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STUMP THE INVESTMENT EXPERTS

Moderator: JOSEPH J. BUFF
Panelists: DENNIS L. CARR
JOSEPH E. CROWNE
LARRY M. GORSKI
MICHAEL J. MILLETTE*
Recorder: JOSEPH J. BUFF

At last, the perfect session for actuaries who are frustrated by their inability to find the right person to answer that nagging investment question in terms that an actuary can relate to. Any investment topic is fair game for this session.

MR. JOSEPH J. BUFF: This is an experimental, new session that is going to be even more experimental than planned. In the fine print for the preliminary program, attendees were asked to send into the Society office written questions that we could review and then be prepared to answer. But as it turns out, no one sent in any questions. That could mean one of two things. It could mean you didn't read the fine print or you really didn't have any questions. But if the latter were the case, why would you be here?

So we've prepared some questions among ourselves that we think are at the core of the day-to-day jobs of our panel members. We'd also like to bounce back and forth and take questions from the audience. As you heard our President, Steve Radcliffe, say earlier, we're trying to have more interactive sessions at SOA meetings.

It's possible you'll ask questions that in fact none of the experts on our panel can answer. In that case, we will try to research good answers and put them in a future issue of *Risk and Rewards*, which is the section newsletter for the Investment Section.

I am a principal with Tillinghast, a Towers Perrin company. Mike Millette is a guest of the Society of Actuaries. Mike is an investment policy officer with John Hancock Financial Services. He joined John Hancock in 1991. He's currently responsible for asset allocation, asset/liability matching, hedging, and investment policy for six portfolios. He also manages the stochastic modeling and risk-analysis team for John Hancock. Mike has published articles on life insurance profitability, performance analysis, and particularly on the Mutual Benefit collapse.

Prior to joining the Hancock, Mike was an account officer with Citicorp, working with insurance and investment companies. He graduated from Boston College with a master of science in finance in 1994. He also graduated from Cornell University with a BA in history and political theory in 1987. He's a member of the Boston Security Analysts Society and the Association for Investment Management and Research. He's a level-three candidate Chartered Financial Analyst. That means he's going to take the last test to be a CFA.

*Mr. Millette, not a member of the sponsoring organizations, is an Investment Policy Officer at John Hancock Financial Services in Boston, MA.

RECORD, VOLUME 20

Joe Crowne is a Fellow of the Society and he's also a Member of the American Academy of Actuaries. He has more than 23 years experience in the insurance industry including ten years in consulting. Prior to joining Merrill Lynch, Joe was a principal and national technical director in the life insurance consulting practice at Coopers and Lybrand. He was also, before that, a principal in the firm of Milliman and Robertson.

Other experience includes positions with Penn Mutual and other insurance companies. His relevant experience for this panel is in areas that include mergers and acquisitions and particularly asset/liability management. He also does a great deal of expense analysis, reinsurance, and general financial analysis of life insurance companies. While at Coopers in 1991 he assisted the New Jersey Department of Insurance in the seizure of an impaired insurer.

Denny Carr was the chief actuary of Life Investors in Cedar Rapids. Then he spent four or five years at Tillinghast as a principal in the Jacksonville office. After that he worked at Capital Holding, now known as Provident, in the area of product development. Last year he joined ARM Group. Some of his responsibilities there revolve around asset/liability management and joint ventures. I think it's fair to say that Denny has been in asset/liability management ever since it became an important field for actuaries in the early to mid-1980s. He's a noted speaker on the subject and is a very capable practitioner of the art.

Larry Gorski is and has been the life actuary with the Illinois Department of Insurance since 1976. Larry is a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. He's very active, as I'm sure many of you know, in the NAIC on projects such as the Invested Asset Working Group, the Mandatory Securities Valuation Reserve (MSVR) Study Group, and the Life and Health Actuarial Task Force. We'll talk with Larry a bit about some of those activities. His specific responsibilities in the department in Illinois include reviewing actuarial opinions and supporting memorandums, developing investment activity, monitoring systems, and reviewing corporate transactions.

Larry's question will be the first, and it has to do with the FLUX measure, which we are sure many of you have heard about. And the question is, what is the FLUX measure? What's it all about? What's its status? What's it supposed to do for regulators and insurance companies?

MR. LARRY M. GORSKI: As Joe pointed out, one of my responsibilities is to review opinions and memorandums. The focus of memorandums is asset/liability management. To make the whole process work, I thought for some time that the regulatory actuaries must become more knowledgeable in the investment area. They need some kind of objective tool to be able to analyze portfolios and to be able to ask the valuation actuaries the right questions relative to those portfolios. That's how I got involved in the FLUX measure and the collateralized mortgage obligation (CMO) FLUX score.

