity market performance. The GMDB stands for guaranteed minimum death benefit, the GMAV stands for guaranteed minimum account value, and the GMIB stands for guaranteed minimum income benefit.

Even policyholder behavior has come to impact insurance company exposure to the equity markets. In the recent bull market, variable annuitants and variable life policyholders transferred their money out of fixed income funds into equity funds.

Finally, to the extent that the equity market decline impacted the credit worthiness of reinsurers, and direct writers are reinsuring some of the business with reinsurers, the direct writer is seeing an impact in the terms of a reinsurance recoverable that has a lower rating.

Let's move on to noninsurance exposures. Some insurance companies have large defined-benefit plans, and they're funding these defined-benefit plans in a significant allocation in common stocks. Also, many insurance company parents also have asset management or consumer finance subsidiaries, whose performance is heavily tied to the equity market.

Lastly, there is correlation. In a period of equity market declines in a recessionary environment, interest rates generally decline. Many insurance companies have written products that have minimum interest rate guarantees. Also in a recessionary environment, the economy will experience more defaults. Thus many insurance companies have been faced with a triple whammy.

**MR. BIDANI:** We wanted to first identify the risks on the asset and the liability side. I think John has gone through some of the variable-product-type issues, GMDBs, mortality and expense (M&E) fees and others. We are now going to focus on the measurement of these risks. The third step would be the actual management of these risks. It's a three-step process. The first is to identify the risks. Linyi's background is on the measurement side, so he can focus on that. I've dealt with a number of insurance companies on the hedging programs they're putting in place, and that's the third step of this process. Now I'll hand it over to Linyi.

**MR. ZHANG:** Interest-rate risk is nothing new to actuaries, and they have been dealing with this risk for a long time. However, with the recent downturn of the equity market and also with the large-scale sales of variable annuities with guaranteed benefits attached to them, more and more companies are now paying attention to the equity exposures they are facing. No doubt those aggressively priced guaranteed benefits are really hurting the companies' bottom lines. Also, the credit rating agencies are looking at what the insurance companies are doing to limit or reduce their exposures to guaranteed benefits. First I'm going to talk about some practical tools to evaluate those guaranteed benefits.

Models consist of two components. The first component is fund modeling, and the second is an option-valuation system. Basically those guarantees are options, but they don't have a very nice closed-form formula for pricing. With today's relatively cheap computation power, we can use a large-scale Monte Carlo simulation model to price those options.

Why do we need fund modeling? It is not unusual for a large life insurance company to have more than 100 variable annuity subaccounts. It is not realistic to put all of these funds into the model, first because we don't have enough data points to generate a reliable correlation matrix. The second reason is model speed. We have to realize that all the Monte Carlo models require heavy computational power. A constrained regression model works well. The basic idea is to convert each variable annuity subaccount into a unique set of a limited number of common generic indices, so that the historical performance of the basket of indices closely follows the performance of the subaccounts. After we have done this fund modeling, we will get regression parameters for each subaccount, and if we apply those regression parameters to the policy-level-fund information, we can map money invested in subaccounts into generic indices for this policy. This mapping simplifies our modeling process and speeds up the model.

The next question is: How well do those models perform? It turns out they work pretty well. One way that we can check is if we look at the aggregate weighted average of the multivariate coefficient of determination ( $R^2$ ), the percentage turns out to be somewhere from 80 to the lower 90s. Condensing a lot of subaccounts to a few indices, and achieving  $R^2$  with an average of somewhere from 80 to 90% is quite efficient. A concern would be whether the models have any bias. You can check the average of error, and normally it's close to almost zero, so that's not a big concern. If you also look at a graphical display of the basket performance versus the subaccount performance, the graph tells you that they're quite close to each other.

A further benefit of the fund modeling is that if the company applies the same technique to each fund-transfer transaction, the company can watch or monitor how much money is moving out of the active equity funds into bond funds. A very interesting observation that we made in one of our clients' work is that there are noticeable transfers in September to fund 1 and in July to fund 2. The September fund 1 transfer is due to the September 11 events. People just suddenly get more conservative, and the July fund 2 transfer is probably largely due to the fact that the policyholders received a very unexciting first half-year fund performance report, so they decided to move money into bond funds.

