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# 1999 Valuation Actuary Symposium

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### Los Angeles, California

## Session 12

### Health Organization Risk-Based Capital

**Moderator:** Burton D. Jay

**Panelists:** Robert G. Meilander  
Timothy L. Patria  
Robert K.W. Yee

*The session reviews current projects by the Academy Committee. New C-3 risk factors for LTD, LTC, stop-loss, and other coverages are among the items being considered by the committee.*

**MR. BURTON D. JAY:** The title of our session is “Health Organization Risk-Based Capital (HORBC).” However, we will cover not only health organizations, but also life insurance companies that complete the Life Risk-Based Capital formula (RBC). We will discuss the treatment of health products for both the life and the health organizations or the managed care organizations (MCO) RBC formulas. We will also cover what the health terms look like in the casualty risk-based capital formula.

I am the financial actuary for Mutual of Omaha. I’m responsible for valuation, asset/liability management and capital management support. I am also chair of the Academy’s Health Organization Risk-Based Capital Task Force. The other panelists are also members of this task force.

Bob Meilander is vice-president and corporate actuary of Northwestern Mutual. In his position, he is responsible for valuation of liabilities, testing of reserves, including cash-flow testing and actuarial compensation aspects of corporate modeling, surplus management, field compensation, and financial reporting.

Bob Yee is business risk manager and actuary for the long-term care division of GE Financial Assurance. He is a member of the Academy's Task Force on Long-Term Care and a member of the Society's Experience Committee on Long-Term Care. He participated in the 1994 Academy Task Force on Health Organization Risk-Based Capital, working on long-term-care products. Our fourth panelist is Tim Patria. Tim is in the corporate actuarial department of The Hartford Life and is responsible for capital allocation and risk management. He is a member of the Academy's Life Risk-Based Capital Task Force. He provides liaison among the Health Organization Risk-Based Capital formula and the Life Risk-Based Capital formula.

Our intention is to make sure that whatever we do for one RBC formula is treated consistently in the other RBC formulas (at least as consistently as possible, considering the different structures of the two types of formulas). We recognize that the co-variance treatment in the three formulas gives different results, but at least the terms representing the same risks will look the same or similar.

Our task force has a fairly long history starting back as early as 1992 or 1993. The group made recommendations to the NAIC on health risk-based capital in 1994. The NAIC members thought that those recommendations were too complicated and would not be practical to implement. The Academy Task Force went back to work for another two years to simplify the initial set of recommendations. In 1996, the NAIC selected only the medical portions: major medical, medical supplement and dental coverage, of the simplified formula that the task force recommended. The NAIC developed a formula for managed care organizations, based on the Academy Task Force recommendations. At the same time, the new factors for these products replaced the comparable existing factors in the life risk-based capital formula. The changes were implemented in 1998 and were effective for 1998 statements.

Later on this year our task force made another series of recommendations that will be outlined in some detail. They affected the disability, long-term care, stop-loss and limited benefit coverages. Those recommendations were adopted for both the MCO formula and the life formula, and they will be effective starting in 1999. For the most part, the factors that were already in the life formula were exported into the Managed Care Organization Risk-Based Capital (MCORBC) formula.

We are now in the process of developing models and conducting research to come up with sounder recommendations for the factors for disability, long-term care and stop-loss. We adopted the factors for these products out of the life formula as a stopgap to have something to use in the MCO formula. These factors were based on very little analysis back in the early part of this decade. It is our hope that, by the end of 1999 or in early 2000, we will have a recommendation that is more scientifically based. Bob Meilander will talk about what the disability subgroup is doing, and then Tim Patria will talk about stop-loss. I will speak on the limited benefit products, and finally Bob Yee will talk about long-term care. We plan to have a few minutes for questions and comments at the end of the presentation.

**MR. ROBERT G. MEILANDER:** I'm going to talk about the disability income risk-based capital effort. My agenda is to give you some background material and an overview of the kinds of things we're doing right now, in particular, the data gathering, modeling, and, eventually, setting factors—and the current status of the project itself. Most of this is specifically pertinent to disability insurance, but some of it is also relevant to some of the other products that are under study. In particular, those of you interested in those other products might find the background material and the discussion of the model interesting.

Let's take a look at the history of how we got to where we are today. The first disability insurance risk-based capital requirements were established in 1991 as part of the life requirements. They were based largely on the internal requirements of four or five large carriers. There was very little modeling, if any. I wouldn't want to leave you with the impression that there was no modeling, but it wasn't much. Most of you are probably familiar with the 1991 requirements because they are still in effect (see Table 1). These factors vary between noncancellable and guaranteed renewable and group or credit. There are premium factors split between the first \$50 million in premium and anything over that. There are also percentage of claim factors.

**TABLE 1**  
**Current Requirements**

	% of Premium		% of Claim Reserve
	1 <sup>st</sup> \$50 Million	Excess	
Noncancellable Individual	35%	15%	5%
Guaranteed Renewable Individual	25	15	5
Group and Credit	25	15	5

This 1991 effort was followed by a 1994 effort, which was the Health Organization's Risk-Based Capital (HORBC) work. The intent, at that time, was to deal with all forms of health insurance using a consistent model. That one model focused on the variation in loss ratios from a trend line. For the most part, the impact of movement in the trend line itself was ignored, and that was a key issue for noncancellable types of insurance. It wouldn't be a big deal for guaranteed renewable.

