Session 16OF
Recent and Planned Changes to Risk-Based Capital for Health Insurance Products

Track:	Health, Financial Reporting
Key Words:	Health Insurance, Financial Reporting, Managed Care, Risk-Based Capital
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Summary: On January 1, 1999, the National Association of Insurance Commissioners adopted a new model regulation addressing risk-based capital for managed care organizations. Panelists discuss the features of this regulation and what we have learned in the months since its adoption. Panelists and attendees share insights into the state of risk-based capital in health insurance organizations.

Mr. Burton D. Jay: To start with a little bit of an overview, the health risk-based capital (RBC) formula for health organizations, also called the managed care organization (MCO) RBC formula, was actually passed in 1998 and became effective in 1998. At the same time, the same treatment became effective for the medical coverages, major medical, medical supplement, and dental.

The new health RBC formula factors were imported into the life formula. In other words, the life formulas for the RBC factors for those products changed in 1998. In 1999,. additional things were passed. We brought in disability income, LTC, stop-loss, and limited benefits into the new health formula MCO. These products were just treated as part of the "all other" category before that. For the first time, in 1999 statements, there will be specific guidance for handling those products. For the most part, the disability, LTC, and stop-loss factors in the life formula were just imported into the MCO formula. They are the same now.

We're continuing to do more work on disability, LTC, and stop-loss because of dissatisfaction with the basis of those original factors developed back in 1991. The committee is working on these now. We're not satisfied anymore, due to the lack of good data that was available back when the studies were originally done. They

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are redoing those studies now, and they'll tell you more about that when they're up here addressing their particular product.

We did find enough confidence in the work that was done on what we called the Limited Benefit Products Task Force back in 1994. Those recommendations were adopted by the NAIC and will be part of both the health and life RBC formula for the 1999 statements. We think we're pretty much done for those products for a while. Those are not being studied anymore. But disability, LTC, and stop-loss are still being studied. Hopefully, we'll have some recommendations by the NAIC meeting in December or the first NAIC meeting that will take place in March 2000.

Mr. Dennis P. Lauzon: As Burt mentioned, I'm basically on loan to him from the Life Risk-Based Capital Working Group, which is now chaired by Mike Zerker of Lincoln National. I'm going to present what we're doing in the disability insurance (DI) area and also give a lot of the background for some of the other work. I'm going to speak about disability income.

The first NAIC RBC requirements for disability income were developed as part of the 1991 effort. In 1991 the report of the Industry Task Force was over 100 pages long. Only one page was devoted specifically to disability income. It was a small part of a much larger effort. In 1991, although several risk segments were based on specific models with specific assumptions, the DI requirements, coming out of the 1991 work, were basically using subjective judgment to combine what the factors were for several large companies. It wasn't based on a specific model run under specific assumptions. The current requirements, those that were in place at the end of 1998, came from the 1991 work. I'd like to at least look at one aspect of the current requirements and at the different risk segments that are involved for the disability income.

The 1991 requirements had at least five segmentations of risk up here. One is a risk by market. We have different factors for the individual and the group market. There's also risk segmentation by product in that we have credit DI isolated from other products. There's risk segmentation by how long premiums are guaranteed. Noncancellable has different factors from guaranteed renewable. There's also risk segmentation by size. Under $50 million of premium gets one set of factors, and over $50 million of premium gets another set of factors. Finally, we have segmentation by the stage of the product, with active life requirements basically represented by premium factors and disabled life requirements represented by reserve factors. There is a lot of segmentation in the DI factors.

The next effort at developing RBC factors was in 1994, and again, this was part of a much larger effort to develop factors for many health risks. One of the big thrusts of the 1994 effort was to get consistent factors across the different risk segments. In order to achieve this, they focused on using one model for all the products. This model was a loss-ratio-based model. It focused on the variability of results off a trend line, and it ignored any changes in the trend line. At the time, the statement was that they were using a stationary population approach. Not looking at any change in trend was equivalent to looking at a population that worked itself down to

a stationary state. But the premiums kept going up because of increases in utilization.

In 1994, both the data adjustments that were made and the modeling were very complex. As deadlines approached, some of the DI results coming in were less than intuitive. A significant amount of judgment was made on the model results to actually make some recommendations for disability income. Those recommendations were never acted upon.

Our current effort is following up on some of the prior work. We reviewed the past 1991 and 1994 work and made an interim recommendation to the NAIC, which is very close to the current recommendations with one change. Looking forward, we're trying extend some of the work done in 1994 and make long-term recommendations.

To summarize, there are several problems with the historical attempts. In 1991 the factors were not based on a specific model using specific assumptions. It was really a blending of different company formulas using judgment. We would like to produce a formula, like the 1994 work, based on a specific model with specific assumptions. However, we hope to improve on what was done in 1994 by making the path from historic data to actual model results a little clearer by using a simpler model. We also hope to be able to explain any nonintuitive results. For instance, in 1994, near the report production deadline, the result for guaranteed renewable business developed a higher capital requirement than noncancellable business. That certainly is not intuitive.

In 1994, there was an examination based on the typical profit margins that resulted in little or no capital being required for disability income products. That certainly was less than intuitive. As I mentioned, significant judgment was used to modify the result of the modeling. For instance, the noncancellable factors are actually applied to guarantee renewable business in the 1994 recommendations. The recommended factors for noncancellable business were loaded by an additional 10%.

