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Session 29IF
Practitioner's Forum

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Summary: This interactive forum addresses the major financial reporting issues and concerns of senior actuaries in life insurance companies. The panelists identify topical issues from their own experience, as well as from audience participation. These include interpretation and uses of cash-flow testing, resource and technical issues, compliance with multiple state requirements, and reconciliation of statutory and GAAP results.

MR. JOSEPH A. SIKORA: I'm a chief actuary in Orlando at Hanover Life Re. I'd like to introduce a couple of our panelists. Jim Bridgeman is currently an associate professor of mathematics. He has had a pretty long career in the actual profession, and he's going to draw from his career as a practitioner. Jim spent 28 years with Aetna and then ING where he was chief actuary and chief financial officer for various segments of the two companies. He has a tremendous amount of experience in international markets. Back in the 1970s, Jim built the cash-flow models and performed testing for the American Council of Life Insurance (ACLI) actuarial committees on dynamic valuation interest rate proposal.

The speakers have a fairly strong background on the investment side. We'll get some indication of what can we draw in a practical sense from the interest rate generated.

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Norm Hill is currently the chief actuary at Kiwanis Insurance Company in Lancaster, South Carolina. I worked with Norm about 15 years ago when we were both at Coopers & Lybrand, so I've known him for several years. Norm's a native like me from Chicago. He has his MBA from University of Michigan. In addition to being an actuary, he's a CPA. So Norm is going to talk from a small company perspective. I know he has worked in a variety of organizations, and a few small companies, so he'll talk about relative experiences, especially with all the changes that have occurred over the last few years.

My topic will be GAAP equity and the equity component. The field is wide open, but it's really tough to narrow it down to one particular topic that is of interest. Each speaker will go through his presentation, and then we'll have a question and answer period after each of the small segments.

MR. JAMES G. BRIDGEMAN: I was the chief actuary for Aetna's international business only, not for the whole company. When asked to speak to this topic, I had to ask myself, what is a practitioner? I don't think I ever met an actuary who wasn't a practitioner. I've taken the point of view for this presentation that a practitioner is strictly a user of our science and its tools, not necessarily an expert in tool building or in comparative tool design. A practitioner uses tools to do a job. In the case of valuation actuaries, the job is to make a decision about whether or not reserves are adequate in light of the assets. If they are not adequate, what kind of strengthening is implied? The practitioner has to make a decision like that under time and resource constraints. In other words, the actuary must use the available staff and make decisions by, at the very latest, February (this happens every February). We hope that with enough advance warning, there will be precious few surprises between now and next February.

Now there's nothing very original in what I'm going to describe. What I want to do is simply share my experience with one very problematic tool of our science. I'll be able to kind of share my experience and thought processes with the use of this tool, and maybe it will help you to hear the experience that my colleagues and I had.

The tool I'm talking about is stochastic interest scenario modeling. Why would a practitioner even use a tool like this? It's so onerous to use, and it's even harder to digest what it means. A practitioner will use this tool only if he has no choice and he couldn't do his job without it, in my opinion. Or a practitioner will use this tool if he can do his job materially better by using this tool than by not using it in the job of making the decision about the adequacy of reserves in light of assets.

I'm going to tell a story about why my colleagues and I got put into the position of using this tool, how we went about it, and why we did it the way we did. I'm going to do it from the perspective of what the stochastic scenarios and the results that come out of them are telling us, and I think this is very problematic. These scenarios seem to be telling us something about probabilities of outcomes, and we know lots about probabilities so we think we understand what they're telling us. Based on my practice experience, that's troublesome to me. The first time I worked with stochastic interest rate generators was back in 1974 programming FORTRAN programs for the pricing of GICs. I've used them a lot since that time, and I'm convinced that these stochastic scenarios aren't telling us much at all about probabilities of future outcomes, even though that's what the formula seems to be telling us it is doing.

The problem is we get out of these scenarios only what we put into them. None of us, in my opinion, has a compelling scientific view of what we ought to put into stochastic interest rate scenarios. It's no accident that there's no such thing as a Commissioners Standard Ordinary (CSO) stochastic interest rate generator. We couldn't agree as a profession on what that should be. I've certainly obtained many good things out of these generators in my practice over the years, but what I don't obtain is the probability that something will occur. What I get is more an education of what could occur. You think you understand a GIC. If you run a bunch of stochastic scenarios, you'll get outcomes that aren't possible based on what you thought you understood about your GIC. You might go into the model and find out what scenario produced a ridiculous outcome, and you see that some screwy zigzag path destroys the product that you designed that you thought was easy. That's good stuff to know, but it's not probability.

The particular situation that I'm going to describe is very simple. Much of the complexity that most of us find in most of our work just isn't there because of the facts of this situation. You can hone right in on what the stochastic scenario might do for you and what it isn't. The company involved has more than $3 billion of life reserves and more than $1.5 billion in premium. It's very rapidly growing. A 30% growth year is a disappointment in this company. It is a U.S.-domiciled life company, but it only writes business in Taiwan. Because of the statutory environment in the state of domicile, the Taiwan reserve basis is okay for the state of domicile. However, all the Actuarial Opinion and Memorandum Regulation (AOMR) requirements still apply, including cash-flow testing and asset adequacy. The products in the company are very traditional life insurance products, (permanent products, fixed terms and conditions), except for a little bit of upside interest rate dividends if interest rates are high. They're very high cash value forms. The other thing that's unique is about 25% of the premium volume is in extraordinarily high margin riders. In its investments the company takes no currency mismatches because all the liabilities are in Taiwan dollars and so are all the investments. That creates a duration problem. There really aren't many long-duration instruments available in new Taiwan dollars. Most of the investment portfolio is in fairly short-term time deposits; they are one-year and two-year time deposits, floating rate mortgages, and some medium-term bonds. In recent years, there has been a little bit of volume of ten-year government bonds in Taiwan, but there are so few out there in the market that they're not a good buy. The problem is duration mismatch, and it's not a very complicated problem. There are very long duration liabilities, very short duration assets, and not much optionality within any of it, although there is some we'll explore.