The HORBC group made a recommendation to the NAIC, and I think that outside of the managed care organization recommendations, most of it was never resolved by the NAIC.

At this point, we're coming back to revisit what was done in 1994 to see if it's useful; we'll see what we felt we needed to do with it to make it more useful. The basic things that were done as part of the current effort in 1998 were to review the past efforts for usefulness and to make some interim recommendations to the NAIC. That recommendation was made last fall. We are now extending the 1994 work, and eventually, we will make long-term recommendations.

As noted earlier, our first order of business was to review the historical attempts. When we did that, we had some issues with what was done. I already acknowledged that, in the 1991 work, there was no disability income (DI) model, and we felt that was a pretty big weakness. I find it interesting that, at that time, some companies had their own internal standards, and the NAIC set their standards based on what those companies were doing. Things have gone full circle and some of those same companies now base their internal requirements on a percentage of the NAIC standards. (I thought that was rather amusing.)

In any case, the current requirements were a result of an effort that used no DI model. Even if there had been one, the data probably would be out of date today. Things have changed quite a bit in the disability world since 1991.

Our next task was to take a look at the 1994 work. There was a very complex treatment of trend and volatility, and our group still isn't sure about how we feel about that. I'm not going to get into details, but how you handle the trend is very, very important in setting a noncancellable requirement. As a result of the way that was handled, we ended up with some nonintuitive results. In particular, the modeling indicated that the guaranteed renewable factor should be higher than the noncancellable factor. Because of these unlikely results, significant judgment was applied in setting the recommendations that came out of the HORBC effort. In particular, the noncancellable factors were used for guaranteed renewable, and the noncancellable factors were increased by 10% for noncancellable.

There were some significant issues with the historical attempts. At that point, we realized something needed to be done, but first we had to make an interim recommendation to the NAIC. That recommendation looks an awful lot like the current requirements. In fact, they're identical, except for the footnote. The footnote says that for tiering for the first \$50 million of gross premium, you can add guaranteed renewable and noncancellable together. Previous to this recommendation they were kept separate (see Table 2).

**TABLE 2**  
**Interim Recommendations**

	% of Premium		% of Claim Reserve
	1 <sup>st</sup> \$50 Million*	Excess	
Noncancellable Individual	35%	15%	5%
Guaranteed Renewable Individual	25	15	5
Group and Credit	25	15	5

\* Guaranteed renewable and noncancellable premium combined into one first tier, with noncancellable 35% applied first and guaranteed renewable 25% applied to the remainder if any.

Once we established the interim recommendation, we began working on going forward with the 1994 type work. There are three phases for the current effort. First, there's a data collection phase. That's where we are right now. Once we get those data, we'll use them to model the risks. Once we have the model results, we'll use them to develop factors. There's some

possibility we might have to cycle back and collect additional data if we don't end up where we want to be. We do have a pretty good history with the 1991 and 1994 attempts, so we have a pretty good feel for the kind of information that we should be looking for.

That's an overview. Let's talk about the data collection phase. There were a number of issues that had to be addressed before we could collect data. The first of those is to determine for which segments to collect data. Our intent here was to get at those segments where surplus requirements might vary. The data segments that we're collecting data on right now are: premium guarantee, (guaranteed renewable versus noncancellable); market or product, (individual versus group versus credit); benefit period, (less than two years versus over two years); stage, (active or disabled); and cause, (accident or other than accident). We will also reflect company size. The first question we had to address was the segments.

The second area that we looked at concerned the amount of history to get. In particular, how many years of data should we collect? We wanted to make sure we got enough history so that we had enough data to work with. On the other hand, we wanted it to be relative to current products, so we couldn't go back too far. We've asked for data back to 1983. Some companies will be able to provide that. Some probably won't, but that's what we've asked for.

The next question was to address the specific data items that we would need. This is really a function of how the model works and the kind of information we need to seed it with. The model office information just splits by beginning date, benefit period, occupation class and that sort of thing. If we do have a need to build a model office, we'd know how to do it.

Finally, the last issue regarding collecting data is data scrubbing. It is pretty likely that when we get the data, some of it is not going to be useful. A particular item that we're thinking about already is whether or not we should interest-adjust the loss ratios. Remember, the key driver of the model is the loss ratio, and interest-adjusted loss ratios tend to work a little bit better for that than non-interest-adjusted loss ratios. We also had to consider what to do with changes in reserve basis. Right now we're leaning towards leaving them in. They will add a little bit to the

volatility of the result, but they are part of the reality of the business. Who knows what other data scrubbing issues we might find as we look at the data that we're getting in?

The current status on data collection is that a survey was mailed to 50 companies. We're getting responses. We hope to have all the responses back some time in September or October. I don't know how many we have received right now; perhaps there's 12–15. By the way, the request was on an Excel spreadsheet, and it is available from the Academy of Actuaries. If any of you would like to contribute data, we'd love to have it.

Once we collect the data, we're going to put it in a model. That model is loss-ratio based. What I mean by that is that it starts with a target loss ratio and stochastically generates variation around that target. The model does not change anything else. It doesn't change interest rates. It doesn't vary expenses. The focus is specifically on the morbidity experience.