Our interim recommendations look the same as the current factors. These will be in effect at year-end 1999. The only difference is that the first $50 million of premium for guaranteed renewable and noncancellable disability products will be combined. Under the prior formula, if you had $40 million premium of noncancellable business and $40 million of guaranteed renewable, you would be applying 35% to the $40 million of noncancellable and 25% to the $40 million of guaranteed renewable. Under the new approach, you would still apply 35% to the first $40 million of the noncancellable premium, but you would only apply the 25% guaranteed renewable factor to the first $10 million of guaranteed renewable premium. In the new formula, there's only a $50 million premium tier. The idea is that the advantages of size, which this tiering reflects, is gained even if the business is spread across guaranteed renewable and noncancellable business.

Our current efforts can be looked at in terms of three different tasks: collecting data, modeling results based on the data collected, and turning the dollar

requirements into factors for use in a RBC formula. This process might need some iteration. If you get to the factor development stage, and you want to take a direction for which you haven't collected data and done modeling, then you have to go back to square one. Hopefully, because of the work done in 1991 and 1994, we can get through this with one iteration.

When you think about collecting data, you have to develop a survey to go out to companies. One of the first things you think about is what risk segments of DI are you going to collect data for? I already mentioned five of the segments that are in the current formula. In addition to those segments, we're looking at collecting data for benefit periods of two years or less. The 1994 report suggested that factors for benefit periods of two years or less should be 75% of those for longer benefit periods. That was based on judgment without any specific data. This time around we hope to collect data and actually do some analysis for that. Another piece of business that we're looking to collect data on is accident-only business, which might have a different volatility than both accident and sickness business.

Once you've decided on the risk segments for which you're going to collect data, you need to decide on how many years of data to ask for. If you ask for too many years of data, some of the older data might not relate to either current products or product management or socioeconomic conditions. But if you ask for too little data, then you run into statistical credibility questions. We've decided to ask for data back to 1983. We believe that it certainly will be easier to throw out earlier data than to go back and try to collect it again.

Once you've decided on the risk segment you're going to look at and how much data you're going to ask for, you still have to pinpoint the specific data items you're going to ask for. Like the 1994 study, we're looking to have a model that's really loss-ratio based. You have to collect data that relates to loss ratios. Reserves and premiums are two items you would need. One big item that's not up on this list is paid claims. Obviously, you'll need that also to develop loss ratios. You also have to collect data on any other assumptions that you have to seed your model with.

Profit levels are an important assumption in the model that will drive RBC results. Depending on your model, expense levels might be important. Right now, our simple model is based on a stationary population. Under static loss ratios, expenses wouldn't vary year by year. We would look at expenses as being equal to what was expected. Another possibility is to use a model office. We have a simpler model that doesn't really require a model office. We also hope to look at the current version of the 1994 model, which does need a model office. We are collecting some data so we could seed those assumptions as well.

Once you've collected data, the next step is to use some type of data scrubbing to complete the data collection task. One of the things that we might have to consider is interest-adjusting the loss ratios. You should also make some adjustments so that the year-to-year volatility in loss ratio is not unusually affected by a change in reserve basis. There might be some other things you have to consider as you look at your data. For example, look at whether it's coming from a growing block or a declining block or if it has some unusual benefits.

The current status of the data collection effort is that we've mailed out a survey to 50 companies. It's in the form of an Excel spreadsheet, which you can get from the Academy. We have received data back from 11 companies. These 11 companies haven't provided data for all the segments or for all the years or even for all the data items. It remains to be seen whether this result is going to give us enough data to do the testing we wish to do. One alternative is to use blue-book data, for which there is plenty. Unfortunately, you really can't collect data by the segments out of the blue book. Any particular Schedule H column could be a mixture of product types and risk segments.

The second task, after you've collected data, is to model the risk. Again, we're looking at a loss-ratio-based model. It will start with assumed surplus and accumulate it based on a loss-ratio formula to the end of the time horizon. If at any point during that time the surplus becomes negative, you have a failure. The total number of failures over the total number of model runs will give you your ruin probability. That's the form that the testing will take.

Let's look in more detail about the loss-ratio formula. It'll be a three-term formula. The first term will be the prior loss ratio. There will be some momentum built into where you are in terms of your next loss ratio. The second term will be a random deviate. It'll have a mean of zero and a standard deviation that will be extracted from the historic data.

The third term is what we call a phase-in reaction. We're going to be modeling a stationary population, and for stationary populations, a certain percentage of the business can be repriced as you go forward. For noncancellable business, it's a lot lower because you only get to reprice new business. For certain other businesses, like group LTD, not only do you get to reprice new business, you also get to reprice some in–force business. This phase-in reaction will depend on the risk segment that we're looking at. This formula is very much like a mean reversion interest rate generator in which the mean we're reverting back to is the target pricing ratio that the new premium rates keep aiming for.

Let's take a look at how this will work using a simple example. I'm assuming that the target loss ratio is 60%. If, in the first year, we have a random deviate of 5%; then our ending loss ratio for the first year is 65%. At this point in time, there's no phase-in factor because it takes longer than one year to recognize the trend and start to reprice for it.