After we do fund modeling, we're almost ready to do the simulation. In this phase, we basically want to place a price tag on those guarantees. There are three steps to do this. The first one is generating paths. Basically, after fund modeling at the policy level, we can run the stochastic generation of random paths with the reliable correlation matrix of generic indices and use that as a proxy for the subaccount's

performance projection. The standard stochastic model uses the geometric Brownian motion process, or, if you prefer, you can also use a more complicated model like regime switching. Based on the single path that you project, you can calculate the payout at each path. The net present value of the claim minus the premium is just the net present value of payout for the single path. The final step is to average the net present value of the paths, to obtain the option values.

Now we are prepared to evaluate those options embedded in the guarantees. I also want to discuss the delta equivalent. What is delta? Delta for the option is basically the change in option value due to a change in the value of the underlying assets. Delta can be determined using the option valuation system. We adjust the starting index value up and down by a certain percentage, revalue the whole portfolio - option value, and then calculate delta from there. In practice, the market will not wait for you to recalculate the delta based on market performance and then decide whether to trade or not. What the company can probably do is a nightly valuation: they shock the index level based on the prior ending-day index level up and down over a wide range. Then at each index level, re-evaluate the portfolio, get an option value, and then calculate delta from there. Basically, a trading grid is generated beforehand and then the next-day transaction can be made based on that.

**MR. BIDANI:** I would first like to go through some of this management information, and then we can come back to earnings, because I think what we want to do is show that there are specific methods you can use to effectively hedge yourself against some of these risks.

One thing John mentioned earlier was the embedded fees in variable products. The second was the benefits, like the GMDBs, that are embedded in these products. I'm going to try to relate those two specific structures in the delta-equivalent measure that Linyi referenced. I'll take an example of M&E fees. If you have a variable product, there's a certain M&E fee that you're going to be expecting. Obviously, as the equity markets go up, your fees go up. However, as the markets go down, the fees that you record can decrease below your expected fee. There are three ways to address this risk. One is to decide that you don't believe the markets are going to go down, so you don't use any risk management method at all. You just say, if the markets go up we'll make money; if they go down, we'll take the hit. This is what I think some companies have done to date.

The second way, which was around up to about three years ago, was a form of protection reinsurers were actually offering against this risk. We were coming across people selling this protection on the equity markets for five or 10 basis points a year on the annuity premium, which from an economic standpoint didn't make much sense from our option-pricing standpoint. Three years ago, these sorts of guarantees that were being offered by reinsurers disappeared, so that second avenue has been cut off. The third avenue has been to use some derivatives to hedge the risk. One approach is to buy a put option on an index, chosen based on the account mapping. Basically, the put option will give you a payoff if the equity

markets go down. Equivalently you can say, I'm going to delta hedge this, which means that you're going to manage using something called futures—Standard & Poor's (S&P) futures or other index futures—where essentially you trade in futures such that your payoff is going to reflect the change in the value of your fees or GMDBs or whatever the underlying exposure is. The concept is that if the markets go down, you want a positive payoff, and in this case you go short futures. The question is: What's the amount of futures you go short, such that your change in value of the underlying exposure is equal to your futures hedge? That's what we meant by delta. If the markets are down by 10% and your fees are down by two percent, you want the payoff on your hedge to be two percent or somewhere in that area. You can use these futures in a program that you dynamically manage every day, using futures. That's the simplest transaction.

I think we were saying that using generic index futures virtually says, if you have all these subaccounts with some group funds, some income funds and a bunch of others, you try to get some form of consolidated-futures instrument that you can use to hedge that portfolio. The rationale is that it's a lot cheaper to do something on an index future basis. You could try to manage delta hedging on individual stock baskets, but that gets quite expensive, and from an operational perspective it's pretty complicated. Using generic futures generally is one of the simpler ways to do it.

I spoke to a number of insurance companies, and at least four companies have been doing delta hedging using futures on their GMDB exposure and a couple on their M&E fees for the last three years. Another company has just initiated a self-pilot program on a small component of the GMDB exposure, so people are now starting to get into it first using futures on an exploratory stage. There are a couple of companies that are much more advanced in doing this. There are a lot of other companies that haven't really hedged this, and as you've seen in the press, they have been hurt substantially. That's the first component, delta hedging.