Once the model has generated the loss ratios, the model determines the surplus impact of variations in morbidity experience. The model is seeded with a surplus requirement and year-by-year surplus movement is examined throughout the time horizon to see whether or not it goes negative. If the year-end surplus goes negative at any time, that scenario is a ruin at that surplus level. We will run a number of these stochastic simulations, probably in the 1,000 to 2,000 range, and see what kind of ruin probability we ended up with for a particular surplus level. That ruin level will be compared to our target ruin probability. We will use an iterative process until we hit the right target.

The loss ratio is the key to the analysis. The way the loss ratio is calculated is to start with last year's loss ratio, add a loss ratio deviate to it, which is a randomly determined amount based on experience. Then the model subtracts out the phase-in of reactions to previous loss ratio problems. For example, if there was a high loss ratio a few years ago, the company is likely to make adjustments in terms of higher rates or otherwise. The phase-in is getting at those reactions.

**FROM THE FLOOR:** What is the definition of loss ratio for that? Does it combine both the new claims coming in and terminations on the old claims?

**MR. MEILANDER:** It's the loss ratio as filed. It would include both new claims and termination experience. One thing I should clarify here is that I've used the term *loss ratio*. It's really claim ratio. We are not including active life reserve changes.

Table 3 is an example of loss-ratio development. All the items shown here are expressed as a percentage of premium. Let's start with an anticipated loss ratio of 60%. Then add in the loss ratio deviate with any changes for phase-in. In the first year, that's going to be zero because there aren't any results from two years ago. I'm assuming, by the way, that the phase-in starts two years after the experience. In this example, the model ends up with a 65% loss ratio in the first year. In the next year, the model uses a loss ratio deviate of 7%. Again, there is still no phase-in. The loss ratio goes up to 72. The next year had a loss ratio deviate of -17. That's a big number, but these were randomly generated. This year we would have a phase-in, and in this case, it is -1. That reflects the fact that two years earlier, the loss ratio was 65%, which was higher than the target of 60%. You take the 72% minus 17% minus another 1%, and the loss ratio goes down to 54%. In the next year, the loss ratio deviate is zero. The phase-in is now -2. That's one for the 65 and one for the 72. You end up with 52. This is an oversimplified example of how the phase-in factors are actually calculated, but that's the idea.

**TABLE 3**  
**Model Sample**  
**(Loss ratio development — all items as a percent of premium)**

Year	LR Deviate	Phase-in	Actual LR
0			60%
1	5%	0%	65
2	7	0	72
3	-17	-1	54
4	0	-2	52
5	16	-1	67

= anticipated

**FROM THE FLOOR:** How do you determine the distribution for the loss ratio deviate?

**MR. MEILANDER:** It will be based on the experience that we get from the companies, and it might or might not include trend. That's the one issue that we haven't settled at this point, but it will be based on the experience of the companies.

**FROM THE FLOOR:** In one of the early versions of the model that I looked at and worked on, there were two components to the loss ratio error. One we called historical fluctuation. The other was more of a statistical fluctuation where we built in some individual claim distributions so you could see the impact of size of business as well as its distribution. Is the statistical fluctuation based on size of business still part of your approach, or are you going to model in something?

**MR. MEILANDER:** We haven't fully addressed that yet. If we get data from enough companies, we will generate both small company data and large company data. Then we won't have to specifically address the statistical issue that you just brought up. If we don't get that kind of data split, then we would have to find a way to adjust for size along the lines of what was done last time. Right now we're hoping to work with one distribution.

After the loss ratio, the next most critical part of the model is the movement of ending surplus. Ending surplus at the end of a particular year is the beginning surplus for that year, plus the profit margin, less the actual loss ratio, and plus the anticipated loss ratio. What this does is get at the difference between actual and anticipated—plus it adds in a tax adjustment, less dividends. Dividends are paid whenever the accumulated surplus is higher than the target.

Table 4 is an example of that. We start surplus with a seed of 20% of premium. The profit margin is 5%, so that gets us up to 25%. The loss ratio difference is minus 5%, so that puts us back at 20%. There's no income tax, and there's no need for a dividend. So we end up at 20% at the end of the first year.

**TABLE 4**  
**Model Sample**  
 (surplus development — all items as a percentage of premium)

Year	Profit Margin	Actual LR	Anticipated LR	Tax	Dividend	EOY Surplus
0						20%
1	5%	65%	60%	0%	0%	20
2	5	72	60	-2	0	15
3	5	54	60	4	2	20
4	5	52	60	4	9	20
5	5	67	60	-1	0	19

The next year we get another profit margin of 5% but the loss ratio now is 12 points over, resulting in a surplus change of -7. The tax effect of that would actually reduce taxes by about 2%, so we end up with an end-of-year surplus of 15%. The next year we add another margin of 5%. The loss ratio contributes another 6% because it's below expected. So that's 11%. The tax is 4% for a total increase of 7%. That would put us over our 20% surplus target. We had a dividend of 2% and ended up with 20%. That's the model.

Let's talk about some of the model issues we have had to address or still have to address. If anybody wants to get involved in this stuff, we have plenty of room on the committee, especially if somebody wants to do work. We really like those people.