In the second year, there is a random deviate of seven. There is the prior loss ratio of 65%, and that gives you a loss ratio for that year of 72%. By the third year, something interesting starts to happen. We've reacted to a loss ratio of 65% back in year one by repricing some business. That has some downward pressure on your loss ratio, which is illustrated by a phase-in factor of minus one. In this year, we also have a happy deviate of minus 17%. You add that to the prior loss ratio: 72% minus 17% minus the one percentage from the phase-in factor gets you to the 54%.

Similarly, in the fourth year, the phase-in factor is going up, and it reflects not only the results you've seen in year one, but it also reflects the results you see in year two. By the fifth year, the phase-in factor starts to drop, reflecting the favorable results you saw in year three.

The loss ratio formula is going to be combined in a process that accumulates surplus forward to develop the ruin scenarios. Basically, in the beginning surplus, you'll have some profit margin, which will increase that surplus. The anticipated loss ratio will be replaced by the actual loss ratio, and it we'll tax affect the result. We can add a dividend component to the formula for situations where our surplus starts to accumulate above our target surplus.

Let's take a look at a simple review of how this might work using the loss ratios that we had in our simple formula. In this particular example, we're assuming that end-of-year surplus or the target surplus is 20% of premium, and our profit margin is 5% of premium. These numbers are picked only for illustration purposes.

In the first year, perhaps our actual loss ratio was 65%, which is 5% above our pricing target. That poor experience is offset by the profit margin in the pricing. We have a break-even year. There is no tax affect, no dividend affects, and we end the year with a 20% surplus as a percentage of premium. In the second year, you have a loss ratio of 72%. That's 12 percentage points above our pricing target of 60%. Only 5% of that excess can be absorbed by the profit margin. That leaves a loss of 7%. You get tax credit for two of those percentage points, and your actual surplus will go down 5–15% of premium. The third year reflects some favorable experience. Our loss ratio is 54. In addition to our 5% profit margin, we pick up another 6% from the favorable experience. That's a profit of 11% of premium. We're going to have to pay 4% points in taxes on that, leaving 7% of premium profit. Since we're at a surplus ratio of 15, 5% of that 7% goes into bringing us back to our surplus target, and the other two can dividend out.

Like the 1994 effort, we want to try to have consistency, where possible with other modeling efforts or other RBC efforts of the 1991 work and also the 1994 work. We also need to take a harder look at the volatility. That's going to be the key driver of the requirements that come out of the analysis.

One of the first questions we'll have to ask is whether there is any reason to adjust historic volatility? Does it represent what we should anticipate going forward? Another question to ask is, when you run your model over many simulations are you getting the volatility out of the model that you thought you should get based on the volatility you put into the model? In 1994, when they ran their model, they found out that there was a difference between the volatility inputted and the volatility that was coming out. They had to add a normalization factor. To do this, they had to iterate through the model to get the volatility that was coming out the same as the volatility they were putting in.

Extracting the volatility from the historic data has to be accomplished in a way that reflects how you're going to use that volatility in the model itself. If you do that, I think the trend in the volatility and the need to equal the volatility out will take care

of itself. In addition, you might want to calculate volatility by the size of the business with the understanding that, at least theoretically, for larger blocks of business, there should be less statistical fluctuation, resulting in lower levels of volatility.

Another modeling consideration is the type of model office you're going to use. As we mentioned, we're looking at a stationary population. There's a lot of argument for modeling a closed block, but I think the arguments in favor of the stationary population is one that seems more consistent with the work done in 1991 and 1994. Therefore, it'll put DI on a basis that is more consistent with other RBC factors. Also, it's a lot easier to use a stationary population. You don't have to worry about how expenses and premiums and claims vary by duration.

The third argument for using a stationary model has to do with the data being collected. When we look at the data we're collecting, we see that there might be some blocks of business that are growing. There might be some blocks that are declining, but on average it's probably a lot closer to a stationary population. There's a better match between the data you are collecting and the data you are modeling.

When you're looking at your modeling, you also need to carefully consider what you are using for the assumptions. We already talked about the loss-ratio distribution. Another important assumption is going to be how fast we think loss-ratio deviation can be phased into the new book. The profit assumption is also a critical assumption. Profits are the first line of defense against losses, so that's a key driver. I think there are two things to remember about your assumptions. First, they should be set at your best estimate. Then the Monte Carlo simulation should be run to give you ruin at whatever probability you're considering. If you use conservative assumptions and then run a 5% ruin level, it's not clear what the results represent. Second, you have to use sensitivity testing to be aware of how important each of the assumptions are.

In addition to the assumptions, there are certain model parameters that you have to set. We'll try to set these consistent with path results. For instance, we need to consider the time horizon. Most results have been based on a five-year time horizon. We'll certainly be able to sensitivity test what happens if you look at a four-year or six-year time horizon. Obviously, the longer time horizon you look at to remain solvent, the higher your RBC is going to be. We also need to consider the ruin target. Targeting 5% ruin seems to be typical for all the factors that have been developed.

Another important consideration is being the seasoning of the model. If we start the model off with no seasoning, and a target loss ratio is 60%, then we have to assume that we have a block of business on the books and that our stationary population is running at a 60% loss ratio. However, if we let the model run for a few years before setting up the surplus at the target level and then make a calculation going forward, we will start with blocks of business that are distributed around that 60%, and that would be the result of seasoning. In other words, the seasoning would give us a random starting point.