The CMO FLUX score is designed to be a tool for regulators to differentiate CMOs with very little, if any, prepayment extension risk versus those CMOs that are highly volatile. Obviously, the name CMO doesn't tell you anything. The acronym

STUMP THE INVESTMENT EXPERTS

associated with the structure of the CMO doesn't tell you very much more. To be told you're holding a planned amortization class (PAC) bond or a target amortization class (TAC) bond or a sequential bond really doesn't get the job done. We had to move to more objective criteria. That's the rationale for developing a FLUX score.

We're a little bit behind schedule. We had hoped to have the whole process in place by April 15, 1994. The process is probably not going to be implemented until June 15, 1994. Basically, a regulator sitting in his or her office will be able to access a set of programs at the NAIC office that will run down the company's Schedule D bond portfolio.

It will take that Schedule D, match it against another file that contains CUSIP numbers and FLUX scores, and then produce a report for that particular company that will indicate, with some degree of objectivity, the level of cash-flow volatility related to that portfolio. It's going to be on a security-by-security basis. That in itself was a little controversial. Basically, the regulatory actuary responsible for reviewing the memorandum will use that document to question an actuary about his or her modeling of particular deals.

So basically the regulatory actuary is going to use this as a diagnostic tool to dig deeper into the modeling that the company's actuary has performed. I personally got "burnt" by a report I reviewed about two years ago. The company told me that it only held PAC bonds and there was no need to be concerned about the volatility of these issues because they were PAC bonds. Well, in fact, it turned out they were PAC support bonds. By the time I had reviewed the memorandum, a good portion of the portfolio had been already paid off and it disappeared. So from that point on, I began putting a great deal of effort into the FLUX score mechanism.

MR. BUFF: The next question is one for Denny Carr. We hear and read so much about derivatives these days. How can an insurance company be confident that it's properly prepared and qualified to really use derivatives?

MR. DENNIS L. CARR: That's a good question, and it's fairly timely. If you read *The Wall Street Journal*, you have read that derivatives have blown up for many people. Proctor and Gamble is one that comes to mind. I guess I would describe derivatives to be like assault weapons. In the wrong hands they can be very dangerous.

However, I think it would be too quick to just dispose of derivatives as a class just because they cause some problems for certain people. In my mind, the problems have been caused because people are dealing with instruments they don't understand. I consider derivatives to be a very good tool, particularly for hedging some of the risks in your portfolio.

But if you're going to use the derivatives to hedge your portfolio, I'd give you two or three hints. You first need to understand the risk that you are hedging. In other words, are you dealing with a portfolio of single-premium deferred annuity (SPDA) liabilities and assets or structured-settlement liabilities and assets? What is the nature of the liability? Make sure you model it out and understand the cash-flow behavior.

The second hint would be to use derivatives where you clearly understand what the cash-flow behavior will be. A hedge is something that will provide a cash-flow stream that meets your expectations in different environments. Here's where I think some people get into trouble. You can get into very complex derivative instruments.

Some of those instruments have dependencies on other items that you might hedge; for example, an SPDA portfolio of liabilities that might be exposed to rising interest rates. This could be helped by purchasing an interest only (IO) security, a mortgage-backed security. The IO's portion of the mortgage-backed security should behave generally in the right direction. In other words, you generally want protection if interest rates should rise. The IO will generally perform better as interest rates rise. However, you've factored in an unknown assumption—the prepayment assumption. That can create a great deal of additional volatility.

My own personal opinion is, unless you really can predict that prepayment assumption well, I would stay away from that sort of instrument in a hedging program. I would stick, instead, with things that provide more known cash-flow streams; things such as caps and floors and swaps and the like.

I think the watchword on derivatives is that they can be valuable for providing an overlay hedge-type program. The word of warning is to understand the cash flows you're hedging against as well as the type of cash-flow pattern that your hedge produces.

MR. BUFF: Speaking of mortgage-backed securities and derivatives, the next question is for Joe Crowne. What's been happening with prepayment rates of mortgage-backed securities, given some of the tendency for interest rates to be declining and then spiking up recently?

MR. JOSEPH E. CROWNE: That's an excellent question. The first two speakers, Larry and Denny, had talked about some of the complex securities out there. Many of them, of course, are based on traditional residential mortgages, Fannie Maes and Ginnie Maes. To understand how some complex structure is going to work, you must start with the basic underlying mortgages. Prepayments will change as interest rates change on mortgages.