I've been working with this company as appointed actuary for about nine years. I think this is my tenth year coming up. Several years ago, the risk free rates, at least Taiwan instruments, were in the 7% or 8% order. We began to see the threat of failing some of the down scenarios, and a few years after that we did begin to fail some of those down scenarios. Even with the huge duration mismatch, it takes a lot to fail one of these scenarios because of the very high gross premium margins in the portfolio and also because the Taiwan reserve requirements require us to hold a whole bunch of contingency reserves above and beyond just the reserves for specific benefits.

The way the state of domicile rules work, we have to hold those Taiwan reserves as reserves on a U.S. statement, so that provides a lot of margin. Even with the margin, the duration mismatch is so much that the down scenarios began to be troublesome, and I could see more trouble coming several years ago when it started to get close.

The practitioner's problem is, if you start failing some scenarios, are the scenarios you failed moderately adverse or not? If they're moderately adverse, you're supposed to make reserve provisions for them. If not, you can note the fact that you failed the scenario, but then move on. What do you do about that problem? Think about it. The problems were in the pop-down and in the declining scenario. The down-up scenario passed by a wide margin. The only problem wasn't so much that interest rates go down. The problem surfaced if they went down and stayed there forever. Anything forever is more than moderate. I knew already without any stochastic scenarios that I shouldn't really have to worry about scenarios where interest rates stay down forever. I didn't think I could take a lot of comfort from the fact that the down-up scenario was a survivor because that seemed to be less than adverse. This occurred back in the days when the starting rates ranged between 6% and 8%. In Japan, even an up-down scenario might be more than moderately adverse, when interest rates are starting at 1%. These are the types of issues that many of us are going to face this year, not just those of us who are looking at Far Eastern companies.

It was very easy to explore the territory between a down-up scenario and the two down forever scenarios by making up a lot of deterministic sensitivity tests in between. What wasn't so clear is where you draw the line. What is the line between moderately adverse and more than moderately adverse? That's where we thought the stochastic scenarios might help. The stochastic scenarios are only going to be as good as the assumptions we make, and what would make you believe one set of assumptions rather than another. What do they even mean? If you look historically at interest rates, whether in Taiwan or anywhere else in the world, there's a certain volatility in historical interest rates that you can look at and measure. You can also see in the history trends in interest rates and plateaus in interest rates that seem to come and go. Trends last for a while, and

plateaus last for a while. They never persist, but they're always there. When you look at the simple implementations of the proprietary stochastic models or even one you build yourself, most of the results tend to sort of hover in a cloud around some sort of central area. No matter how much you tweak the parameters, it's very hard to see these variable periods of runs and plateaus. It's also very hard to produce the extremes of interest rates that we've seen in my lifetime. There have been highs of 16% and lows of 2% or 3%. To produce those kinds of extremes out of a stochastic model, you tend to force in parameters that aren't consistent with the short-term historical parameters. You also would produce crazy scenarios that just run all over the place and don't look much like history.

Before I get into how we exactly came at this practically, I'll tell you about the particular model we were using. It was one of the proprietary cash-flow models that we used for our cash-flow testing and other business modeling. It has a standard two-factor stochastic model generator in it, if you choose to throw the switch to run stochastic models and give it the assumption. It's driven by an assumption about the quarter-to-quarter variance in the change in interest rates. If you want, you can put a mean reversion into it to bring interest rates back home. For the rest of what I'm going to describe here, we would try to judge the scenarios generated from two points of view. Pick a point in time. It can be two years from now, five years from now, ten years from now, or thirty years from now, and look across all the scenarios at what the distribution of interest rates across all the different scenarios would be at those times. The other way to do it is to pick one scenario at a time and see what each one looks like over time and try to judge what you're doing.

The first time out on stochastic modeling was about nine years ago. On their initiative, the students that were building the cash flow model for me threw the switch and came back to me with some stochastic models. They didn't use the mean reversion feature because they couldn't figure out exactly what the mean reversion factors ought to be. They picked the quarter-to-quarter volatility so that the distribution of the resulting rates 30 years out wasn't outlandish. Think about that for a minute. If I start from where interest rates are today and just walk randomly with no mean reversion for 30 years then I've got to put in a pretty small variance in the

period-to-period thing, or else I'm going to have interest rates out at 30% and 0.5% in my 30th year when I try to judge whether it's any good. The result was a far too stable pattern in the quarter-to-quarter volatility, but I didn't argue with them about it. I said, "We don't need to use stochastic scenarios. We're only going to use this tool if we really need it." Nine years ago, with rates in Taiwan at 8% or 9%, I was perfectly happy to use deterministic scenarios that stopped at 6% or 5%. I didn't need stochastic scenarios.

Another feature of Taiwan is I really don't need to look at the yield curve, which also simplifies things, because the whole investment game in Taiwan is in the one-year and two-year instruments. There's essentially nothing else materially available, so in all of this, you're not going to see me looking at yield curves.

About seven years ago, I began to see that if interest rates kept on declining, I was going to get this issue about what's moderately adverse. I could see it coming six or seven years ago, so I decided to start getting practice with answering this question. I suggested throwing in the mean reversion factor so we can put in some decent quarter-to-quarter variations and still have reasonable patterns of where the interest rates are many years out. Because I am a practitioner, and not for theoretical reasons, I simply insisted that the quarter-to-quarter volatility outcome from the model match the historical quarter-to-quarter volatilities over a long period of time in Taiwan.

The outcome volatilities depend on the balance between the input volatility and the strength of the mean reversion factor. So we played around with that until we achieved this goal of the output volatility matching history. There was a reasonable stability in the outcome interest rate in the sense that that cone of the distribution of interest rates as you go forward started to look reasonable and fairly well dispersed, but not too outlandishly so, within five or six years, within that practical constraint, and through a lot of trial and error, we got our random model. What we got out of the model was many scenarios that looked like this or some more complicated version of it. What they really did was they always went up and down. Now I guess that should have

been no surprise because that's what a mean reversion model can do for you. However, there's an important consequence. It was almost impossible, in such a model, to get scenarios that would go up or down and stay there for a while.