The current status of the modeling effort is that it's still going on. We've developed a simple model that is available from the Academy.   We're certainly in the early stages of decision making. The last task to complete is to actually develop factors once we have results from the model. Normally, model results are translated into RBC requirements by applying factors to certain in-force bases. The current bases are premiums and claim reserves. Other possible bases include using the number of lives if you are considering policy or active life reserves.

It's been suggested that perhaps a company with conservative reserves and higher premiums is penalized under the current formula by applying factors to those amounts. If you were to look at something that's neutral (in terms of being or not being conservative), you could use lives or the monthly benefit payment exposure as a basis. I think part of the problem with using lives or monthly benefits relative to premiums is that premiums reflect morbidity surcharges if you write substandard business or hazardous occupations. There's an automatic adjustment in your RBC for that type of risk.

Once you have interim results, you have to decide whether you're going to propose relative or absolute factors. I think we're going to propose absolute factors. The 1994 effort did propose relative factors for the health risks, except for DI and LTC where they proposed absolute factors.

In the final consideration in the factor development process, there's the competing desires to try reflect the relations risk of the different business segments and, at the same time, there's a desire to keep it simple. In the end, it's just not possible to refine the formula so that it makes sense for every possible situation. Necessity dictates that some balancing does occur.

Our current status is that we need to complete the data collection, scrub the data, and develop factors. We still have a lot of work to do. There is still time for you to participate and have input. If you want to be on the committee, or if you just want to be on the interested persons list, or if you just want to make a single comment, certainly get back to either me, Burt Jay, Tom Wilder, or the Academy. We're happy to get input. Originally the target was to have some results by December. That certainly appears a little aggressive at this point in time.

Mr. Timothy L. Patria: I'm in the corporate actuarial area at Hartford Life, and I'm chairing the subgroup reviewing the stop-loss RBC formulas. When I was going through the exams, I remember being told to remember all the things that you learn in the early exams because you're going to see them later in the later exams. I didn't find that to be the case all the time, but it is for this presentation.   There are a lot of the things that you heard in the disability presentation that I'm not going to repeat since they are also true for the stop-loss presentation. This is particularly true for the model office that we're going to use to produce the formulas.

Our project goals are to come up with an RBC formula for 2000 and later. This takes the form of two things. One is to determine the absolute factor that's going

to be applied to calculate the amount to be recorded on the company's books, and also to determine what we're going to apply it to. We're trying not to just look at traditional employer stop-loss. We're really trying to look through that to determine where we should draw that line, irrespective of how the companies have drawn the line internally. We had to develop an interim recommendation for 1999. What we've done is borrow what's being used on the life RBC side because we really didn't have anything else to go on at this time.

We did have to develop a definition that didn't exist on the life side. The definition for individual stop-loss is any medical business that has a deductible of $5,000 or more. For aggregate stop–loss, it's anything that is greater than 90% of the expected claims. That's one of the items that we certainly have to work on. When we look at the data we're collecting to feed our model we're going to be analyzing to find out where we draw these lines. The factor we applied was 25% of annual premium, and, like I said, it's directly borrowed from the life side.

Now here is the plan. We're going to follow the same path as disability. We're going to run a model office. We're going to use the work that was done in the early 1990s. They built a model office to go through all the mathematical mechanics that Dennis showed you, and there are all the items relating to the volatility of claims and how companies are going to react in phasing in the effects of loss ratio. All of that is also true for stop-loss. All of that was also done to determine the medical factors, and I believe stop loss should be most consistent with the development of the medical factors. We're going down the same path.

We're taking a look at the assumptions that were used back then just to make sure that we continue to be comfortable with them. We'll also take a look at the data that comes in from the industry. We have to go out and get more data because there wasn't a lot of experience reported in the early 1990s. We're hoping to receive a lot more experience data to really take a look at the volatility of these stop-loss claims and to take a look at a variety of attachment points to see where we should be drawing the line to determine the definition of stop-loss for RBC purposes.

The biggest piece of the factor is going to be built off the historical volatility of stop-loss. This is going to come from a couple things. We're not just analyzing the random fluctuation of claims. We're trying to get companies to price their products for the coming year or couple of years considering the fact that there's a trend. There's also competition in the marketplace. There are advances in medicine. How well are we predicting them? As we've seen from history, sometimes we're not so good at considering all these factors. Sometimes we're very good at it. But that creates a lot of volatility around the norm. That's going to be the main driver of the RBC analysis that we do.

The other driver is the need with which we can adjust our premiums to handle any experience that we're seeing come out of this model. One thing that we are already getting a strong sense of is that, with stop-loss coverages, you don't know right away what's happening to your experience. After a year, you tend not to be

able to do almost anything. It's really not until two or three years later that you really can start taking action by making some premium-rate adjustments.

Profit margins are another driver. It's a competitive business. I think the profit margins are maybe a little skinnier than they were back in the early 1990s, or at least what we thought they were going to be. We're trying to obtain what the industry thinks it's going to make in this business to be able to feed this assumption into the model. I echo Dennis' sentiments relating to sensitivity. If you just ran the base case model, we wouldn't know how sensitive we were to our assumptions concerning the phase-in factors, profitability, and the like. We're going to be sensitivity testing all these major assumptions to get comfortable with any recommendation that we put forth, to make sure that we're not missing something in the process, and to be sure we're not leaving out a main item that everyone has to know about.