Many of the models that are used to predict prepayments of mortgages remind me of some of the formulas actuaries create to predict the surrenders on SPDAs and products like that. They are very tough formulas to select for modeling. They rely a lot on history and looking back at what has happened in the past to predict what's going to happen in the future. One thing that is different about these investments is that mortgage-backed security prepayment formulas seem to be very highly kept secrets. Not many of the brokerage firms will actually publish what they're using to price their deals. However, they will give you the results of some of their projections under different interest rate scenarios, or at least under different prepayment-rate scenarios.

Much of what happened during the last couple of years can be related to the fact that interest rates went down in 1993. Prepayments went up quite a bit. One of the important questions is, did the models predict that rate of prepayment? Without

STUMP THE INVESTMENT EXPERTS

really having details on any particular company's model for mortgage-backed securities, I think it's safe to say they did not predict the level of prepayments.

In trying to figure out what was going on, I know from personal experience that back in the early 1980s, when I refinanced my own mortgage, I basically had to go out and find somebody and check rates out and go to an office or a bank and fill out the forms, etc. This past year I was being inundated with telephone calls. There seems to be a frenzy of activity in the mortgage refinancing market.

They were calling at home, asking what rate I had and telling me what great rate they could give me. They were willing to come out to the house and take care of filling out the forms right there on the spot. So I think that affected prepayment rates to a great degree, the fact that refinancing seemed to be a popular thing to get into. Many companies were doing it, and they were aggressively pursuing customers.

So, in the long run, even though you may have a good model that's worked in the past, just as with withdrawal rate assumptions in annuities or life insurance products, you know the environment can change in ways that did not happen in the past.

MR. BUFF: Our next question is for Mike Millette. Mike has done some research on the events with Mutual Benefit. Mike, can you tell us what sort of things really went on that caused the difficulties at Executive Life and First Capital and Mutual Benefit?

MR. MICHAEL J. MILLETTE: I've done some work on Mutual Benefit, and I'm familiar with Executive Life because in my past life at Citicorp, I used to call on Executive Life up until the time that it went under. I met with senior management there quite a few times trying to see if Citicorp could do any business with them, and luckily we didn't succeed!

I think that Mutual Benefit and Executive Life were in very similar situations. This is a somewhat different message than what the initial press that came out on the Mutual Benefit disaster indicated. We really saw a generalized failure of investment policy in both cases. I place the fault in both companies, in both instances, with senior management, of course, but on the portfolio-management side of the business. This is a two-pronged failure in each case, and both prongs are really the same.

The first prong of the failure was that in each case the asset-portfolio managers failed to understand the nature of the liabilities they were dealing with. In each case, the liabilities were extremely liquid liabilities. Executive Life sold primarily SPDAs, which tend to move very quickly because of rates or because of rumors about the credit-worthiness of the issuer. Mutual Benefit sold an even more liquid, portable sort of product, the tax-sheltered annuity (TSA). These products are SPDAs for certain sorts of qualified government employees, and the reason they're more portable than non-TSA SPDAs is that they typically don't have surrender charges. The surrender charge schedules are more generous than the SPDA schedules. Second, they tend to be handled in blocks by brokers.

Many individual SPDA policyholders will call you on the phone to surrender your policies. With TSAs, you might have a broker who is working on behalf of some

RECORD, VOLUME 20

teachers' union, who is controlling a large pool of money. You can have a whole block of policies move all at once, which is what, in fact, happened.

They had these short liabilities, and yet the asset people put their portfolios into very illiquid types of assets: junk bonds and commercial mortgages.

So that's the first prong of the failure. The second prong of the failure is that not only did they select fairly illiquid asset types, but they really got into them. Each company had about two-thirds of its assets in one fairly obscure asset class. It was commercial mortgages and other real estate related holdings in Mutual Benefit's case and junk bonds in Executive Life's case.

Not only did they have large fractions in that asset class, but within that asset class they had enormous concentrations of risk. Executive Life came out and made an announcement at one point that really started its slide. It had to write off \$800 million in junk-bond-related losses. That was a very bad announcement. What was much worse was that \$800 million was almost entirely related to about five junk bonds. Executive Life would typically take positions of up to 20% of its whole capital in individual issuers of below investment grade. Death.

Mutual Benefit had an even worse situation. It had two holdings that represented more than its entire capital. These were the famous William's Island and Fisher Island in Florida. These were two high-end residential real estate developments. Neither of them went well. Both were very, very troubled, and between them they represented the company's whole capital. So we have a two-tiered failure of diversification, by asset class and also by security, and we also have a mismatch between the liquidity of the asset class and the liabilities.