I would like to use this model to judge how worried I should be about scenarios that drop down and stay down, but this model isn't going to produce such a scenario. It's not a question of the assumptions I've put into the model. It's a question of the fact that it's a simple mean-reverting model. These models really don't tell us about probability in the world. I could conclude from this model that there's essentially zero probability that, in the real world, interest rates are going to drop down and stay down for an extended period of time before they come back up. I'm worried about a scenario like that. I'm not worried about one that stays down for 30 years, but I'm worried about when it goes down and stays down. How worried should I be about how long they might stay down? If I use this model, by definition, it's going to tell me I shouldn't worry about it. I haven't really learned anything new. I've just learned that that's the way this model works. I haven't learned much about the world.

What we finally used five or six years ago was a model that, in any given scenario, can have more than one mean reversion level over the lifetime of the scenario. I learned earlier in 2001 from an article in the SOA's *North American Actuarial Journal (NAAJ)* (Mary R. Hardy, "A Regime Switching Model of Long-Term Stock Returns," Volume 5, No. 2, April 2001) that there's actually a name for this kind of thing. It's called regime-switching. For a while, your mean reversion is low, and then it's higher. Perhaps, it starts in one place, and then it's lower. The way we implemented this is we put in a gamma process for the time when the scenario switches (i.e., when the mean reversion jumps). That just means that the probability of whether the level of interest (i.e., the mean reversion level, is going to jump is a poisson process). If you use a poisson process, the time for the first jump and then the next jump and so forth follows a gamma process.

Given that the rates are going to switch, what did we do? They're going to switch somewhere else, but where could it be? We decided to use a lognormal distribution for where the mean reversion target would switch and given that it was going to jump. We didn't use this for how far

it was going to jump. We figured if the regime is switching, why should it care where the old regime was? So we put in a single lognormal distribution that is applicable all the time that says if you're going to jump a new mean reversion target level, how do you select where it's going to jump. One issue that became very big is what's the right mean for that process? What's the average of where the mean reversion targets are going to land if they jump?

When we started doing this, interest rates had a 7% or 8% level. I was quite comfortable picking a mean that was lower than 7% or 8%, and I could feel very conservative about that in the light of this particular duration mismatch. As the years went by, I really had to start thinking about the right average of this thing because this is going to be a forever kind of average, even though there's going to be lots of jumping around it. An issue that many of us have to face this year is that interest rate levels today are not a determinate of where their central tendency will be forever, if I'm going to make practical decisions about reserves. Even if some year I happen to think where interest rates are today is the vague central tendency forever, in the next year—when interest rates are a percent and a half lower surely that one year of experience isn't enough evidence to move my target down by 1.5% forever. As a result, in the last few years, we've used a mean that is somewhat higher than where interest rates are today. That's possibly troublesome, but I think it's the right thing to do in decision making. What's troublesome about it, of course, is you're building a bias into your model that interest rates are going to get higher. On average, there are lots of variations, but, over time, there is a bias that they're going to be higher. I'm convinced that this is not a bad place to be, given where we started. I'm sure glad I have a seven-year or eight-year track record of using the same logic upon which I can base what I'm doing this year.

In actually implementing it, you had to do some parameter fitting and, again, this is just a practical thing. What inputs do you put into all of this stuff? As I discussed earlier, first there is the basic quarter-to-quarter volatility thing. We have to decide something there. We did that by sort of *jointly* fitting, by trial and error, that (1) the outcome of the model would reproduce the historical quarter-to-quarter changes in the interest rates on average, and (2) the cone of resulting interest

rates would stabilize around a given mean reversion target within about a five-year horizon. Now we had to do something about all this jumping of the mean reversion target. As I told you, it's a gamma jumping time. Simply by visual inspection of lots of different possibilities, we chose a gamma that had a mean of 20 years and a mode of 10 years. I didn't want the regime to be switching and jumping all the time, but I wanted some reasonable probability that, within a ten-year or so period of time, we would get a fair amount of switching. I didn't want to force switching, or even force switching on average in ten years because I'm worried about low scenarios that stay low for a long time. I didn't want the assumptions in my model to eliminate the possibility, so I chose a mode of 10 and a mean of 20.

Given that the rates are going to switch, what do you do about the mean landing place? We need to take the long-term history in Taiwan. I chose to take the average of recent history, meaning about the last ten years, because that's a little lower than the average of the last 30 years of history in Taiwan. It's not unreasonable. I can defend it both to myself and to somebody else if they ask. It is related to the environment I'm operating in. I get the other advantage that if I keep doing the same thing year after year after year, and if I'm wrong and we move into a world where interest rates are going to be very low forever, then I correct my mistake over time by continually using this moving average.

The variance of the process that controls where the mean reversion target lands was arrived at by trial and error. I kept choosing variances until the resulting interest rates—not the change in interest rates, but the actual resulting interest rates themselves—considered over all my scenarios, reproduced the variance of historical interest rates in Taiwan. These were the actual interest rate levels over the time for which I had records. Again, I'm fitting it to history.

What is the result of all of that? I would not begin to pretend that that's giving me actual probabilities of actual interest rates in Taiwan now or ever. However, it's a stress test. My job is to do a stress test on your reserve. It's a stress test. It's not a forecasting model. I don't really need a forecasting model. I don't need probabilities to do cash-flow testing. What I need is

plausibilities. Do I have to worry about a given scenario or not against this concept of moderately adverse? To get plausibilities, I need a tool that creates a plausible structure vis-à-vis the world. I think that model described here does that. Among the things that we get are very fat tails with reasonable input variance. For example, in recent years, we typically get the 95th percentile results of our resulting surplus at almost 2.5 standard deviations off the means. In a normal distribution, that many standard deviations would be at the 99th percentile or worse. To get a 95th percentile in a normal distribution, you're looking at 1.67 standard deviations. That model has achieved some of what I want to do. It builds into the model some of these extreme scenarios that, in a simple, lognormal model, get excluded by definition.

In the testing that we've done up until now, we pass better than the 90th percentile that even this rigorous model provides. Actually, it typically has been better than the 97th percentile. Until now, I've been comfortable in drawing this conclusion. Even though I failed some down scenarios, they're far more than moderately adverse. As for many of us, this year the issue of what is moderately adverse, for the first time, is really going to come to the fore. The risk-free rate in Taiwan is about 2.8%. There are many products that were priced at 5%, 6% or 7%, historically, still on the books. What are we going to do? The model has been built, and the scenarios have been built. We haven't run the cash-flow test yet. The interesting question is what percentile is going to define moderately adverse?