One of the additional issues that we're talking about is provider stop-loss. I guess we're trying to get a handle on how similar or different it is to traditional stop-loss. Frankly, we haven't gotten a good read on this at this point. It's a smaller market or at least we're getting a sense that it's a much smaller market than the traditional stop-loss market. Getting experience data separately for it is probably not going to give us the data we need to get a separate factor to develop for provider stop-loss. We're probably going to just meld this in with all the traditional stop-loss in determining a factor.

You're certainly welcome to provide input on any of the items we're talking about. But we're trying to get a handle on the items that should be considered separately. What assumptions should we be sensitivity testing more often? What other data should we be getting? Providing stop-loss is one of those items where, frankly, we're a little stymied as to whether it is different enough to do anything with. At this point, we're not going to consider it differently.

Another issue is the degree of complexity that should be included in the RBC formula. The discussions we've had so far center around the fact that RBC is a tool for the regulators to use to look at companies to determine how well-capitalized they are. Stop-loss, for the most part, tends to be a smaller piece of the company's business. For that reason and for the fact that back in the mid 1990s, the regulators were looking for a simplified stop-loss formula, we're moving towards providing a simplified formula.

The original proposal back in 1994 had a couple of tierings with different factors for each tier. The regulators really want to simplify many of the RBC formulas including the stop-loss. In 1996, the request came through to develop a formula with essentially a single factor for stop-loss and to make it easy for companies to apply the factor. I guess we're continuing to echo that at this point, given the lack of better data and given the size of the product line. Given it's only a piece of many company's business, we're also going towards a simplified formula. After the sensitivity analysis, we'll make a better determination about whether we can still stick to a simplified approach or whether we are going to have to tier formulas by

attachment point or aggregate stop-loss limits. At this point, we're not going to be dealing separately with things like group size.

Our survey has been sent out. I actually haven't found out whether we have any responses yet. This survey has been out for a shorter period than the disability survey. Given the fact that we haven't had a large number of responses yet, I think we, too, are going to need to come up with our recommendation for the March NAIC meeting instead of the December one. We're not going to be on our original plan to hit December, but certainly we'll be out there in plenty of time to have something on the books for 2000.

Mr. William J. Bugg, Jr.: A small limited benefits subgroup was created to review the risk-based factors for limited benefits. This group consisted of Steve Lippai, Regina Rohner, and me. All of us were members of the original Academy task force created back in 1994 to work on RBC factors for health organizations and also the simplification task force that was created in 1995 to simplify the formulas created by the 1994 task force. We reviewed the work papers and the files that were created during this earlier development process. It was our conclusion that the recommendations made at that time for limited benefits are still appropriate with one exception which I'll discuss later.

First, I'd like to review the several steps that were taken by those earlier task forces. The process essentially consisted of three stages. During the first stage, data was collected, and the modeling was carried out. The second stage consisted of interpreting the results, converting the results into formulas and reporting of the results. Stage three consisted of steps to simplify the formulas that led to a conversion of the formulas to a constant, plus the percentage of premium.

The data collection step was handled through the Academy's office in an effort to achieve confidentiality of the data. Companies were solicited and asked to send their data directly to the Academy. Upon receipt, the data was coded in a way to retain company confidentiality. It was then assessed for appropriateness and reasonableness. Five companies contributed cancer data; four contributed hospital indemnity data; 11 submitted data on accidental deaths; and eight data on accident-only. These data were then sent to Regina Rohner who adjusted the data to remove the underlying trend. This was accomplished by calculating a least squares line for each line of business. The regression was weighted by earned premium. This was done with the data for all companies combined. Then, for each company, a weighted regression line was determined with a slope from the previous step. This is equivalent to passing a line with given slope through the company data so that actual claims equaled predicted claims. Then by comparing the raw data to the predicted values, one attained a variance that reflected the trend having been removed.

This process was based on instructions from several experts in statistical analysis and was provided to us by the project leaders. The data so modified was then provided to those who performed the modeling. I agreed to perform the modeling for cancer and hospital indemnity lines. Regina handled the modeling for accidental death, and Steve handled the modeling for accident-only.

The model was created by Milliman & Robertson (M&R) under the guidance of Bill Bluhm to simulate the financial results of a block of business over a five-year period. The model had two phases—a statistical and financial. The statistical phase depicted the statistical variability of claims for the portfolio of policies. The second phase was a financial phase, which depicted the variability of financial results associated with a health coverage organization.

The model calculated the probability that the cumulative losses over a five-year period, net of intermediate gains would exceed the initial target surplus. Individual claim distributions were created for each product line using the actual experience of a carrier. Using the collective data and claims distributions, along with several other inputs, the model was run for 5,000 iterations for various portfolio sizes. The portfolio distributions generated in phase one were then used in phase two to determine the business result, ruin or survival, for each iteration. The percentage of iterations where the block of business becomes insolvent represents the probability of ruin under the model.

As I mentioned, the model was run for various portfolio sizes. The portfolio sizes were chosen to determine how the chance of failure would vary as the portfolio size increased. For example, portfolio size was varied from 5,000 to 10,000 lives and so forth, up to one million lives to determine where the failure point stabilized. The output of the model consisted of the probabilities of ruin associated with various surplus target levels.