Let's discuss some of the model issues. First is consistency. How important is it to be consistent with both prior modeling and with modeling done for other products? The real issue here is the level of consistency because we're going to use a model that's pretty similar to what was done in 1994, but it's not going to be identical.

Second is volatility and how we will go about addressing that. We're going to get some historic volatility from the data. The question is, do we need to adjust that? I hope the last 15 years are not typical of the disability insurance world for the next 15 years, but who knows?

In addition, we need to make sure that the model output variability agrees with the model input volatility. This gets at making sure that the trend factor is treated appropriately.

Third, we have to figure out how to address the trend itself. We've got some ideas on that, but we haven't finalized that one.

The last model issue concerns company size. One would expect smaller companies to have more volatile experience.

The next set of issues concerns the model office. What we're really getting at here is whether we're going to use a closed block, a stationary block, or a growing block. In the stationary block, we assume that new issues replace lapsed business. The 1994 study used the stationary block. It's easier to work with, and that's probably the direction we're going to go this time around, but there are other alternatives. They're just not as easy to deal with.

Then we have to develop some assumptions. We have already talked about the loss-ratio distribution and the phase-in factors. We've asked the companies for an estimate of profit margins, not for their specific profit margins but what they think industry profit margins are. Presumably those aren't too much different, but who knows? Finally, we have to figure out how to deal with surplus accumulation. In the example I gave, we divided everything over the target, but that might not be what we end up doing. In the 1994 work, we didn't dividend until it was 150% of the target.

Finally, our last set of modeling issues concerns some of the basic parameters. Because of the way phase-in works, we have to run this model for a couple of years to get the juices flowing and to get some phase-in going. We need to figure out how long we want to do that. We need to figure out the time horizon for testing, and we need to figure out the ruin target. In the 1994 work, the seasoning was two years. The time horizon was five, and the ruin target was 5%. I suspect that's pretty much what we're going to use this time around.

The current status of the modeling part is that we're trying to develop a simple model reflecting all the assumptions and parameters we've talked about, but that is a little simpler than what was used last time around. In particular, we're hoping to use one distribution instead of two.

We are in the early stages of decision-making on the model. The current model is available from the Academy if you want to see it. You can still make a difference in the process if you want to volunteer to help. I'm going to say that a few more times.

Once we get done with the modeling, it's on to factor development, and there are many issues to address here, too. First, we will have to determine the basis for those factors. A number of the alternatives have been expressed. The current requirements are expressed in terms of premiums and claim reserves, and I'd say we're probably leaning towards that. There was a push at one point to go to lives and monthly benefit. The problem with that is that they don't really reflect the risks that are presented. If we simply look at monthly benefit, for example, we won't know whether it's long benefit periods or short benefit periods or what. We'll probably end up back with premiums and claim reserves.

A second issue is whether or not it's a relative or an absolute value. This is a minor point. In the HORBC effort, everything was to be relative so that if the NAIC wanted to create higher surplus or lower surplus, they could do that without disturbing the interrelationships between the various products. That was a good idea, but for reasons that I never followed, DI and long-term care were split off and done on an absolute basis. The likelihood is that we will recommend an absolute number this time as well.

The last point on factor development is that we want it to be simple, and we want it to be meaningful. Simple means using less segments and using existing data that are available in the annual statement. *Meaningful* means we want to recognize segments that have meaningful differences. We mean meaningful for the industry versus meaningful for a particular company. We recognize there's a possibility that there are companies that are involved in particular markets, and these things will have a different effect on those companies than they would on the industry as a whole. However, we're more interested in the industry.

The last thing I'd like to do is to give you an update on the current status of the project overall. We need to complete the data collection. As I indicated, we hope to have that done in the next two, three, or four weeks. Then we're going to have to scrub the data, run the model, and develop factors. As I said before, you can still participate and have input. If you have anything you want to tell us about our effort, we'd love to hear that. If you want to get more involved, we'd love to have you do that, too.

We have an aggressive target, which was to have a recommendation to the NAIC in December. That's what it was a month ago when we put the slides together. It's an aggressive schedule. More recently our target was pushed back to March, but we're still looking to have a preliminary recommendation in December.

That's the DI stuff. Now Tim is going to talk about stop-loss.

**MR. TIMOTHY L. PATRIA:** I work at Hartford Life, and I'm chairing the subgroup that's looking at stop-loss risk-based capital. I guess one thing I want to echo about Bob's talk is participation. We, in particular, have probably one of the smaller subgroups, and that's probably indicative of the stop-loss market as compared to the disability income (DI) market, but we're definitely looking for feedback. We're looking for people who are interested in helping us sort through some of the issues that we have.

I know Bob was worried about going first, particularly after lunch, and having people be a little too relaxed after lunch. I guess one nice thing about having him go first is he was able to do all the hard work for me and talk about how the model works. The stop-loss model is actually very similar to, if not the same as, the disability model, in terms of how we're going to work in the statistical and historical volatilities, the distributions, phase-in factors, and the like.

What I want to try to leave you with here is what the goals are that we're trying to attain in our stop-loss subgroup. I want to show you the direction that we're taking, give you the likely outcomes, or at least the framework for the likely outcomes, and invite your feedback, either here or any time after this meeting to let us know if we are either on track or off track.