Neither company held enough capital for the risks that it had in these asset classes, and neither company had a very good plan to deal with the possibility that it would have a credit-related run.

If you remember back in the summer of 1991, the press talked about how Mutual Benefit was a grand old company of the industry but went under more or less capriciously. There was this rumor that generated a run on the bank that caused a liquidity crisis, and even though Mutual Benefit was very solvent, it just succumbed. It couldn't handle the liquidity crisis. The press said no one could handle such a run on the bank, and the company just drifted underneath the sea.

I think that this was a very bad and dangerous message. I think it was wrong because, as I pointed out, we have an investment policy failure that's very fundamental. This policy failure resulted in both companies being economically insolvent and unable to access capital markets to get some short-term liquidity that they needed to get their policyholders out when they wanted to leave.

It's dangerous to the industry because I think it's a very bad message for the industry to have a notion that perfectly solvent, well-run, well-structured companies can capriciously become bankrupt because of a run on the bank generated by rumors.

STUMP THE INVESTMENT EXPERTS

I don't think that that's true. I think that it's bad for policyholders to think that, because it can become a self-fulfilling prophecy when we all see capricious runs generated at our own companies.

MR. BUFF: I guess it means you should keep an eye on the very fundamentals and have checks and balances on the people in the company. That's an issue.

MR. MILLETTE: Yes, the senior management attention has to be dedicated to investment policy. Asset/liability management is a fairly important function. Enough attention wasn't paid to two sides of the house running independently.

MR. BUFF: *There are some lessons for all of us.*

FROM THE FLOOR: Mr. Carr, could you give us just a simple example of how you might hedge your SPDA portfolio on the asset side in a rising interest rate environment, such as what we've been experiencing this year? Could you give us an example of a hedge that you would recommend for a \$100 million SPDA portfolio to try and combat the effects of rising interest rates?

MR. CARR: *I'm not sure I have the perfect answer. Let me talk instead about maybe a process that I might go through to get an answer. I guess if I had a \$100 million block of SPDA assets and liabilities, I'd go through a simulation process through some different scenarios. Most likely you're going to be concerned about earnings in the end, and that's what I meant by defining the measure that you're really hedging. So let's presume for a moment that we'll pick statutory earnings. Under this cash-flow simulation I've looked at how statutory earnings behave as interest rates change through different environments. I think then you start looking at some fairly simple vehicles, such as perhaps interest rate swaps where you would in return be getting a floating rate. The risk I'm presuming is that these SPDAs are annual reset types of SPDAs. The risk that's going to show up is that you have assets that don't reset as fast as your liability. So you're exposed to that sort of risk.*

Another type of instrument might be interest rate caps. You could use caps so that if rates rise more than a certain amount you get a payoff. Now one of the things that you have to calculate is that it's important to look at your exposure. It's not necessary to buy \$100 million of caps to protect a \$100 million portfolio. You'd have to, through your modeling, determine what you think an appropriate amount of hedge protection or amount of cap to purchase would be.

Just a slightly more sophisticated idea: if you play around with the behavior of this particular liability, you would notice that because you have an annual reset if interest rates rise, it takes a while for all your liability to reset. If it's spread throughout the year, it's going to reset over a one-year period.

So what you would see, I think, is in these rising interest rate environments, your earnings wouldn't be as volatile near term, because you're waiting for everything to get reset, even though you've had a move in interest rates. So you can use a sort of cap that might be based on average rates over a year period and pay off the first time a year from now. You can do some engineering. But again the warning would be not to overengineer the process. So those are a couple of ideas.

MR. MILLETTE: OK, I want to add what I *don't* think is a very good way to do that: I don't think that IOs are a great way to deal with rising interest rates. There has been a lot of excitement over IOs and also a lot of losses over them as well. Many people bought in just before rates plummeted to their final trough. But I think there has been excitement because here finally is a negatively durationed instrument. It is a perfect match for our SPDA liabilities.

The problem, though, with IOs is that their duration doesn't remain constant over interest rates. In fact, there's an inflection point with IO duration. As rates rise, first of all IOs increase in value. The prepayment option that causes an erosion in the value of interest-only securities slowly decreases in value. You're short that prepayment option. So the option that you're short is shrinking in value and getting closer and closer to zero. So the security value is appreciating.

But at the same time, something else is going on. There are cash flows associated with an IO, and they're being discounted at higher and higher rates. So those cash flows are also falling in value. Both dynamics are taking place, and over a lower range of interest rate increases, the shrinkage and the option value dominates, so the IOs increase in value and they have negative duration.