Through several trials, surplus levels bracketing a 5% probability were generated. Then the surplus level associated with the 5% probability ruin was determined by interpolation. The results were then converted into RBC formulas. Initially, the formula for the cancer and the hospital indemnity products were expressed as a function of claims. The relative value (RV) factor was included in the initial formulas to enable the NAIC to easily adjust all of the formulas to the level desired but to keep the RBC amounts on the same level relative to each product. An RV factor of 0.09 provides the RBC for a 5% probability of ruin. There was a break in the claims level for the first 5,000 lives recognizing that there is a greater risk to statistical fluctuation for smaller portfolios. The formulas for cancer and hospital indemnity are quite similar.

The accident coverage was separated into accidental death and accident coverage that did not include death benefits that were called accident-only. The accidental death products formula was made to be a function of earned premium. The recognition of statistical fluctuation risk is accomplished by having a constant dollar amount and a break in the factor at the $6 million premium point. The constant was set at the smaller, $300,000, or three times the maximum retained risk on any life after reinsurance. Any federal employee group life insurance or service employee group life insurance coverage would be excluded. The accident formula was the simplest, just a half of 1% of earned premium.

The results through the second stage were presented in a comprehensive report to the NAIC in December 1994. The report contained a discussion of the various considerations addressed in the development of the formula and of the various

issues that came up. There was an in-depth description of the model, and how the data were obtained and used. Testing of the formula and remaining future tasks were discussed. The rationale of the structure of the modifications to the life RBC formula for health organizations were given in a report. Finally, the modifications, which were the proposed formula for RBC for health organizations, were included. Various technical topics were addressed in the appendices.

Following receipt of the December 1994 report, the NAIC asked for some additional simplifications of the 1994 formulas in order to minimize the costs of collecting and verifying data. Three requests were made: First, to the extent possible, the data used should come directly from the annual statement. Second, data need to be auditable. Third, if data were not in the annual statement, it should be data that would be really available.

A Simplification Task Force was created to respond to this request, and the work of this group led to the following formula simplifications: cancer and hospital indemnity were combined, and cancer was re-labeled specified disease. In the process, the formula was made a function of earned premium. Rather than having a two-level formula, it was changed to a constant plus-one level based on premium. The accidental death and accident-only formulas were combined. The revised formula for accident was quite similar to the early one for accidental death with the breakpoint of the two levels increased to $10 million. Previously, it was $6 million. The factor on the higher level was increased from 0.11 to 0.25. The constant remained unchanged. These simplifications were validated against the original formula for reasonableness and consistency. Obviously, there'd be some differences, but it was felt that the consistency was reasonable. These final simplified formulas were presented to the NAIC and fully documented in a report dated June 1996.

With this latest request, the limited benefits subgroup reviewed the work done earlier, both in the original 1994 formulas and the 1996 simplified ones. We felt that the 1996 formulas previously developed were still valid with one exception. We recommended that accident-only be separated from accidental death as it was in the 1994 formulas. The formulas that are shown here have been recommended and accepted by the NAIC for specified disease and hospital indemnity, accidental death, and other accident. Notice that the RV factor has been removed. The factors have been set at a level for a 5% probability of ruin. These changes have been accepted by the NAIC, and changes to the RBC instructions have been provided. It's then anticipated that they will be in place for the RBC calculations as of this year-end, December 31, 1999.

Mr. Jay: When I introduced our speakers, I inadvertently skipped over our fourth speaker, Bob Yee. Bob is the business risk manager and actuary for the long-term-care division of GE Financial Assurance. He's a member of the Academy Task Force on Long-Term Care and a member of the Society Experience Committee on Long-Term Care. He participated in the LTC task force for the RBC in 1994.

Mr. Robert K.W. Yee: I have a brief agenda. I'm going to talk about why LTC needs new formulas now, and I'll discuss the work that we've done to come up with

the interim recommendation. I'll give you a work-in-progress report of what we have done so far, and I'll raise some of the issues that we need to address before the final recommendation comes out.

Why do we need a new formula for LTC? Among many other reasons, there's quite a bit of confusion today. In 1998, before the 1999 recommendation was made, there were actually several interpretations of the NAIC RBC instructions. The instructions didn't have any specific category for LTC. They merely stated that it should be with the line of business to which it's currently reported. Some companies consider LTC to be disability income. In that case, the disability income formula applies, which is 25% of the first $50 million of premium and 15% of the excess premium, plus 5% of claim reserves. Some companies consider LTC under the category of health coverage, not expecting a rate increase. In that situation they would use 8% of premium and 5% of claim reserves. Practices do vary today.

In 1994, the Health Organization Risk-Based Capital Task Force was formed, and one of the product lines they looked at was LTC. Some of you remember the first recommendation was a fairly onerous surplus requirement. A group of us volunteered. We did some work, as much as we could, and came up with something that at least seems to be reasonable.

The biggest issue that we faced at the time was that there's really not a lot of data available. We did a survey. I believe ten companies participated in it. We found fairly wide variation within companies in the loss ratios. We did the best we could. We did quite a bit of sensitivity testing on various assumption sets. We came up with a formula that is actually lower than the recommendation for DI, but we used the DI formula anyway. It's interesting to point out the DI formula was lower than the current formula. It was, I believe, 25% of earned premium for the first 25,000 lives and 10% of the excess. For LTC, that translates to a breakpoint around $30-35 million.