The goals are to have a recommendation for Years 2000 and later, and that's going to take two forms. One is we have to define what stop-loss is. We're going to have to come up with a definition that encompasses medical insurance, not just typically what we label stop-loss now. The other is going to be how do we calculate it? It's expected to be predominantly a factor approach much like it is now for the life risk-based capital and similar to the approach that Bob laid out for DI work.

There was an interim recommendation that was made for the health organizations that didn't have a factor. There are two types of stop-loss that we dealt with. One is individual stop-loss, and we said anything with a \$5,000 or higher deductible is going to be counted under the definition of stop-loss. Two is aggregate stop-loss, defined as coverage of aggregate claims greater than 90% of expected. Again, these are interim. It's something we're going to look at when we get the industry experience. The interim recommendation is the same as the life risk-based capital factor of 25% of premium, and it's likely that any factor development we have, as a recommendation, is going to be based on premium.

I want to give a very brief history of the stop-loss RBC work done prior to the formation of our subgroup. It follows a lot of what Bob has already laid out. In the early 1990s, a group was put together to determine various health coverage RBC recommendations that culminated in 1994 recommendations and some simplifications in the two succeeding years. Nothing was finalized for the stop-loss piece. Now it's a matter of us coming in and looking at what was done in the past. Taking a look at how we feel about the models and the experience. Whether there was enough experience so that we can craft a recommendation that's going to be applied to essentially all the insurance entities that have to use risk-based capital standards: property/casualty companies, health organizations, and life companies. We are revisiting what's being used by the life insurance companies now, to see if that 25% of premium factor is still appropriate.

We are going to use a projection model similar to the DI block. It's going to have similar periods, I think, but we can get into those in a little bit. We also are going to solicit industry experience. The stop-loss market is probably more volatile than most in terms of its experience.

The prior experience that was gathered was small in size as compared to what we can potentially get now, so we're going to revisit this issue, and over the next week or so, the companies are going to start getting their letters requesting that information.

The projection mode we are using is essentially a model office that runs 1,000 or 2,000 scenarios that projects the business through essentially a five-year business plan to find out when surplus goes negative. So, all the other things I'm going to be talking about here are the inputs to that model to build that projection. The risk-based capital standard that we're going to determine is our best guess at the level of surplus that, when set aside to support the business, will be sufficient to maintain a positive surplus position over the projection period 95% of the time.

What are the main drivers in the projection model? The historical volatility is going to encompass things like competitive forces and trendmiss—things that are going to create volatility around the mean, and things that we expect to glean from the company experience. The phase-in factor is a measure of the company's response to what has happened in the markets. How quickly are they going to be able to change stop-loss premiums to counteract what they're seeing as experience? Finally, there is the profit margin. Essentially, the bigger the margin, the more that's going to get counted as a positive to reduce the level of potential hits to surplus.

Some of the other items that are probably going to have lesser importance are the statistical variance, which is the normal underlying medical claims volatility in the company's target loss ratio and treatment of dividends. We're going to treat dividends the same way that Bob laid it out for the disability folks. We will perform some sensitivity analysis around those assumptions. Hopefully, we're going to be able to do this at the same time we're soliciting company experience so that when the experience comes in, we'll already have factors developed as opposed to having to wait for the experience before we do all of our projections.

One of the other issues that we have to grapple with is, how are we going to deal with stop-loss that is not traditional medical stop-loss, such as provider stop-loss, hospital-only stop-loss, or doctor-only stop-loss? Up to this point I guess we're trying to get a handle on how big those markets are, and we're looking for input on this issue. Right now, the feeling is some of these

markets are just too small to have specific factors that attack each of these stop-loss components. Perhaps there's not one or two companies that are highly dependent on these particular kinds of businesses, but it might be a little bit more spread out. One of the things that we're trying to do is keep the RBC recommendation as simple as possible. Much of that has to do with the initial reactions of the NAIC related to the 1994 factor development when the NAIC came back and said the stop-loss recommendation back then was broken down into various components, and they thought that was too complex. They wanted to simplify it, and we're going to try to keep that simple structure in place.

I think our leaning is to stay with a simple structure, if we can. If the volatility of these other types of stop-loss coverages is similar enough to traditional stop-loss, we're going to throw it all together in one big pot and have one factor attached to premium. However, to the extent that there's some subsegmentation that needs to take place, we'd like to try to get a better handle on that, and, frankly, we're having difficulty trying to do that.

As I mentioned, the company experience requests will be going out to companies soon. We appreciate you jumping right on it and getting it back to us. We also have a goal of trying to come up with a final recommendation for this December. That's largely going to be dependent on how fast we get these responses back. We, too, might have to push this off to next March. We'd still have a recommendation that could be effective for the year 2000. Burt is going to come up to discuss the work done to determine the limited benefits RBC recommendation.

**FROM THE FLOOR:** It seems like there are two criteria that are important in setting the RBC factors. One is size of business, and the other is prior loss ratio experience over, for example, five years. Are you going to take those into consideration in terms of making the recommendations? Are you going to be looking at that in valuing company experience?

**MR. PATRIA:** We're going to take a look at the size of the block. In terms of the experience over the prior five years or so, are you talking individual company or are you talking about an industry-wide experience?

**FROM THE FLOOR:** I'm referring to an individual company. There's such a variance in experience from company to company.