At the first valuation actuary seminar I went to eight or nine years ago, people debated whether 75% is moderately adverse." Others would say, "It has to be 90%." That's a nonsensical discussion because it assumes that the probabilities that we're talking about really are probabilities about the world. We don't have a tool that anyone can agree on that is really describing the world. There are plausibilities, not probabilities, that we need to worry about. I would say that if you use a simple mean-reverting lognormal model that produces this nice tight cloud of results around the mean, maybe you better worry about the 90th percentile. On the other hand, if you've made a very robust model, it still doesn't give you the probabilities in the world, but it gives me a lot more of the variability in the world. Maybe something beyond the 70th percentile starts to look

implausible. I'm not saying it's not going to happen, but I am saying I shouldn't be putting up policyholder money in terms of pricing to fund higher reserves or shareholder money in terms of surplus to fund reserves that are going to cover those scenarios. I still don't know the answer, but, as a practitioner, I have more productive ways to think about the answer than I used to have as a result of having gone through this process.

MR. SIKORA: Thanks, Jim. I'll ask the first question. This touches on something you said very early in your talk about how you can't get actuaries to agree on a specific model. I would say there is a specific model out there on risk-based capital. There is the C-3 interest rate generator. Can you comment on some of the flaws you might see in the model versus the methodology that you just talked about, Jim?

MR. BRIDGEMAN: Once again, it's a practical question. If you're going to come up with C-3 factors or techniques, you're going to need agreement. If it's going to be prescribed, you're going to have to agree on what everyone is going to do. In the end, through a process of compromise, we must agree on what everyone is going to do. That's like the dynamic valuation interest rates in the standard valuation law. You go through a great deal of analysis, and you get people who can at least agree that they can live with the results of a certain calculation algorithm. That agreement to live with the results of an algorithm does not mean those same people agree that probabilities apply to future scenarios in the same sense that a standard valuation mortality table is built on observed true mortality rates with certain margins and other kinds of methodologies that are built in. We could rally around a much tighter set of answers on mortality than we ever can on these economic and interest rate scenarios. We can agree on a calculation methodology, which is what I view the C-3 work as being. It is not a real description of the world.

MR. NORMAN E. HILL: I'm the chief actuary for a small company, and I have a small staff, so my interest is usually on practicality. I want to talk about a number of issues facing the valuation actuary. Some of these issues will be coming up more in 2002 than in 2001, but everybody has been discussing them in 2001, so I think it's relevant to touch on them.

There is going to be a revised Actuarial Opinion and Memorandum Regulation (AOMR), and it's going to affect small companies and large companies. For small companies, it will remove the inclusion of the requirement of the actuary stating an opinion on the asset adequacy. That is the assets backing the reserves and that is just stating that the reserves are fine mechanically. What assets are backing the reserves and are they really adequate to cover the liability? This is noted in the Section 7 exemption. This was bitterly fought by many small companies. But the current status of the AOMR is that the regulatory actuaries have approved it. It has been approved by the A Committee of the NAIC. The last step in going through the NAIC process is that the NAIC itself must prove it. We think it will in the December 2001 convention. Of course, this is a regulation and the state has to adopt the regulation. Some small companies have claimed that they're going to fight this state by state, but it's very difficult to fight the implementation of a regulation as opposed to a model law.

I think one of the key parts of this new AOMR that is even more significant than the removal of Section 7 is the removal of what we call the New York 7 scenarios from being stated explicitly in the regulation. What that says to me is that cash-flow testing is no longer synonymous with those New York 7 scenarios. The actuary now has leeway and should use his own judgment as to what types of cash-flow testing he's going to perform.

There's another key part of this revised AOMR for 2002. The Actuarial Opinion is going to be based on the actuary's home state. Until now, it has been based on staying at the reserves that are complying with the state of filing within every single state. I know actuaries that have complained bitterly about the extreme difficulties and the impossibilities of keeping up with the sometimes unofficial changes and the requirements of every state's reserve. However, that's not the end of it. It's not really just the home state. The actuary has to consider the NAIC codification. I am mainly referring to the NAIC reserve standards in terms of model law, but I also am referring to the regulation and guidelines. If there's a significant difference between the actuary's home state reserves and these NAIC guidelines, at least there has to be some disclosure about this difference. This applies to 2002.

Let's look at 2001. Actuaries must be considering the question of deficiency reserves and Regulation XXX. Of course, if a company writes competitive term life products, deficiency reserves can be a critical problem in terms of surplus strength. Regulation XXX was designed to provide some relief from the deficiency reserves in two aspects. One is the 20-year select factors used to lower the mortality and the net premiums for the deficiency test. If we go one step further, we lower those net premiums even further through the introduction of X factors. I am referring to additional factors to lower those net premiums, lower the mortality, and, therefore, lower the net premiums even further. Because of some regulatory pressure, there was one wrinkle that was thrown into that requirement. If they employ X factors, the Actuarial Opinion has to include a statement regarding asset adequacy (the current Section 8 type of opinion). X factors and asset adequacy statements don't necessarily go together logically, but that's the way Regulation XXX was put together.

Of course, today, the actuary still has new guidelines that he has to be attuned to. There are guidelines regarding the Commissioners Annuity Reserve Valuation Method (CARVM) for annuities. If the actuary has complex lines of business, such as variable annuities or interest-sensitive products, he has to be attuned to guidelines on minimum death benefits for variable annuities and variable life insurance. There's one other guideline that's not official yet. It's known as Guideline XYZ. Any company selling universal life has had secondary guarantees that basically provide for long-term continuance, which is basically term insurance of the product, even if the account value goes to zero. This was more a question of nonforfeiture values if the contract is continuing. If you have nonforfeiture values available, then you must have reserves that are at least equal to these nonforfeiture values. The actuary has to be attuned to requirements such as that.

This is strictly a 2002 and later issue. There's going to be a new valuation table—the CSO 2001. I had thought that, in September, when we were going to have our regional symposium, that the valuation table would be adopted, at least by the NAIC Executive Regulatory Actuaries. This didn't take place. The table should not be considered final because a last minute question has been raised about the margins in the table over the valuation basic table. So I assume that these will be debated once more at the NAIC's December 2001 actuarial meeting.