In 1998, a group of us got together, and without doing any modeling, we came up with some recommendations. We looked at some of the issues. I'm not going to address all of them because the first three are really relatively minor issues. I don't think they have enough significance. For instance, a company that has both DI and LTC, is being allowed to use a single tier for both products. The same thing happens with HMOs; they don't have a lot of LTC coverage. In the market you're seeing companies offering limited pay plans.   But we looked at them, and just didn't see significant in-force business last year. We don't think it's a problem.

The biggest issue the group dealt with was whether LTC should have a lower formula such as a flat, lower percentage like 85% of the DI formula. There was a lot of discussion that LTC is actually less risky than DI because it's less subject to economic trends or cyclical trends, there is less likelihood of antiselection, and there is also less likelihood of overinsurance. On the other hand, some people are saying LTC coverages are more risky because they definitely have greater pricing risks, and changes in government program can affect utilization. At the very end, we basically decided to use the DI formula.

This left us with a fairly big task for this year to develop a recommendation for the new formula for LTC. I'm going to give you a work-in-progress update. First, there are data. We have obtained the NAIC LTC experience. This is Form A and it provides the yearly experience of companies. Every company writing LTC is required to file these data. We have reviewed this for the period from 1991 to 1998, and it contains data from over 100 companies. We have company year-to-year experience with over 900 data points. We're in the process of scrubbing the data; hopefully, it will be a big improvement over the data source used during the 1994 effort.

We're pretty glad that we finally have a significant amount of data for LTC. We're not really intending to do a survey like some of the other lines of business are going to do because we think that this information should have a fairly good basis for doing the modeling. There is also a small group of us working on other types of assumptions such as profit margins, individual claim distributions, the lag factors, and so forth. We're making quite a bit of progress in the data segment of this work.

Another problematical issue is the model validation. We have had some problems with the Academy model that was being used before on DI and LTC. Unfortunately, they did some work to modify the model for DI, but it's modified in a way that makes it difficult to use for LTC right now. One thing that we have looked at very seriously is the offer from another company to use their proprietary surplus model to help us to validate the M&R model. Our plan right now is to use two models to do the testing. I don't know which one we're going to wind up really relying on, but at least we have some validation of one against the other. Hopefully, we still can comply with the consistency requirements among all lines of business in terms of the modeling for RBC.

Of course, the last thing is really to come up with a range of assumptions to do sensitivity testing. We believe that for LTC, and this is particularly important because we just don't know enough about the business, and the market hasn't evolved enough to allow us to see certain trends. Sensitivity testing is going to be very critical. We think we're on target, at least for the first quarter of next year, for making a final recommendation.

There are a list of issues that we have identified, and I'm going to review them just to make sure that you understand. We need to address these before the final recommendation will be made.

The first issue is that there's no morbidity standard for LTC today. One of the issues, in terms of considering RBC for solvency purposes, is that we don't have a good valuation standard or a common valuation standard. With a valuation standard, it is academic to come up with a RBC formula. Whatever work we have done has to piggyback on the need for a valuation standard for LTC. The next issue is referred to as factor development. What are the factors in the formula for LTC? The current formula uses reserves and premiums. Reserves are an issue if your reserve is not adequate or is too conservative. Premium is an issue for limited pay products. Perhaps using the number of policies or number of claims is more

appropriate. We may need to look at limit pay policies separately and consider a separate formula for them.

Another issue that we're really very conscious of is setting up a review process, because we believe LTC is an evolving product. There needs to be more frequent reviews of RBC formulas. We want to set up a process so that we could document on what we have done. The next time another group looks at it, it will be much easier to follow and build from the work we have done.

There are two additional issues that are very critical. The NAIC is looking at rate stabilization regulations for LTC, to the extent that it restricts a company's ability to get rate increases, it should affect the RBC formula. We're going to look at rate guarantees, from guaranteed renewable to noncancellable. We need to consider the change in formula that is appropriate for the variety of premium guarantees.

The last issue is creating the proper treatment when this benefit is combined into other policy types. We're seeing life insurance and annuities where LTC is part of the benefit structure. We need to consider the RBC formula specifically for long-term-care riders attached to life or annuity products. Unfortunately, these products are starting to come out. It's going to be a challenge to isolate the LTC risk.

Mr. Jay: I guess one of the things I'd like to stress is that we're working from data from a lot of companies, and we're coming up with what we think will be factors that will roughly represent a 95% confidence of survival over the projection period, which for the health products, has generally been five years.

There's another movement going on that you might have heard something about. This is the unified valuation system, where the concept is looking at the risk characteristics of each individual company and finding the level of overall capital you need to provide for 95% survival over a long period of time. The details are being debated, and it may be quite a number of years before this concept is actually put into effect. It may be implemented over a period of years, in phases, with one part being implemented at a time. That's something you might want to follow. What goes a step farther than this is using simulation techniques on each specific individual company. Just another thought to follow up on.

Mr. David B. Berg: Some of the historical formulas apply a relative value. How's that relative value determined?