Once interest rates rise even more, IOs start to behave more or less like other bonds. They start to decrease in value as rates rise. So they're not going to help you very much with a spike. They'll help you over very local ranges of interest rate movements if you want to use them that way.

MR. CROWNE: I guess the follow-up point I'd like to make is this: the analysis that goes into determining which route to go should take place in your cash-flow testing for reserve-adequacy purposes. I've seen too many cases where a company does various exposures from an interest rate standpoint and uses derivative instruments of one sort or another. But it doesn't incorporate that into the actual modeling for reserve-testing purposes. It simply waves its hands and says all it is doing is risk reduction so, in fact, if it doesn't model its derivatives it is being conservative. Well that doesn't wash with me, because things do blow up in certain environments. So if you are a user of derivatives, I would expect that the modeling that goes into the acquisition side of the analysis should also flow through to the reserve testing side.

I guess one other point is to not forget the credit issue related to the credit quality of the counterparty. There is some counterparty exposure there. Take that into account when you're making your decisions as to which counterparty to use.

MR. LINGDE HONG: I have two questions. The first one is if you have an SPDA liability portfolio, and you matched a short liability with a short asset, such as an interest rate swap, can you actually make money? Can you stay in the market? Second, if everybody does that, are there enough short assets available in the market to support a huge chunk of liabilities?

MR. MILLETTE: Well I'll take the second part first. I think that there are plenty of assets around. The swap market is enormous, and the swap market is just one way. You're shortening down your asset portfolio with the swap market. You can also acquire other kinds of floating-rate assets. In fact, the industry participates very much

STUMP THE INVESTMENT EXPERTS

in a whole market that I think is very well suited to products like SPDAs and single-premium whole life (SPWL) and Universal Life (UL), and that is the floating-rate paper market that is secondary bank paper.

Banks will go out and make loans and they'll syndicate those loans out to other banks. Some insurance companies that are big into the SPDA market do go and participate in those loans as well. Those float and they have a spread. So those can be another way to get short exposure. It's a huge market that we haven't even begun to really tap. But I think that I had better leave the SPDA part to someone else.

MR. CARR: OK, I'll try part one. I think the first thing I would say is this protection or this lessening of volatility will cost something. In fact, depending on the environment and the block and where it is, let's say a new piece of SPDA business, if you were to build in a hedge that reduced your risk significantly, then my guess is that the profits would indeed disappear on a new piece of business.

Now, on the contrary, in-force business has been through this ramping down of rates, although they've started back in the other direction here recently. Generally, if people didn't get blown away by convexity in their portfolio, they were widening their spreads. At that point in time, there probably was some additional spread that you could have traded perhaps for less volatility.

If you put on this huge hedge, you're going to find it has a huge cost. So you must decide how much protection you want and for what type of interest rate moves. You're probably not going to be able to afford the whole thing at once. So that's a good point.

MR. GORSKI: In my situation I don't expect companies to eliminate all risk. Insurers are in the business of taking risk. So they have to know how much risk they're taking and balance that with the surplus they have. In our discussions we really haven't heard from folks on a surplus issue, so we have a balancing act in terms of risk reduction. How much risk are you going to retain? How much is your surplus? So I don't see derivatives being used as a mechanism to eliminate all this but simply to manage risk with intolerable limits suggested by your surplus levels.

MR. BUFF: OK, let's go back to one or two prepared questions. Here's one for Joe Crowne. Given the changes that we've seen in interest rates, what's that been doing to the durations of typical interest-sensitive liabilities? In particular, what has the recent spike in interest rates done to the theoretical calculated duration of an SPDA liability? Are we seeing that duration change manifesting itself in cash-flow behavior yet?

MR. CROWNE: We found some very interesting things happening to the duration of some of our liabilities during the last couple of years. Just to start with an example, assume you have an SPDA that you put on the books maybe three years ago with a guaranteed rate of 8% for five years. After five years, the rate would roll over to an annual reset; probably a fairly typical design for an SPDA. Say that in addition to the 8% guaranteed for the first five-year period, you have an underlying guarantee of 6% for the fifth through the tenth year and then maybe 4% or something after that.

What you find as interest rates go down is that you question the original thought that maybe that 6% wasn't really significant in terms of determining the duration of the liability. That 6% starts having an effect. If for example, the market rates are below 6%, the duration of your liability can extend quite far out. So you may, as you say, have two years to go on your SPDA, and you may be looking at it initially as about a two-year duration.