The second format is on the option side. A number of insurers say, "We don't want to be in the business of trading S&P futures or other futures every day." You can buy options, and these options could be put options or put spreads or put spreads with call options that you sell. The idea is, depending on how much you want to pay to get a certain amount of downside protection, certain structures can be provided to you. Say that you wanted to buy put options struck at the money, so at today's market levels you want to guarantee any downside from today's market levels over 10 years. If you buy a strip of put options struck at the money today, expiring at one year or two years, three years, all the way up to 10 years, the overall cost is about 20 basis points a year on that annuity program. Mathematically over 10 years it's about 200 basis points, so the cost of buying that protection is certainly there. Unfortunately, in most cases it's not embedded in the underlying policy, and so a number of these GMDBs have been provided to annuitants, but the actual costs haven't been calculated. That is just an example. There are other structures you can use. Instead of using put options, if you don't think the market is going to

go down more than 10%, you can buy options called put-spread options, and the idea is that you buy a put option that struck at today's market level and you sell another option that struck at 90%. The rationale is, you're now guaranteed 10% downside protection and that's it. If the market moves down five percent, you get a five-percent payout. If it moves down 10%, you get a 10% payout. If it moves down 20%, you get a 10% payout. The maximum you can get is 10%, so obviously you're getting less downside protection. You're getting some, but it costs you less. From a pricing perspective, put spread costs you something in the neighborhood of five to seven basis points a year, versus the 20 basis points a year that you had on the put options. That's another structure that's out there.

You see a ratchet feature in some annuities; I am going to use the GMDBs as an example. Depending on the market value of the account, the amount that you get in the event of death may be higher. It's reset every year. Those are slightly more complicated products, but we've talked to a number of companies about these products. They are solutions, but the cost of that relative to the cost of a simple put option is a little more, which should give you a perspective. If you had an annuity where the GMDB benefit gets reset every year to the higher of the market value or today's value, then the cost of that is somewhere in the neighborhood of 30 to 35 basis points a year. You're going to have put spreads at five to six basis points a year, you have put options at 20 basis points a year, and now you have these ratchet options at 30 to 35 basis points a year. The idea is that in using these options, you can create a hedging mechanism for your exposure going forward to the market. If you have a new block of business coming in at the end of the month, then you set in place a program for that new block going forward 10 years. Basically it's a continuous program that would work. It's still going to cost you something, but depending on what the view is internally, you can put a program in place. You have some correlation risk between the hedge you put in place and the account value, because if you do it on, for example, the S&P, the NASDAQ, etc. versus the subaccounts, you may have a tracking-error risk.

Another approach that is gathering a fair amount of interest in the market today is trigger hedges. You have specific structures provided where the payoff is linked both to the equity markets and the fixed-income markets. The rationale actually comes up from the pension fund community that John had mentioned. The concern about underfunded pension funds was in the press for a while. As interest rates come down and liabilities go up, as the equity markets go down, your assets are going down too, so it's a bit of a problem. You want to try to create a hedging structure such that your payoff is linked to both the bond return and the equity return. The concept is you can buy some put spread option on an asset where the asset is the bond return minus the equity return. If bonds outperform equities, you get paid. That structure is gathering a lot of interest, and a lot of people have asked how this works, and can you set something up? The rationale really is to correlate the equity components with the fixed-income components, so you don't have two separate hedges in place. You have one hedge in place.



Just to give you an idea as to the pricing, it's not expensive if you take a three-year structure and price it at the money and 90%, it's a 190 put spread. However, it's not on an equity index; it's on an asset that is qualified by bond returns less equity returns. The equity returns could be S&P. The bond return could be based on the return after 10-year constant maturity Treasuries or whatever assets you want to choose. It's another asset class and another structure that we think especially pension funds and other insurers would be interested in.