CSO 2001, of course, has some new features that should be able to help the actuaries. The reserves, in general, will be lower than they were at the end of the 1980 CSO. There will be 25-year select factors rather than 20-year select factors. The CSO table has split among nonsmoker, smoker, male, and female. We won't have to worry about the new version of it being put forth and developed after the table has already been adopted. The complaint about the table is that there have been a very small number of companies, even the large companies, that contributed experience to it. The companies that are writing the real competitive type of term products, and the companies that have these preferred nonsmoker classes really weren't involved. They didn't contribute towards this table, so the table doesn't have more than one nonsmoker class. It doesn't have a preferred class for reserves, so actuaries will still have to face that problem and decide what to do. The table itself doesn't cover what to do about the guarantee issue type of business. There is the business that's nonmedical, and the business that is mail order. So my factors can still be used and should be used. It is a matter of whether the ultimate only mortality is appropriate for that type of business. Of course, there will be no extended term version of the CSO 2001.

There's going to be another issue that actuaries are going to have to be cognizant of with the 2001 that really was around for the 1980 CSO. The question is the focus of the select factors used for minimizing deficiency reserves. Should you keep these same select factors and your base reserves assets? This is not as resolved as I thought. Many actuaries believe the issue is legal, not actuarial and should be decided solely by regulators.

Arnold Dicke came up with a buzz word that I like: *risk profile*. I think a risk profile should be something that the actuary focuses on very much. The risk profile should determine what kind of test the actuary is going to employ, and what kind of cash-flow testing there should be. There's a new actuarial standard of practice that says, "Cash flow testing is not required in all instances." Therefore, it leaves it up, in considerable part, to the actuary's judgment, and his judgment should depend on the mix of product and assets. All life products carry a mortality risk. The risk profile, of course, comes into play with the product mix. Interest-sensitive products that are important for many companies (such as the old single premium deferred annuities (SPDAs), universal life, GICs) have their own unique characteristics. Still other products that are not

interest sensitive, but are equity sensitive (variable, and indexed life and annuity products), have still other risk characteristics, guaranteed minimum death benefits or living benefits. You have to be sensitive to the type of products and their own unique risks. The types of testing that you do with these products also has to bring in the question of a C-3 risk. There are special RBC requirements for C-3 testing that mainly affect interest-sensitive products. If you're going to do testing in one area (reserves), you should consider the need for testing in the other area (RBC).

You would have different considerations in their risk profile. If you have products such as long-term care or immediate annuities, these would be long-term products, with little cash value so there's little disintermediation risk. They're going to be around for a long time, so the long-term risk of the product has to be considered. On the other hand, with health insurance, there will be more traditional major medical type. These are inflation-sensitive products. You also have the question about what's going to happen to health insurance claim costs.

There's another risk called the liquidity risk. We know of a filing company that was brought down by the question of liquidity. It wasn't insolvent, but it just didn't have enough cash on hand to pay demand because it ran afoul of the decision makers. The decision makers, in this case, were institutions. Decision makers can be agents who control blocks of business. If the decision makers are able to roll business or have it surrender and the business has cash value, and the business has a cash value that is book value with no market-value adjustment, you have to keep in mind how much those reserve levels would cover of that kind of additional risk.

The other side of the coin with the risk profile is your asset mix. Of course, the asset mix risk depends on the duration of the assets, the length of their term, the credit risk, and the disintermediation risk, which can come from just changes in the interest rate prevailing in the economy. There is also the call provision on bonds, which is frequently found with high interest rate assets. Debtors can utilize them immediately if the economy's prevailing interest rates are working in their favor. This question involves a prepayment risk that some companies ran afoul of when they had high yielding collateralized mortgage obligations (CMOs) that suddenly disappeared because they would be paid.

A similar consideration is just the question of the many types of mortgages. Actuaries had to worry about credit quality in the area of commercial mortgages and investment real estate. The credit quality risk is still with us today, and I think it's more about looking at your customer's portfolio. Do you have much in the way of Enron bonds? They've been in the news lately. Does this company have much exposure in the way of airline bonds? You know what happened to the airlines a couple of months ago. The airline companies haven't recovered yet and their bonds, at this point, have not recovered. It's November 30th, and we don't know for sure what the NAIC's valuation decisions are going to be on some of these assets. If they were investment grade before, are they going to be moved to the low investment grade? I think it's reasonable to think that some of them will be moved. We need to take that into account, too, when looking at the risk profile of the company's asset mix. CMOs also have what's known as the flex score calculation, and the more volatile CMOs have a flex score calculation of seven or above that can be defined as the volatile price.

Asset allocation by product line has to consider that some assets are better attuned to some products than others. Allocation methods, of course, come into play. Some companies will compute allocations of balance sheets. Every single dollar of the asset is allocated into one product line or another. I think it is reasonable, in many cases, to allocate your assets not necessarily by specific identification, but by percentage of allocations. Of course, this depends on the characteristics and the risk profile of the product lines themselves.

You would use a cash-flow test. I think everybody realizes what it is, but I'm going to define it anyway. I'd use the cash-flow test versus the gross premium reserves. Using a cash-flow test means that you're projecting your product performance separately from your asset performance and measuring the two to make sure that they're in sync over a period of 20 years. The sensitivity items are involved in the New York 7 in terms of asset performance and the effect of different interest scenarios. I'm often struck when I look at the reinvestment rate as to what a key assumption that is, and how sensitive that is, unless you have a very short-term product. Think of what your existing asset performance is going to be and how little effect that plays in the final outcome and how important it is to really govern where you stand and what that investment is going to be.

A gross premium reserve is really a form of cash-flow testing. In some cases, it's generally considered a minimum statutory reserve anyway. I don't believe this is written into NAIC requirements, but it's often required as a minimum test of long-term-care reserves. The only difference is that you have one overall reinvestment assumption, namely of the discount rate. Your discount rate is supposed to cover a host of different events in the future, such as asset default rates, prepayment rates, and so on. One actuary raised the concern that if a company had a heavy amount of junk bonds yielding 12%, is this going to justify his using a 12% discount rate in the gross premium reserve? This would give a very low risk premium reserve, and I think you can see that the answer is that it is certainly not justified. You should be using a lower discount rate because of the imposing junk bonds. You have the same considerations of asset performance or really combining asset performance and product performance together. Again, risk profile is the key.