As interest rates come down, that 6% may extend the duration out to five or six years. So, looking at duration, even option-adjusted durations, is not always going to tell you the full story of your risk. You can be set up with a portfolio that you think is very well matched, and then as interest rates change, up or down, that match can go away. For example, if you're matched because the underlying guarantee seems fairly high, it may be that your liabilities relative to your assets are really on the long side, given the initial guarantee.

If interest rates start going up, that liability will shorten. Here it's not even the cash flows—it's the guarantees, it's in the contract. This is very similar to what happens with floating-rate securities. You might have a floating-rate security with a one-year reset. Well, the duration, which is a measure of the price sensitivity, would kind of go along with a one-year-type instrument.

If the floating-rate instrument had a floor and the market rates go below the floor, the duration of the asset will extend out. We have that same sort of thing in our products. There's a great deal of similarity between the asset side and the liability side in terms of the risk that you run into. Unfortunately, they often go in the opposite direction. So durations can bounce around quite a bit as interest rates bounce around over time.

MR. BUFF: Larry, what exactly is the status of the NAIC model investment law? What does it have to do with actuaries?

MR. GORSKI: Well the model investment law is really moving to the last phase, what we hope is the last phase. Initially, an industry proposal was based on a prudent-man-rule-type concept with a great deal of emphasis on board responsibility. Regulation reaction to that was to move to a strict pigeonhole approach. I think after hearing some of the comments about the junk-bond market and the real estate markets, you can understand why regulators react in the way they do. Moving more toward, it's called a neutral environment now, we may see cooler heads prevailing. We're developing a model investment law that captures a little bit of the pigeonhole process, but at the same time, it's going to incorporate more and more in terms of board responsibility.

Personally I think that a section of the model investment law is going to require the board to formally approve investment guidelines and require ongoing compliance with those investment guidelines. Ensuring that those investment guidelines really get at the risks that the company is undertaking will be a big step forward.

The actuarial role in this whole process will probably be related to what I was just talking about. The investment guidelines will have to be, in effect, customized or tailor-made guidelines for each particular company, given the level of risk the company

STUMP THE INVESTMENT EXPERTS

is willing to take and given the level of surplus. It's going to require a great deal of risk analysis on the actuarial part.

Similarly, there's the section in the model dealing with derivatives. And that section will require an awful lot of analysis, both before entering into a scheme of using derivatives and after the fact for performance measurement. So I imagine there will be a lot of actuarial input in that process also.

I see the process, in effect, winding down, moving to a model that is somewhere between the two versions that have been on the table. I see the role of the actuary in the whole process being made very significant in some cases.

MR. H-SING CHANG: We know that the duration for solvent derivatives is very high. Some are in the range of 60. When we see a large move in interest rates that could cause some substantial losses to some of the investors, we know there may be the large costs to the derivative's counterparty. As users of derivatives, can we assume in the case of a large movement in interest rates that it's guaranteed that we will receive the payment from our counterparty? If there is a risk we may not get the payment from our counterparty; how can we price that credit risk?

MR. BUFF: To paraphrase the question, what about the credit risk that's involved in derivatives? And how do you control that risk? Are there any thoughts from our experts?

MR. GORSKI: Well I don't know how to really "control" credit risk, but the investment law proposal will deal with limitations on counterparty exposure. This is one of the focal points that everyone has brought to the table in talking about the model investment law: is there going to be a required level of diversification? And right now, I believe, it's at the 3% level of admitted assets.

We talk about derivatives when there is no statement value for some of these assets, but there is a surrogate for that amount. Let's say the replacement value of a particular derivative would be the surrogate for statement value for purposes of measuring counterparty exposure. There's across the board a 3% limit on counterparty exposure and an inside limit of 1% when dealing with derivative instruments. So we're trying to recognize the issue you're bringing up about counterparty exposure. And our attempt in dealing with that is to require diversification based on certain specified limits.

MR. MILLETTE: Well it's a different issue across different types of instruments, because in the futures market, for example, many mechanisms deal with counterparty exposure. You have margin accounts and you have the clearinghouse operations. In the futures market when you're dealing with exchange-traded futures, you'd really have to see the exchange and the clearinghouse fall apart before you'd take a credit risk.

I think that possibility is fairly well boxed in by the futures exchanges, by their origination margin requirements, and by their daily market movement limits. I think that the exchange-traded futures markets should be the least of our worries.