**MR. PATRIA:** We hadn't planned on taking a look at that, and if you think there's an issue related to that, I'd love to talk to you about it.

**MR. BURTON A. JAY:** The recommendations made in 1996 by the Simplification Task Force for Limited Benefits are still appropriate with one exception that I will describe later on. They were proposed again recently and accepted by the NAIC early enough this year to be implemented in 1999. The new factors are now in place for 1999 for both the life and the MCO risk-based capital formulas. We do not know whether any MCOs are selling any of these limited benefits coverages, but when they do, the new factors will be ready.

The original work that was done began around 1991 or 1992, and it was divided into three phases: there's the data collection modeling phase, the conversion of the results into an initial formula, and the reporting of those results. Finally, at the request of the NAIC, because the initial formula was too complicated, the Academy Task Force went back to the drawing board to simplify the recommendations without losing too much of the accuracy represented in the first set of recommendations.

Four or five companies contributed data for the limited benefits products studied in the early 1990s. Two steps were taken after the data were collected and scrubbed. First, it was adjusted for the underlying trend. Loss ratios were received for each company for up to five different calendar years. The task force members drew a least-square line through the calendar years and developed a frequency distribution around wherever that line was for the particular year. In effect, it was assumed that that least-squares line represented the expected value for each calendar year.

The second step was to remove the statistical fluctuation. The model accepted two sets of random numbers, one to determine the statistical variance for a particular trial around the expected value, and the other to determine the additional impact of the historical variance. The

data collected reflected the combined statistical and historical experience. Because we had determined the statistical fluctuation distributions from existing morbidity tables and applied a separate random value to that distribution, we needed to derive a distribution that reflected only the additional fluctuations from causes other than those that were purely statistical. A second random variable was applied to that distribution. A professor from one of the actuarial universities give us a formula that could separate the two variances into the two parts so that we could generate and apply random numbers to each part separately.

The model used was loaned to us by Milliman and Robertson (M&R). We plan to use that same model, but it has been updated substantially since its use by the Academy in 1993 and 1994. This time we are also developing new models to use a check against the M&R model. The distributions were done with a variety of different size groups, from 5,000 lives up to a million lives. Probabilities of ruin associated were with various target surplus levels. A level of target surplus was input into the model, and enough iterations were run to determine the probability of ruin associated with that level of target surplus. A different target surplus produced another probably of ruin. This was continued until target surplus levels were found that produced probabilities of survival just above and below 5%. An interpolation process produced the target surplus level associated with a 5% probability of ruin.

A relative value (RV) factor was included in the RBC factors so that the NAIC could scale the formula to different confidence levels if they chose to do so. The original Academy Task Force recommendation was based on the amount of incurred claims and number of lives. The simplified formula ended up just being based on factors applied to successive tiers of earned premium.

The original recommendation for accidental death and accident-only included separate formulas for each. The final simplified formula combined these coverages before applying the factors. The results of the runs made were included in the 1994 Academy's report. An objective of simplification was that the formula itself should look more simple, and the data should be, as far as possible, available in the annual statements. The work should be easy to audit. If the

information was not available from the annual statements, it should be readily available from some source that could be audited.

The simplified recommendations are given in the 1996 Academy report. The relative value factor was kept at 0.09, where it had been set during the testing. It was never actually used for scaling. The formula contains a constant called "C," which is the smaller of \$300,000 or three times the maximum retained risk on a single life after reinsurance. For accident only, the C-3 component is 5% of earned premium. In the changes just adopted, accidental death benefit and accident only are treated separately. Bob Yee will tell you what is going on in the long-term-care area.

**MR. ROBERT K.W. YEE:** Since everybody talked about the same methodology and data issue, I'm just going to highlight the peculiar characteristics on long-term care in terms of trying to come out with a reasonable risk-based capital (RBC) formula.

I think we do need a new formula for long-term care for a couple of reasons. The first is the current RBC NAIC instructions have no specific category for long-term care. The instructions state simply that it should be included in the use of formula wherever long-term care is reported, with whatever line of business. Some carriers consider long-term care to have similar risk characteristics to disability income. Therefore, they just simply use the disability income formula. As you've seen before, it's 25% of the first \$50 million of earned premium and 15% in excess, plus 5% claim reserves. On the other hand, some carriers consider long-term care more closely aligned with medical insurance. They would put them in a category of health coverage with no expectation of rate increases. If you do that, the formula becomes 8% of earned premium plus 5% of reserves. You can see that there is considerable difference. It depends on the company's interpretation. That's one of the big reasons why we need the formula.

Second, in 1994, I was an original member of the HORBC. One of the problems, at that time, is long-term care was a fairly new market, and there's just not enough company experience. We did the calculation. We're trying to cushion it with a lot of sensitivity analysis, but in the final analysis, we're just not that comfortable with the number we came up with. In fact, what we

came up with is really something that is lower than the recommended formula at that time for disability income (DI), but we sort of chickened out and said, there's just not enough data, so let's adopt the DI formula. The DI formula that was proposed was 25% of earned premium for the first 25,000 lives and then 10% in excess of that. There's a minimum level, and, in terms of claim reserves, there's 10% of the first 300 lives and then 4% in excess. What we recommend is to give a further break for a company with a significant in-force block. We definitely need a new formula for long-term care.