Other changes in assumptions are important to sensitivity tests as well. Health insurance, I think you're aware that the percentage changes in claim costs automatically mean the same percentage changes in the present value of benefits. Interest differences often are not considered important for health insurance, but in certain types, like long-term care, they're quite important. This is especially true if you have what's known as the inflation rider where an automatic increase in benefits each year will take place for an additional premium.

Lapses are always important in measuring risk, of course. However, lapses on non-cash-value business, such as long-term care, are even more important. Mainly, the lower the lapses, the more unfavorable the events are in the future because the long-term-care benefits are going to have a very steep curve by duration. You have to watch your age mix on types of business like that because the age mix on long-term care is getting younger in recent years.

Let's go back to XXX. If you are using the X factors for mortality, they have to be justified, and not just used automatically. The larger companies have their own experience to justify it. If you don't have that much experience, it's harder to be credible. How do you use industry mortality experience to try to justify an X factor to lower the mortality from what it is in the select factors

that are already available in XXX mortality? As we've been saying, some of the X factors seem to range from 20% to 75%. That's a striking range. Again, these are factors that tried to lower the mortality that's already in the select factors. The X factors are still going to be with us in 2002 when the CSO 2001 comes into play. It would be logical to think that because the CSO 2001 has lower mortality that the X factors, to the extent they're used, are going to be lower, and I think that's what we're going to see.

Of course, in the gross premium testing and the asset adequacy test, virtually all of the current business is used and essentially new business comes into play. Knowing what dates to use has always been a tricky thing for actuaries. We have a February 28 filing date. Oftentimes, we just can't use and wait for the December 31st numbers, and so you may use December 30th numbers. Then you have the question of whether the date for your asset performance is in sync with the date for the product performance projection. Control totals are a necessity in somehow reconciling cash for year-end. I think this has never been as tricky a proposition as it is today because of the volatility in the economy that we have seen from September 11th. That volatility is going to continue until the year-end, not only in terms of what certain assets are going to do, but also in terms of the prevailing interest rates you're going to use and in terms of what your reinvestment assumption is going to be. You want to make sure that you're in a position to justify today's appropriate assumption on December 31st.

The asset is a necessity for the valuation actuary to interact with other departments. This was never more true than it is today. Is the way the underwriting department is approaching this consistent with what you think the mortality assumptions and lapse assumptions are going to be? There is also your investment department. What is it doing right now with reinvestment, and how is it reacting to the events in the economy? Consider also your claims department and how it is handling certain types of sensitive claims and what they're doing with the system. Are all these departments' practices consistent with what they've been last year or six months ago or three months ago?

I want to remind you all to be aware of systems changes. Systems changes are a fact of life; they are conversions from one system to another. If at all possible, try to run your reserves at the same date under the old and new system to make sure that you get consistent results. The whole environment for the valuation actuary is more sensitive and more volatile than it has ever been. So I think that's a challenge to us all.

MR. SIKORA: Long-term care is really in its infancy. Something I've heard in the past is that long-term insurance is being developed by health actuaries. Health actuaries are not used to the volatility of interest rates, and how that might impact their product.

MR. HILL: Of course, long-term care is a long-term proposition by definition. Your interest assumption is very important. Industry experience with lapse rates appears to be reducing. You should take that into account. Also, the subject of mortality improvement has come up. The assumption of mortality can be very volatile and very influential in the level of reserves. However, I don't think it's appropriate to assume only mortality improvement by itself because we have a healthier population all the time. I think the two can go hand-in-hand. Certainly, in your sensitivity tests, I think it would be appropriate to build in a combination of mortality improvement and morbidity improvement for a healthier population. We don't have as refined a set of statistics on morbidity as we'd like. The Society has put together several different studies, and they're going to be putting together another one, too. Long-term care is certainly a challenge.

MR. SIKORA: We need at least a 12% return after tax. How many times have you heard such a statement made by the president, CFO, business unit head, or the head of marketing? Why is it 12% and not 9% or 15%? I'll answer that question shortly.

First, I want to delve into what we really mean by return on equity. In the generic sense, we all understand the profit or the numerator of this equation. The problem is the cash-flow measure is adjusted by some kind of accruals. These accruals may be for future benefits, reserve changes or

for expense recognition under some kind of an accounting approach, looking at deferred acquisition cost amortization. The equity component denominator isn't that well understood.

Return on equity is most easily understood on a company level. If you use the calculator return by picking up a company's published GAAP statement, you divide the net GAAP income by the average of the beginning and the end-of-the-year equity to obtain your return. But what does that equity really represent?

Debt equity can be expressed as the sum of three distinct components. The first, tangible capital, is the difference between invested assets and the financial liabilities. Tangible capital encompasses required as well as free surplus. All this surplus generates investment income that funds its way into the profits of the organization. The second component is called deferred acquisition cost. This includes all intangible assets, including those from an acquisition: value of the in-force business, present value of profits, and the goodwill. All these assets are noninterest bearing. They result from the application of accounting rules. Since these intangible assets must be amortized, the future profits of the company are going to be diminished by this amortization expense. The third classifies the tax adjustment. This represents the timing differences involved between actual tax payments and how they're recognized in the GAAP environment. There is deferred tax liability or deferred tax assets. The most significant element of the tax adjustment is due to the deferred acquisition cost asset.

If we assume that this is the only significant or material tax adjustment, GAAP equity may be expressed as tangible capital plus the intangible capital times one minus the tax rate. In the U.S., the tax rate is 35% so this translates into tangible capital plus 65% of deferred acquisition cost assets. How do you define the tangible capital of a company? What is it really made up of? Each company decides what level of tangible capital it needs to hold. Capital is needed to expand markets. It might be used for investments outside what might be termed normal insurance operations. This might be venture capital or real estate investment. The capital that a company holds should reflect the inherent risk of the product that a company has marketed. The options of the product or the more volatile the risk assumed, the higher the level of capital that's needed.