Swaps should be a greater worry because there you have counterparties that are commercial banks. Exotic over-the-counter options should be our greatest worry for two different reasons. First, you do have counterparty risk against other institutions. There's usually no exchange or margining mechanism that will be helping you to limit that risk. Second, it's not always clear just how much these instruments can move. So it's not always so clear as it is in the swap market, how to evaluate your exposure to counterparty risk.

I think that when you get into nonstandard exotic over-the-counter options, you have to be very conservative. With swaps you have a much better idea of how much your cash-flow exposure can move. You can value that and create a credit exposure and then put that into your pricing. But there is not one answer to the whole problem.

MR. BUFF: Yes, I have another thought on that. One of the guest speakers at the Orlando meeting represented the Group of 30 from Washington D.C. that had written a position paper with a couple of dozen recommendations about at-risk control for derivatives. The Group of 30 recommendations were designed to be implemented by the firms that sell them, by regulators, and by the end users such as insurance companies. The comment made in it was that depending on the form of the contract and how it's worded, if you're using an over-the-counter derivative, you may have a whole portfolio. In fact, the nature of the credit-risk exposure for different derivatives that you're using may be different with the same counterparty.

In some instances you may be obligated to continue making payments to them if they become insolvent, although they may not have an obligation to make it back to you and vice versa. The comment was that it's extremely difficult to look at a real live inventory and say exactly what the credit-risk exposure is. Their recommended solution to that was to have standardized contracts, so that they would basically be the same across the entire portfolio. It remains to be seen if we'll get there.

MR. MILLETTE: We do have an example of what you were just talking about at Mutual Benefit. In fact, the industry's credit risk against swaps got greater after Mutual Benefit, because what happened was that the swaps that Mutual Benefit had with commercial banks were not allowed to be net out in the bankruptcy settlement in the conservatorship. The swaps that Mutual Benefit had that were in a positive position, that Mutual Benefit was on the right side of where it had a gain position, were not net out against the swaps where Mutual Benefit owed money. The people who were owed money by Mutual Benefit had to take their loss and could not offset it by the gains. I think that that's a setback for netting, and I think that netting is one way in derivatives that we can start to control our credit risk.

By netting I mean that rather than considering your risk on each contract, you sum up all the contracts that you have with another institution and consider your net credit exposure against that institution. It's not clear that you can do that. Mutual Benefit suggests that you cannot.

MR. GORSKI: The whole issue of netting is something that the NAIC is addressing in various forms. Starting with 1994 there's going to be an enhanced reporting of derivative instruments. Schedule DB is going to be extended beyond simply the

STUMP THE INVESTMENT EXPERTS

exchange traded to include all the over-the-counter-type transactions and a development of counterparty exposure. Netting will be recognized if the netting is subject to a master agreement that meets certain terms.

You need to take into consideration those types of items when you are developing your counterparty exposure for credit exposure purposes.

MR. HENRICK S. WALERYS: Several times an IO security in the context of rising interest rate scenarios has been mentioned here. Now could you give an example of a hedging technique working with an IO security, but in the context of a declining interest rate scenario?

MR. BUFF: So, to summarize, the question is, what do you do to hedge with derivatives or whatever if interest rates are going down?

MR. WALERYS: An IO can become very dangerous when interest rates go down.

MR. BUFF: That's a good question. The whole point is you don't know where interest rates are going to go next. Who would like to be first with that?

MR. CARR: Well, one of the obvious derivatives you could buy would be floors, if you thought interest rates were going down. For example, we've recently had the very low interest rate environment. If you had some 5% guarantee business you could actually purchase some floors at 5% that would start paying dollar for dollar as a certain interest rate went below 5%. That would be one potential vehicle to use if rates go down.

MR. MILLETTE: You have two others: bond warrants and swaptions. But say you have a portfolio and right now you have all the assets invested for five years. Those assets are supporting your liability credited rate, but the market rate is down below both and your liabilities are at their minimum. So you're in a reinvestment risk scenario such as the one you described. Rates are very low, they're below the minimum rates. You might be covered for the next five years while those assets are in place, but you might be concerned about your reinvestment exposure after that, or after four years or after three years or so on. Buying a floor right now might not be very economical. You're paying for protection during this interim time period when you already have an investment portfolio in place, and you really don't have much exposure. You have coupon but not principle exposure.

Instead you might buy a floortion or a swaption or a bond warrant that will entitle you to go out and buy a bond with a coupon at the rate that you need when the principal flows from your existing securities mature. Actually bond warrant swaptions are priced the same way. There are some advantages to a swaption, but it has to do with credit risk.

MR. JAMES A. HINDS III: What level of asset/liability matching do companies usually go for? 100%? 80%? How do regulators view that? Obviously for a 100% match you sacrifice some return on profit. I just wonder about the company standpoint and also about what the regulator at the table thinks about it.