I'm going to fast-forward to what happened late last year and to the beginning of this year where we, as a subgroup, come up with a stop-gap recommendation for the year 1999 and the year 2000. Since we do not have time to do the modeling, we just basically talked about some of the issues. I'm not going to go through all of them; I'll just mention the last one.

Some of the members of the subgroup believe that long-term care is actually inherently less risky than DI. One of the proposals on the table is: can we do some lower percentage like 80–85% of the DI formula. The reason for that is some people think that long-term care is less risky. Long-term care services tend to be less subject to economic trends as in DI, have less antiselection by applicants, and less likelihood of overinsurance. On the other hand, some people think that it's a relatively new market. There's not a lot of company data, so there's quite a bit of pricing risk. In the final analysis, we have adopted the old formula without the distinction. It must be a separate category. Right now everything should be at the 25% and the 15% formula.

I'm going to discuss the work-in-progress and what the subgroup has been doing up to now. In terms of data what we have done is gotten the NAIC loss experience Form A data. These are calendar year incurred loss ratios by company. We have data all the way since 1991, 1991 through 1998, so there are eight years of data of, on the average, over 100 companies. We have around 1,000 data points. We're in the process of doing some scrubbing of the data. We are in the process of making assumptions on other input to the model such as phase-in factor, profit margins, and so forth. Relative to using the model, we are going to use the M&R model to be consistent with other lines of business. One company has offered their own internal target surplus model. We intend to use that as a reasonableness check. The input assumption into the

models are slightly different. We hope we can have some sort of independent validation of the results from the M&R model. We are targeted to do model runs of simulations about the end of October. Everybody's working hard on that with the objective to come out with at least some initial results by the December NAIC meeting and perhaps have a final recommendation by the first NAIC meeting in the year 2000.

I'm going to highlight some of the issues that we have identified before the recommendation will be made. The first one has to do with reserve adequacy. To date, there is no minimum valuation standard for long-term care. We could do the best job we can on RBC. But if the company holds really aggressive reserves, and there's a huge solvency issue, along with the new RBC formula, we need some sort of valuation standard. The RBC work is really dealing with 5% probability of ruin, and the assumption there is that statutory reserve covers 80–85%. We don't know about that. That seems to be a huge issue.

The other one has to do with the metric to use. What are the bases for the formula? Right now the formula is based on premium and reserve amount. Premium has a problem in some of the newer forms of long-term-care products, especially single premium pay. Reserves have the same problem. If your reserve is not adequate, then I don't know why we would use a formula based on reserves. Limited pay creates an issue. We will probably come out with a separate formula to deal with a limited pay plan. It's not an issue as much as we like to set a process because long-term care is a fairly new product. We believe that the RBC formula probably should be reviewed more frequently than perhaps other products. What we'd like to do is to set up a process with consistent documentation. Maybe three years from now, another group will review the RBC formula

I'd like to mention that the NAIC is initiating rate stabilization regulation for long-term care, and when that happens, we need to account for the effect of how easy it is to get rate increases? The last issue has to do with product evolution. I could see, in the future, that there will be long-term-care riders bundled and attached to universal life and products with long-term-care components. We need to address how RBC is going to take care of that.

**MR. ROBERT BRUCE CUMMING:** I had a couple of questions. One was did you consider looking at the appropriateness of the RBC factor for claim reserves? Was there any discussion of that or did you do any analysis of that component? The second question pertains to long-term care. Was any consideration given to varying the capital requirements based on the managed care features that we are starting to see in long-term-care policies. On the medical side, there is some variation in the capital requirements with managed care features.

**MR. JAY:** We have not spent time specifically addressing the claim component, but it should be taken into consideration as we do our modeling study. To the extent that claim liabilities contribute to the target surplus needed for the 95% confidence level, they should be taken into account. I will let Bob follow up on your second question.

**MR. YEE:** Yes. I believe managed care is a relatively new tool for providing the long-term-care claim adjudication process, and I don't think we have enough data to measure what the impact of managed care is in terms of loss ratios? I think it's something that we need to somehow separate in the future, but right now, I don't think we really have enough data to see the difference. I think we will limit it by experience.

**MR. JAY:** That might be one of the major considerations of the first follow-up study in three or four years.

**MR. PAUL S. GRAHAM, III:** I was wondering if you took into account excess-loss reinsurance? In the 1994 version, there was a lot of consideration of excess loss reinsurance for LTD and stop-loss. Are you collecting the right kind of data to be able to tell how that affects not only the ceding insurer but the reinsurer? It seems that there is not enough risk-based capital for some of the reinsurers that are taking the very top end of the risk.

**MR. JAY:** The basic approach that we are taking is to look at the results after reinsurance for the ceding company and for the assuming company, so that we can treat the assumed risk business as though it were direct business. Each company would have the risk reflected in accordance with the amount of risk retained.

**MR. PATRIA:** I have one more comment from the stop-loss perspective. We would expect that the volatility of claims would be a lot higher as there are higher deductible levels in the excess reinsurance. We have not planned to have a lot of gradations of the risk-based capital factor based on all the deductible levels. We are taking our cue from the NAIC feedback in the mid-1990s, during which a gradation was proposed. The NAIC came back and said that was too complex. They wanted a simple formula. We are going to take a look at what a good aggregate factor would be, but we are taking a look at gradations again to make sure we are still comfortable saying that a simplified approach would work well for the industry in total and not cause distortions for any single company that is taking more risk than would be counted on an entity basis.