In terms of hedging, the fourth component is reinsurance. On the reinsurance side, I don't think that many reinsurers today provide pure protection on the equity market as pure funds in the market, but I think some reinsurers will work with brokers in setting up reinsurance contracts for insurance companies. Now, instead of an insurance company asking a broker to sell puts on the S&P—and that would be an over-the-counter contract whether it's collateral and other stuff involved—there might be something where companies ask for a reinsurance contract such that the protection is provided through the reinsurance contract. Reinsurers are getting involved in that business, so that's certainly something that we are seeing. The pricing on that is certainly going to depend on the pricing of the underlying options themselves, so it's the option price plus X, whatever those basis points are.

The fifth component is securitization. I haven't seen much of that happen. I know that a number of the mutual funds have been securitizing 12B-1 fees as an example. This is a similar concept to the M&E fees that you get on variable attempts. With securitization, at Bear Stearns we have done some dealings with one specific company with the idea that, when you get these 12B-1 fees, you can then securitize them and sell the fee risk to investors. You're saying that you're getting your 1.25% a year, and you just want that value. If the markets go up, you don't care; you're just trying to lock this value in. I think it's something that the people would start to look at on the M&E fees on the variable products. I don't know where it goes, but I think it's an avenue worth exploring.

The last item is policyholder-behavior modeling. It's been interesting to see the reaction of people when you know you can get three-percent rate guarantee on the fixed-income side any time you want, and there's an equity fund where you can move in and out. Until about two years ago, I think most people shifted into equities. I think there are some fixed-income solutions for at least trying to lock in a three-percent rate or similar yield. Companies are searching for ways to get yield. There are certain derivative kinds of transactions you can do, including buying caps, selling swaptions, structures like that, but one of the things I've seen some companies starting to look at in insurance companies are investments in this new asset class called fund to funds. The idea is that you try to generate some market-neutral returns. A fund to fund is basically a collection of different hedge funds, and the idea is they're producing equities with market-neutral returns, then you're trying to get at least three-, five-, six- and eight-percent returns on a consistent basis. We know at least three insurance companies that have started to invest in

hedge funds for that reason. I think you'll find a number of structured products in that area are also going forward, where if you can provide companies a mechanism to invest both from a capital-efficient standpoint and from an accounting-friendly standpoint, in some alternative asset class that gives you a certain return.

Now, if you have a hedging program in place and this hedge offsets any decrease you have in assets, the concept is to make your income statement less volatile. The main question is how effective is the hedge that you have versus the underlying asset loss? It brings us to the next area, which is related to accounting issues, user derivatives and other implications that we can certainly talk about. Are there any questions on this stuff?

**MR. TOOHEY:** Before we go on, I'll just make one more comment on the measures. If you take your holdings on the balance sheet on the asset side, look at your common stock holdings and if you hold, say, \$100 of common stock, that's \$100 of exposure to the equity market. If you hold \$100 of a convertible bond, what's your exposure on the balance sheet to the equity market? It's not \$100. You have to look at the delta of the option that's embedded in that convertible bond. Then you look on your liability side, at what the delta is from the fees on the variable products and what the delta is of your guaranteed benefits, like the GMDB. You can aggregate all of those exposures from the insurance companies and any exposure from noninsurance businesses to compute an overall balance sheet exposure.

You can also consider the corresponding income-statement exposure. Under most accounting schemes, the movement in market value of a direct holding of common of stock is not going to go through the income statement. That's going to impact your balance sheet, but not your income statement. However, as the equity market declines, fees that you're receiving from a variable annuity are going to decline, and that's going to go through the income statement. For something like the GMDB, any benefits you actually have to pay are going to run through the income statement, or any reserve increases associated with those benefits are going to run through the income statement. You can't easily translate from the balance-sheet calculation to what your income-statement impact will be, so you really have to deal with two different calculations.

Let's look at the last slide on the management using hedging. If you're going to use derivatives as a means of managing your exposure, you have to take into account the regulatory, accounting, and tax regimes wherever the insurance company is domiciled. For instance, if you report using U.S. GAAP, mark to market volatility of any derivative not deemed an effective hedge is going to run through your income statement.