A significant aspect of an insurance operation is the skill with which it is able to produce a high level of investment income while minimizing the investment risk. Since investments, as an insurance policy, don't have the same level of risk, management must determine the appropriate level of capital to hold to moderate these risks. The level of tangible capital is theoretically based on the degree of adverse deviation that should be provided for. Now this has been talked about by Jim, and so, in a mathematical sense, should this be one, two, or four standard deviations. It's up to the practitioner to decide.

Another way of thinking about this is what's the probability of ruin? How much capital do I need to provide in 99 out of 100 scenarios? Has there been insufficient capital in only one out of 10,000 stochastic runs? That's a missed dividend payment only once in 25 years! We need to come up to shareholders with some type of measurement.

While we need to evaluate the risks inherent in the business that we write, we need to relate our findings to a standard measure. Until just a few years ago, only simple measures were used to define the adequacy of capital in an organization. Surplus ratios in excess of 10% signified that we had superior capitalization. A surplus ratio below 5% required closer scrutiny of a company. Risk-based capital or capital adequacy ratios have improved our understanding of an organization's inherent risk. The NAIC developed a formula to use as an industry-wide tool. This allows comparisons among the universe of companies. There are other formulas out there from the rating agencies, like Standard & Poor's and Moody's, that might also be used for comparative purposes. The problem with using these is they don't really cover the whole universe, so this limits the usefulness of these ratios.

Now an organization might decide that it might need to develop its own internal formula. These have been around for several years. They've been documented in some of the actuarial literature. This action might be prompted by the unique nature of the risk being assumed or necessitated by the requirement of wanting a little bit more of a dynamic formula. A company might evaluate its overall capital needs using a specialized formula. They must be ready to explain. It might fare less under one of the more generally accepted formulas that are out there in the public domain.

An organization, especially a group of companies, must review its capital adequacy of each separate company. The organization might determine that it has more than adequate capital overall, but that capital might not be distributed properly. If return on equity is being used as a measurement tool, capital would need to be adjusted formally or informally to obtain a proper gauge of the contribution from each entity.

The same type of review is being made on a product line basis. This is especially true if capital ratio comes into play in a large organization. New product pricing introduces a whole new complexity. Return on equity, by its very nature, is a point-in-time measurement. It isn't meant to be an encapsulation of the lifetime profitability of a product.

As I mentioned earlier, why is a 12% after-tax return the benchmark one most often hears these days? If you pick up a finance book, the hurdle rate that I recall seeing most often is 15%. If you look at the universe of insurance companies in the public domain, you can see that their returns are below this level on the average. There are some that might exceed 15%, but I think there are many more below that 15% level. This 15% level that you see quoted in finance books is the overall historical average of all industries that are out there. Even the insurance industry offers a more predictable return than industries as a whole. This is due to the longer-term nature of the product and the corresponding accounting treatment. Most industries report profits only at the point of sale, while the insurance industry bleeds profits over an extended period of time. The accounting treatment might also mask some adverse issues occurring in an organization. The level of return is impacted by the overall profitability and the level of interest rates.

In the early 1980s, interest rates were substantially higher than they are today. A newly formed company in those days would have had a 12% return on equity hurdle rate by practically doing nothing. You just invested capital at 18%, which is where interest rates were. You take 35% off and get to 12%. Our finance theory indicates that equity returns should be the sum of a riskless rate plus some kind of a risk premium. We now look at U.S. Treasuries and maybe you had a 7.5% risk premium, you end up with 10.5%. That's basically the current rate that we should be looking at as having a reasonable return on our products that we're developing.

We're also faced with accounting changes that impact GAAP returns. The change might involve income recognition, or it might impact the equity calculation. The proposed change in treatment of goodwill, which is happening in 2002, is a prime example that impacts both the company income as well as the equity of the company. Goodwill will no longer be amortized as income next year. Income won't be depressed as it has been in the past. However, goodwill is a portion of GAAP equity, as we mentioned earlier. This higher level of goodwill will reduce equity returns.

A product line manager must understand senior management's tolerance for risk. He must establish capital adequacy goals in line with overall company levels or be prepared to defend why his goals are more important. The same ruin tests that are used at a company level are probably not appropriate to use at a product line level due to the smaller size and the more concentrated risk. The line manager must recognize the risks inherent in the business being marketed. He must also recognize that the use of a more narrowly defined and more finally specific capital adequacy formula would be more useful than a standard formula. The investments allocated to a business segment should require a level of capital consistent with the risk parameters of those assets. When return-on-equity is being used as an indicator of performance, the influence that the line manager has on the investment return and the level of capital required for those investments must be weighed accordingly.

One of the best ways to measure the impact on a new product is to look at overall results. Model the entire economic structure of the organization before and after the influence of a new product. The difference between the two results is the marginal impact that the product has on the overall return on equity. I know I've never done it that way. I'm not sure if anyone else has because it's pretty impractical. An alternative approach is to view the marginal impact of the product in isolation. This would encompass using marginal expenses and measuring the impact on existing products that might carry a different return than the new product. The most used capital level that I've seen for product pricing is 200% of NAIC company action level. You can demonstrate that the level of capital being used is consistent with the perceived risks of the product and the associated investment. As much as you would like to develop and market products with a return in excess of the 12% level, the market won't allow us to do this in all cases.

The reality is that we must both maximize the return of a product and make it salable at the same time. Generally, we are trying to maximize both sales and profitability. Of course, we must always have one eye on the market.

All products are not created equal. We understand that an accidental death policy is more risky than a normal life plan. The relationship of premium to the face amount exposure is much higher in an accidental death plan. You should expect a lower loss ratio on an accidental death plan than on a normal life plan. If the same relative level of capital is used in both products, the expected return on equity for the accidental death business should be higher than on the life plan. But if a company wants the same hurdle rate for both products, the relative level of capital would need to be adjusted. The alternative is to establish different return criteria for each product as opposed to changing the capital level.

The key to fine tuning capital requirements is to understand what makes our policyholders tick. We need to model policyholder characteristics in order to adequately determine the level of capital required to live through those unpleasant times of cash outflows. We need to understand how severe an environment we can survive in. We need to determine if we can craft a policy that would dampen some of the risk to which we're exposed. Some changes are generally out of our control. We must fund a solution after the event occurs. Regulatory changes as well as tax changes will always be wild cards out there. When DAC tax was introduced, the result was that the overall profitability of life products were reduced. The industry responded to this by becoming a little bit more expense efficient to offset what's lost in product earnings. Economic risk measurement forms the basis for asset adequacy testing. However, our test and scenario testings, which are generally based on historical activity, do not pick up outliers. The sudden massive default in foreign bond markets and its impact on financial results are an example of generally untested scenarios.