Mr. Jay: The relative value was put in the formulas that was proposed to the NAIC both in 1994 and 1996 so that the NAIC would then be able to scale up and down if they thought the levels that were being recommended were too low or too high. They could adjust it uniformly. The concept broke down when the relative value didn't apply to disability or LTC but only to all the other products. The level recommended that gave us our 95% probability was 0.09. When the NAIC took the recommendation and implemented it into a model law they took the 0.09. At that time, the relative value factor disappeared and hasn't cropped up again.

Mr. John T. Lynch: You mentioned a survival factor of 95% over five years. Does that mean that one out of 20 companies can go broke every five years? I think I must have misunderstood this aspect.

Mr. Jay: No, that's the concept. It's more of a mathematical target. Obviously, we wouldn't want 20% of the companies, or even one out of 20 (5%) going broke every five years. I don't know what the real rate has been historically. It certainly varies with type of coverage. That was used as a standard for setting the RBC factors. Remember that didn't take into account the actions of management. The model takes into account adjusting premiums and that sort of thing. All the other actions that management might take are not considered. This is a mathematical that just ran for a period of time. Management isn't going to sit back for five years, watch what happens, and say "oops" at the end if the company doesn't survive. They'll take some action. It does represent the 95th percentile mathematically. In real life, we think that companies would survive at a higher rate rather than for other reasons that are beyond our capability to model.

Mr. Lauzon: In addition, individual companies have more than just one line. When you look at the correlation results they're not 100%. The overall survival will be higher than the 95th percentile company's.

Mr. Jay: The way it's combined, a company doesn't get credit in the formula to the extent that they do have multiple products, as Dennis pointed out. We thought about that. If you have life insurance and annuities and health insurance, you ought to be able to take advantage of the product diversity because all things aren't likely to go bad at the same time. The formula is conservative in that it doesn't reflect that.

Another thing that it doesn't reflect is the type of risk. You have in the life formula the C-1, the C-2, the C-3 risk. Now we have a C-3(a) and (b) and the C-4(a) and (b) as well. In the health organization formula, we have H0, H1, H2, and H3. With the exception of H0 and H4 in the life formula the exception would be C-1(a) and C-4(a), the rest of the factors are inside of the radical. In other words, they are treated as either being 100% correlated or 0% correlated. In the life formula, for instance, the C-1 and C-3 terms are added together as though they were perfectly correlated. That increases the result. For the most part, the way those risks are handled is considered to be conservative.

In the life formula, a change to this aspect is being considered. Bonds and stocks are combined in the same term. They're both in the C-1 term. That's a conservative measure because, as everybody knows, the value of bonds and stocks are not 100% correlated. They're treated as though they were.

Ms. Dorthea D. Cardamone: I have a question on stop-loss. Have you considered that companies in the casualty area also write stop loss? How will they be regulated? I know this is life, but you have a market in stop-loss that goes beyond the life and health writers. Is there going to be consistency between companies on the health side writing stop-loss and companies on the casualty side writing it or are we going to have very disparate circumstances in the market?

Mr. Patria: I think the hope is that this would be a recommendation for all stop-loss written in any type of company. Whatever gets recommended would be a recommendation for all types of companies.

Ms. Cardamone: Are you working with the people on the casualty side to see what has been done on stop loss, if anything?

Mr. Patria: We had some very preliminary discussions about it. Unfortunately, we didn't glean any information that they had looked at it because, for them, this is really more of a lifeline. If any company does it, it's a minuscule piece of their business, and, in fact, they don't even have any formulas to deal with it.

Ms. Cardamone: I think you're very optimistic to think that one product will fit all sizes in the stop-loss market. I wish you a lot of success. We, as a company, saw the survey. I don't know if we're one of the companies that responded, but every actuary doing day-to-day work says, "Oh, here's something." You're asking for information. It's voluntary, and it goes on the shelf. It falls down below in priority. I think you must do some public relations work to get what you want.

Mr. Patria: I think you're right.

Mr. Jay: We know you're right. We've already started, and we'll continue to follow up with telephone calls. If we don't hear from someone after a couple of weeks, we'll give them a call and try to urge them. Maybe we'll get enough responses that we will have enough credible data to work with.

Another comment on your first statement. There is a movement at the NAIC level to treat the same products the same way for RBC purposes, no matter what type of company sells them. We're quite a ways from there because of the great differences between the three formulas. They are looking at that, and there's a proposal right now with regard to some of the health products. Whether you're a casualty company or a life company or a health organization, if you write more than x percent, and they're talking 95% of your premium, or if your reserve is health insurance, then you would file the health blank and use the health RBC formula. This is true even if you're chartered as a casualty company.

Mr. Roy Goldman: I missed the very beginning. What is the status is of the adoption of the health formula? I know the NAIC has adopted it, but has it been adopted by any states?

Mr. Jay: It's a complicated question because there are some pieces to that. Once the NAIC adopts the recommendation for the changes in the formula, it goes into the instructions that everyone who files that statement blank must use. It doesn't require your state to pass it.

However, there is a model law that has been put forth for the states to pass it. How can one state actually take over a company? If they fail one of the RBC levels or in order for a state to require any of the action levels, they have to pass the model law. Otherwise, it's just the process of filling it out and sending it in.

Nothing can happen without the law, and I don't know an exact count, but I know quite a number of states have passed the model health organization law. I don't know if it is half or not, but if I were to make a guess, I would say it is maybe something around that level. I know that in Nebraska, it's up for consideration this year.