**MR. BIDANI:** You can use a derivative that under GAAP will be accounted for mark to market, and people are certainly concerned about the volatility that comes from that. I think one of the ways to alleviate that concern is to make sure that the

underlying asset and the hedge you have in place are closely correlated. Tests that you have to do from an accounting perspective to demonstrate effectiveness can get cumbersome in some cases and in some cases not, but that's certainly one of the challenges out there. Some companies, instead of buying the put options or other hedging instruments directly, may want to get a reinsurance contract to avoid derivative accounting

**MR. ZHANG:** As John said, when you start the hedging program, you want to monitor how effective this hedging program is. That leads to the next question, a need for the performance-attribution system. The basic idea is that you want to decompose your gains and losses from your hedging program into different components. One component could be the basis mismatch from using generic indices to represent your subaccounts. Others could be the actual-to-expected earned rate, actual-to-expected lapses and claims. Here you can use a sequential model or an independent model. The sequential model starts with the prior-period-option value. You change the factors one at a time until you get to the end of period-option value. By definition you haven't explained the correlation between factors. For the independent model, you change one factor at the baseline from the prior-period-option value, and then you quantify how much option value you change. That's how much that factor contributes to the option-value changes.

Also, before people put into place a hedging program, first they want to see how well the hedging program will perform. If they look into the future, that leads into the financial projection system. The financial projection system is also useful if you want to do some stress testing on your hedging program. It's basically a deterministic scenario. You project forward and look at gains and losses by years of your hedging program. Also, you may want to look back and do some historical simulation and see how well the hedging program can perform if you already set up the hedging program in the past.

**MR. TOOHEY:** If you have a question, please just go to a microphone and ask it, thank you.

**FROM THE FLOOR:** I have a couple of questions. First, from your experience, which strategy of hedging is cheaper: options or futures, if you consider the trading costs, the bid-off spread and the margin requirement? Second, from the point of view of FAS-133, which will give you a better, more stable earning-income statement?

**MR. BIDANI:** My view is that it really depends on the complexity of the option itself. If you have a simple option, a certain put option, you're just trying to get protection on that and that's one or two years out. All you're trying to do is buy protection. The delta is relatively easy to manage and you don't really have any model risk. From a transaction standpoint in a market that isn't very volatile, you could probably do well to use futures themselves. Futures are relatively easy to

trade, but the problem that we find in most places is you can have significant operational risk there.

**FROM THE FLOOR:** Balance of income...

**MR. BIDANI:** From an operational perspective, it's full of dents, so if the market is turning around a lot, you can lose a fair amount of your delta hedging. It's really a question that how sophisticated you want to make your operation. If you have a very efficient operation like a futures-trading group that some people do happen to have...

**FROM THE FLOOR:** Long-term capital?

**MR. BIDANI:** If you have a really very efficient system and you're very comfortable with it, I think that's the cheapest thing. Unfortunately, that's not your fundamental business. When we sell put options to people, our hedge is to go short futures. That's our business, our bread and butter, and we do it every day. From that perspective, you eliminate the operational risk. The cost I will tell you from simple put options on the S&P. When I started seven or eight years ago, the delta spreads were 40 or 50 basis points. Now it's a very, very efficient market, so you'll find five, six, seven or eight options on the S&P trading within five basis points of each other. You get full dealers, you get options that are four to five basis points, and the bid/offer spread is very tight, about 15 basis points. From an efficiency standpoint, I'd say just buying options is a lot easier. If you're very comfortable in your trading capabilities and you have a very efficient operation, you can use futures. It would probably be cheaper in some ways, but you certainly have the operational risk. The last thing you want, because of one glitch instead of buying and being sold, is that you're suddenly down 500 grand, and in futures it can happen quickly. The last thing you want is one glitch to cause you a huge problem. From that standpoint I would probably say, doing options is better. It's probably going to cost some extra basis points, but it takes away the operational risk for you, because you're locked into that contract.

The second aspect on the margin is that when you're buying options, you just pay the premium up front. On futures, you certainly have to keep track every day of your maintenance margin, four percent or whatever it is. You have to be enforcing that, and it can fluctuate, so if the market goes up substantially it will cost a lot more. It's also an operational issue. If you buy more options, it's one time, it's done and it's finished. With the margin step, if an insurance company was selling call options, it may be doing a call off; we were buying puts and selling calls. You can probably get more efficient margin terms using over-the-counter contracts for the call contracts versus doing it on an exchange or doing futures where you are selling futures. I'd say on the margin side, it's relatively easy again. For convenience and efficiency, I would probably say options, but I'm really biased. I do think, however, that it's probably a better solution, unless you have a very efficient group doing that for a living, in which case it makes sense to do futures.