RECORD, VOLUME 20

MR. GORSKI: I don't think there's a complete answer to your question or an answer that holds in all environments. We've been receiving reviewing memorandums now for three years, and I monitor the company's interest rate risk exposure from year to year to see if it is taking more and more risk. I do that by simply comparing ending results under the seven scenarios or the ten scenarios maybe chosen relative to starting reserves being tested. I look over time as to whether the company's margins are deteriorating or improving.

Second, if I think that the scenarios are not really good measures or tests for that particular company, I ask for some in-depth analysis by using some random interest rate scenarios. I personally don't believe that failing one of the deterministic tests is a death nail for the company. I take into account the probability of that environment taking place. I take into account the intangibles that the company may be able to use in that situation to eliminate or alleviate the problem. I use cash-flow testing as more of a diagnostic tool to measure performance of a company over time relative to interest rate risk as opposed to a yes or no at this particular point in time.

MR. CROWNE: I'll take the asset/liability part of that. I think the first thing to recognize is that if you think you're 100% matched, it's almost certain that you're 100% wrong. As we were talking about earlier, the durations of these assets and the liabilities move depending on how interest rates move. Unless you have a very simple liability structure, it's really unlikely that you could be perfectly matched.

But the question is how matched should I be? Or how much risk do I want to take? I think these are questions you have to ask and you have to look at them in terms of your own company. How much surplus do you have? How much appetite for risk taking does your company have?

In many cases we've seen in the past there has been a fair amount of risk taking that some companies were willing to put up with, and it's costing quite a bit. I think that the most important thing is looking at scenario testing as we do with the cash-flow testing for the statutory reserves. I think that can help you determine how much risk you really have in your portfolio; that is, assuming that your assumptions are reasonably accurate for your cash flows.

MR. ALAN GERARD MONTEMURRO: Mr. Gorski, with regard to the counterparty exposure, you said something about a 3% exposure limit. Was that of the notional amount of the swap?

MR. GORSKI: The counterparty exposure limit is 3% based on statement value for all of the investments. One percent is for derivative instruments. The measure of counterparty exposure differs from instrument to instrument. In no case is it a notional amount, although in some cases it may be the market value, if you're dealing with the over-the-counter instrument replacement value of the security. In no case is it something such as the notional amount. We were much more sophisticated than that, thanks to the help from many industry people.

FROM THE FLOOR: I have a comment in regard to modeling some of these derivative-type securities. There seems to be a gap between what is engineered in the

STUMP THE INVESTMENT EXPERTS

investment community to model these securities and what our existing actuarial models can do.

Oftentimes the investment department calls with an investment opportunity that appears to be good and perhaps it is. But when it comes to actually modeling under the New York 7, it's hard to get these things engineered. I think that there is a gap there that we all have to deal with as the new legislation comes forward.

FROM THE FLOOR: What drives the swap market? Who are the major players? What drives swap spreads and things such as prices on caps and floors?

MR. CARR: I'd like to make a comment on your comment as opposed to the last question. Then I'll let somebody take the last question. I think there is this modeling gap and that's where I see many people getting in trouble. You don't want to allow a gap. If somebody from Wall Street is selling you something and you still have a gap, then my opinion is you should not buy it if you don't clearly understand the cash-flow behavior. Shame on us if we do it. I think that's where some of the problems in other industries have occurred. They didn't exactly understand what was going on and what some of the risks were. A high return with little risk was promised and indeed that wasn't what the behavior was.

MR. MILLETTE: What drives swap spreads? Well, to some extent it is the credit rating, the banks on the other side of the swap. The swap market operates as if it's a double-A market and not a triple-A market, so it does show some spread to Treasuries, which varies over time. That's one part of your answer, I guess.

The swap market does not tend to differentiate very well between different counterparties on the nonbank side as far as their own creditworthiness. Because of that, it was easier for low-grade companies to use swaps to achieve lower interest rates as borrowers. I don't know when that sort of differentiation is going to start to creep into the swap market, but I imagine it will when the banks start taking losses because of that.

MR. CARR: Another driver is the forward rate curve in the swap market. If you want a floating rate, the floating-rate side of a swap is going to look expensive if you have a steep yield curve that creates a steeply sloping forward curve. In the environment we're in today, you might look at it and say that seems too expensive, particularly if you don't believe the forward curve is a good predictor of future interest rates. But they tend to be priced off the forward curve. That's another element that means a steep yield curve affects the price.