**MR. DAVID M. CAMPBELL:** Two questions. One is a follow-up of the other. Was the intention of the modeling process to assume a fixed claim reserve component, and then, with that fixed component, find the percentage of premium piece that works? Or, was the intention to really try to find optimal combinations of the two? I am saying that not necessarily knowing what the definition of optimal is. I guess it depends on the perspective, is it a company versus a regulator.

**MR. JAY:** We do not have a mandate to keep the 5% of claims fixed.

**MR. MEILANDER:** I'd like to comment on that one, at least for DI. In the 1994 work, we actually had separate distributions for the risk inherent in the disabled life reserve, and for the risk inherent for new claims. We put most of the company volatility, the stuff we got from the surveys, in the new claim volatility. I'm not quite sure why it ended up there, but that's where it ended up. We came out with 4% at that time, even though some of us thought it should be 5%. It was a function of a statistical fluctuation for a block of claims.

On the other hand, it might make sense to increase the 5% because a big part of the problems we've had in the disability business have been because termination rates should be reflected in the claim reserve piece. That's a good thought. We haven't made any decisions at this point about how we're going to deal with that this time around.

**MR. CAMPBELL:** I will ask my second question. I think you mentioned that you were focusing just on the claim ratio. Was the intention for the final factors to use these and not have a provision for expense variations or was the intention to send these factors to the NAIC as the claim piece? They might then add on half a percent or 1% or 5% for expense variations in the final factors.

**MR. MEILANDER:** I think we were thinking that this was it, at least for disability. The idea of just going after the claim ratio variation was that it is the biggest piece of the variation. We were thinking that was it. We're not expecting them to add to it.

**MR. JAY:** Just as an interesting note, in the MCO formula, the expense variation factor is in what is called the H4 component. All of the other risk factors, the morbidity factors, are in the H2 component. The NAIC has separated expenses out into a different component, and it gave it a specific value not based on a lot of analysis. We have not seen our charge as dealing with the expense variation, though it's a good point.

**MR. WILLIS B. HOWARD, JR.:** I have a technical question and an unrelated social question. The technical question is first. The RBC analysis seems to assume that the company is only in a single line of business. Is there any consideration given to the interplay of risks in a company that has not only long-term care but other products?

**MR. JAY:** I also argued that back in the early 1990s. When companies have multiple lines of health business, the relative independence of the experience on one line to another would tend to reduce the risk in the same way that the co-variance factor separates the different categories of risk, the interest rate risk versus the pricing risk versus the default risk. We were told that the formulas are already too complicated to consider reflecting product diversification.

**MR. HOWARD:** The social question is, does any of this transfer very well to the question of adequacy of pricing of retirement homes that provide independent living followed by assisted living, followed by long-term care and nursing care?

**MR. JAY:** That is a very good question. I do not believe that those types of entities have been considered. We do not have data from any of them. We should have. Are they normally even supervised by insurance departments?

**MR. HOWARD:** Some are; some are not. Is this perhaps a project that some group of actuaries should undertake. Should they look at the experience of some of these unregulated retirement homes?

**MR. JAY:** I certainly think so.

**MR. HOWARD:** As the son of an 84-year-old mother who's considering this, I have a personal concern.

**MR. JAY:** Many of us sympathize with you and have or have had similar circumstances. Maybe the first step is to adequately regulate all of those entities. Then we must refine the regulation to deal with questions like capital adequacy requirements.

I have a comment for you all to consider. Are we trying to build better buggies when others are starting to design automobiles? I am a member of the Unified Valuation System Task Force. The Valuation Task Force is considering ways to measure capital adequacy for insurance companies, one company at a time, based on the best estimate of the frequency functions for all the type of risks. The frequency function would reflect all of the interactions between the risks for a particular company, and all the parameters tailored to that particular company's circumstances. The objective is to determine the amount of capital needed to assure survival of the company at a 95% confidence level. The actual level of reserves is unimportant. The 95% confidence level would represent an RBC action level. The line drawn between reserve and risk-based capital is important only to determine earnings. The question is, what is the amount of a particular set of assets needed to assure a 95% probability level of survival? When this is determined, breaking it down to the other action levels would be rather academic. The process would define an entire S curve that would represent the confidence level of company solvency to

an amount of asset needed. If a UVS was adopted, it would render most of the current RBC work rather like building a better buggy.

**FROM THE FLOOR:** Does the data collected include data from companies that went out of business?

**MR. JAY:** For the most part, the answer is no because we received all of our data by requesting them from existing life companies. However, long-term-care data could include this information because it was collected from the NAIC database. There could be experience in these data from companies that are no longer in existence.

**MR. YEE:** We probably can identify them because, during the eight-year period, I believe every company is required to submit data. We see that a company just submitted data through 1996. We could almost assume that they got merged. One of the issues we're dealing with is what happens if companies merge together and they change the NAIC codes? We'll have no continuity. That's one of the issues we're looking at, too.

**MR. JAY:** One could reasonably ask, if we want to learn about companies that become insolvent, we should study companies that have become insolvent. For the most part, we have only looked at companies that have survived.