**MR. ZHANG:** I think the question also concerns the finite set of indices you can use in futures. If the futures index and the underlying index for the option are the same, it really doesn't make a big difference as far as effectiveness is concerned. You're better off using options if you want to customize your own hedging structure, which you can do more easily with an option than with futures. There may not be futures in some indices that you're interested in, so that may create a problem.

**MR. TOOHEY:** Comparing capital markets hedging solutions to reinsurance, one of the nice things about the reinsurance was not just the pricing. You also benefited from reinsurance accounting as opposed to applying derivative accounting.

**FROM THE FLOOR:** Is there any difference between that and maintaining a portfolio of interest-rate swaps and futures? Please ignore the operational differences; we're not interested in that.

**MR. BIDANI:** Effectively it's the same thing, because what you're looking for is outperformance of one versus the other. If you construct it to pay off the same way, the answer is yes.

**MR. AARON SCHAFLY:** I work at Alliance in Thailand. I'm wondering what kind of suggestions you have for a market like Thailand where we don't have options. We don't have futures or anything like that, where you could really effectively hedge it.

**MR. BIDANI:** Last night I was actually working on something in Taiwan, so even though there isn't necessarily a way to effectively go short some indices, there are Morgan Stanley Capital International (MSCI) indices that are trading everywhere. In Asia there's an actively traded index market, so if you wanted to go short or long, but it's delta one, you can do that. The problem is on the option side. Being able to delta hedge exposure is a little more difficult, because it's tough to short stock in some countries and it's tough to hedge that position in some others, but if you're looking for pure outside long- or short-hedging exposure, that's certainly possible.

**FROM THE FLOOR:** It seems like the insurance companies are stuck with lower potential earnings in the future. Do you see any companies that can pass this cost down to the policyholders?

**MR. BIDANI:** Two things will happen. One is that companies will recognize that there's a cost to the embedded benefits that they are providing in these policies. With GMBDs, in the last year everyone has had to value these. We have the instance where I talked about a reset structure that, depending on whether the market value goes up, you're locked in at the higher level. There are lots of these things where the 1999 level is really high and locked in. What is starting to happen, and you'll find this in a couple of the contracts out there, is that people are putting caps on the maximum that benefit can attain, as opposed to levying a higher explicit fee.

The second thing, I think, starts to happen when we find that there's going to be additional cost charged on certain benefits that you're providing,. If you want this cost back, if you pay X basis points, those X basis points will be based on the real value of that benefit you're providing. I think that very often there has to be a reason for the insurance company to do it—maybe rating agency pressure?

**FROM THE FLOOR:** Another interesting point that I wanted to understand is, how is this going to benefit in terms of accounting, for example, deferred acquisition cost (DAC)? You're still probably going to have the DAC write-down issues unless you can show that you have profit.

**MR. BIDANI:** I think that if you have programs in place to effectively get some form of payoff when you're going to suffer if the markets go down, what you're really doing in effect is locking in your DAC value, so then there won't be a write-down if you have an effective hedge in place. The problem is, if you don't set something in place, you have to have the DAC write-downs that you've had. However, on a going-forward basis, if you were to put in place a hedge for M&E fees and for DAC, then if the markets go down, you'd have an asset from the hedging that you have in place. In effect, your DAC is really being effectively locked in. Whether companies will do that or not is a different issue, but I think it's something they're starting to look at.

**MR. TOOHEY:** I have just one other comment to your question about insurance companies passing the risk back to policyholders. I'm assuming you're referring to the fact that there are a lot of guaranteed benefits in the United States where the risk is not being passed back. In Asia in particular you'll see more of that risk being passed back in a sense that the guarantees are principal protection, in which case there's some zero-coupon bond that's providing the principal protection. The equity risk is not going to cause you to suffer a loss of principal. It's going to be a credit event because you're hedging with a bond. You'll also see what are called capital-protected products, which really means that the insurance companies are giving no guarantee. Index-linked might be another common term for these types of products where ultimately the investment risk is passed through back to the policyholder.