We're currently experiencing some kind of agency discontinuity. Insurance companies are now part of what's called the financial services industry. Part of the response is to look at tools used by banks to see if we can control this risk because banks are now considered as part of our same

sector. Because we're in the uncertainty business, are there any tools or programs that we can institute to dampen this uncertainty? We definitely want predictable returns because the market rewards predictability. A prime example of predictability is G.E. We see the dependability of demonstrated earnings growth of this organization. G.E. has had 20-25 years of continued growth, and its market multiple is well above other companies. The insurance industry is built on bringing predictable cost to its policyholders. Direct writers obtain more predictable results using reinsurance, hedges, and diversification in both product lines and investments. Investment income may be enhanced through the use of swaps or protected by using options. The intent is to dampen the impact from adverse economic changes that are likely to occur. Alternative investment opportunities involving the developing instruments offer good value to the additional risk being assumed. We all want to utilize our scarce resource of capital wisely. Are more expensive levels of capital being expended than needed? Have all alternative financing options been explored?

When are taxes to be paid? Since GAAP equity involves the time between actual payment and the recognition of those taxes, the impact from alternative strategies and the impact on trends in returns should be examined. Companies still feel the pressure to reduce expenses. The need to expand into new markets results in increased expense levels. One method that has been used to expand the market with a minimum increase in expense levels is to form partnerships. This allows new entry without incurring a high level of start-up cost. Underwriting of older age policyholders is one example in which you might want to find a partner.

As you saw earlier, return on equity is an easily expressed formula. It's not so easy to understand exactly what is a good return. Hopefully, you can have a better understanding and appreciation of the process needed within the companies to help you understand how to obtain that answer for your organization. We have a couple of minutes for questions.

FROM THE FLOOR: I have a question about the return on equity (ROE), specifically at the product level. You mentioned that, because of the GAAP rules, ROE owed for a product level is not likely to be level over the lifetime of the product. Suppose you have a product that overall

would meet its ROE target with a high ROE in the earlier period followed by a low ROE in the late periods. Once you reach the late periods, you have a problem communicating that to management. What would you do?

MR. SIKORA: I've thought about that, and the best solution I have been able to come up with is basically communicating to management. Let's look at the product as if we're selling the same product over a 20-year horizon. When you start thinking about it, that's really how the accounting and statements are put together. Once you think about that, then you say, "Okay, what does that mean?" It means you're layering one year on top of another. All you end up doing is just taking the 20-year simple average of the returns on equity, weighted by the actual income for each year and the average equity in each year, and collapse it down. That's the number that you talk about. Don't try to explain the more idiosyncrasies of GAAP. You just give senior management one number. That's what you do from a product standpoint. You just make sure everyone understands or maybe they'll forget by the time low earnings emerge.

FROM THE FLOOR: If you stop selling this product, and reach the out period, you can try to remind them of what might have happened in the past, but now that they are looking at 5% ROE, they might not be happy about that.

MR. SIKORA: All you can do is hope that that has become a much smaller piece of your portfolio and that they're looking really at other business producing a higher ROE output. Or, you can hope that you're gone or you're about to retire.

FROM THE FLOOR: I have a couple of comments on that. I think what it really says is it makes returns on equity growth sensitive. If you keep growing, you can stay ahead of the game. In fact, if you have products that tend to have higher ROEs, higher margins in the early years and you keep growing, your ROE gets better even over time. If you stop growing or if you shrink, then you run the risk of seeing the lower ROEs coming in later. I think this topic was part of an article from the *North American Actuarial Journal.*

As to relating GAAP ROE's to statutory ROE's using a levelized approach, the same relative ROE would emerge over the projection period as long as the same capital is used under both accounting bases. A levelized ROE approach is similar to an internal rate of return which is one of the methods used most often in the pricing of products.

One way to relate levelized ROEs to internal rates of return is to grow new production at a rate equal to the internal rate of return rather than assume a stationary level of production. When you perform this exercise, the resulting ROE in each reporting period will remain stable.

We price on an internal rate of return basis, which is really the correct economic way to look at the business of the cash flow. What are the free cash flows? It doesn't translate right over into GAAP ROE. I think our management has struggled with that, and it has been a little bit difficult to explain those nuances.

MR. SIKORA: I think we all price the same way. We're being forced to really look at translating it into the GAAP world because the statements out there that the public sees are the GAAP accounting statements. Everyone is saying that we need to increase our GAAP income. We all struggle with how do I translate that. It's never going to be a real good translation to a nice formula or a nice specific answer. So we all tend to levelize it out. I agree with you.

MR. BRIDGEMAN: It's kind of a difficult discussion if you have to go to your management and say, "The product's priced to return a 15% internal rate of return. We're hitting all our pricing assumptions, and it's now returning 8% ROE." It's just difficult.

MR. SIKORA: Is that 8% at one point in time?

MR. JACKSON: Yes.

MR. SIKORA: That's where we try to deflect it unless they keep pushing away. Hopefully, they just ask the question, "What's the ROE on the product?" You can say, "Well, the average ROE is x%." Hopefully they don't ask, "What is it now?" I'm not sure they would know how to ask that question.

MR. HILL: When you're talking about the profitability of a product, you get all kinds of questions. Are you really covering that total expense of a product, or is it just marginal expense? Are you really covering the total expenses of the company? Are you getting every dollar of that overhead and taking it into account?

MR. SIKORA: The questions pertain to whether a company's investment portfolio is weighted more towards common equity than a more traditional investment philosophy. How should you recognize that aspect in your pricing?

MR. BRIDGEMAN: I think very few of us are going to have much practical experience with that concept. I think, from a pricing exercise, you price a return on capital in the language you're talking about. The corporate finance job, apart from your pricing, is to structure the financial aspect so that the prices you get from the market you're participating in translates into a corporate return that's acceptable. In the end, it's the marketplace that sets the prices, not us. We don't always act that way, but as a practical matter, that's what happens.